



# **SOMATOM** **Emotion 6/16-slice** **configuration** Application Guide

**Protocols**  
**Principles**  
**Helpful Hints**

Software Version *syngo* CT 2007E

**SIEMENS**  
medical

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The pertaining operating instructions must always be strictly followed when operating the SOMATOM Emotion 6/16-slice configuration. The statutory source for the technical data are the corresponding data sheets.

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To improve future versions of this application guide, we would highly appreciate your questions, suggestions and comments.

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For further information about the basic operation, please refer to the corresponding *syngo* CT Operator Manual:

## ***syngo* CT Operator Manual Volume 1:**

*syngo* Security Package  
Siemens Virus Protection  
Basics  
SOMATOM LifeNet  
*syngo* Patient Browser  
*syngo* Data Set Conversion  
Camtasia  
SaveLog  
E-Logbook  
*syngo* Viewing  
*syngo* Filming

## ***syngo* CT Operator Manual Volume 2:**

Preparations  
Examination  
MPPS  
HeartView CT  
Respiratory Gating CT  
CARE Bolus CT  
CARE Vision CT

## ***syngo* CT Operator Manual Volume 3:**

*syngo* 3D  
*syngo* Dental CT  
*syngo* Osteo CT



## ***syngo* CT Operator Manual Volume 4:**

*syngo* LungCARE CT

*syngo* Pulmo CT

*syngo* Neuro Perfusion CT

*syngo* Body Perfusion CT

## ***syngo* CT Operator Manual Volume 5:**

*syngo* Calcium Scoring

*syngo* Circulation

*syngo* Volume Calculation

*syngo* Dynamic Evaluation

*syngo* Neuro DSA CT

## ***syngo* CT Operator Manual Volume 6:**

*syngo* InSpace 4D CT

*syngo* Colonography

## Concept of Scan Protocols

The scan protocols for adult and children are defined according to body regions - **Head, Neck, Shoulder, Thorax, Abdomen, Pelvis, Spine, Upper Extremities, Lower Extremities, Vascular, RT, Specials** and optional **Cardiac, PET, SPECT** and **Private**.

The protocols for special applications are defined in the Application Guide "**Clinical Applications**" or in the case of a Heart View examination, in the Application Guide "**Cardiac CT**".

The general concept is as follows: All protocols without a suffix are standard spiral modes. For example, "**Sinus**" means the spiral mode for the sinus.

The suffixes of the protocol name are follows:

"**Routine**": for routine studies

"**Seq**": for sequence studies

"**Fast**": use a higher pitch for fast acquisition

"**ThinSlice**": use a thinner slice collimation

"**Combi**": use a thinner and a thicker slice collimation

"**05s**": use the rotation time of 0.5 seconds

"**ECG**": use a ECG-gated or triggered mode

"**Neuro**": for neurological examinations with a special mode

"**Vol**": use the 3D Recon workflow

"**HR**": use a thin slice width for High Resolution studies

A prefix of the protocol name is as follows:

"**RT**": for radio therapy studies

The availability of scan protocols depends on the system configuration.

"**Resp**": for respiratory gated studies

The availability of scan protocols depends on the system configuration.

## Scan Set Up

Scans can be simply set up by selecting a predefined examination protocol. To repeat any mode, just click the chronicle with the right mouse button for **repeat**. To delete it, select **cut**. Each range name in the chronicle can be easily changed before **load**.

Multiple ranges can be run either automatically with **auto range**, which is denoted by a bracket connecting the two ranges, or separately with a **pause** in between.

## Feed in/Feed out

The performance of the different buttons (soft buttons, gantry buttons, control box buttons) is standardized as follows:

- in **NOT loaded** modes

1 mm

- in **loaded Biopsy** mode:

$$\text{Feed In/Out} = \frac{\text{slice width} \times \text{No. slice positions per scan}}{2}$$

## Topo Length

<b>SOMATOM Emotion 16</b>	
<i>Length [mm]</i>	<i>128, 256, 512, 768, 1024, 1500</i>
<i>Slice width [mm]</i>	<i>4x0.6</i>
<i>Angle</i>	<i>Top, Bottom, Lateral</i>

<b>SOMATOM Emotion 6</b>	
<i>Length [mm]</i>	<i>128, 256, 512, 768, 1024, 1500, 1536*, 2000**, 2048***</i>
<i>Slice width [mm]</i>	<i>3x1</i>
<i>Angle</i>	<i>AP, PA, Lateral</i>

\* *only in combination with PET and SPECT, option*

\*\* *only in combination with SPECT, option*

\*\*\* *only in combination with PET, option*

## Scan Modes

### Sequential Scanning

This is an incremental, slice-by-slice imaging mode in which there is no table movement during data acquisition. A minimum interscan delay in between each acquisition is required to move the table to the next slice position.

### Spiral Scanning

Spiral scanning is a continuous volume imaging mode. The data acquisition and table movements are performed simultaneously for the entire scan duration. There is no inter-scan delay and a typical range can be acquired in a single breath hold.

Each acquisition provides a complete volume data set, from which images with overlapping can be reconstructed at any arbitrary slice position. Unlike the sequence mode, spiral scanning does not require additional radiation to obtain overlapping slices.

## Quick Scan

The data is usually acquired during a full 360° rotation – this is a Full scan. Data acquisition not using a full 360° rotation is called a “Quick scan”. Quick scans are employed to reduce motion artifacts and improve the temporal resolution.

## Dynamic Multiscan

Multiple continuous rotations at the same table position are performed for data acquisition. Normally, it is applied for fast dynamic contrast studies, such as *syngo* Neuro Perfusion CT.

## Dynamic Serioscan

Dynamic serial scanning mode without table feed. Dynamic serio can still be used for dynamic evaluation such as Test Bolus. The image order can be defined on the **Recon** subtask card.

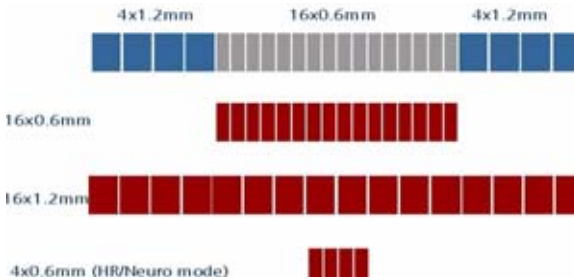
# Scan and Reconstruction

## UFC detector

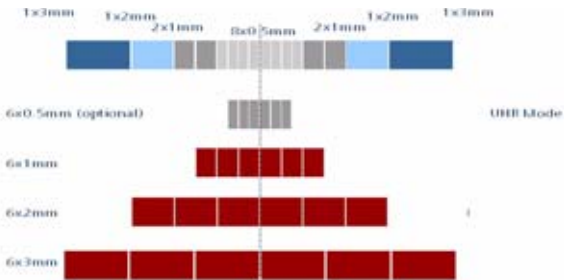
Siemens' proprietary, high-speed Ultra Fast Ceramic (UFC) detector enables a virtually simultaneous read-out of two projections for each detector element.

The detector configuration with the routine acquisition of the Emotion 6/16-slice configuration:

### SOMATOM Emotion 16-slice configuration:



### SOMATOM Emotion 6-slice configuration:



## Acquisition, Slice Collimation and Slice Width

Slice collimation is the slice thickness resulting from the effect of the tube-side collimator and the adaptive detector array design. In Multislice CT, the Z-coverage per rotation is given by the product of the number of active detector slices and the collimation (e.g. 6 x 1.0mm for the SOMATOM Emotion 6-slice configuration or 16 x 0.6mm for the SOMATOM Emotion 16-slice configuration ).

Slice width is the FWHM (full width at half maximum) of the reconstructed image.

With the SOMATOM Emotion 6/16-slice configuration, you select the slice collimation together with the slice width desired. The slice width is independent of pitch, i.e. what you select is always what you get. Actually, you do not need to care about the algorithm any more; the software does it for you.

If Metrorecon/Fastrecon is not selected you will routinely get "Real Time" images. The Recon icon on the chronicle will be labeled with "RT". After the scan the Real Time displayed image series has to be reconstructed.

In some cases – this depends also on Scan pitch and Reconstruction increment – the Recon icon on the chronicle will be labeled with "RT". This indicates the Real Time display of images during scanning. The Real Time displayed image series has to be reconstructed after completion of spiral.

The **Acq** (Acquisition) is displayed on the **Examination** task card. The **Acquisition** is simply "number of slices acquired per rotation" x "width of one slice".



## SOMATOM Emotion 16-slice configuration

### Spiral Mode

<b>Collimation/ Acquisition</b>	<b>Slice width</b>
<i>16 x 0.6 mm</i>	<i>0.75, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0 mm</i>
<i>16 x 1.2 mm</i>	<i>1.5, 2.0, 3.0, 4.0, 5.0, 6.0, 8.0, 10.0 mm</i>

### HR/Neuro Spiral Mode

<b>Collimation/ Acquisition</b>	<b>Slice width</b>
<i>4 x 0.6 mm</i>	<i>0.6, 0.75, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0 mm</i>

### Sequence Mode

<b>Collimation/ Acquisition</b>	<b>Slice width</b>
<i>4 x 0.6 mm</i>	<i>0.6, 1.2, 2.4 mm</i>
<i>12 x 0.6 mm</i>	<i>0.6, 2.4, 7.2 mm</i>
<i>16 x 0.6 mm</i>	<i>1.2, 2.4, 4.8, 9.6 mm</i>
<i>2 x 5 mm</i>	<i>5.0, 10.0 mm</i>
<i>12 x 1.2mm</i>	<i>1.2, 3.6, 4.8 mm</i>
<i>2 x 8 mm</i>	<i>8.0, 16.0 mm</i>
<i>16 x 1.2 mm</i>	<i>2.4, 4.8, 9.6, 19.2 mm</i>

# Scan and Reconstruction

## SOMATOM Emotion 6-slice configuration

### Spiral Mode

Collimation	Slice width
1 mm	1, 1.25, 2, 2.5, 3, 4, 5, 6, 8, 10 mm
2 mm	2.5, 3, 4, 5, 6, 8, 10 mm
3 mm	4, 5, 6, 8, 10 mm

### Sequence Mode

Collimation	Slice width
1 mm	1, 2, 3 mm
2 mm	2, 4, 6, 12 mm
3 mm	3, 6, 9, 18 mm
5 mm	5, 10 mm

### HR Spiral Mode

Collimation	Slice width
0.5 mm	0.63, 0.75, 1, 1.25, 2, 2.5, 3, 4, 5 mm

### HR Sequence Mode

Collimation	Slice width
1 mm	1 mm

## Increment

The increment is the distance between the reconstructed images in Z direction. When the chosen increment is smaller than the slice thickness, the images are created with an overlap. This technique is useful for reducing partial volume effect, giving you better detail of the anatomy and high quality 2D and 3D postprocessing.

The increment can be freely adapted from 0.1 - 10 mm.

## Pitch

$$\text{Pitch} = \frac{\text{feed per rotation}}{\text{z-coverage}}$$

$$\text{z-coverage} = \text{detector rows} \times \text{collimated slice width}$$

$$\text{Feed/Rotation} = \text{table movement per rotation}$$

The Pitch Factor can be freely adapted from 0.45 – 2.0, in Cardio, there is a fixed pitch down to 0.1.

With the SOMATOM Emotion 6/16-slice configuration, you select the slice collimation together with the slice width desired.

The slice width is independent of pitch, i.e. what you select is always what you get. Actually, you do not need to be concerned about the algorithm any more; the software does it for you.

Pitch values with a step width of 0.05 can be selected for all modes.

We recommend to use a Pitch Factor of 0.45 for MPR reconstructions.

## Kernels

There are 4 different types of kernels: "H" stands for Head, "B" stands for Body, "C" stands for ChildHead and "S" stands for Special Application, e.g. *syngo* Osteo CT.

The image sharpness is defined by the numbers – the higher the number, the sharper the image; the lower the number, the smoother the image.

### Head Kernels:

Kernel	description
H10s	very smooth
H19s	very smooth
H20s	smooth
H21s	smooth +
H22s	smooth FR +
H29s	smooth +
H30s	medium smooth
H31s	medium smooth +
H32s	medium smooth FR +
H37s	medium smooth (Emotion 16-slice configuration only)
H39s	medium smooth
H40s	medium
H41s	medium +
H42s	medium FR
H45s	medium
H47s	medium smooth (Emotion 16-slice configuration only)
H48s	medium smooth (Emotion 16-slice configuration only)
H50s	sharp
H60s	medium
H70s	very sharp
H80s	inner ear
H90s	inner ear

# Scan and Reconstruction

## Body Kernels:

Kernel	description
B08s	very smooth
B10s	very smooth
B19s	very smooth
B20s	smooth
B29s	smooth
B30s	medium smooth
B31s	medium smooth +
B35s	HeartView medium
B39f	HeartView medium
B40s	medium
B41s	medium+
B46s	medium
B50s	medium sharp
B60s	sharp
B65s	sharp
B70s	very sharp
B75s	very sharp (Emotion 16-slice configuration only)
B80s	ultra sharp
B90s	ultra sharp

## Child Head Kernels:

Kernel	description
C20s	smooth
C30s	medium smooth
C60s	sharp

# Scan and Reconstruction

## Topogram Kernels:

Kernel	description
T10s	smooth
T20s	standard
T21s	standard
T80s	sharp
T81s	sharp
T90s	ultra sharp

## Special Application:

Kernel	description
S30s	Shepp-Logan
S80s	Shepp-Logan with notch filter
S90s	Shepp-Logan without notch filter
U90s	specification kernel

## PET-Kernel:

Kernel	PET
B19s	smooth
B29s	medium smooth
B39s	medium
H19s	smooth
H29s	medium smooth
H39s	medium

## SPECT-Kernel:

Kernel	SPECT
H08s	very smooth
B08s	very smooth

## Head Kernels

For soft tissue head studies, the standard kernel is H40s; softer images are obtained with H30s or H20s, H10s, sharper images with H50s. The kernels H21s, H31s, H41s yield the same visual sharpness as H20s, H30s or H40s, respectively. The image appearance, however, is more acceptable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using H31s, H41s instead of H30s, H40s.

In emergency examinations, kernels H22s, H32s, and H42s can be used because they allow fast reconstruction (FR) and easy patient positioning (50 cm FoV). To ensure best performance, special online bone correction (PFO) is not used.

High Resolution head studies should be performed with H50f, H60f (for example, for dental and sinuses). It is essential to position the area of interest in the center of the scan field.

For a better gray-white brain tissue differentiation use the H37s, H38s or H47s kernel (Emotion 16-slice configuration only).

## Child Head Kernels

For head scans of small children, the kernels C20s, C30s (for example for soft tissue studies) and C60s (for example, provided for sinuses) should be chosen instead of the "adult" head kernels H20s, H30s and H60s.



## Body Kernels

As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s respectively, B40s, the image appearance, however, is more acceptable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.

For higher sharpness, as is required for example, in patient protocols for cervical spine, shoulder, extremities, thorax, the kernels B50s, B60s, B70s, B80s are available.

## Special Application Kernels

The special kernels are mostly used for "physical" measurements with phantoms, e.g. for adjustment procedures (S80s), for constancy and acceptance tests (S80s, S90s), or for specification purposes (S90s). For special patient protocols, S80s and S90s are chosen, e.g. for osteo (S80s).

### **Note:**

In case of 3D study only, use kernel B10s and at least 50% overlapping for image reconstruction.

Do not use different kernels for body parts other than what they are designed for.

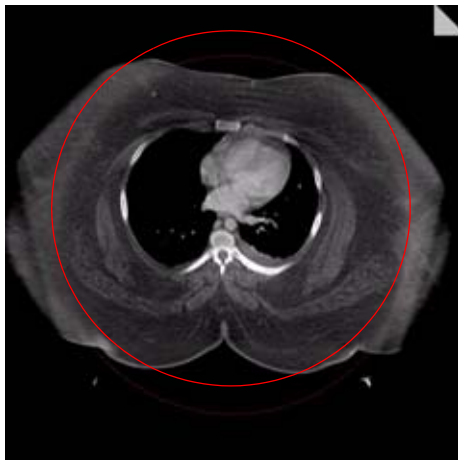
## Extended FoV

SOMATOM Emotion 16/6-slice configuration offers the extended field of view. The range can be individually adapted by the user from 50 cm up to 70 cm.

To use this feature you have to select the **extended FoV** checkbox on the **Recon** subtask card. The default setting is 65 cm, but can be modified.

**Extended FoV** can be used with each scan protocol.

The **extended FoV** value should be adapted carefully to the exact patient size in order to achieve best possible image quality outside the standard scan field.



## Auto-FoV

After scanning a topogram the available ranges are displayed in the topo segment. They can be automatically adapted according to the patient contours. When moving the scan range over the topogram and press the "**ctrl**" key simultaneous, the adaptation will be done automatically. Please make sure, that the whole object is covered within the default FoV.

In case the FoV is too small, please press the "**ctrl**" key and move the scan range over the object once, and it will be adapted automatically.

The Auto-FoV will also work with the snap function, when an examination has two or more ranges. The snap function will also cover the Auto-FoV and therefore you have the possibility to merge different ranges. To be able to use the snap function, it is necessary to have the same FoV and the same x and y coordinates for all available ranges.

Do not use Auto-FoV for asymmetric objects (e.g. only one arm within the scan field).



# Scan and Reconstruction

## Hints

- When positioning the arms along the body, the Auto-FoV will also cover the arms.
- When scanning two extremities at the same time, the Auto-FoV will also cover both extremities.

## Neuro Modes

In addition to the standard collimations, the SOMATOM Emotion 16-slice configuration provides a special mode which is optimized for Neuro applications. Excellent low contrast and detail resolution are achieved.

For spiral scans 4 x 0.6 acquisition mode is provided in the range of the cerebrum. This approach shows a minimized partial volume effect, i.e. low level of artifacts in the base of the skull or near vertebral bodies, as 0.6 mm detector rows are used and the narrow collimation reduces scattered radiation.

One scan protocol is predefined for adults:

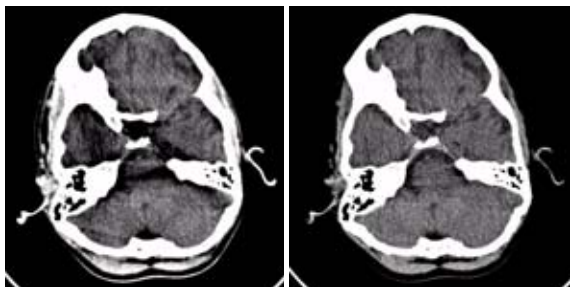
- HeadNeuro using an acquisition 16 x 0.6 mm in the base and an acquisition of 4 x 0.6 mm in the cerebrum

We recommend using this special protocol for dedicated Neuro examinations.

For fast standard examinations such as rule out of hemorrhage or ischemia, the "Routine" protocol should be used.

## Automatic Bone Correction

The head protocols provide significant improvements regarding image quality for heads. An automatic bone correction algorithm has been included in the standard image reconstruction. Using a new iterative technique, typical artifacts arising from the beam-hardening effect, for example, Hounsfield bar, are minimized without additional post-processing. This advanced algorithm produces excellent images of the posterior fossa, but also improves head image quality in general. Bone correction is activated automatically for body region "Head". The reconstruction algorithm for "Head" also employs special adaptive convolution kernels which help to improve the sharpness-to-noise ratio. More precisely, anatomic contours are clearly displayed while noise is suppressed at the same time without causing a blurring of edges.

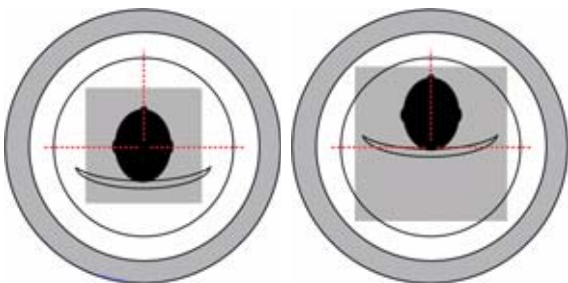


*Head image without correction.*

*Head image with corrections.*

## Positioning

In order to optimize image quality versus radiation dose, scans in body regions "Head" and "AngioHead" are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



*correct positioning  
of the head*

*wrong positioning  
of the head*

For trauma examinations of the head we provide two protocols, to be found in the specials folder:

- HeadTrauma
- HeadTraumaSeq.

The scan protocols enable you to utilize the full 50 cm FoV, resulting in easier patient positioning for trauma examinations and to ensure the highest performance, the dedicated PFO head filter is not used.

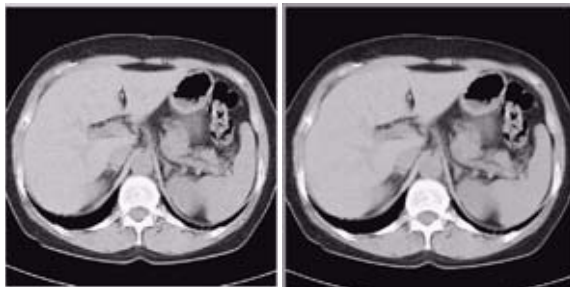
## Image Filters

If you use kernels, the images are reconstructed again with the selected kernel value. If you use image filters, the images are not reconstructed again and the result is much quicker.

Three different filters are available:

**LCE: The Low-contrast enhancement filter** enhances low-contrast detectability. It reduces the image noise.

- Similar to reconstruction with a smoother kernel
- Reduces noise
- Enhances low-contrast detectability
- Adjustable in four steps
- Automatic post-processing



*Image taken without the LCE filter*

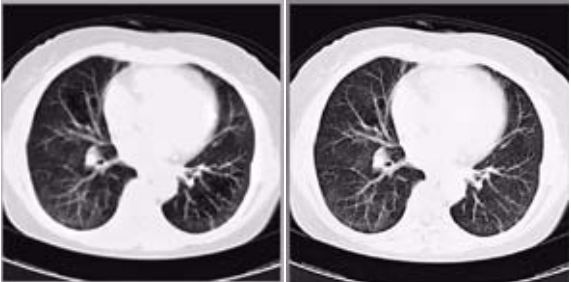
*Image taken with the LCE filter*



# Scan and Reconstruction

**"HCE": The High-contrast enhancement (HCE) filter** enhances high-contrast detectability. It increases the image sharpness, similar to reconstruction with a sharper kernel.

- Increases sharpness
- Faster than raw-data reconstruction
- Enhances high-contrast detectability
- Automatic post-processing



*Image taken without  
the HCE filter*

*Image taken with the  
HCE filter*

## **"ASA": The Advanced Smoothing Algorithm (ASA)**

filter reduces noise in soft tissues while edges with high contrast are preserved.

- Reduces noise without blurring of edges
- Enhances low-contrast detectability
- Individually adaptable
- Automatic post-processing

## CTDI<sub>w</sub> and CTDI<sub>Vol</sub>

The average dose in the scan plane is best described by the CTDI<sub>w</sub> for the selected scan parameters. The CTDI<sub>w</sub> is measured in dedicated plastic phantoms – 16 cm diameter for head and 32 cm diameter for body (as defined in IEC 60601 – 2 – 44). For scan modes with z-Sharp the CTDI<sub>100</sub> is calculated using the single number of tomographic sections (not doubled by z-Sharp) to remain within the terms of IEC 60601-2-44. The z-coverage with and without z-Sharp is the same and so is the dose. This dose index gives a good estimation of the average dose applied in the scanned volume, as long as the patient size is similar to the size of the respective dose phantoms.

Since the body size can be smaller or larger than 32 cm, the CTDI<sub>w</sub> value displayed can deviate from the dose in the scanned volume.

The CTDI<sub>w</sub> definition and measurement are based on single axial scan modes. For clinical scanning, i.e. scanning of entire volumes in patients, the average dose will also depend on the table feed between axial scans or the feed per rotation in spiral scanning. The dose, expressed as the CTDI<sub>w</sub>, must therefore be corrected by the pitch factor of the spiral scan or an axial scan series to describe the average dose in the scanned volume.

For this purpose the IEC defined the term “CTDI<sub>Vol</sub>” in September 2002:

$$\text{CTDI}_{\text{Vol}} = \frac{\text{CTDI}_w}{\text{Pitch factor}}$$

This dose number is displayed on the user interface for the selected scan parameters.

# Dose Information

**Note:** Previously the dose display on the user interface was labeled “CTDI<sub>w</sub>”. This displayed CTDI<sub>w</sub> was also corrected for the pitch and was therefore identical to the current CTDI<sub>vol</sub>.

The CTDI<sub>w</sub> value does not provide the entire information of the radiation risk associated with CT examination. For this purpose, the concept of the “Effective Dose” was introduced by ICRP (International Commission on Radiation Protection). The effective dose is expressed as a weighted sum of the dose applied not only to the organs in the scanned range, but also to the rest of the body. It could be measured in whole body phantoms (Alderson phantom) or simulated with Monte Carlo techniques.

The calculation of the effective dose is rather complicated and has to be performed by sophisticated programs. These have to take into account the scan parameters, the system design of the individual scanner, such as X-ray filtration and gantry geometry, the scan range, the organs involved in the scanned range and the organs affected by scattered radiation. For each organ, the respective dose delivered during the CT scanning has to be calculated and then multiplied by its radiation risk factor. Finally, the weighted organ dose numbers are added up to get the effective dose.

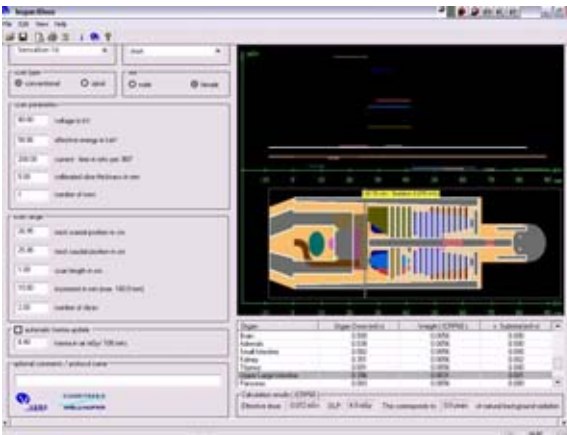
The concept of effective dose allows the comparison of radiation risk associated with different CT or X-ray exams, i.e. different exams associated with the same effective dose would have the same radiation risk for the patient. It also allows a comparison of the applied X-ray exposure to the natural background radiation, for example, 2 – 3 mSv per year in Germany.

## ImpactDose

For most of the scan protocols, the effective dose numbers for standard male\* and female\* are calculated, and listed the result in the description of each scan protocol.

The calculation was performed using the commercially available program "ImpactDose" (Wellhoefer Dosimetry).

For pediatric protocols, the ImpactDose calculation and the correction factors published in "Radiation Exposure in Computed Tomography"\* are used. These only include conversion factors for ages 8 weeks and 7 years.



\*The Calculation of Dose from External Photon Exposures Using Reference Human Phantoms and Monte Carlo Methods. M. Zankl et al. GSF report 30/91

\*\*Radiation Exposure in Computed Tomography, edited by Hans Dieter Nagel, published by COCIR c/o ZVEI, Stresemannallee 19, D-60596, Frankfurt, Germany.

## Effective mAs

In sequential scanning, the dose ( $D_{seq}$ ) applied to the patient is the product of the tube current-time (mAs) and the  $CTDI_w$  per mAs:

$$D_{seq} = D_{CTDIw} \times \text{mAs}$$

In spiral scanning, however, the applied dose ( $D_{spiral}$ ) is influenced by the conventional mAs (mA x Rot Time) and additionally by the pitch factor. For example, if a Multislice CT scanner is used, the actual dose applied to the patient in spiral scanning will be decreased when the pitch factor is greater than 1, and increased when the pitch factor is less than 1 (for constant mA). Therefore, the dose in spiral scanning has to be corrected by the pitch factor:

$$D_{spiral} = \frac{(D_{CTDIw} \times \text{mA} \times \text{Rot Time})}{\text{Pitch Factor}}$$

To simplify this task, the concept of the "effective" mAs was introduced with the SOMATOM Multislice scanners.

The effective mAs takes into account the influence of pitch on both the image quality and dose:

$$\text{Effective mAs} = \frac{\text{mAs}}{\text{Pitch Factor}}$$

To calculate the dose, you simply multiply the  $CTDI_w$  per mAs with the effective mAs of the scan:

$$D_{spiral} = D_{CTDIw} \times \text{effective mAs}$$

# Dose Information

For spiral scan protocols, the indicated mAs is the effective mAs per image. The correlation between tube current and effective mAs of spiral scans on a Multi-slice CT scanner is expressed by the following formula:

$$\text{Effective mAs} = \frac{\text{mA} \times \text{RotTime}}{\text{Pitch Factor}}$$

$$\text{Pitch Factor} = \frac{\text{Feed per Rotation}}{\text{nrow} \times \text{Slice collimation}}$$

$$\text{mA} = \frac{\text{effective mAs}}{\text{RotTime}} \times \text{Pitch Factor}$$

where Slice collimation refers to the collimation of one detector row, and nrow is the number of used detector rows.

## CARE Dose 4D

CARE Dose 4D is an automated exposure control, which ensures constant diagnostic image quality over all body regions at the lowest possible dose.

CARE Dose 4D combines three different adaptation methods to optimize image quality at the lowest dose level:

- Automatic adaptation of the tube current to the patient size
- Automatic adaptation of the tube current to the attenuation of the patient's long axis, the so-called z-axis.
- Automatic adaptation of the tube current to the angular attenuation profile measured online for each single tube rotation, the so-called angle modulation.

Based on a single a.p. or lateral topogram, CARE Dose 4D determines the adequate mAs level for every section of the patient. Based on these levels, CARE Dose 4D modulates the tube current automatically during each tube rotation according to the patient's angular attenuation profile. Thus, the best distribution of dose along the patient's long axis and for every viewing angle can be achieved.

# Dose Information

Based on a user defined **Image Quality Reference mAs**, CARE Dose 4D automatically adapts the (eff.) mAs to the patient size and attenuation changes within the scan region. With the setting of the **Image Quality Reference mAs** you can adjust image quality (image noise) to the diagnostic requirements and the individual preference of the radiologist.

**Note: The Image Quality Reference mAs should not be adjusted to the individual patient size!**

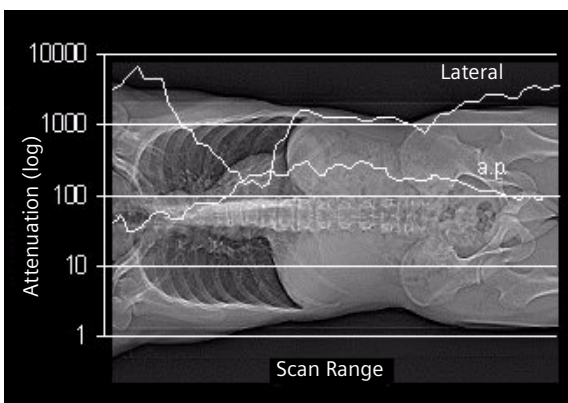


## How does CARE Dose 4D work?

CARE Dose 4D combines two types of tube current modulation:

### 1) Axial tube current modulation:

Based on a single Topogram (a.p. or lateral) the attenuation profile along the patient's long axis is measured in direction of the projection and estimated for the perpendicular direction by a sophisticated algorithm.



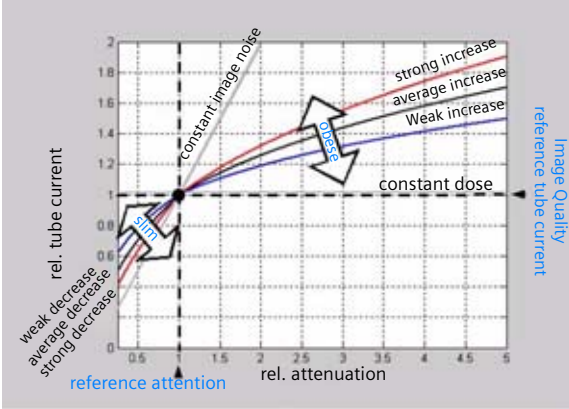
*Example of lateral and a.p. attenuation profile evaluated from an a.p. Topogram.*

Based on these attenuation profiles, axial tube current profiles (lateral and a.p.) and the resulting eff. mAs for every table position are calculated. The correlation between attenuation and tube current is defined by an analytical function which results in an optimum dose and image noise in every slice of the scan.

# Dose Information

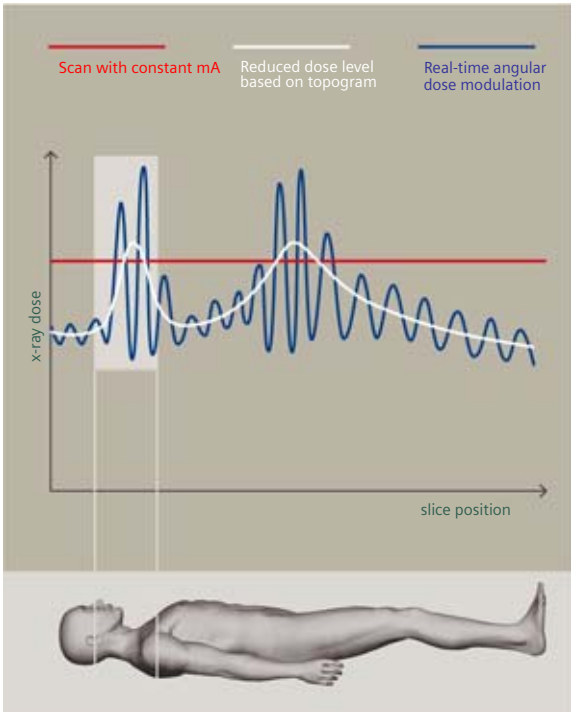
## 2) Angular tube current modulation:

Based on the above described axial eff. mAs profiles, the tube current is modulated during each tube rotation. Therefore the angular attenuation profile is measured automatically during the scan and the tube current is modulated accordingly in real time to achieve an optimum distribution of the X-ray intensity for every viewing angle.



Relation between relative attenuation and relative tube current. The adaptation strength may be adjusted by user separately for the left branch (*slim*) and the right branch (*obese*) of the curve. This adjustment effects all examinations. The gray lines here indicates the theoretical limits of the adaptation (constant dose resp. constant image noise). The absolute (eff.) mAs value is scaled with the **Image Reference mAs** value, which may be adjusted in the **Scan Card** by the user.

# Dose Information



# Dose Information



*Principle of automatic tube current adaptation by CARE Dose 4D for a spiral scan from shoulder to pelvis (very high table feed for demonstration): High tube current and strong modulation in shoulder and pelvis, lower tube current and low modulation in abdomen and thorax. The dotted lines represent the min. and max. tube current at the corresponding table position and result from the attenuation profile of the Topogram.*

The mAs value displayed in the user interface and in the patient protocol is the mean (eff.) mAs value for the scan range.

The mAs value recorded in the images is the local (eff.) mAs value.

## Special Modes of CARE Dose 4D

For certain examination protocols CARE Dose 4D uses modified tube current modulation, to meet specific conditions, for example:

- for Adult Head protocols the tube current is adapted to the variation along the patient's long axis and not to the angular attenuation profile.
- for Extremities, CARE Vision, *syngo* Neuro Perfusion CT, *syngo* Body Perfusion CT and other special protocols (indicated as CARE Dose), only angular tube current modulation is supported.
- for Osteo and Cardio protocols the mAs setting is adjusted to the patient size and not modulated during the scan, except if ECG pulsing is switched on.

## Scanning with CARE Dose 4D

If the settings of Image Quality Reference mAs are correctly predefined\*, no further adjustment of the tube current is required to perform a scan.

CARE Dose 4D automatically adapts the tube current to different patient sizes and anatomic shapes, but it widely ignores metal implants.

**Note: Otherwise the magnification of the topogram would be distorted which would lead to an underestimation or overestimation of the required eff. mAs.**

For an accurate mAs adaptation to the patient's size and body shape with CARE Dose 4D, the patient should be carefully centered in the scan field.

When using protocols with CARE Dose 4D for body regions other than those they are designed for, the image quality should be carefully evaluated.

As CARE Dose 4D determines the (eff.) mAs for every slice of the topogram, a topogram must be obtained for use of CARE Dose 4D.

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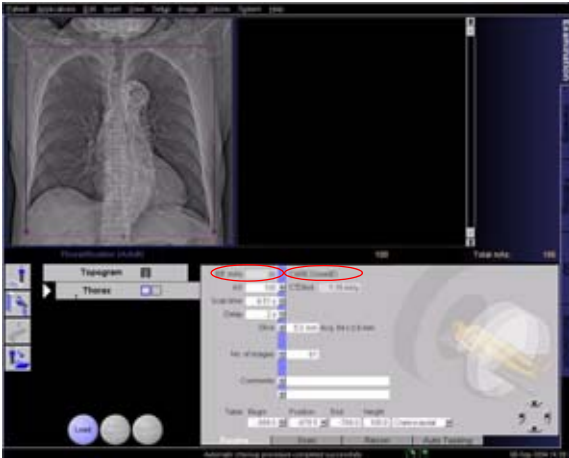
\*For Siemens scan protocols of SW version syngo CT 2007E, the settings of CARE Dose 4D are already predefined but may be changed to meet the customer's preference of image quality (image noise).

# Dose Information

Outside the topogram range, CARE Dose 4D will continue the scan with the last available topogram information. Without a topogram, CARE Dose 4D cannot be switched on. Repositioning of the patient on the table and excessive motion of the patient must be avoided between the topogram and the scan. If two topograms of the same projection exist for one scan range, the last acquired will be used for determining the (eff.) mAs. If a lateral and a.p. topogram exist for one scan range, both will be used for determining the (eff.) mAs.

# Dose Information

After the topogram has been scanned, the (eff.) mAs value in the **Routine** tab card displays the mean (eff.) mAs estimated by CARE Dose 4D based on the topogram\*. After the scan has been performed this value is updated to the mean (eff.) mAs that was applied. The values may differ slightly due to the online modulation according to the patient's angular attenuation profile.



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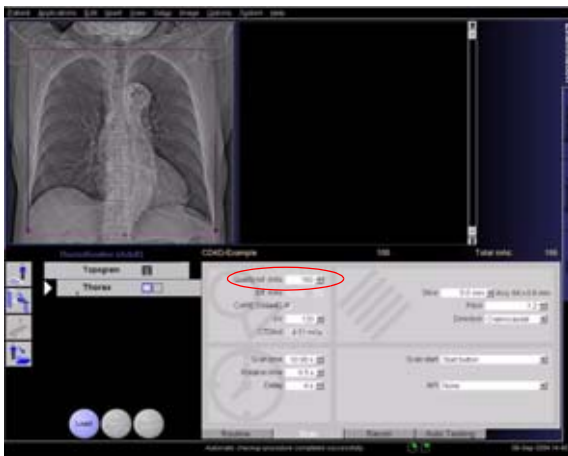
\*When tuning the CARE Dose 4D parameter setting to the individual preference for image quality, we recommend keeping track of this value and comparing it with the values used without CARE Dose 4D.



# Dose Information

The **Quality reference mAs** value is displayed on the **Scan** tab card. This defines the overall image quality of the scan protocol currently being used. This value can be adapted for each protocol according to the user's individual requirements of image quality. Here you can also view the effective mAs value that the system is going to use for the current scan range.

You can also deselect CARE Dose4D on this tab card.



## Adjusting the Image Noise

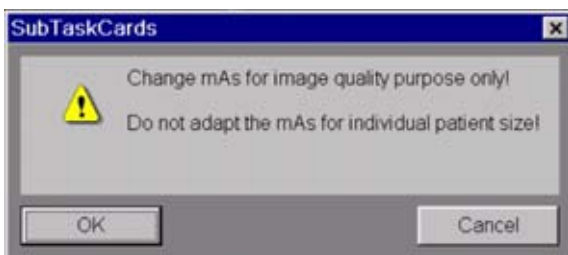
The correlation between attenuation and tube current is defined by the analytical function described above. This function may be adjusted to adapt the image quality (image noise) according to the diagnostic requirements and the individual preference of the radiologist.

- To adapt the image noise for a scan protocol the **Image Quality Reference mAs** value in the **Scan** tab card may be adjusted. This value can be adapted for each protocol according to the user's individual preferences of image quality, and reflects the mean (eff.) mAs value that the system will use for a reference patient with that protocol and the corresponding body region. The reference patient is defined as a typical adult, 70 kg to 80 kg or 155 to 180 lbs (for adult protocols), or as a typical child, 5 years, appr. 20 kg or 45 lbs (for child protocols). Based on that value, CARE Dose 4D adapts the tube current (or the mean (eff.) mAs value) to the individual patient size or body region.

**Note: Do not adapt the Image Quality Reference mAs for an individual patient's size. Only change this value if you want to adjust the image quality.**

# Dose Information

If you change the quality ref. mAs, a pop-up window is displayed.



- To change the configuration of CARE Dose 4D, please open the **Examination Configuration** dialog box under **Options > Configuration**. In the window that then appears, please double-click the **Examination** icon to display the configuration window. The adaptation strength of CARE Dose 4D may be influenced for slim, obese patients, or body parts of a patient by changing the CARE Dose 4D settings in the **Patient** tab card.  
This may be desirable:
  - if the automatic dose increase for obese patients (or patient sections) has to be stronger than the preset (choose **obese: strong increase**), resulting in less image noise and a higher dose for those images.

# Dose Information

- if the automatic dose increase for obese patients (or patient sections) has to be more moderate than the preset (choose **obese: weak increase**), resulting in more image noise and a lower dose for those images.
- if the automatic dose decrease for slim patients (or patient sections) has to be stronger than the preset (choose **slim: strong decrease**), resulting in more image noise and a lower dose for those images.
- if the automatic dose decrease for slim patients (or patient sections) has to be more moderate than the preset (choose **slim: weak decrease**), resulting in less image noise and a higher dose for those images.



On the **Patient** tab card you can adjust the image quality (for more information see chapter **How does CARE Dose 4D work**).

**Note:** Changing this adaptation strength effects all protocols!

## Activating and Deactivating

CARE Dose 4D may be activated or deactivated for the current scan in the **Scan** tab card. If CARE Dose 4D is activated as default, the **Image Quality Reference mAs** value is set to the default value of the protocol. After deactivating CARE Dose 4D, the **Image Quality Reference mAs** is dimmed and the (eff.) mAs value has to be adjusted to the individual patient's size! If CARE Dose 4D is switched on again, the Image Quality Reference mAs is reactivated. Note that the last setting of the Image Quality Reference mAs or the (eff.) mAs will be restored when you switch from and back to CARE Dose 4D usage. The default activation state of CARE Dose 4D may be set in the Scan Protocol Manager. CARE Dose 4D must be selected (column CARE Dose type). The corresponding column for activating CARE Dose 4D is called CARE Dose (4D), with possible default **on** or **off**.

## Conversion of Old Protocols into Protocols with CARE Dose 4D

Protocols of SW versions VA70, VA47 and VA45 may be converted to CARE Dose 4D in the Scan Protocol Manager.

Prior to activating CARE Dose 4D an Image Quality Reference mAs value has to be set in the corresponding column.

# Dose Information

If you are unsure about the correct Image Quality Reference mAs value, follow this simple procedure:

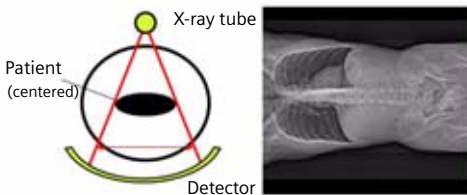
- Enter the (eff.) mAs value used for that type of protocol without CARE Dose 4D.
- There is a simple way of ascertaining what eff. mAs CARE Dose 4D will use along the scan range: When the topogram is complete shrink the scan range to its minimum. As you move this small box over the topogram you can see how the eff. mAs displayed in the **Routine** and **Scan** tab card varies along the patient's body.  
To achieve a certain eff. mAs at a patient's particular body region you can move the small scan range to this position and then adjust the Quality reference mAs so that the displayed eff. mAs value is as desired. After resizing the scan range to the range for the examination, carefully observe the displayed mean eff. mAs. After the subsequent scan is completed inspect the image quality to ensure that the chosen Quality reference mAs is the right value.
- With that setting perform the first scan and carefully inspect the image quality. In that first step the dose may not be lower than without CARE Dose 4D but will be well adapted to the patient's attenuation, resulting in improved image quality.
- Starting from that setting, reduce the Image Quality Reference mAs step by step to meet the necessary image quality level.
- Store the scan protocol with the adapted image quality reference mAs.

# Dose Information

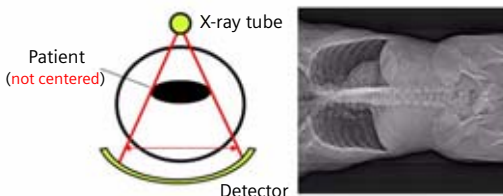
## Additional Important Information

For ideal dose application it is very important to position the patient in the isocenter of the gantry.

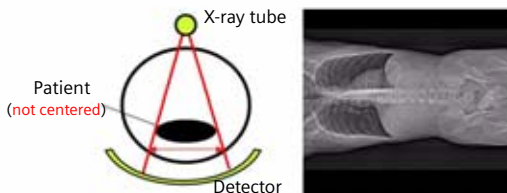
Example for an a.p. topogram:



*Patient is positioned in the isocenter – optimal dose and image quality*



*Patient is positioned too high – increased mAs*



*Patient is positioned too low – reduced mAs and increased noise*

## WorkStream4D

### Recon Jobs

In the **Recon** card, you can define up to eight reconstruction jobs for each range with different parameters either before or after you acquire the data. When you click on **Recon**, these jobs are performed automatically in the background. If you want to add more than eight recon jobs, simply click the icon for an already completed recon job in the chronicle with the right mouse button and select **delete recon job**. Another recon job will now become available on the **Recon** tab card.

**Note:** What you delete is just the job from the display, not the images that have been reconstructed. Once reconstructed, these completed recon jobs stay in the browser, until deleted from the local database.

You can also reconstruct images for all scans performed by not selecting any range in the chronicle, prior to clicking **Recon**.

Another entry you will find in the right mouse menu is **copy/replace recon parameters**. This function is available for spiral scans only.

The main goal is to support the transfer of volume parameters between oblique recon jobs of ranges which cover mainly the same area, e.g., two spiral scans with/without contrast media.



## 3D Recon

3D Recon allows you to perform oblique and/ or double oblique reconstructions in any user-defined direction directly after scanning.

No further post-processing or data loading is needed. The high-quality SPO (spiral oblique) images are calculated by using the system's raw data.

### Key Features

- Reconstruction of axial, sagittal coronal and oblique/ double oblique images
- 3 planning images in the 3 standard orientations (coronal, axial, sagittal)
- Image types for planning MPR Thick (10 mm), MIP Thin (3 mm)
- Field of view and reference image definition possible in each planning segment
- Asynchronous reconstruction (several reconstruction jobs are possible in the background, axial and non-axial)
- Workstream 4D performs reconstructions on the basis of CT raw data
- If the raw data are saved you can start the 3D reconstruction on your *syngo* CT Workplace.
- It is also possible to perform the reconstruction with non-square matrix.

# Workflow Information

## Workflow Description

WorkStream 4D improves your workflow whenever non-axial images of a CT scan are required, for example examinations of the spine.

3D reconstructions are possible:

- spiral scan is needed
- as soon as one scan range is finished and at least one axial reconstruction job has been performed (RTD or RTR images).



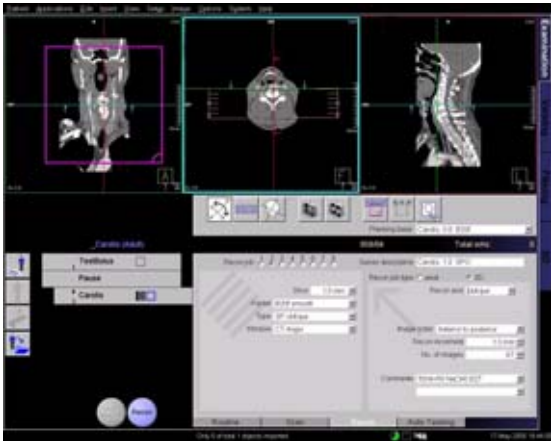
Select a new recon job and mark **Recon Job Type – 3D** on the **Recon** card. The first recon job that is suitable for the 3D reconstruction is used as **Available planning volumes**.

# Workflow Information

## Additional Important Information

### Pitch factor for 3D Recon

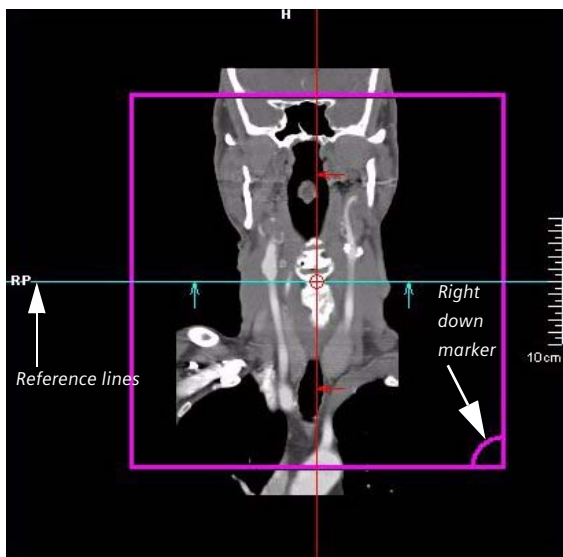
- For reconstruction of 3D recon jobs the maximum pitch factor is 1.5.  
If the pitch factor is  $> 1.5$  a message window informs you that this 3D recon job cannot be started and may be deleted. In this case use the standard **3D** task card with an axial image series for reconstruction.



# Workflow Information

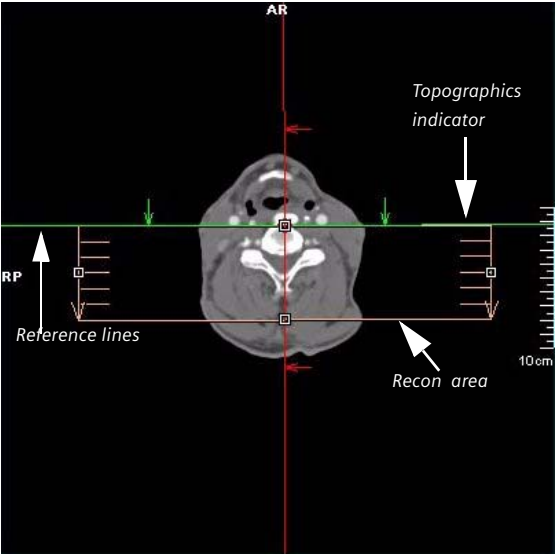
Three planning segments in perpendicular orientations will appear in the upper screen area. You can choose between **MPR Thick** (3 mm) and **MIP Thin** (10 mm) as the image type for your planning volume using the relevant buttons.

In each segment you will find a pink rectangle which represents the boundary of the result images. The image with the right down marker represents the field of view (FoV) of the result images (viewing direction).



# Workflow Information

The rectangle with the grid represents the reference image (topogram) which is added to the Topogram series including the reference lines after reconstruction.



# Workflow Information

## Preview Image

A preview of the actual FoV is now available.

- After pressing the button **Preview Image** the actual FoV to be reconstructed will be displayed.
- Clicking again on the button deactivates the preview image and displays the whole reference image again.
- Double clicking into the FoV image activates or deactivates the **Preview Image** function as well.

If the **Preview Image** function is active and you move or rotate the box, or change the recon begin and end position, the Preview image in the FoV segment will be updated accordingly.



Depending on the desired resultant images, choose coronal, sagittal or oblique recon axis.

## 1. Sagittal/Coronal Reconstructions

- Adjust the field of view size to your needs.
- It is only possible to reconstruct images with a squared matrix.

## 2. Oblique/Double-oblique Reconstructions

If you want to define the orientation of the result images independent of the patient's axis:

- Enable the **Free View Mode** and rotate the reference lines in the three segments until the desired image orientation is displayed. The vertical and horizontal line are always perpendicular to each other. With the default orientation button you can reset the image orientation at any time.
- It is only possible to reconstruct images with a squared matrix.
- Set the field of view to the active segment by clicking the **Set FoV** button. The result images will then be orientated as in the FoV segment. You can adjust the extension perpendicular to the field of view in the same way in the other two segments.

# Workflow Information

To define the reference image (topogram) to the active segment, click on the **Set Reference Segment** button. This defines the orientation of the reference image which will be added to the result images.

Once you have finished the adjustment, start calculation of the result images by clicking on the **Recon** button. You can start a recon job at any time, independently of other ongoing jobs (asynchronous reconstruction). After starting the recon job the layout of the **Examination** task card changes back to the standard layout. If "auto recon" is selected, all defined recon jobs start automatically after scanning. The progress of reconstruction is displayed by the slider in the tomo segment.



## Additional Information

As soon as you define a new recon range, all recon ranges will be shown in the topo segment. The two numbers on the right-hand side at the beginning of each recon range indicate the recon job the range belongs to. The first number stands for the scan range, the second number stands for the recon job to which the range belongs. If no recon job is pending, only the scan ranges are shown in the topo segment. Only one number on the right-hand side at the beginning of each scan range indicates which scan the range belongs to.

- If the first recon job is saved as an **Oblique** recon job, RTD images are displayed after scanning and the **Examination** task card is automatically switched to **3D reconstruction**
- Patient Browser:  
for each double oblique recon job, one series is added in the Patient Browser.
- If **Auto Reference Lines** is selected the corresponding reference image is added to the 3D recon series.
- All reconstructions are performed in the background
- Do not use high resolution images
- Do not use extended FoV
- If no entry is selected in the chronicle, all open reconstructions are automatically reconstructed.
- If **Autorecon** is selected on the **Recon** tab card, this recon job (axial and oblique) will be automatically reconstructed after scanning.

## Recon Planning

During planning of a 3D recon range, the image displayed in the FoV segment will be updated to the new position of the recon start and end position.

The corresponding reference line displayed in both planning segments is the reference line to the actual image displayed in the FoV segment.

One click on the start or end position of the recon range displays either the reference image to the start position of the recon range or the reference image to the end position of the recon range in the FoV segment.

## Case Examples

**Some scan protocols are supplied with predefined oblique reconstructions. These protocols are marked with the suffix "VOL".**

- *Coronal and sagittal reconstruction of the spine:*
  - Scan a topogram
  - Plan your axial spiral scan range
  - Reconstruction of the spiral images (RT images)
  - Select **Recon job Type** sagittal/coronal
  - Select the axial image segment
  - Press button **Set FoV Segment**
  - Adjust the FoV to your needs
  - Define your desired reconstruction parameters (for example, image type SPO)
  - Start reconstruction
  - Repeat the reconstruction steps for the other orientation (sagittal/coronal)

# Workflow Information

- *Oblique reconstruction of the sinuses:*
  - Scan a topogram
  - Plan your axial spiral scan range
  - Reconstruction of the spiral images (RT images)
  - Select **Recon job Type** oblique
  - Select the sagittal image segment
  - Enable **Free Mode**
  - Rotate the reference lines until the best view of the sinuses is displayed in one of the other segments
  - Select this segment and press the **Set FoV Segment** button
  - Adjust the FoV to your needs
  - Define your desired reconstruction parameters (e.g., image type SPO)
  - Start reconstruction
- *Oblique reconstruction of the vascular tree:*
  - Scan a topogram
  - Plan your spiral scan range
  - Axial reconstruction of the spiral images (RTD images)
  - Select **Recon job Type** oblique
  - Select button **MIP Thin** as image type for the planning volume on the toolbar
  - Enable **Free Mode**
  - Rotate the reference lines until the best view of the entire vascular tree is displayed in one of the other segments
  - Select the coronal image segment
  - Select this segment and press the **Set FoV Segment** button
  - Adjust the FoV to your needs
  - Define your desired reconstruction parameters (e.g., Type MIP Thin)
  - Start reconstruction

## Non-square Matrix for 3D Recon

If you perform a 3D reconstruction of your spiral scan you have the possibility to choose between three different FoV matrices: 512 square, 512 non-square, 256 non-square. In some cases it is already saved to the scan protocol (Spine, CarotidAngio) set up a new scan protocol or want to modify an existing one you can save the non-square matrix together with the recon parameters.

- 512 square: the FoV stays quadratic with a 512x512 matrix size.
- 512 non-square: the FoV can be adjusted as a rectangle to your needs, for example spine reconstruction. Its max. side ratio is 1:4.
- 256 non-square: the FoV can be adjusted as a rectangle to your needs but with a lower matrix size and a lower resolution for example RunOff, Cardiac reconstructions. The maximum side ratio is then 1:8.

If you use the non-square matrix and you extend the side length of your FoV more than the max. ratio then the shorter side will be stretched to fit into the ratio again.

You will find the FoV displayed in the image text for the non-square matrix. It will be displayed like this: FoV X x FoV Y.

## Case Examples for 3D Recon and Non-Square Matrix

Some scan protocols are delivered with predefined oblique and non-square matrix reconstructions. These protocols are marked with the suffix "VOL"

- *Coronal and sagittal reconstruction of the spine:*
  - Scan a topogram
  - Plan your axial spiral scan range
  - Reconstruction of the spiral images (RTR/RTD images)
  - Select **Recon job Type** sagittal/coronal
  - Select the axial image segment
  - Press button **Set FoV Segment**
  - Select the Matrix size for example, non-square 512 and adjust the FoV to your needs.
  - Define your desired reconstruction parameters (e.g. image type SPO)
  - Start reconstruction
  - Repeat the reconstruction steps for the other orientation (sagittal/coronal)
- *Oblique reconstruction of the carotid:*
  - Scan a topogram
  - Plan your spiral scan range
  - Axial reconstruction of the spiral images (RTR/RTD images)
  - Select **Recon job Type** oblique
  - Select the coronal image segment
  - Enable **Free Mode**

# Workflow Information

- Rotate the reference lines until the best view on the sinuses is displayed in one of the other segments
- Select this segment and press button **Set FoV Segment** button
- Select the Matrix size for example, non-square 512 and adjust the FoV to your needs
- Define your desired reconstruction parameters (e.g. image type SPO)
- Start reconstruction
- *Double-oblique reconstructions of the heart*  
For detailed information on heart reconstructions please refer to your "**Cardiac CT**" Application Guide.

## Workflow

### Patient Position

A default patient position can be linked and stored to each scan protocol. The SIEMENS default protocols are already linked to a default patient position.  
(Head first - supine)

If a scan protocol is selected and confirmed in the **Patient Model Dialog**, the linked patient position stays active until the user changes it, even if a scan protocol with different patient position is selected.

### Auto Reference Lines

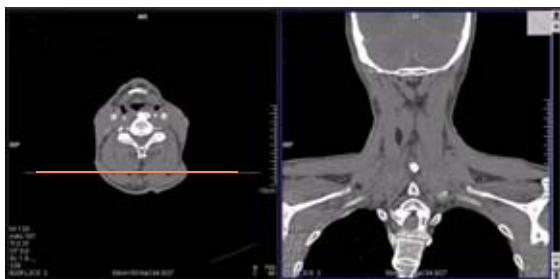
The **Auto Reference lines** settings defined in the Patient Model Dialog can be linked and saved to each scan protocol.

If a scan protocol is selected and confirmed in the **Patient Model Dialog**, the linked **Auto Reference lines** settings stay active until the user changes them, even if a scan protocol with different **Auto Reference lines** settings is selected.

## Navigation within the Topogram

Navigation within the topogram helps you to plan a reconstruction range. The minimum conditions for its use are a scanned range and the availability of RTD (Real time display) images. After scanning, an orange line is displayed within the topogram. This line corresponds to the axial image in the tomo segment.

- If you scroll through the axial image stack, the orange line in the topogram is displayed as a reference line to the currently displayed axial image in the tomo segment.
- If you change the reconstruction begin or end, the orange reference line automatically jumps to this new position and the axial image in the tomo segment will be updated accordingly to the newly selected position.
- If you move the whole recon box in the topogram, the orange reference line automatically jumps to this new position and the axial image in the tomo segment will be updated accordingly to the newly selected position.

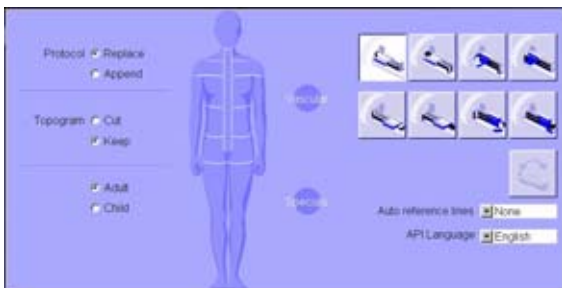




# Workflow Information

## API Language

The API language can now be selected directly in the **Patient Model Dialog**.



When the API language is selected, only the relevant, language specific API entries can be selected in the **Scan** subtask card. This way it is much easier to select the correct patient instruction.



# Workflow Information

Before recording a new API text, first define the API language in the API setup dialog under **Setup > API/Comment Setup** in the main menu.



## e - Logbook

The goal of **e-Logbook** is to offer an effective and efficient functionality to process examination information.

The **e-Logbook** consists of three components:

- The **e-Logbook Configuration**
- The **e-Logbook** subtask card area
- The **e-Logbook Browser**, where all examinations can be listed for viewing, sorting, searching and printing

### e- Logbook Configuration

You will find the **e- Logbook Configuration** under **Options >Configuration >e- Logbook Configuration**.

The configuration is divided into three tab cards:

- General
- System Entries
- Manual Entries

Under **General** you can activate and deactivate the **e-Logbook**, as default the **e-Logbook** is activated. If the **e-Logbook** is deactivated, no patient information is recorded.

If you do not want to have the **e-Logbook** displayed in the subtask area you can switch it off, even though the system entries will be recorded.

Additionally you can select a **Default printer** from a drop down menu.

# Workflow Information

Over **Default Time period** you can determine how the recordings should be listed inside the **e-Logbook Browser**:

- Today (which is the default setting)
- This week
- This month
- Yesterday
- Last week
- Last month

Any changes can be saved by selecting **"Apply"**



# Workflow Information

On the **Manual Entries** tab card you can configure the **System Entries** and **Manual Entries**, that should be displayed in the **e-Logbook**.

**System Entries** are automatically filled out by the system and displayed in the **e-Logbook** as read-only if they are configured.

Default settings are:

- Date of Examination
- Patient Name
- Patient ID
- Date of birth
- Scan Protocol Name
- Total mAs

The **Continuous Number** field is an incremental number to mark each recorded study within a defined time range. In addition the **Start No.** can be set to ensure for example an ongoing numbering after a software update.

# Workflow Information

Furthermore the **Continuous Number** can be set to:

- **Daily**
- **Monthly**
- **Yearly**

If you set **Continuous Number** to **Daily**, the continuous number starts with one each day.



# Workflow Information

Additionally the user can define **Manual Entries** which will also be displayed in the **e-Logbook**. These information can be pre-configured and then selected over a drop down menu in the **e-Logbook**.

To configure new entries of the drop down menu for each **Manual Entry**, just type the desired information inside and click on add.

To remove already existing entries, just select the entry and click on delete.

Additionally you can customize up to five **Manual Entries** fields. If you want to rename the customized entry fields type select **Rename**.

## e- Logbook subtask card area



The screenshot displays a form for entering examination data. The fields are organized into three columns and include the following information:

In / Out patient: <input type="text" value="Inpatient"/>	Contrast agent: <input type="text"/>	Without contrast: <input type="text"/>
History: <input type="text"/>	Concentration: <input type="text"/>	Reimburs. code: <input type="text"/>
Patient's room: <input type="text"/>	Medication: <input type="text"/>	No. of film sheets: <input type="text"/>
Storage medium: <input type="text"/>	Consumable: <input type="text"/>	
No. 5	Age 94	DUP: 245
Date: 03-Aug-2006	Body region: Thorax	Operator: <input type="text"/>
Time of exam: 14:25	Scan protocol name: ThoraxFlouine (A)	Referring physician: Dr. Flan
Patient name: Tact, Frank	Number of images: 40	Performing physician: Dr. Dig
Patient ID: 123	Study ID: 1	Contrast media: <input type="text"/>
Date of birth: 12-Jan-1912	Total mAs: 1258	Ward: <input type="text"/>

An "OK" button is located at the bottom left of the form.

If you close the current patient examination you will get an **e-Logbook** subtask area which shows you all the information that will be saved in your system. Here you can edit the manual entries and save these as well by clicking on "ok".

## e- Logbook Browser

You will find the **e- Logbook Browser** in the **main menu** under **Patient > e- Logbook browser** or you can use **F12** key on your keyboard.



You can list the **e-Logbook** recordings by date. Select your desired timeframe in the calendar and click **List now**.

If you want to list the **e-Logbook** recordings from today, click on **Today** and the recordings will be displayed immediately, no confirmation is needed.

A shortcut to yesterday's recordings is accessible over the black arrow on the right side of the **Today** button.

The system behaves the same if you want to list the recordings from **This Week/Last Week** and **This Month/Last Month**.



# Workflow Information

Additional to the dates, certain criteria can be selected to have a more specific search. Search criteria can be defined for all entries recorded inside the **e-Logbook**.

For example, the entry **Number of images** is recorded. A search for datasets which have a certain amount of images can be defined.

Additional conditions can be defined in this case:

- **is greater than**
- **greater or equal**
- **is less than**
- **less or equal**
- **equals**

The conditions vary with the selected search criteria.

You will find under the **only within** drop-down menus only the **System** and **Manual Entries** you have configured before.

The list can be printed:

- Select from the main menu **File> Print**. The whole list will be printed at the Default printer, which is configured under **Options> Configuration> e-Logbook> General**.

The list can be exported:

- Select from the main menu **File> Export**.
- A **Save As** dialog pops up.
- The list will be automatically exported to **H:\Site-Data\le-Logbook**.
- A file name can be given.

The number of columns inside the displayed list depend on the configurations under **Options> Configuration> e-Logbook> System/Manual Entries**.

## Hints for the Record List:

### 1. Calling up **Patient Browser**

When you double click on any record in the **e-Logbook Browser**, the patient data of the **Patient Browser** will be opened, if still available and the customer has the chance to edit the patient information. This change will also be updated inside the **e-Logbook**.

### 2. Updating the **Recon List**

The **e-Logbook** is updated automatically when the examination data has changed within the **Patient Browser** with **Correct** and **Rearrange**. Patient name, date of birth, patient ID and study ID will be updated automatically.

### 3. Sorting data within the **Recon List**

You can decide if the data in the **Record List** should be listed in ascending or descending order. The default sorting order is ascending. Just click on the column head and a small arrow will appear, clicking on it will change the sorting order.

### 4. Resizing and reorder the columns

It is possible to reorder the table columns by drag and drop the column head. For resizing the columns you just have to move the vertical column lines together.

### 5. Modify **Manual Entries**

Make a right mouse click into the cell and modify the information to your needs. The cell background color will be changed to green as an indication. Click on the enabled "**Apply**" button, then the changes will be applied to the database and the cell background color will be white again.

## Study Continuation

An existing study can be continued at a later time.

To load an existing study:

- Select the desired study in the **Patient Browser**.
- Select **Register** from the **Patient** drop-down menu.
- The patient data is loaded in the **Registration** dialog box.

The previous scan protocol is already preselected, but it is also possible to select any desired scan protocol.

After the patient has been registered, the patient is loaded into the **Examination** card.

The ranges already scanned are listed. The following chronicle entry is shown between the ranges already scanned and the new ranges: **Exam Continue**  
<**Patient Position**>.

If you want to continue a contrast media study, the system asks you if the next scan should be continued as a non-contrast scan instead.

- If you want to continue as a non-contrast scan, the chronicle entries for the new scan range is indicated as a non-contrast scan. (No injector symbol is shown.)

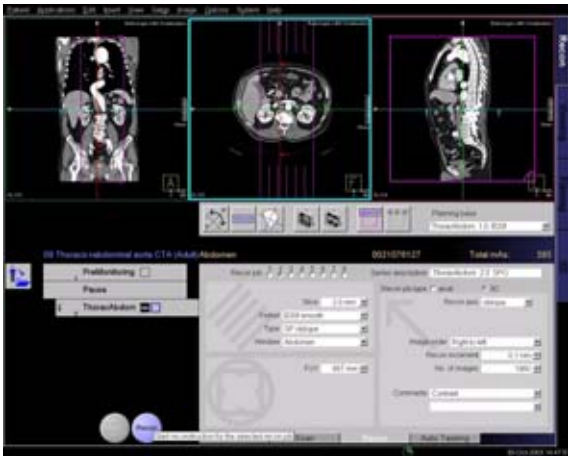
If you continue a study as a contrast study, the chronicle entries of the new scan range are indicated as a contrast scan. (An injector symbol is shown.)

# Workflow Information

## Reconstruction on the *syngo* CT Workplace

It is possible to start all reconstructions from your satellite console.

- Raw data has to be available in the local database
- Select the raw data series of the patient in the Patient Browser and load it into the **Recon** card
- Plan your recon jobs as usual



## Examination Job Status

You can get an overview of all recon jobs by clicking on the **recon** task symbol in the status bar or selecting **Transfer – Examination Job status** in the patient main menu in the Patient Browser.

The **Examination Job Status** dialog box will appear where all recon jobs (completed, queued and in work) are listed. You can stop, restart and delete each job by clicking the according button. To give a selected job a higher priority click **urgent**.

The column **Type** shows you which kind of reconstruction is queued.

Two types are displayed:

– **Recon**

all recon jobs from the **Recon** card, either on the *syngo* Acquisition Workplace or *syngo* CT Workplace.

– **Auto 3D**

all 3D reconstructions which you have send via **Auto postprocessing** automatically into the **3D** Card. These jobs will be deleted from the job list as soon as the patient is closed in the **3D** card.



## Auto Load in 3D and Postprocessing Presets

You can activate the **Auto load in 3D** function on the **Examination** task card/**Auto Tasking** and link it to a recon job, for example, the 2<sup>nd</sup> recon job with thinner slice width in some of the examination protocols. If the post-processing type is chosen from the pull-down menu, the reconstructed images will be loaded automatically into the **3D** task card on the **syngo Acquisition Workplace** with the corresponding post-processing type.

On the **3D** task card you can create parallel and radial ranges for Multi-Planar-Reconstruction (MPR) and Thin Maximum-Intensity-Projection (MIP Thin), which can be linked to a special series.

For example, if you always perform sagittal MPRs for a spine examination, as soon as you load a spine examination into the **3D** task card, select the image type (MPR), orientation, and open the Range Parallel function. Adapt the range settings (image thickness, distance between the images etc.) and click the link button and save your settings. You now have a predefined post-processing protocol linked to the series description of a spine examination.

# Workflow Information

The same can be done for VRT presets. In the main menu under **Type > VRT Definition**, you can link VRT presets with a series description.

Some of the scan protocols, primarily for Angio examinations, are already preset in the protocol with Auto load in 3D. If you prefer not to have this preset, deselect the Auto load in 3D and save your scan protocol.

Some of the scan protocols are preset in the protocol with links to a post-processing protocol. If you prefer not to have this preset, please delete the Range Parallel preset or overwrite them with your own settings.

## Scan Protocol Creation

You can modify or create your scan protocols in two different ways:

- by editing/saving scan protocols
- via scan protocol manager.

### Edit/Save Scan Protocol

If you want to modify an existing protocol or create a new one, for example, you want to have two **Abdomen Routine Protocols** with different slice widths, we recommend you do this directly on the **Examination** task card.



# Workflow Information

*User-specific scan protocols can be saved with the following basic procedure:*

- Register a patient, you can choose any patient position in the **Patient Model Dialog**.
- Select an existing scan protocol in the **Patient Model Dialog**.
- Modify the scan protocol, change parameters, add new ranges etc. to adapt the new protocol to your requirements.
- Scan your patient as usual.
- Check that all parameters are as you desire.
- Select **Edit/Save Scan Protocol** in the main menu.
- Select the folder where you want the new protocol to appear and the scan protocol name in the pop-up dialog box.
- You can either use the same name to overwrite the existing scan protocol or enter a new name, which will create a new protocol name and will not alter any of the existing protocols already stored.
- If you want to save an "old" protocol again, you may have to modify the protocol name. The old protocol (with the old name) must be cancelled explicitly.

## Additional important information:

- You can save your scan protocol at any time during the examination.
- It is recommended that you save your own scan protocol under a new name in order to avoid overwriting the default scan protocol.
- Do not use special characters or blanks. Allowed are all numbers from 0 to 9, all characters from A to Z and a to z and explicitly the \_ (under-score), but no country-specific characters, for example, à, ê, å, ç, ñ.
- Do not rename scan protocol files at Windows level. This will lead to inconsistencies.
- You can now save your own scan protocols in any pre-defined folder. The organ characteristics will belong to the scan protocol, not to the region.
- In the **Patient Model Dialog**, the modified scan protocols are marked by a dot in front of the protocol.

## Scan Protocol Assistant

If you want to modify special parameters for several existing scan protocols or you want to modify the folder structure, we recommend doing this in the "**Scan Protocol Assistant**".

You will find the **Scan Protocol Assistant** under **Options > Configuration** in the main menu.

# Workflow Information

Step 1 - What do you want to do?

Four different operation types are possible:

- Manipulate Scan protocols (cut, copy, paste and delete)
- Change parameters
- Import scan protocols from SOMATOM LifeNet/CD
- Restore protocols to Siemens default

Additional important information

- Each workflow consists of up to five steps, indicated by the footprints.
- Depending on the workflow step you can list all scan protocols or all selected scan protocols. The **<Export>** button exports the listed scan protocols in MS Excel recognizable format. The export file is always created in H:\SiteData\protocols folder. The folder selection cannot be changed.
- The section "**Change Parameters**" is preselected as default.
- Depending on the selected workflow in Step 1, the **Scan protocol Assistant** leads you through the corresponding steps.
- From Step 3 an **<Undo>** and **<Redo>** button are added. Both buttons only affect the last operation.
- You can navigate through the selected workflow via the footprints or with the "**Back**" and "**Next**" buttons. With the "**Quit**" Button you can leave the **Scan Protocol Assistant** at any time without any changes saved.

## Manipulate scan protocols

This workflow consists of four steps.

### Step 2 - Manipulate scan protocols (cut/copy/paste/delete)

To be able to modify existing scan protocols you just have to click with the right mouse button onto the protocol you want to cut, copy or delete, there a menu will be displayed where you can choose what you want to do.

Cutting a scan protocol out of one of the folders and putting it into another one can be done with cut and then click again on the right mouse button on the desired folder and you will get the option to paste this scan protocol there. If you want to leave the scan protocol in the old folder and save it into another one you just use the copy/paste function. Removing a scan protocol will delete it. **Adult** and **Child** protocols are managed separately.

# Workflow Information

## Setting the Emergency Protocol:

One protocol must be labeled as the **emergency** protocol, if you want to change the default **emergency** protocol you have to select the desired protocol and click onto the **Emergency** icon. An Application Restart is necessary to set the new default **emergency** protocol.

The emergency protocol is displayed with the **Emergency** icon in front of the protocol name. This protocol can not be deleted.



## Step 3 - Confirmation

Here you can check the modifications and save the changes. All relevant information such as the Name of the manipulated scan protocols, destination Folder, Name of the deleted protocols and the changed **Emergency** protocols are displayed inside the **Change overview**.

## Step 4 - Changes saved

In this step you can decide if you want to pass a different modification workflow or if you want to exit the **Scan Protocol Assistant**.

## Change parameters

This workflow consists of five steps.

### Step 2 - Select the scan protocols you want to change

Here you can select:

- scan protocols with certain recon jobs
- all scan protocols with ECG
- all customized or Siemens scan protocols for modification
- all scan protocols

Additionally you can choose in the protocol list:

- single scan protocols
- all scan protocols within a body region
- several body regions

Adult and Child protocols are managed apart.

### Step 3 - Change parameters

In this step a second footprint section is added, consists of:

- Protocol
- Topogram
- Scan
- Recon
- Auto tasking
- Trigger

# Workflow Information

All scan protocols selected in Step 2 are displayed. For each parameter you can select the scan protocols you want to apply your changes. The **<Select All>** checkbox is convenient for the user to select and deselect all scan protocols listed. If the parameter values in the selected rows are the same, the value will appear in the corresponding entry, otherwise if the parameter values in the selected rows are different, no value is displayed in the subsection.



# Workflow Information

## Protocol

Select single scan protocol or all scan protocols you want to modify in this subsection.

In the subsection Protocol the following changes can be made:

- Protocol Name  
This entry is only available in single protocol selection. Here you can rename your scan protocol.
- Default Patient Position  
Enter the patient position you want to have as default displayed in the **Patient Model Dialog**.
- Auto reference Lines  
Select where you want to have displayed the Auto reference lines:
  - On study level
  - On series level
  - Off (the entry in the Auto tasking card cannot be selected)
- Body region  
Select in which body region the scan protocol should be saved and displayed in the **Patient Model dialog**.



# Workflow Information

The four buttons: **Column Configuration**, **Show/Hide Parameters**, **Parameter Property** and **Find/Replace** are now available.

## – **Column Configuration**

With the column configuration you can include or exclude specific entries that will be displayed in the sub footprint line and also change the order of the entries with the drag&drop functionality.

## – **Show/Hide Parameters**

You can decide if you want to show/hide the parameters in the parameter area of the selected protocols.

## – **Parameter Property**

If you select a single cell you are able to get the parameter properties displayed as a minimum and maximum value together with the units and incremental steps.

## – **Find/Replace**

For a fast and easy handling you can search for certain values and replace them with the desired value.

If you have selected for example the columns mAs, Recon increment, Auto filming, Auto transfer CD/DVD, Auto transfer Node a so called "**Function**" area will be accessible and over a drop down menu task specific instructions are selectable.

# Workflow Information

## Topogram

Select single scan protocol or all scan protocols you want to modify in this subsection.

In the subsection topogram the following changes can be made:

- mA  
Set the mA value for the topogram.
- Topogram length  
All available topo lengths are listed in the dropdown list.
- Tube position  
Set the tube position either to *Top* or *Lateral*.
- kV  
Can be defined individually to the Scan value.
- Auto transfer modes  
Sends images automatically
- Auto **Viewing** and **Filming**  
Loads images automatically into the Viewing or Filming card.
- API  
Select one of the predefined breathing commands from the dropdown list.
- Scan direction  
Select *Head to Feet* or *Feet to Head* from the dropdown list.



# Workflow Information

## Scan

Select single scan protocol or all scan protocols you want to modify in this subsection. Additionally you can select the scan mode entries:

- **Sequence**
- **Spiral**
- **Multiscan**
- **CAREVision**

The displayed parameters depend on the selection you have made.

- If no special scan mode is selected, the so called mixed mode is active. The mixed mode means the user can choose scan ranges from different modes (**Spiral**, **Sequence**, **Multiscan**, or **CAREVision** modes). If the control in one mode is not applicable, the control in mixed mode is not shown in **<Parameters Area>**.

A checkbox **<Including topogram>** is shown below the parameter grid. When the checkbox is selected, an information line is added to the parameter grid. The line is placed immediately before the ranges belonging to the topogram, you might have to scroll to the right side of the line to get the information visible.

# Workflow Information

It is possible to insert the Autorange brackets in a selected Multi Range by using the right mouse button and removing the Pause from the protocol. You are also able to put a pause into your selected Ranges so you are scanning the ranges seperatly.



# Workflow Information

Scan Parameters	Spiral Mode	Sequence Mode	Multiscan Mode	CareVision Mode	Mixed Mode
<i>mAs</i>		X	X	X	X
<i>eff. mAs</i>	X				X
<i>CARE Dose type</i>	X	X			X
<i>Dose modulation</i>	X	X			X
<i>Quality Ref mAs</i>	X	X			X
<i>kV</i>	X	X	X	X	X
<i>Slice</i>	X	X	X	X	X
<i>Cycle Time</i>		X			
<i>Rotation Time</i>	X	X	X	X	X
<i>Pitch</i>	X				
<i>Table feed</i>		X			
<i>Scan Time</i>	X	X	X		X
<i>Scan Direction</i>	X	X			
<i>HandCARE</i>				X	
<i>Start Delay</i>	X	X	X		X
<i>Range Start</i>	X	X	X	X	X
<i>API</i>	X	X	X		X
<i>API Cluster</i>		X			
<i>Range Name</i>	X	X	X	X	X
<i>Comment</i>	X	X	X	X	X

# Workflow Information

## Recon

You can select all recon jobs, Sequence, Spiral, Multiscan and CareVision Scan Entries you want to modify in this subsection, of course you can also only select single Recon jobs out of the list. Additionally you can display information about the scan range:

- When **<include scan range information>** is selected, an information line for each scan range is listed before the recon jobs belonging to this scan range, you might have to scroll to the right side of the line to get the information visible.
- If no special scan mode is selected, the so called mixed mode is active. The mixed mode means the user can choose scan ranges from different modes (**Spiral, Sequence, Multiscan, or CAREVision** modes). If the control in one mode is not applicable, the control in mixed mode is not shown in **<Parameters Area>**.



# Workflow Information

In the subsection Recon the following changes can be made:

Scan Parameters	Spiral Mode	Sequence Mode	Multiscan Mode	CareVision Mode	Mixed Mode
<i>Slice</i>	X	X	X	X	X
<i>Recon Increment</i>	X				X
<i>Kernel</i>	X	X	X	X	X
<i>Window</i>	X	X	X	X	X
<i>Mirror</i>	X	X	X	X	X
<i>No of images</i>	X	X	X	X	X
<i>Extended FoV</i>	X	X	X		X
<i>Recon type</i>	X				X
<i>Series description</i>	X	X	X	X	X
<i>Recon job type</i>	X				X
<i>Recon axis</i>	X				X
<i>Image Order</i>	X	X			X
<i>Non square matrix</i>		X	X		
<i>3D Recon</i>		X	X		



# Workflow Information

## AutoTasking

Select single recon job or all recon jobs you want to modify in this subsection. Additionally you can display information about the scan range:

- When "include scan range information" is selected, an information line for each scan range is listed before the recon jobs belonging to this scan range, you might have to scroll to the right side of the line to get the information visible.



# Workflow Information

In the subsection Auto Tasking the following changes can be made:

- Auto transfer 1,2,3
- Auto Viewing
- Auto Recon
- Auto Filming
- Auto Postprocessing
- Auto Reference lines (only if selected in the protocol)
- Body Part Examined

# Workflow Information

## Trigger

Select single, all, all sequence or all spiral scan protocols with trigger,

- When "include scan range and recon information" is selected, an information line for each scan range and reconstruction is listed before the recon jobs belonging to this scan range, you might have to scroll to the right side of the line to get the information visible.

In the subsection you can make the following changes:

	Sequence	Spiral	Mixed
Synthetic Trigger	X	X	X
ECG Pulsing		X	
Phase Start in % or ms	X	X	X
Phase Start	X	X	X
MultiPhase		X	
ACV	X	X	X



# Workflow Information

Some parameters listed are associated with each other. If you input a value which influences another value and therefore causes a conflict, the influenced parameter values are auto corrected and displayed in green. If an invalid protocol is loaded, the parameters with the incorrect value will be highlighted in yellow. If you insert incorrect values these will be marked in yellow and will be auto corrected. All the values will be adjusted after the first change is made.

<b>State</b>	<b>Color</b>
<i>valid</i>	<i>white</i>
<i>changed &amp; valid (after an action)</i>	<i>green</i>
<i>invalid</i>	<i>yellow</i>
<i>read only</i>	<i>gray</i>

## **Step 4 - Confirmation**

In this step the changed protocols are listed with both the old and the changed parameters and they have to be confirmed.

## **Step 5 - Changes saved**

In this step you can decide if you want to pass a different modification workflow or if you want to exit the **Scan Protocol Assistant**.

## Import scan protocols from SOMATOM LifeNet/CD

In this workflow you can import new scan protocols either from SOMATOM LifeNet, if a remote connection is available, or from CD.

Before you can import new scan protocols, you have to download them from the SOMATOM LifeNet.

This workflow consists of three steps:

### **Step 2 - Import scan protocols**

Follow the instructions on this page to import the scan protocols.

### **Step 3 - Changes saved**

In this step you can decide if you want to pass a different modification workflow or if you want to exit the **Scan Protocol Assistant**.

## Restoring protocols to Siemens default

This workflow consists of four steps:

### Step 2- Select the scan protocols you want to restore to Siemens default.

In this workflow you can restore or import Siemens default scan protocols. Adult and Child protocols are managed apart.

- Select what you want to do
  - Replace customized protocols with same name.  
All selected modified scan protocols will be replaced with the Siemens default scan protocol settings. All changed protocols made by the user which are marked with a black dot in front will be lost.
  - Add Siemens protocols as duplicates  
Customized scan protocols with the same name as original Siemens protocols will get a new name extension "(Customized)".  
If there exists a scan protocol with this name, the new copies are numbered, for example:  
*HeadSpi.MIAdult* > *HeadSpi(Customized).MIAdult*  
*HeadSpi\_(Customized).MIAdult*  
*HeadSpi\_(Customized2).MIAdult*  
The original Siemens protocols will be copied in the corresponding body region folder.

# Workflow Information

If no customized scan protocols are selected, the radio buttons <**Replace customized protocols with same name**> and <**Add Siemens protocols as duplicates**> will be dimmed.

- Select deleted Siemens scan protocols
  - The <**Select Deleted**> checkbox is convenient for the user to select and deselect all deleted Siemens default scan protocols
  - The checkbox is in indeterminate state when some but not all deleted Siemens default scan protocols are selected in the region protocol lists.
  - The checkbox is disabled (dimmed) when there is no deleted Siemens default scan protocols.

## Step 3 - Confirmation

In this step the changed protocols are listed (old and new Ones) and the changes have to be confirmed.



## Step 4 -Changes saved

In this step you can decide if you want to pass a different modification workflow or if you want to exit the **Scan Protocol Assistant**.

### List all Scan Protocols and all selected Protocols

To list all available protocols, select the **List all protocols** icon in the lower left corner of any arbitrary step. Comparisons between Siemens default and customized protocols is possible with this table. You are able to print, export to floppy and export this sheet as a .xml file under H:/SiteData/protocols.

The same can be done with all selected Protocols as well.

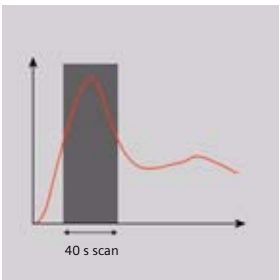




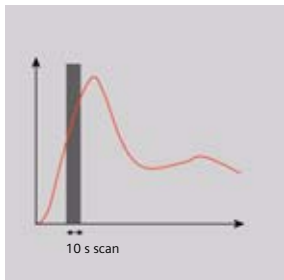
## Contrast Medium

### The Basics

The administration of intravenous (IV) contrast material during spiral scanning improves the tissue and lesion characterization, as well as the opacity of vessels. The contrast scan will yield good results only if acquisition is performed during the optimal phase of enhancement in the region of interest. Therefore, it is essential to initiate the acquisition with the correct start delay. Since multislice spiral CT can provide much faster speeds and shorter acquisition times, it is even more critical to get the right timing to achieve optimal results.



*Longer scan time*



*Shorter scan time*

# Contrast Medium

The dynamics of the contrast enhancement is determined by:

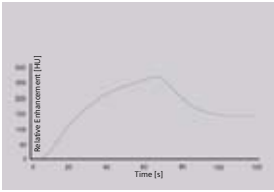
- Patient cardiac output
- Injection rate
- Total volume of contrast medium injected
- Concentration of the contrast medium
- Type of injection – uni-phasic or bi-phasic
- Patient pathology

Aortic time-enhancement curves after i.v. contrast injection (computer simulation\*).

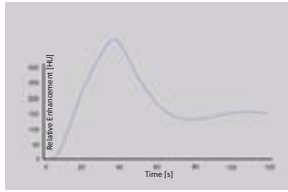
All curves are based on the same patient parameters (male, 60-year-old, 75 kg).

\* *Radiology* 1998; 207:647 – 655

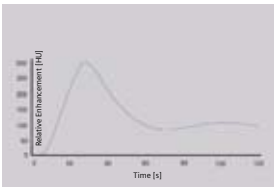
# Contrast Medium



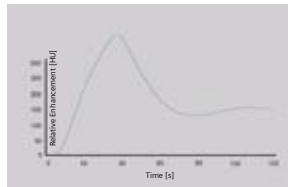
*Injection rate: 2 ml/s,  
120 ml, 300 mg I/ml*



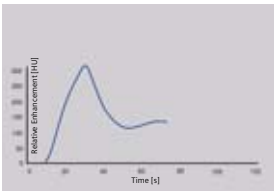
*Injection rate: 4 ml/s,  
120 ml, 300 mg I/ml*



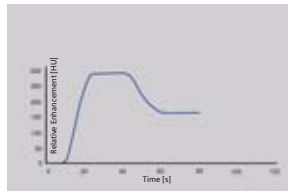
*Total volume of contrast  
medium injected: 80 ml,  
4 ml/s, 300 mg I/ml*



*Total volume of contrast  
medium injected: 120 ml,  
4 ml/s, 300 mg I/ml*



*Type of injection: Uni-  
phase  
140 ml, 4 ml/s,  
370 mg I/ml*



*Type of injection: Bi-  
phase  
70 ml, 4 ml/s,  
plus 70 ml, 2 ml/s,  
370 mg I/ml*

## IV Injection\*

The administration of a contrast medium depends on the indication and on the delay times to be used during the examination. The patients weight and circulatory situation also play a role. In general, no more than 3 ml per kg of body weight for adults and 2 ml per kg of body weight for children should be applied.

For a CTA study (arterial phase), the principle is to keep the contrast flowing throughout the duration of the scan. Thus, the total amount of contrast medium needed should be calculated with the following formula:

$$\text{CM} = (\text{start delay time} + \text{scan time}) \times \text{flow rate.}$$

**CARE Bolus CT** or **Test Bolus** may be used for optimal contrast bolus timing. Please refer to the special protocols.

To achieve optimal results in contrast studies, the use of **CARE Bolus CT** is recommended. In a case where it is not available, use **Test Bolus**. Once completed, load images into **DynEva** task card for calculation of **Time to Peak** enhancement.

For multiphase examinations, for example, three-phase liver, the maximum start delay can be set to 600 sec. The countdown of the delay always starts after scanning of the previous phase.

---

*\*For more information regarding the general use of drugs and doses mentioned in this guide, please refer to page 2.*

## Bolus Tracking

An automatic Bolus Tracking program is available which enables triggering of the spiral scanning at the optimal phase of the contrast enhancement.

### Additional Important Information

1. This mode can be used in combination with any spiral scanning protocol. Simply insert **Bolus Tracking** by clicking the right mouse button in the chronicle. This inserts the entire set-up including pre-monitoring, i.v. bolus, and the monitoring scan protocol. You can also save the entire set-up in your own scan protocols.
2. The pre-monitoring scan is used to determine the position of the monitoring scans. It can be performed at any position of interest. You can also increase the mAs setting to reduce the image noise when necessary.
3. To achieve the shortest possible spiral start delay (2 s), the position of the monitoring scans relative to the beginning of spiral scan must be optimized. A **snapping** function is provided:
  - After the topogram is performed, the predefined spiral scanning range and the optimal monitoring position will be shown.
  - If you need to redefine the spiral scanning range, you should also reposition the monitoring scan in order to keep the shortest start delay time (2 s). (The distance between the beginning of the spiral scanning range and the monitoring scan will be the same).

# Contrast Medium

- Move the monitoring scan line *toward* the optimal position and release the mouse button, it will be snapped automatically. (Trick: if you move the monitoring scan line *away* from the optimal position the **snapping** mechanism will be inactive).
- 4. Place a **ROI** in the premonitoring scan on the target area or vessel used for triggering with one left mouse click. (The ROI is defined by double circles – the outer circle is used for easy positioning, and the inner circle is used for the actual evaluation). You can also zoom the reference image for easier positioning of the ROI.
- 5. Set the appropriate trigger threshold, and start contrast injection and monitoring scans at the same time.  
The relative enhancement of the target ROI will be displayed for the duration of the monitoring scan. When the predefined density is reached, the spiral acquisition will be triggered automatically.
- 6. You can also initiate the spiral any time during the monitoring phase manually – either by pressing the **START** button or by left mouse clicking the **START** radio button. If you do not want to use automatic triggering, you can set your trigger threshold number extremely high so that it will not trigger automatically and start the spiral when you want to.

## Test Bolus using CARE Bolus

You can use the CARE Bolus option as a **Test Bolus**.

### Method

1. Insert a **Bolus Tracking** via the context menu prior to the spiral.
2. Insert **contrast** from the context menu.  
**Note:** By inserting **contrast** you are interrupting the **Auto range function** preventing an automatic start of the spiral.
3. Start with the topogram.
4. Position the premonitoring scan and the spiral.
5. Perform the premonitoring scan, position and accept the ROI.
6. Start the monitoring scans and a small amount of contrast medium (20 ml/2.5 ml/sec.). The rate of the injection on the monitoring scans should match the rate of injection used for the spiral scan.  
**Note:** When you start the spiral manually, the system switches to the **Trigger** tab card. The trigger line is not shown at this stage.
7. Now you can read the proper delay from the **Trigger** tab card.
8. Insert the delay in the **Routine** tab card and load the spiral.
9. Start the spiral and injector at the same time with the appropriate amount of contrast for the study being performed.



## Test Bolus

This is a low dose sequential protocol without table feed used to calculate the start delay of a spiral scan to ensure optimal enhancement after the contrast medium injection. The **syngo Dynamic Evaluation** function may be used to generate the time density curve. You will find the **Test Bolus** scan protocol in the chapter **Specials**.

### Method

1. Select the spiral mode that you want to perform and then **Append** the **Test Bolus** mode under **Special** protocols.
2. Insert the **Test Bolus** mode above the contrast spiral scan of interest using **cut/paste** (with right mouse button).
3. Perform the topogram and define the slice position for the test bolus.
4. Check the start delay, number of scans, and cycle time before loading the mode.
5. A test bolus with 10 – 20 ml is then administered with the same flow rate as during the subsequent spiral scan. Start the contrast media injection and the scan at the same time.

6. Load the images into the **DynEva** task card and determine the time to peak enhancement. Alternatively, on the image segment, click **select series** with the right mouse button and position an ROI on the first image. This ROI will appear on all images in the test bolus series. Find the image with the peak HU value, and calculate the time **delta t** taken to reach the peak HU value (do not forget to add the preset start delay time). This time can then be used as the optimal start delay time for the spiral scan.

## CARE Contrast

With the injector coupling, the bolus injector can now be connected to your CT scanner.

### Key features

- Synchronized scanning and contrast injection
- One button control from the CT-console and from the injector
  - The scan start can be initiated by the injector and also by the CT scanner, without having to press both start buttons at the same time.
  - The start by the CT can also be done via the foot switch.
  - The **Start** of the CT scanner, including the start delay can be initiated also by the start button at the bolus injector.

The injector and the CT have to be coupled explicitly. You can store protocols where the injector coupling is selected.

# Contrast Medium

## Workflow

To start a contrast enhanced examination in coupled mode:

- Select the **Scan** subtask card.
- Select under the menu field **Scan Start** either the entry **Injector coupled (Start button)** or the entry **Injector coupled (Footswitch)**
  - Injector coupled (Start button): The **Start** button of the CT scanner will start the injector.
  - Injector coupled (Footswitch): The footswitch of the CT scanner will start the injector.



If an injector is connected, load the scan mode first and then arm the injector.

Depending on the injector it might be not possible to arm the injector before the scan protocol is loaded (see User manual of the injector). When the mode is loaded, the CT scanner will ask you to check the injector and to arm it. Check the parameters at the injector side and confirm the parameters. The injector is armed and ready for the examination.

**Note:** If the scan mode is unloaded the injector will also be disabled.

# Contrast Medium



After the injector is armed the scan and the injector can be started by pressing either the **Start** button/ Footswitch at the scanner, or the **Start** button at the injector panel outside of the scan room or directly at the injector inside the scan room.

**Note:** If the injector is not ready the scan cannot be started. If both systems are ready to START and the user disarms the injector, the bubble **Check Injector** is shown again.

## Additional Important Information

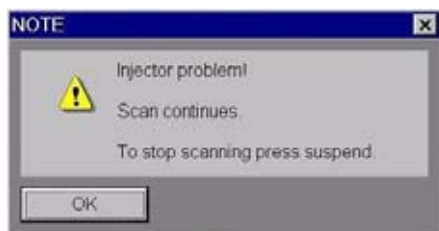
- If **Coupled Mode** is selected the CT checks if there is an injector available.  
The scan mode cannot be loaded if a connection cannot be established or if the injector does not accept coupling (The injector will not accept coupling while injecting).  
A message appears: Injector is not connected.
- Scanning interrupted  
If the injector does not accept the START from the CT the scan mode is cancelled.  
If the scanner is suspended by the user or if technical problems occur, the injector will be stopped too.
- Injector stopped  
If the injector is stopped by the user the scan will be stopped too.  
If the injector is interrupted, by pressing the **Hold** button the scan will be continued.

# Contrast Medium

The injector reports a technical problem:

The connection between scanner and injector is interrupted, or the injection was stopped due to technical problems. In this case the scan continues and an error message pops up.

The user can decide if he wants to stop the scan or if he would like to continue.



- If the injection is longer than the CT scan, the CT scanner does not stop the injection. A new scan mode can be loaded. If the new mode is a coupled mode, the scan can only be started if the injector is ready.
- When a coupled range is pasted or repeated, the start condition for the new scan is reset to uncoupled.



## SOMATOM LifeNet

### General Information

SOMATOM LifeNet is our information and service portal that can be accessed directly at the **syngo Acquisition Workplace**, **syngo CT Workplace**, and **syngo MultiModality Workplace**. It provides up-to-date news about your scanner, helpful configuration information about your system, and enables you to access the SOMATOM LifeNet online area where you will find further functions to ease your daily work.

To benefit from the SOMATOM LifeNet online area, a Siemens Remote Service connection is required. The SOMATOM LifeNet online area allows you to order 90 day Trial Licenses for free, download application guides or find interesting information and services related to your CT system.

Siemens Remote Service is part of your service contract and is also prerequisite for other services for your CT system which optimize your system's availability and efficiency.



## Key Features

SOMATOM LifeNet offline (All users):

- General Information about your system and configuration
- Access to *syngo* E-Learning

SOMATOM LifeNet online (In combination with a Siemens Remote Service connection):

- Newsticker archive and FAQ (frequently asked questions) section
- Free trial software order and installation
- Download of information, manuals and scan protocols
- Log Book order functionality: A contact function for an easy and fast interface to Siemens including the possibility to attach up to two DICOM images

## SOMATOM LifeNet offline

Start SOMATOM LifeNet by selecting SOMATOM LifeNet under **Options** in your *syngo* menu bar and you will find a browser window that allows you to access various information about your hard- and software environment.

Under **System Information**, for example, you will find information such as software version or a scan second counter. Under **Customer Information** you can enter your contact data.

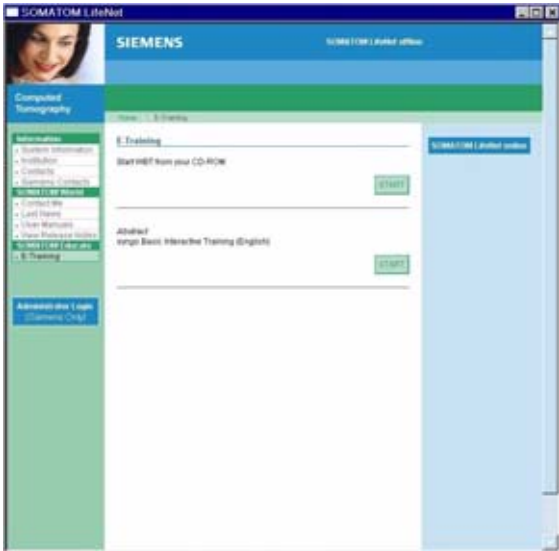


## Access to syngo E-Learning

Start the *syngo* E-Learning to learn more about your software and the use of basic and advanced applications.

# Application Information

The *syngo* Basics E-Learning is pre-installed on your system and can directly be used by selecting **E-Training**. The ***syngo* Advanced Application E-Learning** can be downloaded in the SOMATOM LifeNet online area or is sent to you automatically on CD if trial software is requested via SOMATOM LifeNet.



In case a pdf document (e.g., Application Guides) is not visible in the SOMATOM LifeNet window after being opened, please minimize or move the Browser window of the SOMATOM LifeNet platform since it might be hidden in the background.

## SOMATOM LifeNet online

When you start up your system you will receive up-to-date information in the **Newsticker** and see the expiration date of installed trial software.

Access the Siemens Extranet by clicking on **SOMATOM LifeNet online**. After entering your CT system serial number you will be forwarded to the information and service portal. You can find the serial number by selecting system information in the offline part of SOMATOM LifeNet.

You will be able to view up to date information and make use of various services.



# Application Information

## Download of Files

Each download will be performed in the background and even if you disconnect your SOMATOM LifeNet online session and start to work with the CT scanner, it will continue the process until the download is completed. Due to bandwidth restrictions it is only possible to perform one download at a time.

Depending on your connection speed downloading of larger files like, for example, the **Advanced Application Training** may take quite some time. Shutting down the system in between will interrupt the download.

Downloaded PDFs can be found offline under **Options > File Browser > H:\SiteData\Manuals**.



# Application Information

The E-training is automatically installed as soon as it is downloaded and can be started within the SOMATOM LifeNet offline section under **SOMATOM Educate > E-Training**.

For **syngo Acquisition Workplaces**, you can download and install scan protocols.

To install the downloaded protocols open the **Scan Protocol Manager** via **Options > Configuration**. Select **Import Scan Protocols** in the menu **Scan Protocol**. You can select which protocols you want to import and which not from a selection box which opens, allowing you to choose the protocols you want to copy to your **Customer Folder**. These protocols are then ready to use for your next examination.

# Application Information

All new protocols, including those you did not choose to import to the **Customer Folder** will also be stored in the **Siemens Folder** so that they can be copied later.

All downloaded scan protocols are named "DL\_.." so they can be easily identified when mixed with pre-installed protocols.



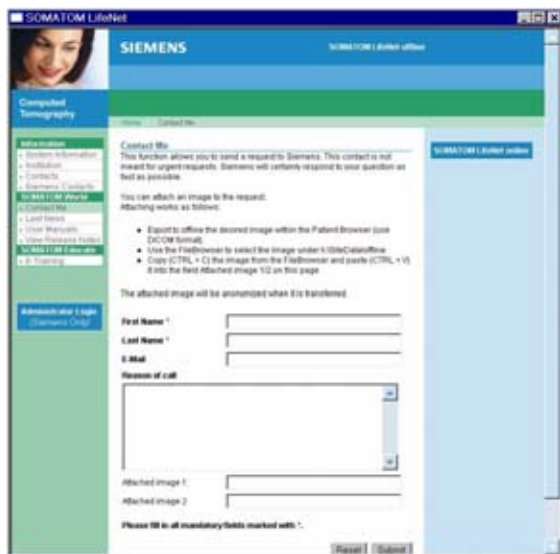
Also, see the chapter **Scan Protocol Assistant** for more information.

# Application Information

## Contact Function

Contacting Siemens via Email is possible directly from your scanner and even DICOM images can be attached to your message. To attach an image, please first select the images on your **Viewing** task card first and then export these images to H:\SiteData\Offline as a DICOM image.

After exporting the image, open the Siemens Extranet and choose **Contact**. After entering your message you can easily attach the image by selecting the images from the File Browser with the shortcut CTRL and C and paste it with the shortcut CTRL and V into the Extranet.



Every patient image is made anonymous before sending. Because the SOMATOM LifeNet window is always in the foreground we recommend to restore/minimize it to be able to switch between both screens, the File Browser and the SOMATOM LifeNet window.



# Application Information

## Trial Order and Installation

As a SOMATOM CT user you can request trial clinical software directly from the scanner. The requested software will be made available and installed automatically through our Siemens Remote Services connection.

After you have accessed the SOMATOM LifeNet online area, you can choose system-specific trial software under **SOMATOM Expand > Trial Licenses**. After clicking on **Order Trial** and confirming a license agreement for trial-use software, you will enter your contact data and then submit the license request.



The trial software will be installed within eight working days and you will then be informed about the successful installation via the SOMATOM LifeNet news-ticker window that appears during system start-up.

Trial licenses are valid for 90 days and can only be ordered once. Forwarding Information via Email

# Application Information

## Forwarding information via Email

This service enables those customers who do not have a printing device connected to their CT Scanner, but would like to have the information provided in SOMATOM LifeNet sent to their regular email account or forwarded to a contact person of interest as an email.

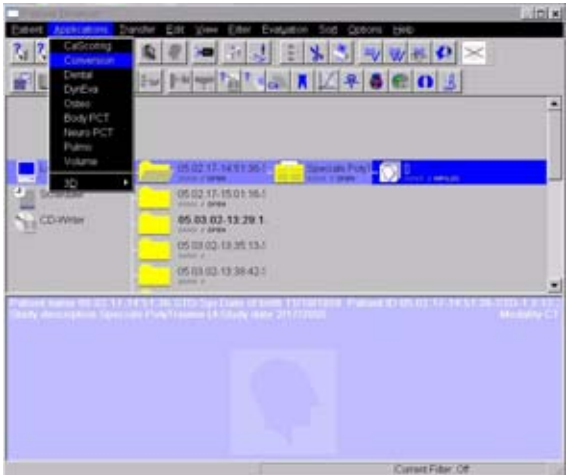
Information about current courses and clinical training programs, as well as CT accessories can be sent from the scanner to any email account. This information can then be printed or a quote requested from your local Siemens representative.



## Image Converter

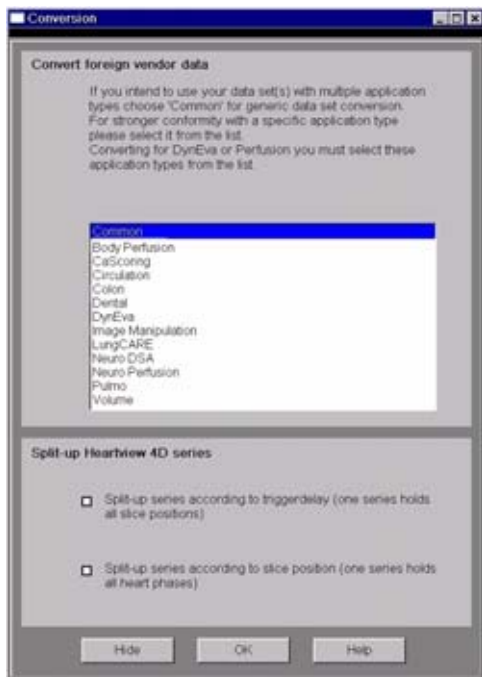
The CT application Common DICOM Adapter can convert different DICOM data sets to formats provided by other CT vendors.

- You will find the converter in the **Applications** menu of the **Patient Browser**.



# Application Information

In the pop-up window you can select the application for which you want to convert the images



## Split-Up Multi-Phase Series

1. Select **Split-up series according to trigger delay** from the section **Split-up Heartview 4D series**, if you intend to split-up the series of multi-phase heart reconstruction according to the different heart phases included.

Or

2. Select **Split-up series according to slice position** to split up the series according to the different slice positions it contains.

After conversion you can load these data sets into the application of your choice.

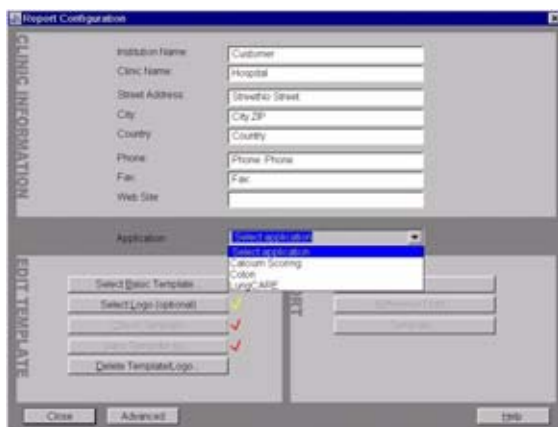
## Report Template Configuration

Under **Options/Configuration** you will find the **Report Template Configuration**.

With the **Report Configuration** you can edit the basic information, e.g. clinic information for your report templates of the applications:

- **syngo Calcium Scoring**
- **syngo Colonography CT**
- **syngo Lung CARE CT**

Additionally you can insert your logo and select which reference data you want to use.



## File Browser

The File Browser provides you with a secure means of accessing and managing data in a private folder, which is a well defined part of the computer file system. This user partition is strictly separated from the system operating file system.

The user partition is shared read only and may be used for transferring data from the scanner to other computers, for example, transferring DICOM images (export to offline), transferring AVIs, or accessing files (PDF files) which were downloaded via SOMATOM LifeNet.

### Key Features

- Copy images and files to the CD Burn folder.
- Raw data transfer.
- Access to all created reports and movies (AVI files).
- Access to the offline folder.
- Access to downloaded files.

Open the File Browser via main menu entry:

### Options > File Browser.

The File Browser provides special folders for CT applications. The created reports and movies are saved within these folders.

With an external PC connected you can access your offline data on the external PC for post-processing.

# Application Information

## ***Raw data transfer:***

Raw data set can be transferred.

First configure the directory where the raw data should be transferred to:

- Open the File Browser.
- Choose the desired directory from the navigation tree to the left of the File Browser.
- Select the item **Set as Export Root** from the **CT Data Transfer** drop down menu.
- Select the raw data files you want to transfer in the content area of the Patient Browser.
- From the browser open the **Patient** main menu and select the item **Transfer CT Data**.
- The raw data includes the ECG file.

## ***Transfer files to USB storage device:***

- Insert an USB memory device into the USB port.

A new folder is added to the File Browser:

"USB storage device (F:)"

- Select the desired files and send them via the right mouse button menu to the USB storage device.

## ***Transfer files to floppy:***

- Select the desired files and send them via the right mouse button menu on a floppy disk.



# Application Information

## **Burn on CD:**

- Do not write files to CD-R while other jobs are being transferred.
- Make sure that the volume of data to be recorded does not exceed the CD-R storage capacity.
- Select the desired files and copy & paste or drag & drop them into the folder **CDBurn** (or send them via the right mouse button menu to the folder **CDBurn**).
- Open the **LocalJobStatus** in the Patient Browser and clear all entries.
- Select **Record to Offline** in the **Transfer** menu of the Patient Browser.
- CD writing starts.  
**Hint:** Offline files can only be written to CD in a single session.

When recording is successfully completed the entries in the subdirectory CDBurn will be deleted automatically.



# Application Information

## *Review reports and movies:*

- Select the desired files and double-click on them.
- The corresponding program, for example, Movie Media Player, will be opened and you can review what you have saved.
- You can now transfer these files to floppy disk or copy them onto a CD.

## **Additional Important Information:**

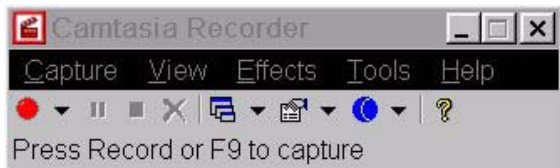
- Files with the following extensions cannot be started/ opened from the File Browser  
**"bat", "cmd", "com", "exe", "reg", "dot", "htm", "html", "pl", "vbs", "js", "wsf", "wsh", "xml".**
- To transfer avi files from the File Browser to any external storage device, for example, CD or USB stick, use RMB menu **Send to**. Drag & drop and copy/ paste to any storage device is not possible within the File Browser.

## Camtasia

**Camtasia** is a separate software tool that allows you to film your desktop activities. You can save these recordings as avi files for documentation and presentation purposes.

### Key features

- Camtasia Recorder: to capture avi files.  
Before starting recording you can select the area you want to capture.



- Camtasia Player: to play avi files
- Camtasia Producer: to edit avi files

To open the **Camtasia** tool, select in the main menu **Application > Desktop > Camtasia Recorder**.

# Application Information

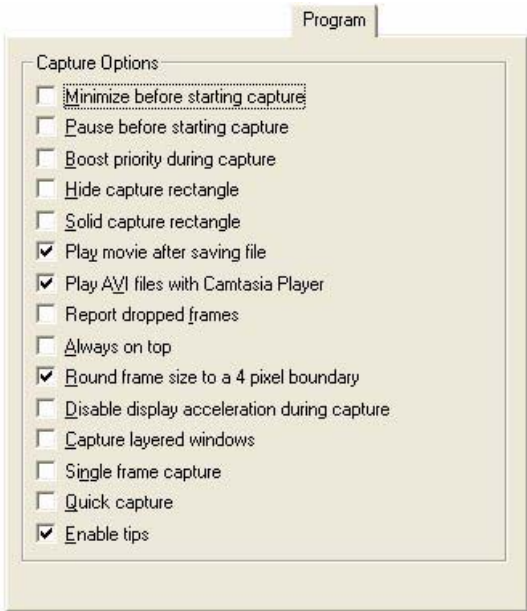
Under **Tools > Options** you can define special settings for recording:



- AVI – to define Video and Audio options
- File – to define the output options (files and folders)
- Hotkeys – to define special hotkeys, e.g. for start/stop recording
- Live – to define live source options

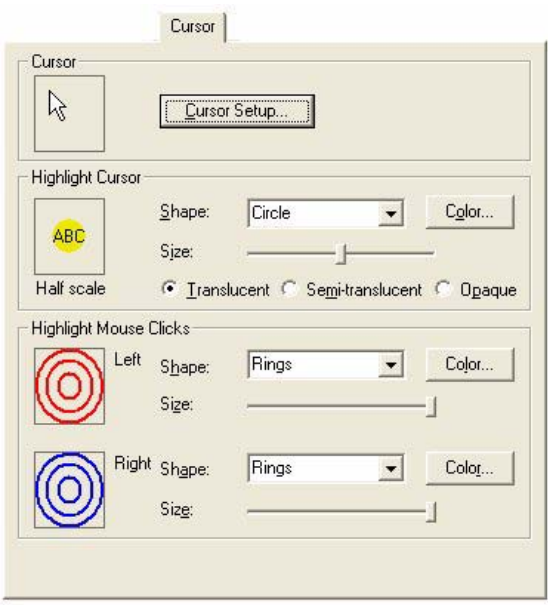
# Application Information

- Program – to define capture options



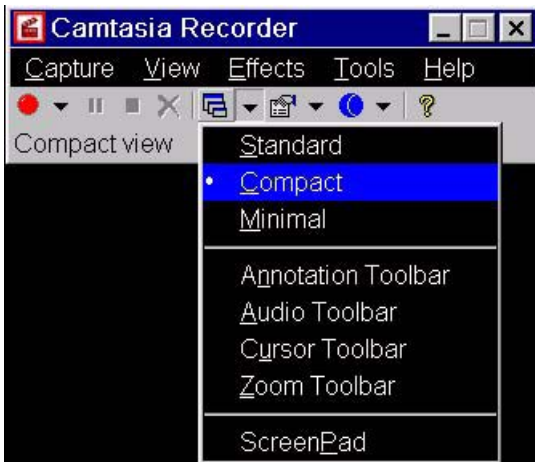
# Application Information

The **Effects Options** dialog box allows you to set options for your recording, for example, cursor effects.



## Additional Important Information

- To transfer avi files from the file browser to any external storage device, for example CD, or USB stick use RMB menu **Send to**. Drag&drop and copy/paste to any storage device is not possible within the File Browser.
- To display the main menu, set **ToggleView - Compact**.



- AVI files can only be played on the **syngo CT Workplace**.
- For further information on how to operate the **Camtasia** tool, please refer to the **Help** menu.

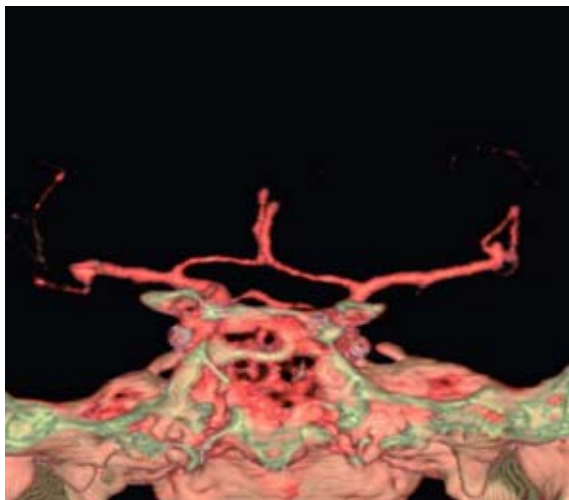
## Patient Protocol

Scan:	number of scan range
kV:	kilo Volt
mAs:	averaged applied mAs of the range
ref. mAs	quality ref. mAs of the range
TI:	Rotation Time
cSL:	collimated Slice
CTDI <sub>vol</sub> :	$\frac{CTDI_w}{\text{Pitch Factor}}$ <p>For further information please refer to the chapter "Dose Information".</p>
DLP:	Dose Length Product
	$\frac{CTDI_{vol} \times (\text{length} + \text{collimated slice})}{10}$
Total DLP	DLP value of the entire examination
Total mAs	actual mAs value of the entire examination

Patient Protocol		Hospital Emotion 18 CT 2006G0.1.02					
19-Jul-2005 12:48							
Ward:							
Physician:							
Operator:							
Total mAs 4733		Total DLP 1398					
	Scan	kV	mAs / ref.	CTDIvol	DLP	TI	cSL
Patient Position H-SP							
Topogram	1	130				3.4	0.6
BaseSeq	2	130	250	55.38	224	1.5	5.0
CerebrumSeq	6	130	270	58.00	475	1.5	8.0
BaseSeq	11	130	250	55.38	224	1.5	5.0
CerebrumSeq	15	130	270	58.00	475	1.5	8.0







## Overview

In this chapter you will find all scan protocols relating to the **Head** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, stroke, brain tumors, cranial trauma, cerebral atrophy, hydrocephalus, and inflammatory changes.

For SOMATOM Emotion 16-slice configuration:

- **HeadRoutine**  
Spiral mode for routine head studies
- **HeadNeuro**  
Special spiral mode using an acq. of 4 x 0.6 mm
- **HeadSeq**  
Sequential mode for routine head studies
- **InnerEarHR**  
Spiral mode for high resolution inner ear studies
- **InnerEarHRVol**  
Spiral mode for high resolution inner ear studies and double oblique studies
- **InnerEar**  
Spiral mode for routine ear studies
- **InnerEarSeq**  
Sequential mode for inner ear studies
- **Sinus**  
Spiral mode for routine sinus studies
- **SinusVol**  
Spiral mode for axial and coronal sinus studies
- **Orbit**  
Spiral mode for routine orbital studies
- **Dental**  
Spiral mode for the application *syngo* Dental CT

# Head

For SOMATOM Emotion 6-slice configuration:

- **HeadRoutine**  
Spiral mode for routine head studies
- **HeadSeq**  
Sequential mode for routine head studies
- **InnerEarHR**  
Spiral mode for high resolution inner ear studies
- **InnerEarHRVol**  
Spiral mode for high resolution inner ear studies and double oblique studies
- **InnerEar**  
Spiral mode for routine ear studies
- **InnerEarSeq**  
Sequential mode for inner ear studies
- **Sinus**  
Spiral mode for routine sinus studies
- **SinusVol**  
Spiral mode for axial and coronal sinus studies
- **Orbit**  
Spiral mode for routine orbital studies
- **Dental**  
Spiral mode for the application *syngo* Dental CT

## General Hints

- Topogram: Lateral, 256 mm.
- Patient positioning:  
Patient lying in supine position, arms resting against body, secure head well in the head holder, support lower legs.
- Gantry tilt is available for sequence scanning. However, image artifacts may occur if spirals are acquired with a tilt angle greater than  $8^{\circ}$ .
- For all head studies, it is very important for image quality to position the patient in the center of the scan field. Use the lateral laser beam to make sure that the patient is positioned in the center.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.

## Head Kernels

- For soft tissue head studies, the standard kernel is H40s; softer images are obtained with H30s or H20s, H10s, sharper images with H50s. The kernels H21s, H31s, H41s yield the same visual sharpness as H20s, H30s, H40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using H31s, H 41s instead of H30s, H40s. For the standard head protocols, we propose H21s, H31s, H41s.
- High Resolution head studies should be performed with H60s, H70s (e.g. for dental and sinuses) and H80s, H90s (e.g. inner ear).
- It is mandatory to position the area of interest in the center of the scan field.



## Scan Protocols

### HeadRoutine

#### Indications:

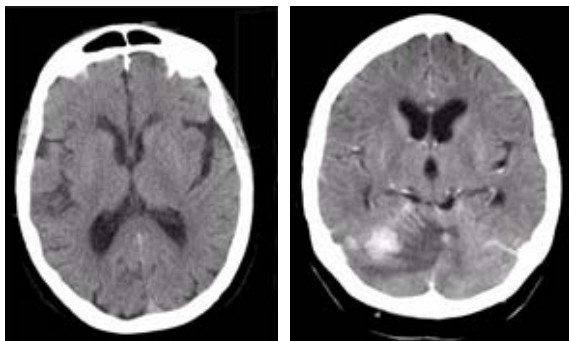
Spiral mode for routine head studies, for example, stroke, brain tumors, cranial trauma, cerebral atrophy, hydrocephalus, and inflammation, etc.

For SOMATOM Emotion 16-slice configuration:

A range for the base of 4 cm will be covered in 14.36 sec., a range for the cerebrum of 8 cm will be covered in 14.36 sec.

For SOMATOM Emotion 6-slice configuration:

A range for the base of 4 cm will be covered in 28.00 sec., a range for the cerebrum of 8 cm will be covered in 28.00 sec.





# Head

<b>Emotion 16</b>	<b>Base</b>	<b>Cerebrum</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	220	240
<i>Rotation time</i>	1.5 sec.	1.5 sec.
<i>Acquisition</i>	16 x 0.6 mm	16 x 1.2 mm
<i>Slice collimation</i>	0.6 mm	1.2 mm
<i>Slice width</i>	4.0 mm	6.0 mm
<i>Feed/Rotation</i>	5.3 mm	10.6 mm
<i>Pitch factor</i>	0.55	0.55
<i>Increment</i>	4.0 mm	6.0 mm
<i>Kernel</i>	H31s	H31s
<i>CTDI<sub>vol</sub></i>	58.52 mGy	57.60 mGy
<i>Effective dose</i>	Male: 1.33 mSv Female: 1.43 mSv	Male: 1.98 mSv Female: 2.21 mSv

# Head

<b>Emotion 6</b>	<b>Base</b>	<b>Cerebrum</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	220	250
<i>Rotation time</i>	1.5 sec.	1.5 sec.
<i>Acquisition</i>	6 x 1.0 mm	6 x 2.0 mm
<i>Slice collimation</i>	1.0 mm	2.0 mm
<i>Slice width</i>	4.0 mm	6.0 mm
<i>Feed/Rotation</i>	2.4 mm	4.8 mm
<i>Pitch factor</i>	0.40	0.40
<i>Increment</i>	4.0 mm	6.0 mm
<i>Kernel</i>	H31s	H31s
<i>CTDI<sub>Vol</sub></i>	60.50 mGy	58.75 mGy
<i>Effective dose</i>	<i>Male:</i>	<i>Male:</i>
	0.94 mSv	1.72 mSv
	<i>Female:</i>	<i>Female:</i>
	0.98 mSv	1.90 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Total amount</i>	<i>50 – 60 ml</i>

## Hints

- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.

## HeadNeuro

### Indications:

Special spiral neuro mode for dedicated head studies.

Two ranges are predefined for the base of the skull using an acquisition of 16x0.6 mm and for the cerebrum using an acquisition of 4x0.6 mm.

A range for the base of 4 cm will be covered in 9.58 sec., a range for the cerebrum of 8 cm will be covered in 68.67 sec.

<b>Emotion 16</b>	<b>Base</b>	<b>Cerebrum</b>
<i>kV</i>	130	130
<i>Effective mAs/</i>	250	270
<i>Quality ref. mAs</i>		
<i>Rotation time</i>	1.0 sec.	1.0 sec.
<i>Acquisition</i>	16 x 0.6 mm	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm	0.6 mm
<i>Slice width</i>	4.0 mm	5.0 mm
<i>Feed/Rotation</i>	5.3 mm	1.3 mm
<i>Pitch factor</i>	0.55	0.55
<i>Increment</i>	4.0 mm	5.0 mm
<i>Kernel</i>	H31s	H31s
<i>CTDI<sub>Vol</sub></i>	66.50 mGy	79.65 mGy
<i>Effective dose</i>	<i>Male:</i>	<i>Male:</i>
	1.52 mSv	2.29 mSv
	<i>Female:</i>	<i>Female:</i>
	1.73 mSv	2.55 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Total amount</i>	<i>50 – 60 ml</i>

## Hints

- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the isocenter. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.

## HeadSeq

### Indications:

Sequence mode for routine head studies, e.g. stroke, brain tumors, cranial trauma, cerebral atrophy, hydrocephalus, and inflammation, etc.

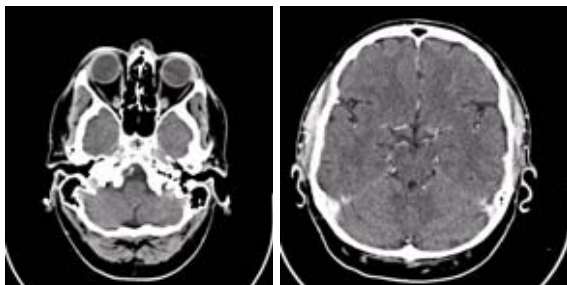
Two ranges are predefined for the base of the skull and for the cerebrum.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 12.30 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 12.80 cm.



# Head

<b>Emotion 16</b>	<b>BaseSeq</b>	<b>CerebrumSeq</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	270	270
<i>Rotation Time</i>	1.5 sec.	1.5 sec.
<i>Acquisition</i>	2 x 5.0 mm	2 x 8.0 mm
<i>Slice collimation</i>	5.0 mm	8.0 mm
<i>Slice width</i>	5.0 mm	8.0 mm
<i>Feed/Scan</i>	10 mm	16 mm
<i>Kernel</i>	H31s	H31s
<i>CTDI<sub>Vol</sub></i>	58.32 mGy	57.24 mGy
<i>Effective dose</i>	Male: 1.08 mSv Female: 1.20 mSv	Male: 1.96 mSv Female: 2.17 mSv

<b>Emotion 6</b>	<b>BaseSeq</b>	<b>CerebrumSeq</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	250	270
<i>Rotation Time</i>	1.5 sec.	1.5 sec.
<i>Acquisition</i>	6 x 2.0 mm	6 x 3.0 mm
<i>Slice collimation</i>	2.0 mm	3.0 mm
<i>Slice width</i>	4.0 mm	6.0 mm
<i>Feed/Scan</i>	12 mm	18 mm
<i>Kernel</i>	H31s	H31s
<i>CTDI<sub>Vol</sub></i>	58.75 mGy	59.40 mGy
<i>Effective dose</i>	Male: 1.11 mSv Female: 1.15 mSv	Male: 1.94 mSv Female: 2.13 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Volume</i>	<i>50-60 ml</i>

## Hints

- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



## InnerEarHR

### Indications:

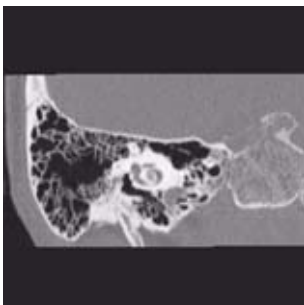
Spiral mode for inner ear high resolution studies, e.g. inflammatory changes, tumorous processes of pyramids, cerebellopontine angle tumors, posttraumatic changes, etc.

For SOMATOM Emotion 16-slice configuration:

A range of 4.0 cm will be covered in 24.22 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 4.0 cm will be covered in 17.69 sec.



# Head

<b>Emotion 16</b>	<b>InnerEar</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	4 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	0.75 mm
<i>Feed/Rotation</i>	1.1 mm	
<i>Pitch Factor</i>	0.45	
<i>Increment</i>	2.0 mm	0.6 mm
<i>Kernel</i>	H90s	H90s
<i>CTDI<sub>Vol</sub></i>	38.35 mGy	
<i>Effective dose</i>	Male: 0.74 mSv Female: 0.78 mSv	

<b>Emotion 6</b>	<b>InnerEar</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 0.5 mm	
<i>Slice collimation</i>	0.5 mm	
<i>Slice width</i>	2.0 mm	0.6 mm
<i>Feed/Rotation</i>	2.6 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.4 mm
<i>Kernel</i>	H90s	H90s
<i>CTDI<sub>Vol</sub></i>	35.88 mGy	
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.59 mSv	

## Hints

- For image reconstruction of soft tissue, use kernel H30s/H31s.
- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.

## InnerEarHRVol

### Indications:

Spiral mode for high resolution inner ear studies, e.g. malformations of the inner ear, inflammatory changes, pathologies of the mastoid process, tumor-processes of the pyramids, posttraumatic changes, etc.

Three recon jobs are predefined for reconstruction: the first for axial bone structure, the second and third for the double oblique for each side in 3D images display view.

For SOMATION Emotion 16-slice configuration:

A range of 40 mm will be covered in 24.22 sec.

For SOMATION Emotion 6-slice configuration:

A range of 40 mm will be covered in 17.69 sec.

<b>Emotion 16</b>	<b>Inner Ear</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>d</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	130		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	4 x 0.6 mm		
<i>Slice collimation</i>	0.6 mm		
<i>Slice width</i>	2.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	1.1 mm		
<i>Pitch Factor</i>	0.45		
<i>Increment</i>	2.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	H90s	H90s	H90s
<i>CTDI<sub>Vol</sub></i>	38.35 mGy		
<i>Effective dose</i>	Male: 0.74 mSv Female: 0.78 mSv		

# Head

<b>Emotion 6</b>	<b>Inner Ear</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>d</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	130		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 0.5 mm		
<i>Slice collimation</i>	0.5 mm		
<i>Slice width</i>	2.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	2.6 mm		
<i>Pitch Factor</i>	0.85		
<i>Increment</i>	2.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	H90s	H90s	H90s
<i>CTDI<sub>vol</sub></i>	35.88 mGy		
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.59 mSv		

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Volume</i>	<i>50-60 ml</i>

## Hints

- For image reconstruction of soft tissue, use kernel H30s/H31s.
- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the isocenter. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



## InnerEar

### Indications:

Spiral mode for inner ear studies, e.g. inflammatory changes, tumorous processes of pyramids, cerebellopontine angle tumors, post-traumatic changes, etc.

For SOMATOM Emotion 16-slice configuration:

A range of 4 cm will be covered in 7.21 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 4 cm will be covered in 9.84 sec.





# Head

<b>Emotion 16</b>	<b>InnerEar</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	0.75 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	2.0 mm	0.5 mm
<i>Kernel</i>	H90s	H90s
<i>CTDI<sub>Vol</sub></i>	31.92 mGy	
<i>Effective dose</i>	Male: 0.77 mSv Female: 0.83 mSv	

<b>Emotion 6</b>	<b>InnerEar</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	2.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.8 mm
<i>Kernel</i>	H90s	H90s
<i>CTDI<sub>Vol</sub></i>	33.00 mGy	
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.60 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Total amount</i>	<i>50 ml</i>

### Hints

- For image reconstruction of soft tissue, use kernel H30s/H31s.
- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



## InnerEarSeq

### Indications:

Sequence mode for inner ear studies, e.g. inflammatory changes, tumorous processes of pyramids, cerebellopontine angle tumors, post-traumatic changes, etc.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 8.6 mm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 4.7 mm.



<b>Emotion 16</b>	<b>InnerEarSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	140
<i>Rotation Time</i>	1.0 sec.
<i>Acquisition</i>	12 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.6 mm
<i>Feed/Scan</i>	7.2 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	42.00 mGy
<i>Effective dose</i>	Male: 1.51 mSv Female: 1.62 mSv

<b>Emotion 6</b>	<b>InnerEarSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	140
<i>Rotation Time</i>	1.0 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	6.0 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	38.50 mGy
<i>Effective dose</i>	Male: 0.68 mSv Female: 0.79 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>60 sec.</i>
<i>Flow rate</i>	<i>2 ml/sec.</i>
<i>Total amount</i>	<i>60 ml</i>

### Hints

- For image reconstruction of soft tissue, use kernel H30s/H31s.
- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



## Sinus

### Indications:

Spiral mode for paranasal sinuses studies, e.g. sinusitis, mucocele, pneumatization, polyposis, tumor, corrections etc.

For SOMATOM Emotion 16-slice configuration:

A range of 80 mm will be covered in 12.42 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 80 mm will be covered in 17.69 sec.





# Head

<b>Emotion 16</b>	<b>Sinus</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	35			
<i>Rotation time</i>	1.0 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	7.7 mm			
<i>Pitch Factor</i>	0.80			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	H70s	H30s	H70s	H30s
<i>CTDI<sub>Vol</sub></i>	9.31 mGy			
<i>Effective dose</i>	Male: 0.32 mSv Female: 0.36 mSv			

# Head

<b>Emotion 6</b>	<b>Sinus</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	35			
<i>Rotation time</i>	1.0 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.25 mm	1.25 mm
<i>Feed/ Rotation</i>	5.1 mm			
<i>Pitch Factor</i>	0.85			
<i>Increment</i>	5.0 mm	5.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	H70s	H30s	H70s	H30s
<i>CTDI<sub>Vol</sub></i>	9.63 mGy			
<i>Effective dose</i>	Male: 0.20 mSv Female: 0.25 mSv			

## **Contrast medium IV injection**

<i>Start delay</i>	45 sec.
<i>Flow rate</i>	2.0 ml/sec.
<i>Total amount</i>	75 ml

### **Hint**

- For low dose studies use only 20 mAs.



## SinusVol

### Indications:

Spiral mode for axial and coronal paranasal sinuses studies, e.g. sinusitis, mucocele, polyposis, tumor, corrections etc.

Three recon jobs are predefined for reconstruction: the first for axial bone structure and the second for the coronal soft tissue in 3D images display view and the third for the coronal bone structure in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A range of 80 mm will be covered in 12.42 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 80 mm will be covered in 17.69 sec.

<b>Emotion 16</b>	<b>Sinus</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>d</sup> recon.</b>
<i>kV</i>	<i>130</i>		
<i>Effective mAs/ Quality ref. mAs</i>	<i>35</i>		
<i>Rotation Time</i>	<i>1.0 sec.</i>		
<i>Acquisition</i>	<i>16 x 0.6 mm</i>		
<i>Slice collimation</i>	<i>0.6 mm</i>		
<i>Slice width</i>	<i>5.0 mm</i>	<i>3.0 mm</i>	<i>3.0 mm</i>
<i>Feed/Rotation</i>	<i>7.7 mm</i>		
<i>Pitch Factor</i>	<i>0.80</i>		
<i>Increment</i>	<i>5.0 mm</i>	<i>3.0 mm</i>	<i>3.0 mm</i>
<i>Kernel</i>	<i>H70s</i>	<i>H30s</i>	<i>H60s</i>
<i>CTDI<sub>Vol</sub></i>	<i>9.31 mGy</i>		
<i>Effective dose</i>	<i>Male: 0.32 mSv</i> <i>Female: 0.36 mSv</i>		

<b>Emotion 6</b>	<b>Sinus</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>d</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	35		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	5.0 mm	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	5.1 mm		
<i>Pitch Factor</i>	0.85		
<i>Increment</i>	5.0 mm	3.0 mm	3.0 mm
<i>Kernel</i>	H70s	H30s	H60s
<i>CTDI<sub>vol</sub></i>	9.63 mGy		
<i>Effective dose</i>	Male: 0.20 mSv Female: 0.25 mSv		

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	45 sec.
<i>Flow rate</i>	2.0 ml/sec.
<i>Total amount</i>	75 ml

## Hint

- For low dose studies use only 20 mAs.

## Orbit

### Indications:

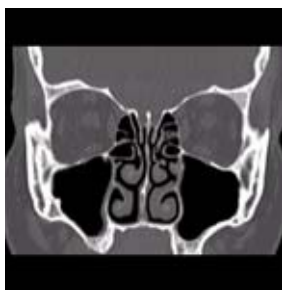
Spiral mode for orbital studies, e.g. fracture.

For SOMATOM Emotion 16-slice configuration:

A range of 50 mm will be covered in 8.51 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 50 mm will be covered in 11.80 sec.



<b>Emotion 16</b>	<b>Orbit</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	H70s	H70s
<i>CTDI<sub>Vol</sub></i>	18.62 mGy	
<i>Effective dose</i>	Male: 0.50 mSv Female: 0.54 mSv	

<b>Emotion 6</b>	<b>Orbit</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	5.0 mm	0.5 mm
<i>Kernel</i>	H70s	H70s
<i>CTDI<sub>Vol</sub></i>	19.25 mGy	
<i>Effective dose</i>	Male: 0.25 mSv Female: 0.32 mSv	

## **Contrast medium IV injection**

<i>Start delay</i>	45 sec.
<i>Flow rate</i>	2.0 ml/sec.
<i>Total amount</i>	75 ml

### **Hint**

- For low dose studies use only 20 mAs.

## Dental

### Indications:

This is the scan protocol for the *syngo* Dental application package. It is used for evaluation and reformatting of the upper and lower jaws.

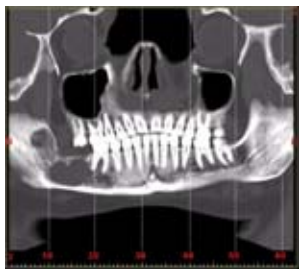
It enables the display and measurement of the bone structures of the upper and lower jaw as the basis for planning in oral surgery.

For SOMATOM Emotion 16-slice configuration:

A range of 50 mm will be covered in 8.51 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 50 mm will be covered in 9.44 sec.





# Head

<b>Emotion 16</b>	<b>Dental</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	45
<i>Rotation Time</i>	1.0 sec.
<i>Acquisition</i>	16 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.75 mm
<i>Feed/Rotation</i>	7.7 mm
<i>Pitch Factor</i>	0.80
<i>Increment</i>	0.5 mm
<i>Kernel</i>	H70s
<i>CTDI<sub>Vol</sub></i>	11.97 mGy
<i>Effective dose</i>	Male: 0.25 mSv Female: 0.26 mSv

<b>Emotion 6</b>	<b>Dental</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	45
<i>Rotation Time</i>	0.8 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.25 mm
<i>Feed/Rotation</i>	5.1 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	0.6 mm
<i>Kernel</i>	H70s
<i>CTDI<sub>Vol</sub></i>	12.38 mGy
<i>Effective dose</i>	Male: 0.19 mSv Female: 0.23 mSv

For further information on the scan protocols and how to use syngo Dental CT, please refer to the Application Guide "Clinical Applications".

## Hint

- An automatic bone correction allows for improved head image quality, without any additional postprocessing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.



## Overview

In this chapter you will find all scan protocols relating to the **Neck** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, tumors, lymphoma, and abscesses.

For SOMATOM Emotion 16-slice configuration:

- **NeckRoutine**

- Spiral mode for soft tissue routine neck studies

- **NeckVol**

- Spiral mode for axial, coronal and sagittal neck studies

For SOMATOM Emotion 6-slice configuration:

- **NeckRoutine**

- Spiral mode for soft tissue routine neck studies

- **NeckThinSlice**

- Spiral mode for thin slice soft tissue neck studies

- **NeckVol**

- Spiral mode for axial, coronal and sagittal neck studies

## General Hints

- Topogram: Lateral, 256 mm or AP 512 mm.
- Patient positioning  
Patient lying in supine position, hyperextend neck slightly, secure head well in head holder.
- Patient respiratory instruction:  
do not breathe, do not swallow.
- For contrast studies, CARE Bolus (optional) may be used to optimize the bolus timing.
- For image reconstruction of bone structure, use kernel B60.
- Patient positioning is very important for artifact-free images. The thoracic girdle should be positioned as far as possible in the caudal direction. This can be done using a strap with a permanent loop or Velcro fastener at its end. The ends of the strap must be attached to the patients wrists. Then the strap must be wrapped around the patients feet with his legs extended and under tension. The entire thoracic girdle is thus pulled toward the patients feet.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.
- In case of 3D study only, use kernel B10s and at least 50% overlapping for image reconstruction.

## Scan Protocols

### NeckRoutine

#### Indications:

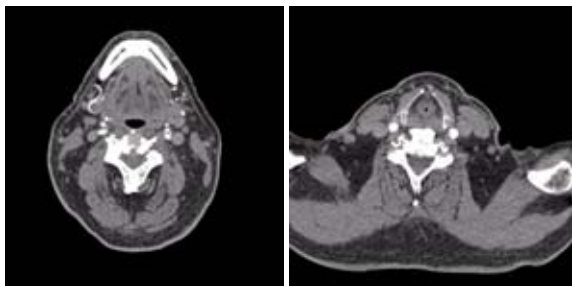
Spiral mode for soft tissue studies in the cervical region, e.g. tumors, lymphoma, abscesses etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20 cm will be covered in 28.04 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 20 cm will be covered in 17.29 sec.





# Neck

<b>Emotion 16</b>	<b>NeckRoutine</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B50s	B50s
<i>CTDI<sub>Vol</sub></i>	16.25 mGy	
<i>Effective dose</i>	Male: 3.61 mSv Female: 3.90 mSv	

<b>Emotion 6</b>	<b>NeckRoutine</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	85
<i>Rotation Time</i>	0.8 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	10.2 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B50s
<i>CTDI<sub>Vol</sub></i>	9.27 mGy
<i>Effective dose</i>	Male: 2.36 mSv Female: 2.48 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>45 sec.</i>
<i>Flow rate</i>	<i>2.0 ml/sec.</i>
<i>Total amount</i>	<i>120 ml</i>

### Hints

- Due to its iodine content, the thyroid gland is hyperdense in relation to the neighboring muscles both before and after an IV CM injection. For displays of the parotid or thyroid gland or the floor of the mouth, the slice thickness should be < 5 mm and the length of the range should be adapted to match the anatomic region.
- Target the FoV to ensure adequate coverage of the region of interest in the upper neck & middle neck levels as well as to include the axilla in the lower neck level if required.



## NeckThinSlice

### Indications:

Spiral mode using thin slices for soft tissue studies, e.g. the functional study of the throat.

For SOMATOM Emotion 6-slice configuration:

A typical range of 20 cm will be covered in 32.97 sec.

<b>Emotion 6</b>	<b>NeckThinSlice</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B50s	B50s
<i>CTDI<sub>Vol</sub></i>	16.51 mGy	
<i>Effective dose</i>	Male: 4.06 mSv Female: 4.25 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>45 sec.</i>
<i>Flow rate</i>	<i>2.0 ml/sec.</i>
<i>Total amount</i>	<i>120 ml</i>

### Hints

- Due to its iodine content, the thyroid gland is hyperdense in relation to the neighboring muscles both before and after an IV CM injection. For displays of the parotid or thyroid gland or the floor of the mouth, the slice thickness should be < 5 mm and the length of the range should be adapted to match the anatomic region.
- Target the FoV to ensure adequate coverage of the region of interest in the upper neck & middle neck levels as well as to include the axilla in the lower neck level if required.

## NeckVol

### Indications:

Spiral mode for soft tissue studies in the cervical region, e.g. tumors, lymphoma, abscesses etc.

Three recon jobs are predefined for reconstruction: the first for axial, the second for coronal and third for sagittal studies in 3D images display.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20 cm will be covered in 28.04 sec.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20 cm will be covered in 32.97 sec.

<b>Emotion 16</b>	<b>Neck</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	130		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	16 x 0.6 mm		
<i>Slice collimation</i>	0.6 mm		
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	7.7 mm		
<i>Pitch Factor</i>	0.80		
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B50s	B20s	B20s
<i>CTDI<sub>Vol</sub></i>	16.25 mGy		
<i>Effective dose</i>	Male: 3.61 mSv Female: 3.90 mSv		

# Neck

<b>Emotion 6</b>	<b>Neck</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	130		
<i>Rotation Time</i>	0.8 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	5.1 mm		
<i>Pitch Factor</i>	0.85		
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B50s	B20s	B20s
<i>CTDI<sub>Vol</sub></i>	16.51 mGy		
<i>Effective dose</i>	Male: 4.06 mSv Female: 4.25 mSv		

## Contrast medium IV injection

<i>Start delay</i>	<i>45 sec.</i>
<i>Flow rate</i>	<i>2.0 ml/sec.</i>
<i>Total amount</i>	<i>120 ml</i>

### Hints

- Due to its iodine content, the thyroid gland is hyperdense in relation to the neighboring muscles both before and after an IV CM injection. For displays of the parotid or thyroid gland or the floor of the mouth, the slice thickness should be < 5 mm and the length of the range should be adapted to match the anatomic region.
- Target the FoV to ensure adequate coverage of the region of interest in the upper neck & middle neck levels as well as to include the axilla in the lower neck level if required.







## Overview

In this chapter you will find all scan protocols relating to the **Shoulder** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, masses, trauma, dislocations, and orthopedic indications.

For SOMATOM Emotion 16-slice configuration:

- **Shoulder**  
Spiral mode for bone shoulder routine studies
- **ShoulderVol**  
Spiral mode for axial, coronal and sagittal shoulder studies

For SOMATOM Emotion 6-slice configuration:

- **Shoulder**  
Spiral mode for bone shoulder routine studies
- **ShoulderVol**  
Spiral mode for axial, coronal and sagittal shoulder studies

## General Hints

- Topogram: AP, 256 mm.
- Patient positioning:  
Patient lying in supine position, the uninjured arm placed above the head, the injured arm placed flat against his body. If only one side is under investigation, position this side in the center and support the other side with a Bocollo pillow (optional).
- If only one side is examined, it is advisable to enter the side in the comment line on the routine card.
- Contrast medium is required for soft tissue mass evaluation.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.

## Scan Protocols

### Shoulder

#### Indications:

Spiral mode for bone studies and soft tissue, e.g. evaluation of joint cavities, masses, trauma, dislocations, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A scan range of 15 cm will be covered in 26.44 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 15 cm will be covered in 40.50 sec.



# Shoulder

<b>Emotion 16</b>	<b>Shoulder</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation Time</i>	1.5 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	9.6 mm	
<i>Pitch Factor</i>	1.0	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B60s	B60s
<i>CTDI<sub>Vol</sub></i>	12.50 mGy	
<i>Effective dose</i>	Male: 3.38 mSv Female: 3.75 mSv	

<b>Emotion 6</b>	<b>Shoulder</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation Time</i>	1.5 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	6.0 mm	
<i>Pitch Factor</i>	1.00	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B60s	B60s
<i>CTDI<sub>Vol</sub></i>	12.70 mGy	
<i>Effective dose</i>	Male: 2.96mSv Female: 3.52 mSv	

## Hints

- Use raw data to review a target region if necessary.
- For image reconstruction of soft tissue use kernel B31s and a slice width of 5.0 mm.
- Coronal and sagittal 2D planar reconstructions are important for evaluation of the joint space & bursa sacs in CT arthograms.
- 3D renderings are helpful for complex fractures & dislocations.



## ShoulderVol

### Indications:

Spiral mode for bone studies and soft tissues, e.g. evaluation of joint cavities, masses, trauma, dislocations, orthopedic indications etc.

Three recon jobs are predefined for reconstruction: the first for soft tissue axial, the second for soft tissue coronal and third for sagittal bone studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A scan range of 15 cm will be covered in 26.44 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 15 cm will be covered in 40.50 sec.

<b>Emotion 16</b>	<b>Shoulder</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	100		
<i>Rotation Time</i>	1.5 sec.		
<i>Acquisition</i>	16 x 0.6 mm		
<i>Slice collimation</i>	0.6 mm		
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	9.6 mm		
<i>Pitch Factor</i>	1.0		
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B60s	B31s	B60s
<i>CTDI<sub>vol</sub></i>	12.50 mGy		
<i>Effective dose</i>	Male: 3.38 mSv Female: 3.75 mSv		



# Shoulder

<b>Emotion 6</b>	<b>Shoulder</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	100		
<i>Rotation Time</i>	1.5 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	6.0 mm		
<i>Pitch Factor</i>	1.0		
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B60s	B20s	B20s
<i>CTDI<sub>Vol</sub></i>	12.70 mGy		
<i>Effective dose</i>	Male: 2.96 mSv Female: 3.52 mSv		

## Hints

- Use raw data to review a target region if necessary.
- For image reconstruction of soft tissue use kernel B31s and a slice width of 5.0 mm.
- Coronal and sagittal 2D planar reconstructions are important for evaluation of the joint space & bursa sacs in CT arthograms.
- 3D renderings are helpful for complex fractures & dislocations.



## Overview

In this chapter you will find all scan protocols relating to the **Thorax** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, tumors, metastases, lymphoma, lymph nodes, vascular anomalies, and interstitial changes in the lungs.

For SOMATOM Emotion 16-slice configuration:

- **ThoraxRoutine**  
Spiral mode for routine thorax studies
- **ThoraxCombi**  
Spiral mode for the combination of thin slice lung and routine thorax studies
- **ThoraxVol**  
Spiral mode for axial, coronal soft tissue and coronal lung studies
- **ThoraxHR**  
Spiral mode for high resolution lung studies
- **ThoraxHRSeq**  
Sequential mode for high resolution lung studies
- **ThoraxECGHRSeq**  
Sequential mode for high resolution, ECG-triggered lung studies
- **LungLowDose**  
Spiral mode with very low dose for early visualization of pathologies
- **LungCARE**  
Spiral mode used for the application *syngo* Lung-CARE CT

# Thorax

For SOMATOM Emotion 6-slice configuration:

- **ThoraxRoutine/ThoraxRoutine06s**  
Spiral mode for routine thorax studies
- **ThoraxCombi/ThoraxCombi06s**  
Spiral mode for the combination of thin slice lung and routine thorax studies
- **ThoraxVol**  
Spiral mode for axial, coronal soft tissue and coronal lung studies
- **ThoraxFast/ThoraxFast06s**  
Spiral mode for fast chest studies
- **ThoraxHR**  
Spiral mode for high resolution lung studies
- **ThoraxHRSeq**  
Sequential mode for high resolution lung studies
- **ThoraxECGHRSeq**  
Sequential mode for high resolution, ECG-triggered lung studies
- **LungLowDose/LungLowDose06s**  
Spiral mode with very low dose for early visualization of pathologies
- **LungCARE/LungCARE06s**  
Spiral mode used for the application *syngo* Lung-CARE CT

## General Hints

- Topogram: AP, 512 mm.
- Patient positioning:  
Patient lying in supine position, arms positioned comfortably above the head in the head-arm rest, lower legs supported.
- Contrast medium administration: in general, IV injections are employed in all mediastinal examinations, but not in routine High Resolution studies of diffused, interstitial lung diseases. An IV contrast medium injection improves the vascular opacification and facilitates the visualization of the lesions, lymph nodes and the vessels.
- Stasis of contrast medium in the arm & superior vena cava often result in high density streak artifacts either in the region of the aortic arch or in the region of the subclavian vein. A caudo-cranial (bottom to top) scanning direction should be used to reduce this artifact – by simply acquiring the data in this region at the later phase of the spiral scan. In addition, if the patient cannot hold his/her breath for the duration of the entire scan, breathing motion will be less apparent in the apex than in the lower lobes.
- CARE Bolus (optional) may be used to optimize the bolus timing. Set the ROI for monitoring scan in the aorta at the level of the diaphragm with triggering threshold of 120 HU, or use manual triggering.

- Lung images should be documented in both soft tissue window and lung window.
- It is also possible to interleave the soft tissue & lung setting images in one film sheet. This can be set up in the configuration for filming.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.
- A special High Resolution lung kernel is supplied with B90s; by using kernel B90s, practically the same image impression is obtained as with HCE-filtering of a B40s image.

## Scan Protocols

### ThoraxRoutine/ ThoraxRoutine06s

#### Indications:

Routine spiral studies for the region of thorax, e.g. examination of tumors, metastases, lymphoma, lymph nodes, vascular anomalies etc.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 12.92 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 18.85 sec.





# Thorax

<b>Emotion 16</b>	<b>ThorRoutine</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	15.40 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	7.84 mGy	
<i>Effective dose</i>	Male: 4.36 mSv Female: 5.55 mSv	

<b>Emotion 6</b>	<b>ThorRoutine</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	10.2 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	7.63 mGy	
<i>Effective dose</i>	Male: 3.87 mSv Female: 5.02 mSv	

## Contrast medium IV injection

*Start delay*            25 – 30 sec.

*Flow rate*             2.5 ml/sec.

*Total amount*        80 ml

### Hint

- For lung cancer evaluation, this protocol can be combined with protocol **NeckRoutine**.

## ThoraxCombi/ ThoraxCombi06s

### Indications:

Combining thin slice lung and routine thorax studies with one spiral scan. E.g. thorax studies in general and interstitial changes in the lungs.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 21.20 sec.



# Thorax

<b>Emotion 16</b>	<b>Thor Combi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	70			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	14.4 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	B41s	B90s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	8.75 mGy			
<i>Effective dose</i>	Male: 4.51 mSv Female: 5.78 mSv			

# Thorax

<b>Emotion 6</b>	<b>Thor Combi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	70			
<i>Rotation time</i>	0.8/0.6 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.25 m m	1.25 m m
<i>Feed/ Rotation</i>	10.8/9.0 mm			
<i>Pitch Factor</i>	1.80/1.50			
<i>Increment</i>	5.0 mm	5.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	B41s	B90s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	8.89 mGy			
<i>Effective dose</i>	Male: 4.52/4.46 mSv Female: 5.85/5.79 mSv			

## Contrast medium IV injection

<i>Start delay</i>	<i>25 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 ml</i>

### Hints

- In addition to the mediastinum and the lungs, it may be necessary to evaluate the axillary fatty tissue and the bilateral mammary glands. A third reconstruction can be set up with a wider FoV in the Recon task card.
- For lung cancer evaluation, this protocol can be combined with protocol "Neck Routine".



## ThoraxVol

### Indications:

Routine spiral studies for the region of thorax, e.g., visualization of tumors, metastases, lymphoma, lymph nodes, vascular anomalies etc.

Four recon jobs are predefined for reconstruction: the first for soft tissue axial, the second for lung axial, the third for soft tissue coronal and fourth for soft tissue coronal studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 23.82 sec.



# Thorax

<b>Emotion 16</b>	<b>Thor Combi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	70			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm	5.0 mm
<i>Feed/ Rotation</i>	14.4 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	8.75 mGy			
<i>Effective dose</i>	Male: 4.51 mSv Female: 5.78 mSv			

# Thorax

<b>Emotion 6</b>	<b>Thor Combi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	70			
<i>Rotation time</i>	0.8 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	5.0 mm	5.0 mm
<i>Feed/ Rotation</i>	10.8 mm			
<i>Pitch Factor</i>	1.80			
<i>Increment</i>	5.0 mm	5.0 mm	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	8.89 mGy			
<i>Effective dose</i>	Male: 4.52 mSv Female: 5.85 mSv			

For the 3<sup>rd</sup> and 4<sup>th</sup> reconstruction a non-square matrix 3D recon job is predefined.

## Contrast medium IV injection

<i>Start delay</i>	<i>25 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 ml</i>

### Hint

- In addition to the mediastinum and the lungs, it may be necessary to evaluate the axillary fatty tissue and the bilateral mammary glands. A third reconstruction can be set up with a wider FoV in the Recon task card.
- For lung cancer evaluation, this protocol can be combined with protocol **NeckRoutine**.

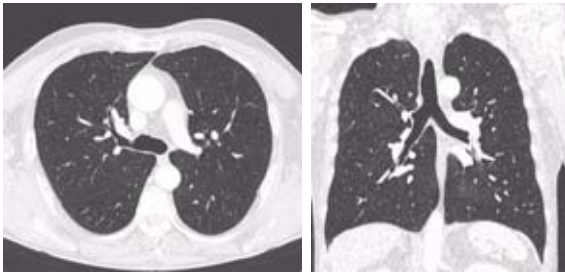
## ThoraxFast/ ThoraxFast06s

### Indications:

Fast spiral mode for lung studies, e.g. when a patient has difficulty with breathhold.

For SOMATOM Emotion 6-slice configuration:

A complete thorax scan in a range of 30 cm will be covered in 7.87 sec. with ThoraxFast.



# Thorax

<b>Emotion 6</b>	<b>ThorFast</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 3.0 mm	
<i>Slice collimation</i>	3.0 mm	
<i>Slice width</i>	6.0 mm	6.0 mm
<i>Feed/Rotation</i>	27.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	6.0 mm	6.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	7.14 mGy	
<i>Effective dose</i>	Male: 4.12 mSv Female: 5.25 mSv	

## **Contrast medium IV injection**

<i>Start delay</i>	25 – 30 sec.
<i>Flow rate</i>	2.5 ml/sec.
<i>Total amount</i>	80 ml

## **Hints**

- For lung cancer evaluation, this protocol can be combined with protocol "Neck Routine".

## ThoraxHR

### Indications:

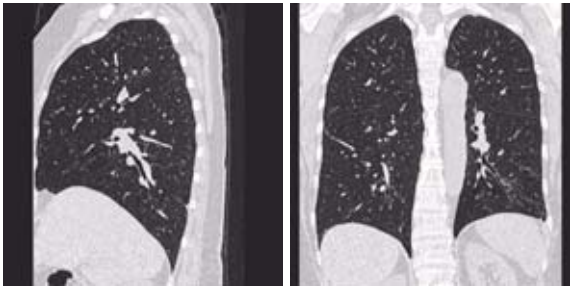
Spiral mode for high resolution studies, e.g. interstitial changes in the lungs.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm for the complete thorax will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm for the complete thorax will be covered in 28.27 sec.



# Thorax

<b>Emotion 16</b>	<b>ThorHR</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	100			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	14.4 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	B90s	B41s	B70s	B41s
<i>CTDI<sub>Vol</sub></i>	12.50 mGy			
<i>Effective dose</i>	Male: 6.56 mSv Female: 8.29 mSv			

# Thorax

<b>Emotion 6</b>	<b>ThorHR</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	130			
<i>Effective mAs/ Quality ref. mAs</i>	100			
<i>Rotation time</i>	0.8 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	9.0 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	B90s	B41s	B70s	B41s
<i>CTDI<sub>Vol</sub></i>	12.70 mGy			
<i>Effective dose</i>	Male: 6.23 mSv Female: 8.10 mSv			

## Hints

- With studies of interstitial changes in the lungs, contrast medium is not necessary.
- This examination is normally performed following a standard thorax study or used for regular follow up studies for high risk patient groups with a history of exposure to carcinogenic agents e.g. asbestos.





## ThoraxHRSeq

### Indications:

Sequence mode for high-resolution lung studies, for example, interstitial changes in the lungs using a feed of 10 mm.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 30.1 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 30.0 cm.



<b>Emotion 16</b>	<b>ThorHRSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	100
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	1.2 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	3.31 mGy
<i>Effective dose</i>	Male: 1.65 mSv Female: 2.13 mSv

<b>Emotion 6</b>	<b>ThorHRSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	100
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	1 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	1.01 mGy
<i>Effective dose</i>	Male: 0.49 mSv Female: 0.63 mSv

## Hints

- If you want to reconstruct thin slices every 10 or 20 mm instead of 15 mm as predefined, simply change the Feed/Scan before loading the mode.
- With studies of interstitial changes in the lungs, contrast medium is not necessary.

## ThoraxECGHRSeq

### Indications:

Sequence mode for High Resolution, ECG triggered lung studies, e.g. interstitial changes in the lungs.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 19.1 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 12.0 cm.

<b>Emotion 16</b>	<b>ThoraxECGHR</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	70
<i>Rotation time</i>	0.5 sec.
<i>Acquisition</i>	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	1.2 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	2.32 mGy
<i>Effective dose</i>	Male: 0.74 mSv Female: 0.98 mSv

<b>Emotion 6</b>	<b>ThoraxECGHR</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	70
<i>Rotation time</i>	0.8 sec.
<i>Acquisition</i>	1 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	0.71 mGy
<i>Effective dose</i>	Male: 0.21 mSv Female: 0.29 mSv

## Hints

- With studies of interstitial changes in the lungs, contrast medium is not necessary.
- If you want to reconstruct thin slices every 10 or 20 mm instead of 15 mm as predefined, simply change the Feed/Scan before loading the mode.

## LungLowDose/ LungLowDose06s

### Indications:

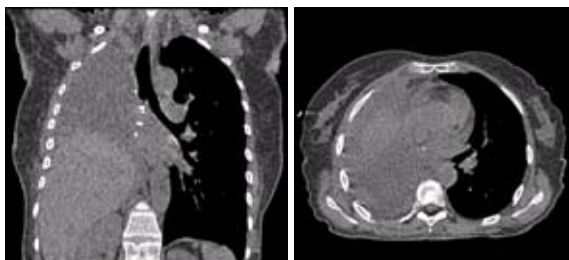
Spiral lung studies with low dose setting, e.g. early visualization of pulmonary nodules.

For SOMATOM Emotion 16-slice configuration:

A typical thorax study in a range of 30 cm will be covered in 19.95 sec.

For SOMATOM Emotion 6-slice configuration:

A typical thorax study in a range of 30 cm will be covered in 18.85 sec.



# Thorax

<b>Emotion 16</b>	<b>Lung Low Dose</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	16			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	9.6 mm			
<i>Pitch Factor</i>	1.00			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	B41s	B90s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	1.28 mGy			
<i>Effective dose</i>	Male: 0.68 mSv Female: 0.86 mSv			

# Thorax

<b>Emotion 6</b>	<b>LungLowDose</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	16	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	12.0/10.2 mm	
<i>Pitch Factor</i>	1.00/0.85	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B70s	B30s
<i>CTDI<sub>Vol</sub></i>	1.14 mGy	
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.62/0.74 mSv	



## Contrast medium IV injection

<i>Start delay</i>	<i>30 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>50 – 70 ml</i>

### Hints

- For lung cancer evaluation, this protocol can be combined with protocol "Neck Routine".
- Low dose lung images are usually evaluated using lung window setting. Soft tissue/bone window settings may be used to detect the presence of calcifications in the nodules.
- It is essential to use the same protocol for follow-up studies to check for progression.
- CARE Dose 4D is off as default because for LungLow-Dose protocols the lowest mAs values are used.

## LungCARE/ LungCARE06s

### Indications:

Spiral lung study with low dose setting for early visualization of pathologies, used for the application LungCARE.

For SOMATOM Emotion 16-slice configuration:

A typical thorax study in a range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A typical thorax study in a range of 30 cm will be covered in 17.87 sec.



# Thorax

<b>Emotion 16</b>	<b>Lung CARE</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	15			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	14.4 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	5.0 mm	5.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	B41s	B90s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	1.20 mGy			
<i>Effective dose</i>	Male: 0.64 mSv Female: 0.81 mSv			

# Thorax

<b>Emotion 6</b>	<b>Lung CARE</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	15			
<i>Rotation time</i>	0.8/0.6 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	5.0 mm	5.0 mm	1.25 mm	1.25 mm
<i>Feed/ Rotation</i>	10.8 mm			
<i>Pitch Factor</i>	1.80			
<i>Increment</i>	5.0 mm	5.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	B41s	B90s	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	1.25 mGy			
<i>Effective dose</i>	Male: 0.63 mSv Female: 0.81 mSv			

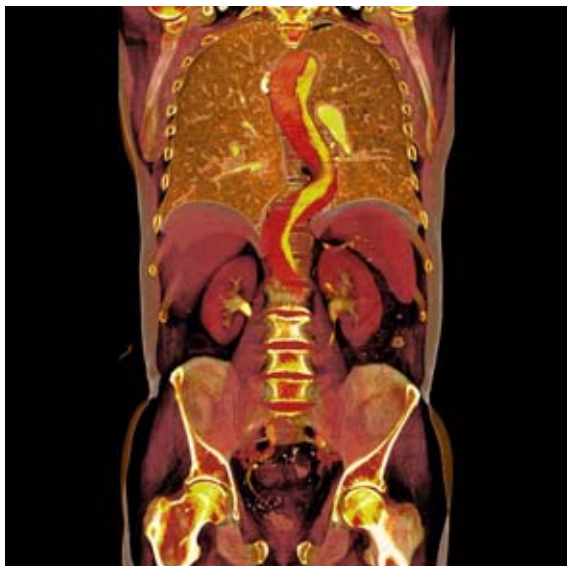
## Contrast medium IV injection

<i>Start delay</i>	<i>30 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>50 – 70 ml</i>

### Hints

- For lung cancer evaluation, this protocol can be combined with protocol Neck Routine or you can use the protocol NeckThorax.
- Low dose lung images are usually evaluated using lung window setting. Soft tissue/bone window settings may be used to visualize the presence of calcifications in the nodules.
- It is essential to use the same protocol for follow-up studies to check for progression.
- CARE Dose 4D is off as default because for syngo Lung CARE protocols the lowest mAs values are used.

For further information on the scan protocols and how to use *syngo* Lung CARE, please refer to the Application Guide "Clinical Applications".



## Overview

In this chapter you will find all scan protocols relating to the **Abdomen** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, liver, pancreas, and kidney abnormalities

For SOMATOM Emotion 16-slice configuration:

- **AbdomenRoutine**  
Spiral mode for routine abdominal studies
- **AbdomenCombi**  
Spiral mode for the combination of thin slice and routine abdominal studies
- **AbdomenVol**  
Spiral mode for axial and coronal abdomen studies

# Abdomen

- **AbdMultiPhase**  
Spiral mode for three phases liver studies
- **AbdSeq**  
Sequential mode for abdominal studies
- **Colonography**  
Spiral mode used for the application  
*syngo* Colonography

For SOMATOM Emotion 6-slice configuration:

- **AbdomenRoutine/AbdomenRoutine06s**  
Spiral mode for routine abdominal studies
- **AbdomenCombi/AbdomenCombi06s**  
Spiral mode for the combination of thin slice and routine abdominal studies
- **AbdomenVol**  
Spiral mode for axial and coronal abdomen studies
- **AbdomenFast/AbdomenFast06s**  
Spiral mode for fast abdominal studies
- **AbdMultiPhase/AbdMultiPhase06s**  
Spiral mode for three phases liver studies
- **AbdomenSeq**  
Sequential mode for abdominal studies
- **Colonography/Colonography06s**  
Spiral mode used for the application  
*syngo* Colonography

## General Hints

- Topogram: AP, 512.
- Patient positioning:  
Patient lying in supine position, arms positioned comfortably above the head in the head-arm rest, lower legs supported.
- Patient respiratory instruction: inspiration.
- Oral administration of contrast medium:  
For abdominal studies, it is necessary to delineate the bowel from other structures such as lymph nodes, abdominal masses & abscesses. Various types of bowel opacifying agents can be used:
  - Diluted barium suspension (1%–2%) e.g. EZCAT
  - Water soluble agent (2%–4%) e.g. Gastrografin
  - Water alone, as a negative contrast agent.

Timing of the oral contrast administration is important to ensure its even distribution in the bowel.

Upper abdomen:

Minimum 600 ml of contrast divided into 3 cups (approximately 200–250 ml)

1<sup>st</sup> cup to drink 30 minutes before exam

2<sup>nd</sup> cup to drink 15 minutes before exam

3<sup>rd</sup> cup to drink 5 minutes before exam

Abdomen-Pelvis:

Minimum 1000 ml of contrast divided into 4 cups

1<sup>st</sup> cup to drink 1 hour before exam

2<sup>nd</sup>–4<sup>th</sup> cups every subsequent 15 minutes

Start exam 5 minutes after the 4<sup>th</sup> cup is administered.



# Abdomen

- In general, for abdominal studies such as liver, gall bladder (query stones), pancreas, gastrointestinal studies, focal lesion of the kidneys and CTA studies, it is sufficient to use just water. Water is more effective than positive oral contrast agent in depicting the linings of the stomach & intestines in post enhancement studies. In addition, the use of water will not obscure the blood vessels thus allowing CTA processing to be performed easily afterwards.
- For patients with bowel obstruction, only water or water-soluble contrast can be used. Barium suspension is a contraindication.
- Be careful when examining pheochromocytoma patients. Administration of an IV CM injection in such cases may trigger a hypertensive crisis!
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.

## Scan Protocols

### **AbdomenRoutine/ AbdomenRoutine06s**

#### **Indications:**

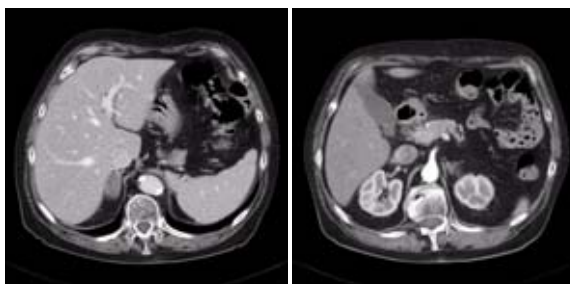
Spiral mode for routine studies in the region of abdomen, e.g. evaluation, follow-up examinations etc.

For SOMATOM Emotion 16-slice configuration:

A scan range of 20 cm will be covered in 9.01 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 20 cm will be covered in 12.96 sec.



# Abdomen

<b>Emotion 16</b>	<b>AbdRoutine</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	15.4 mm
<i>Pitch Factor</i>	0.80
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.44 mGy
<i>Effective dose</i>	Male: 5.81 mSv Female: 7.15 mSv

<b>Emotion 6</b>	<b>AbdRoutine</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	10.2 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.08 mGy
<i>Effective dose</i>	Male: 5.06 mSv Female: 6.30 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>50 – 60 sec.</i>
<i>Flow rate</i>	<i>3.0 ml/sec.</i>
<i>Total amount</i>	<i>100 ml</i>

### Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for “repeat”. E.g. when both non-contrast and contrast studies are required.
- Delayed scans may be required for the kidneys & bladder.
- If you want to use this protocol for a two-phase study, repeat the same protocol as mentioned below, and choose start delay time for arterial phase as 20 - 25 sec. In this case, the thin slice reconstruction can also be used for post-processing. Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images. Water could be used instead if necessary.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver.
- For pancreatic studies, the arterial phase acquisition can be acquired later with a start delay of 40 – 50 sec. It may be necessary to use a thinner collimation.



## AbdomenCombi/ AbdomenCombi06s

### Indications:

Combination of thin slice and routine abdominal studies with one spiral scan.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm for liver, pancreas or kidneys will be covered in 9.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 20 cm for liver, pancreas or kidneys will be covered in 14.53 sec.



# Abdomen

<b>Emotion 16</b>	<b>AbdCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	16.25 mGy	
<i>Effective dose</i>	Male: 6.66 mSv Female: 8.09 mSv	

<b>Emotion 6</b>	<b>AbdCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130/120	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	16.51/15.24 mGy	
<i>Effective dose</i>	Male: 6.32/5.84 mSv Female: 7.85/7.25mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>50 – 65 sec.</i>
<i>Flow rate</i>	<i>3.0 ml/sec.</i>
<i>Total amount</i>	<i>100 ml</i>

### Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for “repeat”. E.g. when both non-contrast and contrast studies are required.
- Delayed scans may be required for the kidneys & bladder.
- If you want to use this protocol for a two-phase study, repeat the same protocol as mentioned below, and choose start delay time for arterial phase as 20 - 25 sec. In this case, the thin slice reconstruction can also be used for post-processing. Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images. Water could be used instead if necessary.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver.
- For pancreatic studies, the arterial phase acquisition can be acquired later with a start delay of 40 -50 sec. It may be necessary to use a thinner collimation.





## AbdomenVol

### Indications:

Spiral mode for all routine studies in the region of abdomen, e.g. follow-up examinations etc. Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

The whole scan range of 20 cm will be covered in 9.53 sec.

For SOMATOM Emotion 6-slice configuration:

The whole scan range of 20 cm will be covered in 19.38 sec.

<b>Emotion 16</b>	<b>AbdCombi</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	0.6	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B30s
<i>CTDI<sub>Vol</sub></i>	16.25 mGy	
<i>Effective dose</i>	Male: 6.66 mSv Female: 8.09 mSv	

# Abdomen

<b>Emotion 6</b>	<b>AbdCombi</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	130	
<i>Rotation Time</i>	0.8	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B30s
<i>CTDI<sub>Vol</sub></i>	16.51 mGy	
<i>Effective dose</i>	Male: 6.32 mSv Female: 7.85 mSv	

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	50 – 65 sec.
<i>Flow rate</i>	3.0 ml/sec.
<i>Total amount</i>	100 ml

## Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for "repeat". E.g. when both non-contrast and contrast studies are required.
- Delayed scans may be required for the kidneys & bladder.
- If you want to use this protocol for a two-phase study, repeat the same protocol as mentioned below, and choose start delay time for arterial phase as 20 - 25 sec. In this case, the thin slice reconstruction can also be used for post-processing. Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images. Water could be used instead if necessary.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver.
- For pancreatic studies, the arterial phase acquisition can be acquired later with a start delay of 40 -50 sec. It may be necessary to use a thinner collimation.



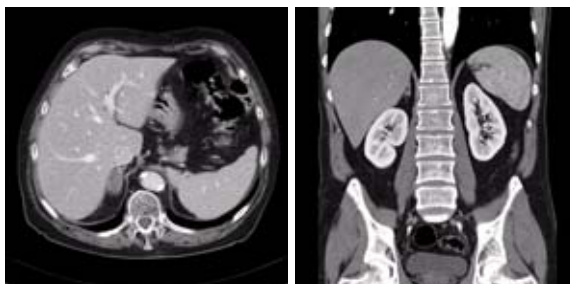
## AbdomenFast/ AbdomenFast06s

### Indications:

Fast spiral mode for abdominal studies, e.g. when a patient has difficulty with breathhold.

For the SOMATOM Emotion 6-slice configuration:

A range of 20 cm will be covered in 5.64 sec. with AbdomenFast06s.



<b>Emotion 6</b>	<b>AbdFast</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm
<i>Slice width</i>	6.0 mm
<i>Feed/Rotation</i>	27.0 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	6.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	12.24 mGy
<i>Effective dose</i>	Male: 5.34 mSv Female: 6.91 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>25 – 30 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 ml</i>

### Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for "repeat". E.g. when both non-contrast and contrast studies are required.
- Delayed scans may be required for the kidneys & bladder.
- If you want to use this protocol for a two-phase study, repeat the same protocol as mentioned below, and choose start delay time for arterial phase as 20 - 25 sec. In this case, the thin slice reconstruction can also be used for post-processing. Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images. Water could be used instead if necessary.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver.
- For pancreatic studies, the arterial phase acquisition can be acquired later with a start delay of 40 - 50 sec. It may be necessary to use a thinner collimation.

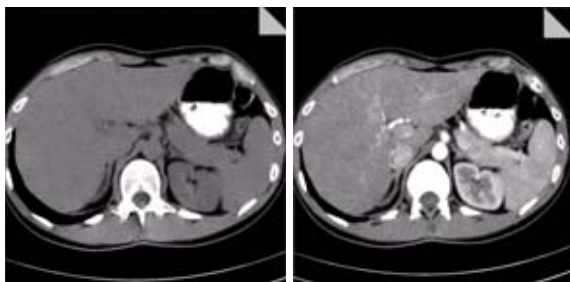
## AbdMultiPhase/ AbdMultiPhase06s

### Indications:

Combination of three phase study including liver, pancreas and kidney.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 5.37 sec.



<b>Emotion 16</b>	<b>Non Contrast</b>
kV	110
Effective mAs/ Quality ref. mAs	75
Rotation Time	0.6 sec.
Acquisition	16 x 1.2 mm
Slice collimation	1.2 mm
Slice width	5.0 mm
Feed/Rotation	28.8 mm
Pitch Factor	1.50
Increment	5.0 mm
Kernel	B41s
CTDI <sub>Vol</sub>	5.40 mGy
Effective dose	Male: 2.34 mSv Female: 2.89 mSv



# Abdomen

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 16.83 sec.

<b>Emotion 16</b>	<b>Arterial Phase</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	9.60 mGy	
<i>Effective dose</i>	Male: 4.05 mSv Female: 4.84 mSv	

# Abdomen

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 9.01 sec.

<b>Emotion 16</b>	<b>Venous Phase</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation Time</i>	0.6 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	15.4 mm
<i>Pitch Factor</i>	0.80
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.44 mGy
<i>Effective dose</i>	Male: 5.89 mSv Female: 7.15 mSv

# Abdomen

For SOMATOM Emotion 6-slice configuration:

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 7.87 sec.

<b>Emotion 6</b>	<b>Non Contrast</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	75
<i>Rotation Time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	18.0 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	5.33 mGy
<i>Effective dose</i>	Male: 2.14 mSv Female: 2.71 mSv

# Abdomen

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 12.96 sec.

<b>Emotion 6</b>	<b>Arterial Phase</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	2.5 mm
<i>Feed/Rotation</i>	10.2 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	5.0 mm	1.7 mm
<i>Kernel</i>	B41s	B31/B41s
<i>CTDI<sub>vol</sub></i>	8.52 mGy	
<i>Effective dose</i>	Male: 3.24 mSv Female: 4.03 mSv	

# Abdomen

A range of 20 cm including liver, pancreas and kidney:  
arterial phase acquired in 12.96 sec.

<b>Emotion 6</b>	<b>Venous Phase</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation Time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	10.2 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.08 mGy
<i>Effective dose</i>	Male: 5.06 mSv Female: 6.30 mSv

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	20 – 25 sec. * (arterial phase) 50 – 75 sec. * (venous phase)
<i>Flow rate</i>	4 – 5 ml/sec.
<i>Total amount</i>	100 – 120 ml

\* CARE Bolus may be used to optimize the bolus timing. Set the ROI for monitoring scan in the abdominal aorta at the beginning of the scan range with triggering threshold of 120 HU, or use manual triggering.

## Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for “repeat”. E.g. when both non-contrast and contrast studies are required.
- Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images. Use water instead if necessary.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver. Furthermore, this also ensures exact positioning for the CTA spiral.
- For pancreatic studies, the arterial phase acquisition can be acquired later with a start delay of 40–50 sec. It may be necessary to use a thinner collimation of 3 mm.



## AbdomenSeq

### Indications:

This protocol is created for measurement with sequential mode in the region of the abdomen.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 19.5 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 30.8 cm.

<b>Emotion 16</b>	<b>AbdSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	12.24 mGy
<i>Effective dose</i>	Male: 4.85 mSv Female: 5.68 mSv



# Abdomen

<b>Emotion 6</b>	<b>AbdSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation time</i>	0.8 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	4.0 mm
<i>Feed/Scan</i>	12.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.08 mGy
<i>Effective dose</i>	Male: 6.77 mSv Female: 11.34 mSv

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	50 – 60 sec.
<i>Flow rate</i>	3.0 ml/sec.
<i>Total amount</i>	100 ml

## Hints

- You could repeat the same protocol simply by clicking the chronicle with the right mouse button for “repeat”. E.g. when both non-contrast and contrast studies are required.
- Water, rather than positive oral contrast agents should be used. Give the last cup 200 ml just prior to positioning the patient. To ensure adequate filling of the duodenal loop, lay the patient on the right side for 5 minutes before performing the topogram.
- A pre-contrast examination is usually performed only if no CT scans were previously acquired, to exclude calculi in the common bile duct and to visualize possible lesions in the liver.

## Colonography/ Colonography06s

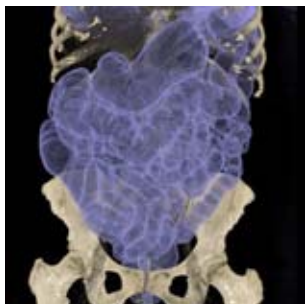
Spiral mode used for the application *syngo* Colonography.

For SOMATOM Emotion 16-slice configuration:

A complete colon in a range of 40 cm will be covered in 17.87 sec.

For SOMATOM Emotion 6-slice configuration:

A complete colon in a range of 40 cm will be covered in 27.87 sec.



# Abdomen

<b>Emotion 16</b>	<b>Colo_supine</b>	<b>Colo_prone</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	50	30
<i>Rotation Time</i>	0.6 sec.	0.6 sec.
<i>Acquisition</i>	16 x 0.6 mm	16 x 0.6 mm
<i>Slice collimation</i>	0.6 mm	0.6 mm
<i>Slice width</i>	1.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	14.4 mm
<i>Pitch Factor</i>	1.50	1.50
<i>Increment</i>	0.7 mm	0.7 mm
<i>Kernel</i>	B41s	B20s
<i>CTDI<sub>Vol</sub></i>	6.25 mGy	3.75 mGy
<i>Effective dose</i>	Male: 4.48 mSv Female: 6.85 mSv	Male: 2.64 mSv Female: 4.11 mSv

# Abdomen

<b>Emotion 6</b>	<b>Colo_supine</b>	<b>Colo_prone</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	50	30
<i>Rotation Time</i>	0.8/0.6 sec.	0.8/0.6 sec.
<i>Acquisition</i>	6 x 1.0 mm	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm	1.0 mm
<i>Slice width</i>	1.25 mm	1.25 mm
<i>Feed/Rotation</i>	10.8/9.0 mm	10.8/9.0 mm
<i>Pitch Factor</i>	1.80/1.50	1.80/1.50
<i>Increment</i>	0.8 mm	0.8 mm
<i>Kernel</i>	B41s	B20s
<i>CTDI<sub>vol</sub></i>	6.35 mGy	3.81 mGy
<i>Effective dose</i>		
<i>Male:</i>	4.61/4.53 mSv	2.77/2.72 mSv
<i>Female:</i>	7.01/6.96 mSv	4.20/4.18 mSv

## **Contrast medium IV injection**

<i>Start delay</i>	50 – 60 sec.
<i>Flow rate</i>	3.0 ml/sec.
<i>Total amount</i>	100 ml

CARE Dose 4D is off as default because for CT Colonography protocols the lowest mAs values are used.

For further information on the scan protocols and how to use *syngo* Colonography, please refer to the Application Guide "Clinical Applications".





## Overview

In this chapter you will find all scan protocols relating to the **Spine** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, prolapse, degenerative changes, trauma, and tumors.

For SOMATOM Emotion 16-slice configuration:

- **C-Spine**  
Spiral mode for cervical spine studies
- **C-SpineVol**  
Spiral mode for axial, sagittal soft tissue and sagittal bone studies for the cervical spine
- **SpineRoutine**  
Spiral mode for routine lumbar and thoracic spine studies

# Spine

- **SpineVol**  
Spiral mode for axial and sagittal lumbar and thoracic spine studies
- **SpineSeq**  
Sequential mode for lumbar and thoracic evaluation of the discs
- **Osteo**  
Sequential mode used for the application *syngo* Osteo CT

For SOMATOM Emotion 6-slice configuration:

- **C-Spine**  
Spiral mode for cervical spine studies
- **C-SpineVol**  
Spiral mode for axial, sagittal soft tissue and sagittal bone studies for the cervical spine
- **SpineRoutine**  
Spiral mode for routine lumbar and thoracic spine studies
- **SpineVol**  
Spiral mode for axial and sagittal lumbar and thoracic spine studies
- **SpineThinSlice**  
Spiral mode for thin slice lumbar and thoracic spine studies
- **SpineSeq**  
Sequential mode for lumbar and thoracic evaluation of the discs
- **Osteo**  
Sequential mode used for the application *syngo* Osteo CT

## General Hints

- Topogram: Lateral, 512 mm for thoracic and lumbar spine and 256 mm for the C-spine.
- Patient positioning for thoracic and lumbar spine studies:  
Patient lying in supine position, arms positioned comfortably above the head in the head-arm rest, lower legs supported.
- Patient positioning for cervical spine studies:  
Patient lying in supine position, hyperextend neck slightly, secure head well in head holder.
  - Patient respiratory instruction: do not breathe, do not swallow.

*Any possible injuries to the spinal column should be determined before beginning the examination and taken into account when repositioning the patient.*

- In case of 3D study only, images should be reconstructed with at least 50% overlapping and kernel B10.
- In case of SSD study only, mAs value can be reduced by 50%. Use kernel B10 and 50% overlapping image reconstruction.
- For lumbar studies, place a cushion under the patient's knees. This will reduce the curve in the spine and also make the patient more comfortable.
- For image reconstruction of bone study, use kernel B60.
- The CT scan following myelography must be performed within 4-6 hours of the injection, otherwise, the contrast density in the spinal canal will be too high to obtain artifact-free images. Also, if possible, it is a good idea to roll the patient once, or scan in a prone position. This will prevent the contrast from pooling posterior to the spinal cord.
- If a prone scan is performed, breathing instructions are recommended to avoid motion artifact in axial source and MPR images.



- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.
- With CAREdose 4D the mA values are adapted for each osteo range, according to the patient diameter. Therefore special obese protocols for the osteo evaluation are not longer necessary.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.

## Scan Protocols

### C-Spine

#### Indications:

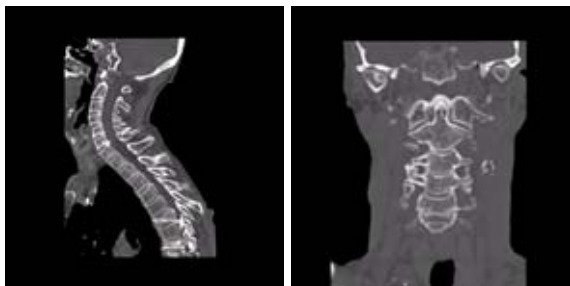
Spiral mode for cervical spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be covered in 21.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be covered in 31.41 sec.



# Spine

<b>Emotion 16</b>	<b>C-Spine</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	2.0 mm	0.7 mm
<i>Kernel</i>	B31s	B60s
<i>CTDI<sub>Vol</sub></i>	18.75 mGy	
<i>Effective dose</i>	Male: 3.49 mSv Female: 3.71 mSv	

<b>Emotion 6</b>	<b>C-Spine</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	2.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.8 mm
<i>Kernel</i>	B31s	B60s
<i>CTDI<sub>Vol</sub></i>	19.05 mGy	
<i>Effective dose</i>	Male: 4.27 mSv Female: 4.29 mSv	

## C-SpineVol

### Indications:

Spiral mode for cervical spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

Three recon jobs are predefined for reconstruction: the first for soft tissue axial, the second for soft tissue sagittal and third for sagittal bone studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be covered in 21.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be covered in 31.41 sec.

<b>Emotion 16</b>	<b>C-Spine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	150		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	16 x 0.6 mm		
<i>Slice collimation</i>	0.6 mm		
<i>Slice width</i>	2.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	7.7 mm		
<i>Pitch Factor</i>	0.80		
<i>Increment</i>	2.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B20s	B60s
<i>CTDI<sub>vol</sub></i>	18.75 mGy		
<i>Effective dose</i>	Male: 3.49 mSv Female: 3.71 mSv		

# Spine

<b>Emotion 6</b>	<b>C-Spine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	150		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	2.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	5.1 mm		
<i>Pitch Factor</i>	0.85		
<i>Increment</i>	2.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B20s	B60s
<i>CTDI<sub>Vol</sub></i>	19.05 mGy		
<i>Effective dose</i>	Male: 4.27 mSv Female: 4.29 mSv		

## SpineRoutine

### Indications:

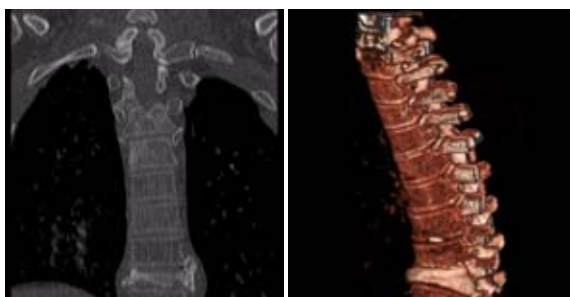
Spiral mode for thoracic and lumbar spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be covered in 26.04 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be covered in 27.00 sec.



<b>Emotion 16</b>	<b>SpineRoutine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
kV	130		
Effective mAs/ Quality ref. mAs	190		
Rotation Time	1.0 sec.		
Acquisition	16 x 0.6 mm		
Slice collimation	0.6 mm		
Slice width	3.0 mm	1.0 mm	1.0 mm
Feed/Rotation	6.2 mm		
Pitch Factor	0.65		
Increment	3.0 mm	0.7 mm	0.7 mm
Kernel	B31s	B31s	B70s
CTDI <sub>vol</sub>	23.75 mGy		
Effective dose	Male: 4.42 mSv Female: 4.70 mSv		

# Spine

<b>Emotion 6</b>	<b>Spine Routine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	190		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 2.0 mm		
<i>Slice collimation</i>	2.0 mm		
<i>Slice width</i>	3.0 mm	2.5 mm	2.5 mm
<i>Feed/Rotation</i>	6.0 mm		
<i>Pitch Factor</i>	0.50		
<i>Increment</i>	3.0 mm	1.5 mm	1.5 mm
<i>Kernel</i>	B31s	B31s	B60s
<i>CTDI<sub>Vol</sub></i>	20.70 mGy		
<i>Effective dose</i>	Male: 4.93 mSv Female: 11.26 mSv		

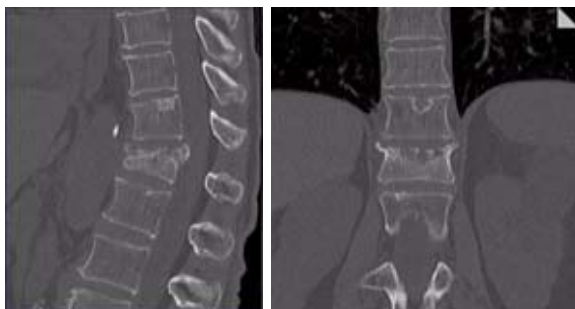
## SpineThinSlice

### Indications:

Spiral mode for thin slice thoracic and lumbar spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be covered in 32.30 sec.



<b>Emotion 6</b>	<b>Spine ThinSlice</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	190		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	3.0 mm	1.25 mm	1.25 mm
<i>Feed/Rotation</i>	3.3 mm		
<i>Pitch Factor</i>	0.55		
<i>Increment</i>	3.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	B31s	B31s	B70s
<i>CTDI<sub>Vol</sub></i>	24.13 mGy		
<i>Effective dose</i>	Male: 3.64 mSv Female: 7.23 mSv		



## SpineVol

### Indications:

Spiral mode for thoracic and lumbar spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

Three recon jobs are predefined for reconstruction: the first for soft tissue axial, the second for soft tissue sagittal and third for coronal bone studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be covered in 26.04 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be covered in 32.30 sec.

<b>Emotion 16</b>	<b>Spine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	190		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	16 x 0.6 mm		
<i>Slice collimation</i>	0.6 mm		
<i>Slice width</i>	3.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	6.2 mm		
<i>Pitch Factor</i>	0.65		
<i>Increment</i>	3.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B20s	B20s
<i>CTDI<sub>Vol</sub></i>	23.75 mGy		
<i>Effective dose</i>	Male: 4.42 mSv Female: 4.70 mSv		

# Spine

<b>Emotion 6</b>	<b>Spine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	190		
<i>Rotation Time</i>	1.0 sec.		
<i>Acquisition</i>	6 x 1.0 mm		
<i>Slice collimation</i>	1.0 mm		
<i>Slice width</i>	3.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	3.3 mm		
<i>Pitch Factor</i>	0.55		
<i>Increment</i>	3.0 mm	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B20s	B20s
<i>CTDI<sub>vol</sub></i>	24.13 mGy		
<i>Effective dose</i>	Male: 3.64 mSv Female: 7.23 mSv		



## SpineSeq

### Indications:

Sequence mode for spine studies, e.g. prolapse, degenerative changes, trauma, tumors etc.

This protocol contains three ranges: L3-L4, L4-L5, L5-S1.

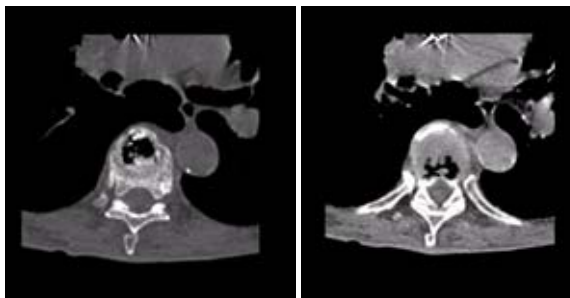
Three different typical gantry tilts are predefined: for L3-L4:  $0^\circ$ , for L4-L5:  $+5^\circ$  and for L5-S1:  $+15^\circ$

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 79 mm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 84 mm.



# Spine

<b>Emotion 16</b>	<b>L3-4</b>	<b>L4-5</b>	<b>L5-S1</b>
<i>kV</i>	130	130	130
<i>Effective mAs/ Quality ref. mAs</i>	280	280	320
<i>Rotation time</i>	1.5 sec.	1.5 sec.	1.5 sec.
<i>Acquisition</i>	12 x 0.6 mm	12 x 0.6 mm	12 x 0.6 mm
<i>Slice collimation</i>	0.6 mm	0.6 mm	0.6 mm
<i>Slice width</i>	2.4 mm	2.4 mm	2.4 mm
<i>Feed/Scan</i>	7.2 mm	7.2 mm	7.5 mm
<i>Kernel</i>	B31s	B31s	B31s
<i>CTDI<sub>Vol</sub></i>	38.64 mGy	38.49 mGy	42.66 mGy
<i>Effective dose</i>			
<i>Male:</i>	1.75 mSv	2.15 mSv	2.43 mSv
<i>Female:</i>	2.45 mSv	3.78 mSv	5.56 mSv

# Spine

<b>Emotion 6</b>	<b>L3-4</b>	<b>L4-5</b>	<b>L5-S1</b>
<i>kV</i>	130	130	130
<i>Effective mAs/ Quality ref. mAs</i>	280	280	320
<i>Rotation time</i>	1.5 sec.	1.5 sec.	1.5 sec.
<i>Acquisition</i>	6 x 1.0 mm	6 x 1.0 mm	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm	1.0 mm	1.0 mm
<i>Slice width</i>	2.0 mm	2.0 mm	2.0 mm
<i>Feed/Scan</i>	6.0 mm	6.0 mm	6.0 mm
<i>Kernel</i>	B31s	B31s	B31s
<i>CTDI<sub>Vol</sub></i>	35.56 mGy	35.56 mGy	40.64 mGy
<i>Effective dose</i>			
<i>Male:</i>	0.88 mSv	0.91 mSv	0.81 mSv
<i>Female:</i>	1.44 mSv	1.96 mSv	3.52 mSv

## Hint

- You could repeat the same protocol by simply clicking the chronicle with the right mouse button for repeat.



## Osteo

This is the scan protocol for the syngo Osteo CT application package to assist the physician with the quantitative assessment of vertebral bone mineral density (BMD) in the diagnosis and follow-up of osteopenia and osteoporosis.

<b>Emotion 16</b>	<b>Osteo</b>
<i>kV</i>	80
<i>Effective mAs/ Quality ref. mAs</i>	220
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	S80s
<i>CTDI<sub>Vol</sub></i>	5.72 mGy
<i>Effective dose</i>	Male: 0.48 mSv Female: 0.71 mSv

<b>Emotion 6</b>	<b>Osteo</b>
<i>kV</i>	80
<i>Effective mAs/ Quality ref. mAs</i>	220
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	S80s
<i>CTDI<sub>Vol</sub></i>	5.50 mGy
<i>Effective dose</i>	Male: 0.21 mSv Female: 0.49 mSv



- With CAREdose 4D the mA values are adapted for each osteo range, according to the patient diameter. Therefore special obese protocols for the osteo evaluation are not longer necessary.

Load all ranges in the application *syngo Osteo CT*.

For further information, please refer to the Application Guide "Clinical Applications".



## Overview

In this chapter you will find all scan protocols relating to the **Pelvis** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, abnormalities of the prostate, urinary bladder, rectum, joint cavity, masses, and trauma.

For SOMATOM Emotion 16-slice configuration:

- **Pelvis**  
Spiral mode for routine soft tissue pelvis studies
- **PelvisVol**  
Spiral mode for axial and coronal pelvis studies
- **Hip**  
Spiral mode for routine hip studies
- **HipVol**  
Spiral mode for axial and coronal hip studies
- **SI\_Joints**  
Spiral mode for sacral iliac joints studies

For SOMATOM Emotion 6-slice configuration:

- **Pelvis**  
Spiral mode for routine soft tissue pelvis studies
- **PelvisVol**  
Spiral mode for axial and coronal pelvis studies
- **Hip**  
Spiral mode for routine hip studies
- **HipVol**  
Spiral mode for axial and coronal hip studies
- **SI\_Joints**  
Spiral mode for sacral iliac joints studies

## General Hints

- Topogram: AP, 512 mm for pelvis studies and 256 mm for studies of the hip and SI Joints.
- Patient positioning:  
Patient lying in supine position, arms positioned comfortably above the head in the head-arm rest, lower legs supported.
- A breathing command is not necessarily required for the pelvic examination, since respiration does not negatively influence this region.
- Rectal contrast medium administration:  
Rectal contrast media is usually required to delineate the rectum and sigmoid colon, if lower pelvic mass or pathology is suspected. In some cases, air may be substituted for a positive contrast agent. The use of vaginal tampon may be helpful in adult female patients with suspected pelvis pathology.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, the kernels B50s, B60s, B70s, B80s are available.

## Scan Protocols

### Pelvis

#### Indications:

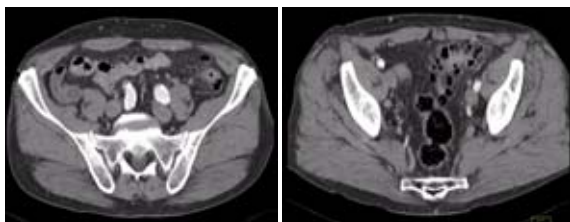
Spiral mode for routine pelvis studies, e.g. processes of the prostate, urinary bladder, rectum, gynecological indications etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20 cm will be covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 20 cm will be covered in 13.11 sec.



# Pelvis

<b>Emotion 16</b>	<b>Pelvis</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation Time</i>	1.0 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	28.8 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.44 mGy
<i>Effective dose</i>	Male: 5.32 mSv Female: 9.14 mSv

<b>Emotion 6</b>	<b>Pelvis</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	120
<i>Rotation Time</i>	1.0 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	18.0 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	13.08 mGy
<i>Effective dose</i>	Male: 5.13 mSv Female: 8.76 mSv

## Contrast medium IV injection

<i>Start delay</i>	<i>50 sec. *</i>
<i>Flow rate</i>	<i>2.0 – 3.0 ml/sec.</i>
<i>Total amount</i>	<i>100 – 120 ml</i>

*\* If the examination performed requires a full urinary bladder, wait at least 3 minutes following IV administration of the contrast medium.*





## PelvisVol

### Indications:

Spiral mode for pelvis studies, e.g. processes of the prostate, urinary bladder, rectum, gynecological indications etc.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20 cm will be covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 20 cm will be covered in 13.11 sec.

<b>Emotion 16</b>	<b>Pelvis</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	28.8 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	13.44 mGy	
<i>Effective Dose</i>	Male: 5.32 mSv Female: 9.14 mSv	

# Pelvis

<b>Emotion 6</b>	<b>Pelvis</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	18.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	13.08 mGy	
<i>Effective Dose</i>	Male: 5.13 mSv Female: 8.76 mSv	

## **Contrast medium IV injection**

<i>Start delay</i>	50 sec. *
<i>Flow rate</i>	2.0 – 3.0 ml/sec.
<i>Total amount</i>	100 – 120 ml

\* If the examination performed requires a full urinary bladder, wait at least 3 minutes following IV administration of the contrast medium.

## Hip

### Indications:

Spiral mode for bone studies and soft tissue studies of the Hip. E.g. evaluation of joint cavity, masses, trauma, dysplasia, necrosis of the head of the hip, congruence evaluations, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 10 cm will be covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 10 cm will be covered in 13.11 sec.



# Pelvis

<b>Emotion 16</b>	<b>Hip</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B70s	B70s
<i>CTDI<sub>Vol</sub></i>	12.50 mGy	
<i>Effective Dose</i>	Male: 2.31 mSv Female: 5.93 mSv	

<b>Emotion 6</b>	<b>Hip</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation Time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B70s	B70s
<i>CTDI<sub>Vol</sub></i>	12.70 mGy	
<i>Effective Dose</i>	Male: 3.60 mSv Female: 3.16 mSv	

## Hints

- In case of 3D study only, images should be reconstructed with at least 50% overlapping and kernel B10.
- If only one side is examined, it is advisable to enter the side in the comment line on the **Routine** card.



## HipVol

### Indications:

Spiral mode for bone studies and soft tissue studies of the Hip, e.g. evaluation of joint cavity, masses, trauma, dysplasia, necrosis of the head of the hip, congruence evaluations, orthopedic indications etc.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A typical range of 10 cm will be covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 10 cm will be covered in 13.11 sec.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

<b>Emotion 16</b>	<b>Hip</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B70s	B60s
<i>CTDI<sub>Vol</sub></i>	12.50 mGy	
<i>Effective Dose</i>	Male: 2.31 mSv Female: 5.93 mSv	



# Pelvis

<b>Emotion 6</b>	<b>Hip</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	100	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B70s	B60s
<i>CTDI<sub>Vol</sub></i>	12.70 mGy	
<i>Effective Dose</i>	Male: 3.60 mSv Female: 3.16 mSv	

## Hint

- In case of 3D study only, images should be reconstructed with at least 50% overlapping and kernel B10.
- If only one side is examined, it is advisable to enter the side in the comment line on the routine card.

## SI\_Joints

### Indications:

Spiral mode for bone studies of the sacral iliac joints, e.g. evaluation of joint cavity, masses, trauma, dysplasia, necrosis, congruence evaluations, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 8 cm will be covered in 7.56 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 8 cm will be covered in 10.89 sec.



# Pelvis

<b>Emotion 16</b>	<b>SI_Joints</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	3.0 mm	0.7 mm
<i>Kernel</i>	B70s	B70s
<i>CTDI<sub>Vol</sub></i>	15.00 mGy	
<i>Effective dose</i>	Male: 2.21 mSv Female: 5.44 mSv	

<b>Emotion 6</b>	<b>SI_Joints</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	120	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	B70s	B70s
<i>CTDI<sub>Vol</sub></i>	15.24 mGy	
<i>Effective dose</i>	Male: 2.83 mSv Female: 3.82 mSv	

# Upper Extremities



## Overview

In this chapter you will find the scan protocol relating to the **Upper Extremities** region, its description, individual indications, and important hints on using it.

You can use the following scan protocol to clarify, for example, trauma, masses, disorders of the joint, and orthopedic indications.

# Upper Extremities

For SOMATOM Emotion 16-slice configuration:

- **WristHR**  
Spiral mode for routine high resolution wrist studies
- **ExtrRoutineHR**  
Spiral mode for routine high resolution extremity studies
- **ExtrCombi**  
Spiral mode for the combination of thin slice and routine studies

For SOMATOM Emotion 6-slice configuration:

- **WristHR**  
Spiral mode for routine high resolution wrist studies
- **ExtrRoutineHR**  
Spiral mode for routine high resolution extremity studies
- **ExtrCombi**  
Spiral mode for the combination of thin slice and routine studies

## General Hints

- Topogram: AP, 256 mm for joint studies.
- Patient positioning:  
Depends on the region of examination.  
In general, for bilateral studies, you should always try to position the patient evenly whenever the patient can comply.

For wrists and elbow scans:

Patient lying in **prone position**, hands stretched above the head and lying flat on a Bocollo pillow (optional), ankles supported with a pad. Both wrists should be examined together when necessary.

- Retrospective reconstruction can be done:
  - a) Use B50s kernel for soft tissue evaluation.
  - b) For targeted FoV images on the affected side, it is advisable to enter the side being examined in the comment line.
- In case of 3D study only, use kernel B10 and at least 50% overlapping image reconstruction.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.
- The special kernels are mostly used for "physical" measurements with phantoms, e.g. for adjustment procedures (S80s), for constancy and acceptance tests (S80s, U90s), or for specification purposes (U90s).
- For special patient protocols, S80s and U90s are chosen, e.g. for osteo (S80s) and for high resolution bone studies (U90s). We recommend using the high resolution specification kernel U90s only with "small" objects, like the wrist, otherwise artifacts will occur in the images.

## Scan Protocols

### WristHR

#### Indications:

Spiral mode for resolution bone study of the wrist, for example, trauma, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A range of 6 cm will be done in 35.33 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 6 cm will be done in 25.53 sec.





# Upper Extremities

<b>Emotion 16</b>	<b>WristHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	40	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	4 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	0.6 mm
<i>Feed/Rotation</i>	1.8 mm	
<i>Pitch Factor</i>	0.75	
<i>Increment</i>	2.0 mm	0.4 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	5.52 mGy	
<i>Effective dose</i>	Male: < 0 mSv Female: < 0 mSv	

<b>Emotion 6</b>	<b>WristHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	40	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 0.5 mm	
<i>Slice collimation</i>	0.5 mm	
<i>Slice width</i>	2.0 mm	1.0 mm
<i>Feed/Rotation</i>	2.6 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.6 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	5.12 mGy	
<i>Effective dose</i>	Male: 0.01mSv Female: < 0 mSv	

## Hints

- For image reconstruction of soft tissue, use kernel B30s/B31s.



## ExtrRoutineHR

### Indications:

Spiral mode for high-resolution bone study, for example, trauma, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A range of 10 cm will be done in 57.56 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be done in 41.22 sec.



# Upper Extremities

<b>Emotion 16</b>	<b>ExtrHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	4 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	0.6 mm
<i>Feed/Rotation</i>	1.8 mm	
<i>Pitch Factor</i>	0.75	
<i>Increment</i>	2.0 mm	0.4 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	8.28 mGy	
<i>Effective dose</i>	Male: 0.02 mSv Female: 0.02 mSv	

<b>Emotion 6</b>	<b>ExtrHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 0.5 mm	
<i>Slice collimation</i>	0.5 mm	
<i>Slice width</i>	2.0 mm	1.0 mm
<i>Feed/Rotation</i>	2.6 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.6 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	7.68 mGy	
<i>Effective dose</i>	Male: 0.01 mSv Female: 0.02 mSv	

## Hint

- For image reconstruction of soft tissue, use kernel B30s/B31s.



## ExtrCombi

### Indications:

Spiral mode for the combination of bone and soft tissue studies, e.g. masses, trauma, disorders of the joint etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be done in 12.42 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be done in 13.11 sec.

<b>Emotion 16</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	50	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	4.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	4.0 mm	0.7 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	6.25 mGy	
<i>Effective dose</i>	Male: 0.02 mSv Female: 0.02 mSv	

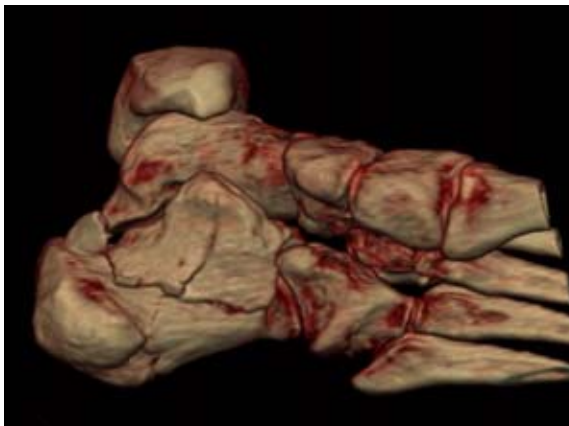


# Upper Extremities

<b>Emotion 6</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	50	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	4.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	4.0 mm	0.8 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	6.35 mGy	
<i>Effective dose</i>	Male: 0.01 mSv Female: 0.01 mSv	

## Hint

- For image reconstruction of soft tissue, use kernel B30s/B31s.



## Overview

In this chapter you will find the scan protocol relating to the **Lower Extremities** region, its description, individual indications, and important hints on using it.

You can use the following scan protocol to clarify, for example, masses, disorders of the joint, and orthopedic indications.

For SOMATOM Emotion 16-slice configuration:

- **Knee**  
Spiral mode for routine joint studies
- **Foot**  
Spiral mode for routine foot studies
- **ExtrRoutineHR**  
Spiral mode for routine high resolution extremity studies
- **ExtrCombi**  
Spiral mode for the combination of thin slice and routine studies

# Lower Extremities

For SOMATOM Emotion 6-slice configuration:

- **Knee**  
Spiral mode for routine joint studies
- **Foot**  
Spiral mode for routine wrist studies
- **ExtrRoutineHR**  
Spiral mode for routine high resolution extremity studies
- **ExtrCombi**  
Spiral mode for the combination of thin slice and routine studies

## General Hints

- Topogram: AP, 256 mm for joint studies.
- Patient positioning:  
Depends on the region of examination. In general, for bilateral studies, you should always try to position the patient evenly whenever the patient can comply.
- For knee scan:  
Patient lying in supine position, feet first, promote relaxation by placing Bocollo pillows between knees and feet, bind feet together. The only exceptions are extremely light patients. The latter can remove the leg not being examined from the gantry by bending it 90° at the hip and the knee and placing the bottom of the same foot against the gantry casing.
- For ankle and feet scan:  
Patient lying in supine position, feet first. Bind both ankles together if necessary to assure the AP position of both feet. Special positioning is not necessary since the real time MPR could simulate any view of secondary reconstruction.
- Retrospective reconstruction can be done:
  - a) Use B50s kernel for soft tissue evaluation.
  - b) For targeted FoV images on the affected side, it is advisable to enter the side being examined in the comment line.
- In case of 3D study only, use kernel B10 and at least 50% overlapping image reconstruction.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment, and slice width for image reconstruction.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required e.g. in patient protocols for cervical spine, shoulder, extremities, thorax, lung, the kernels B50s, B60s, B70s, B80s are available.
- In case of 3D study only, the mAs value can be reduced by 50%. Use kernel B10s and at least 50% overlapping for image reconstruction.

## Scan Protocols

### Knee

#### Indications:

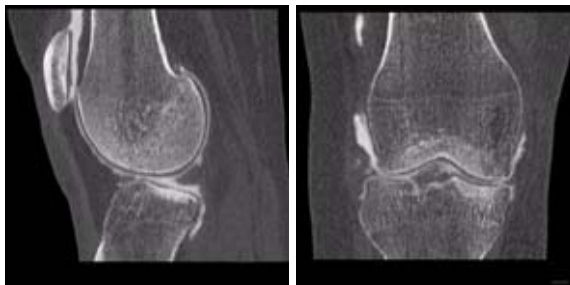
Spiral mode for knee bone study, e.g. trauma, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be done in 21.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be done in 31.41 sec.



# Lower Extremities

<b>Emotion 16</b>	<b>Knee</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	3.0 mm	0.7 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	10.00 mGy	
<i>Effective dose</i>	Male: 0.06 mSv Female: 0.05 mSv	

<b>Emotion 6</b>	<b>Knee</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	10.16 mGy	
<i>Effective dose</i>	Male: 0.05 mSv Female: 0.05 mSv	

## Hints

- For image reconstruction of soft tissue, use kernel B30s/B31s.

## Foot

### Indications:

Spiral mode for foot bone study, e.g. trauma, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be done in 21.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be done in 31.41 sec.





# Lower Extremities

<b>Emotion 16</b>	<b>Foot</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	3.0 mm	0.7 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	7.50 mGy	
<i>Effective dose</i>	Male: 0.02 mSv Female: 0.01 mSv	

<b>Emotion 6</b>	<b>Foot</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	7.62 mGy	
<i>Effective dose</i>	Male: 0.02 mSv Female: 0.02 mSv	

## Hints

- For image reconstruction of soft tissue, use kernel B30s/B31s.

## ExtrRoutineHR

### Indications:

Spiral mode for high resolution bone study, e.g. trauma, orthopedic indications etc.

For SOMATOM Emotion 16-slice configuration:

A range of 10 cm will be done in 57.56 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be done in 41.22 sec.



# Lower Extremities

<b>Emotion 16</b>	<b>ExtrHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs*</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	4 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	0.6 mm
<i>Feed/Rotation</i>	1.8 mm	
<i>Pitch Factor</i>	0.75	
<i>Increment</i>	2.0 mm	0.4 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	8.28 mGy	
<i>Effective dose</i>	Male: 0.01 mSv Female: 0.01 mSv	

# Lower Extremities

<b>Emotion 6</b>	<b>ExtrHR</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs*</i>	60	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 0.5 mm	
<i>Slice collimation</i>	0.5 mm	
<i>Slice width</i>	2.0 mm	1.0 mm
<i>Feed/Rotation</i>	2.6 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	2.0 mm	0.6 mm
<i>Kernel</i>	U90s	U90s
<i>CTDI<sub>Vol</sub></i>	7.68 mGy	
<i>Effective dose</i>	Male: 0.01 mSv Female: 0.01 mSv	

\* Adjust the mAs value to the body region.

## Hint

- For image reconstruction of soft tissue, use kernel B30s/B31s.



## ExtrCombi

### Indications:

Spiral mode for the combination of bone and soft tissue studies, e.g. masses, trauma, disorders of the joint etc.

For SOMATOM Emotion 16-slice configuration:

A range of 15 cm will be done in 12.42 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 10 cm will be done in 13.11 sec.

<b>Emotion 16</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup>reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs*</i>	50	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	4.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	4.0 mm	0.7 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	6.25 mGy	
<i>Effective dose</i>	Male: 0.02 mSv Female: 0.02 mSv	

# Lower Extremities

<b>Emotion 6</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs*</i>	50	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	4.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	4.0 mm	0.8 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	6.35 mGy	
<i>Effective dose</i>	Male: 0.01 mSv Female: 0.01 mSv	

\* Adjust the mAs value to the body region.

## Hint

- For image reconstruction of soft tissue, use kernel B30s/B31s.



## Overview

In this chapter you will find all scan protocols relating to the **Vascular** region, their descriptions, individual indications, and important hints on using them.

You can use the following scan protocols to clarify, for example, vascular abnormalities, stenosis or occlusions, coarse plaques anomalies, aneurysm, and embolism.



# Vascular

For SOMATOM Emotion 16-slice configuration:

- **HeadAngio**  
Spiral mode for routine head CTAngio studies
- **HeadAngioVol**  
Spiral mode for axial and coronal HeadCTAngio studies
- **CarotidAngio**  
Spiral mode for carotid CTAngio studies
- **CarotidAngioVol**  
Spiral mode for axial and coronal carotid CTAngio studies
- **ThorAngioRoutine**  
Spiral mode for routine thorax CTAngio studies
- **ThorAngioVol**  
Spiral mode for axial and oblique thorax CTAngio studies
- **ThorAngioECG**  
Spiral mode for ECG-gated thorax CTAngio studies using a collimation of 1.2 mm
- **Embolism**  
Spiral mode for routine pulmonary embolism studies
- **BodyAngioRoutine**  
Spiral mode for body CTAngio studies
- **BodyAngioVol**  
Spiral mode for axial and coronal body CTAngio studies
- **AngioRunOff**  
Spiral mode for long distance extremity CTAngio studies
- **WholeBodyAngio**  
Spiral mode for whole body angio studies

# Vascular

For SOMATOM Emotion 6-slice configuration:

- **HeadAngio/HeadAngio06s**  
Spiral mode for routine head CTAngio studies
- **HeadAngioVol**  
Spiral mode for axial and coronal HeadCTAngio studies
- **CarotidAngio/CarotidAngio06s**  
Spiral mode for carotid CTAngio studies
- **CarotidAngioVol**  
Spiral mode for axial and coronal carotid CTAngio studies
- **ThorAngioRoutine/ThorAngioRoutine06s**  
Spiral mode for routine thorax CTAngio studies
- **ThorAngioVol**  
Spiral mode for axial and oblique thorax CTAngio studies
- **ThorAngioECG06s**  
Spiral mode for ECG-gated thorax CTAngio studies
- **ThorAngioECGSeq**  
Sequential mode for ECG triggered chest CTAngio studies
- **Embolism/Embolism06s**  
Spiral mode for routine pulmonary embolism studies
- **BodyAngioRoutine/BodyAngioRoutine06s**  
Spiral mode for body CTAngio studies
- **BodyAngioVol**  
Spiral mode for axial and coronal body CTAngio studies
- **BodyAngioFast/BodyAngioFast06s**  
Spiral mode for fast body CTAngio studies
- **AngioRunOff /AngioRunOff06s**  
Spiral mode for long distance extremity CTAngio studies

## General Hints

- Topogram: AP, 512/1024, LAT 256
- Patient positioning:  
Patient lying in supine position, arms positioned comfortably above the head in the head-arm rest, lower legs supported.
- Patient respiratory instructions: inspiration.
- Oral administration of contrast medium:  
The use of water will not obscure the blood vessels thus allowing CTA processing to be performed easily afterwards.
- Be careful when examining pheochromocytoma patients. Administration of an IV CM injection in such cases may trigger a hypertensive crisis!
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment and slice width for image reconstruction.

## Head Kernels

- For soft tissue head studies, the standard kernel is H40s; softer images are obtained with H30s or H20s, H10s, sharper images with H50s. The kernels H21s, H31s, H41s yield the same visual sharpness as H20s, H30s, H40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using H31s, H41s instead of H30s, H40s. For the standard head protocols, we propose H21s, H31s, H41s.

## Body Kernels

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.

## Scan Protocols

### HeadAngio/ HeadAngio06s

#### Indications:

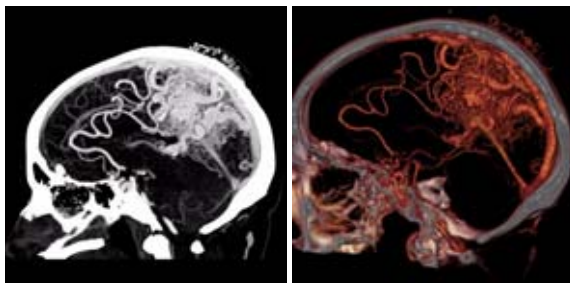
Spiral mode for cerebral CT Angio studies, e.g. cerebral vascular abnormalities, tumors and follow up studies etc.

For SOMATOM Emotion 16-slice configuration:

A range of 80 mm will be covered in 7.45 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 80 mm will be covered in 10.61 sec.



# Vascular

<b>Emotion 16</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	1.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	3.0 mm	0.7 mm
<i>Kernel</i>	H31s	H20s
<i>CTDI<sub>Vol</sub></i>	12.46 mGy	
<i>Effective dose</i>	Male: 0.43 mSv Female: 0.48 mSv	

<b>Emotion 6</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	1.25 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	H31s	H20s
<i>CTDI<sub>Vol</sub></i>	12.88 mGy	
<i>Effective dose</i>	Male: 0.37 mSv Female: 0.42 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>18 sec.</i>
<i>Flow rate</i>	<i>3.5 ml/sec.</i>
<i>Total amount</i>	<i>75 ml</i>

### Hint

- Use of CARE Bolus with monitoring scans positioned at the level of the basilar artery or carotid artery. Set the trigger threshold at 120 HU, or use manual triggering.





## HeadAngioVol

### Indications:

Spiral mode for cerebral CT Angio studies, e.g. cerebral vascular abnormalities, tumors and follow-up studies etc.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

The coronal view images will be reconstructed as MIP images.

For SOMATOM Emotion 16-slice configuration:

A range of 8.0 cm will be covered in 7.45 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 8.0 cm will be covered in 14.15 sec.

<b>Emotion 16</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	4.0 mm
<i>Feed/Rotation</i>	7.7 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	3.0 mm	4.0 mm
<i>Kernel</i>	H31s	H20s
<i>CTDI<sub>Vol</sub></i>	12.46 mGy	
<i>Effective dose</i>	Male: 0.43 mSv Female: 0.48 mSv	

# Vascular

<b>Emotion 6</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	4.0 mm
<i>Feed/Rotation</i>	5.1 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	3.0 mm	4.0 mm
<i>Kernel</i>	H31s	H20s
<i>CTDI<sub>Vol</sub></i>	12.88 mGy	
<i>Effective dose</i>	Male: 0.37 mSv Female: 0.42 mSv	

## **Contrast medium IV injection**

<i>Start delay</i>	18 sec.
<i>Flow rate</i>	3.5 ml/sec.
<i>Total amount</i>	75 ml

### **Hint**

- Use of CARE Bolus with monitoring scans positioned at the level of the basilar artery or carotid artery. Set the trigger threshold at 120 HU, or use manual triggering.

## CarotidAngio/ CarotidAngio06s

### Indications:

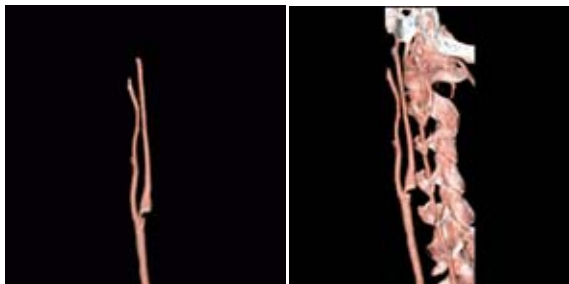
CT angiography of the carotid arteries, e.g. carotid stenosis or occlusion, coarse plaques abnormalities of the carotids or vertebral arteries, etc.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm including the aorta arch will be covered in 9.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 12 cm including the aorta arch will be covered in 9.20 sec.



# Vascular

<b>Emotion 16</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B30s	B20s
<i>CTDI<sub>Vol</sub></i>	5.60 mGy	
<i>Effective dose</i>	Male: 1.28 mSv Female: 1.41 mSv	

<b>Emotion 6</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	5.81 mGy	
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.62 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>15 sec.</i>
<i>Flow rate</i>	<i>4 ml/sec.</i>
<i>Total amount</i>	<i>90 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.
- High quality 2D & 3D postprocessing can be achieved using a thin slice thickness and 50% overlapping increments.
- Thick MPRs and ThinMIPs can be created very quickly on the 3D Task Card by just clicking on the appropriate icons. The thickness of these reconstructed images can be defined by clicking on the icons with the right mouse to open the entry field.



## CarotidAngioVol

### Indications:

CT angiography of the carotid arteries, e.g. carotid stenosis or occlusions, coarse plaques abnormalities of the carotids and vertebral arteries, etc.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view.

The coronal view images will be reconstructed as MIP images.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm including the aorta arch will be covered in 9.53 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 12 cm including the aorta arch will be covered in 12.27 sec.

<b>Emotion 16</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	5.60 mGy	
<i>Effective dose</i>	Male: 1.28 mSv Female: 1.41 mSv	



# Vascular

<b>Emotion 6</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	5.81 mGy	
<i>Effective dose</i>	Male: 0.57 mSv Female: 0.62 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>15 sec.</i>
<i>Flow rate</i>	<i>4 ml/sec.</i>
<i>Total amount</i>	<i>90 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.
- High quality 2D & 3D postprocessing can be achieved using a thin slice thickness and 50% overlapping increments.
- Thick MPRs and ThinMIPs can be created very quickly on the 3D Task Card by just clicking on the appropriate icons. The thickness of these reconstructed images can be defined by clicking on the icons with the right mouse to open the entry field.



## ThorAngioRoutine/ ThorAngioRoutine06s

### Indications:

Spiral mode for thorax CT Angio studies, e.g. visualization of tumors, metastases, lymphoma, lymph nodes, vascular anomalies etc.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 21.20 sec.



# Vascular

<b>Emotion 16</b>	<b>ThorAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	5.60 mGy	
<i>Effective dose</i>	Male: 2.92 mSv Female: 3.78 mSv	

<b>Emotion 6</b>	<b>ThorAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	5.81 mGy	
<i>Effective dose</i>	Male: 2.96 mSv Female: 3.83 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>10 – 25 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.
- Thick MPRs and ThinMIPs can be created very quickly on the 3D Task Card by just clicking on the appropriate icons. The thickness of these reconstructed images can be defined by clicking on the icons with the right mouse to open the entry field.
- Editing is necessary for SSD display of the thoracic aorta without the bone.



## ThorAngioVol

### Indications:

Spiral mode for thorax CT Angio studies, e.g. visualization of tumors, metastases, lymphoma, lymph nodes, vascular anomalies etc.

Two recon jobs are predefined for reconstruction: the first for axial, the second for double-oblique studies in 3D images display view.

The oblique view images will be reconstructed as MIP images.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 28.27 sec.

<b>Emotion 16</b>	<b>ThorAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/</i>	70	
<i>Quality ref. mAs</i>		
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B30s
<i>CTDI<sub>Vol</sub></i>	5.60 mGy	
<i>Effective dose</i>	Male: 2.92 mSv	
	Female: 3.78 mSv	



# Vascular

<b>Emotion 6</b>	<b>ThorAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	70	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B30s
<i>CTDI<sub>Vol</sub></i>	5.81 mGy	
<i>Effective dose</i>	Male: 2.96 mSv Female: 3.83 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>10 – 25 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.
- Thick MPRs and ThinMIPs can be created very quickly on the 3D Task Card by just clicking on the appropriate icons. The thickness of these reconstructed images can be defined by clicking on the icons with the right mouse to open the entry field.
- Editing is necessary for SSD display of the thoracic aorta without the bone.



## ThorAngioECG/ ThorAngioECG06s

### Indications:

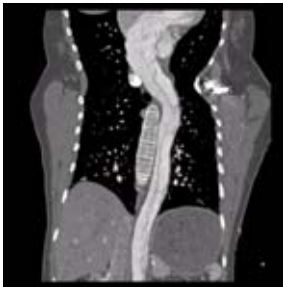
This is a spiral scanning protocol using a collimation of 1.2 mm and an ECG gating technique for thorax CTAngio studies.

For SOMATOM Emotion 16-slice configuration:

A range of 25 cm will be covered in 18.13 sec.

For SOMATOM Emotion 6:

A range of 15 cm will be covered in 19.95 sec.



# Vascular

<b>Emotion 16</b>	<b>ThorAngioECG</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	280	
<i>Rotation Time</i>	0.5 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	1.5 mm
<i>Feed/Rotation</i>	7.3 mm	
<i>Pitch Factor</i>	0.38	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	B31s	B31s
<i>Temp. resolution *</i>	up to 125 ms	
<i>CTDI<sub>Vol</sub></i>	31.36 mGy	
<i>Effective dose</i>	Male: 13.88 mSv Female: 18.66 mSv	

\*. depends on heart rate

# Vascular

<b>Emotion 6</b>	<b>ThorAngioECG</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	210	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	2.5 mm
<i>Feed/Rotation</i>	4.8 mm	
<i>Pitch Factor</i>	0.40	
<i>Increment</i>	5.0 mm	1.5 mm
<i>Kernel</i>	B31s	B31s
<i>Temp. resolution*</i>	up to 150 ms	
<i>CTDI<sub>vol</sub></i>	22.89 mGy	
<i>Effective dose</i>	Male: 5.87 mSv Female: 8.12 mSv	

\*. depends on heart rate

## Contrast medium IV injection

<i>Start delay</i>	<i>4 – 10 sec.</i>
<i>Flow rate</i>	<i>2.5 ml/sec.</i>
<i>Total amount</i>	<i>80 – 100 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.

## ThorAngioECGSeq

### Indications:

Sequential, ECG triggered study for location and extent of aneurysms, dissection, and ruptures of the thoracic aorta with typical scan range of 29.9 cm.

<b>Emotion 6</b>	<b>ThorAngioECG</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	80
<i>Rotation Time</i>	0.8 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	6.0 mm
<i>Kernel</i>	B31s
<i>Temp. resolution</i> *	up to 400 ms
<i>CTDI<sub>vol</sub></i>	10.16 mGy
<i>Effective dose</i>	Male: 6.92 mSv Female: 9.00 mSv

\*. depends on heart rate

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	10 – 30 sec.
<i>Flow rate</i>	2.5 ml/sec.
<i>Total amount</i>	80 ml

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the aortic arch with triggering threshold of 120 HU, or use manual triggering.





## Embolism/ Embolism06s

### Indications:

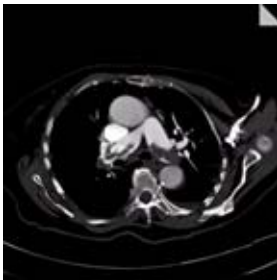
Spiral mode for pulmonary embolism studies.

For SOMATOM Emotion 16-slice configuration

A range of 30 cm will be covered in 13.70 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 28 cm will be covered in 19.87 sec.



# Vascular

<b>Emotion 16</b>	<b>Embolism</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	3.0 mm	0.75 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	3.0 mm	0.5 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	6.40 mGy	
<i>Effective dose</i>	Male: 3.28 mSv Female: 4.26 mSv	

<b>Emotion 6</b>	<b>Embolism</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	3.0 mm	1.25 mm
<i>Feed/Rotation</i>	10.8/9.0 mm	
<i>Pitch Factor</i>	1.80/1.50	
<i>Increment</i>	3.0 mm	0.8 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	6.64 mGy	
<i>Effective dose</i>	Male: 3.25/3.21 mSv Female: 4.23/4.18 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>6 – 10 sec.</i>
<i>Flow rate</i>	<i>4 ml/sec.</i>
<i>Total amount</i>	<i>80 – 100 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the pulmonary trunk with triggering threshold of 120 HU, or use manual triggering.



## BodyAngioRoutine/ BodyAngioRoutine06s

### Indications:

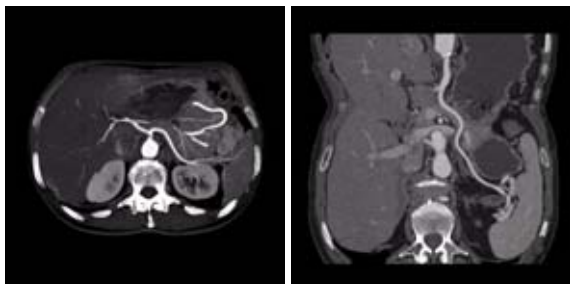
Spiral mode for abdominal CT Angio studies.

For SOMATOM Emotion 16-slice configuration:

A typical study in a range of 40 cm will be covered in 17.87 sec.

For SOMATOM Emotion 6-slice configuration:

A typical study in a range of 20 cm will be covered in 14.53 sec.



# Vascular

<b>Emotion 16</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.7 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	7.20 mGy	
<i>Effective dose</i>	Male: 5.04 mSv Female: 6.36 mSv	

<b>Emotion 6</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	0.8 mm
<i>Kernel</i>	B31s	B20s
<i>CTDI<sub>Vol</sub></i>	7.47 mGy	
<i>Effective dose</i>	Male: 2.83 mSv Female: 3.51 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>20 – 25 sec.</i>
<i>Flow rate</i>	<i>3.0 – 3.5 ml/sec.</i>
<i>Total amount</i>	<i>100 – 120 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the abdominal aorta with triggering threshold of 120 HU, or use manual triggering.
- Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images.
- Use water as oral contrast.
- The length of the CM spiral in the topogram (via the table position) can be planned exactly by means of pre-contrast images.
- Precontrast images are used to visualize calcification.
- Excellent postprocessed images can be created using a thin slice thickness and overlapping images, i.e. the increment should be smaller than the slice thickness.





## BodyAngioVol

### Indications:

Spiral mode for abdominal CT Angio studies.

Two recon jobs are predefined for reconstruction: the first for axial, the second for coronal studies in 3D images display view. The coronal view images will be reconstructed as MIP images.

For SOMATOM Emotion 16-slice configuration:

A typical study in a range of 40 cm will be covered in 17.87 sec.

For SOMATOM Emotion 6-slice configuration:

A typical study in a range of 20 cm will be covered in 19.38 sec.

<b>Emotion 16</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B30s
<i>CTDI<sub>Vol</sub></i>	7.20 mGy	
<i>Effective dose</i>	Male: 5.04 mSv Female: 6.36 mSv	

# Vascular

<b>Emotion 6</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	5.0 mm	3.0 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	3.0 mm
<i>Kernel</i>	B31s	B30s
<i>CTDI<sub>Vol</sub></i>	7.47 mGy	
<i>Effective dose</i>	Male: 2.83 mSv Female: 3.51 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>20 – 25 sec.</i>
<i>Flow rate</i>	<i>3.0 – 3.5 ml/sec.</i>
<i>Total amount</i>	<i>100 – 120 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the abdominal aorta with triggering threshold of 120 HU, or use manual triggering.
- Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images.
- Use water as oral contrast.
- The length of the CM spiral in the topogram (via the table position) can be planned exactly by means of pre-contrast images.
- Precontrast images are used to visualize calcification.
- Excellent postprocessed images can be created using a thin slice thickness and overlapping images, i.e. the increment should be smaller than the slice thickness.



## BodyAngioFast/ BodyAngioFast06s

### Indications:

Spiral mode for longer coverage and larger vessels.

For SOMATOM Emotion 6-slice configuration:

A typical study of the whole aorta including its bran-  
chiocephalic trunk and iliac arteries in a range of 30 cm  
will be covered in 9.77 sec.



# Vascular

<b>Emotion 6</b>	<b>BodyAngio Fast</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	2.5 mm
<i>Feed/Rotation</i>	21.0 mm	
<i>Pitch Factor</i>	1.75	
<i>Increment</i>	5.0 mm	1.5 mm
<i>Kernel</i>	B31/B30s	B31s
<i>CTDI<sub>Vol</sub></i>	6.39 mGy	
<i>Effective dose</i>	Male: 3.45 mSv Female: 5.82 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>20 sec.</i>
<i>Flow rate</i>	<i>3.5 ml/sec.</i>
<i>Total amount</i>	<i>120 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan in the abdominal aorta with triggering threshold of 120 HU, or use manual triggering.
- Do not administer oral contrast medium, as this impairs the editing of MIP/SSD/VRT images.
- Use water as oral contrast.
- The length of the CM spiral in the topogram (via the table position) can be planned exactly by means of pre-contrast images.
- Precontrast images are used to visualize calcification.
- Excellent postprocessed images can be created using a thin slice thickness and overlapping images, i.e. the increment should be smaller than the slice thickness.





## AngioRunOff/ AngioRunOff06s

### Indications:

Spiral mode for CT Angio studies of the extremities.

For SOMATOM Emotion 16-slice configuration:

A range of 80 cm will be done in 17.87 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 80 cm will be done in 23.42 sec.



# Vascular

<b>Emotion 16</b>	<b>AngioRunOff</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	6.0 mm	1.5 mm
<i>Feed/Rotation</i>	28.8 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	6.0 mm	1.0 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>Vol</sub></i>	6.48 mGy	
<i>Effective dose</i>	Male: 4.98 mSv Female: 5.08 mSv	

<b>Emotion 6</b>	<b>AngioRunOff</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	6.0 mm	2.5 mm
<i>Feed/Rotation</i>	21.6 mm	
<i>Pitch Factor</i>	1.80	
<i>Increment</i>	6.0 mm	1.5 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>Vol</sub></i>	6.39 mGy	
<i>Effective dose</i>	Male: 2.95 mSv Female: 1.94 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>25 – 30 sec.</i>
<i>Flow rate</i>	<i>3.0 – 3.5 ml/sec.</i>
<i>Total amount</i>	<i>120 – 150 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing and with a triggering threshold of 120 HU, or use manual triggering.
- If Topo length 1024 mm is not long enough, you can also choose the Topo length of 1500 mm.
- Position the patient as feet first. Bend the feet together if necessary.



## WholeBodyAngio

### Indications:

For CT Angio spiral studies of the whole body.

For SOMATOM Emotion 16-slice configuration:

A range of 80 cm will be done in 17.87 sec.

<b>Emotion 16</b>	<b>WholeBody</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation Time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	6.0 mm	1.5 mm
<i>Feed/Rotation</i>	28.8 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	6.0 mm	1.0 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>Vol</sub></i>	6.48 mGy	
<i>Effective dose</i>	Male: 9.33 mSv Female: 10.11 mSv	

## Contrast medium IV injection

<i>Start delay</i>	<i>10 – 20 sec.</i>
<i>Flow rate</i>	<i>3.0 – 3.5 ml/sec.</i>
<i>Total amount</i>	<i>120 – 150 ml</i>

### Hints

- CARE Bolus may be used to optimize the bolus timing.
- Set the ROI for monitoring scan with triggering threshold of 120 HU, or use manual triggering.
- If Topo length 1024 mm is not long enough, you can also choose the 1540 mm long Topogram.
- Position the patient as feet first. Bend the feet together if necessary.

## Overview

The examination protocols designed for some of these applications are under the "Special" folder.

### Trauma

In any trauma situation, time means life and the quality of life for the survivor. To facilitate the examinations, five protocols are provided.

For SOMATOM Emotion 16-slice configuration:

- **Trauma**  
This is a one-range mode for fast screening
- **TraumaVol**  
This is an one-range mode for fast screening for coronal and sagittal studies
- **PolyTrauma**  
This is a combined mode for the examination of multiple ranges, for example, Head, Neck, Thorax, Abdomen and Pelvis
- **HeadTrauma**  
Spiral head protocol for trauma studies with a FoV of 500 and therefore lowered image quality
- **HeadTraumaSeq**  
Sequential head protocol for trauma studies, with a FoV of 500 and therefore lowered image quality



For SOMATOM Emotion 6-slice configuration:

– **PolyTrauma/PolyTrauma06s**

This is a combined mode for the examination of multiple ranges, for example, Head, Neck, Thorax, Abdomen and Pelvis

– **HeadTrauma**

Spiral head protocol for trauma studies with a FoV of 500 and therefore lowered image quality

– **HeadTraumaSeq**

Sequential head protocol for trauma studies, with a FoV of 500 and therefore lowered image quality

## Interventional CT

For SOMATOM Emotion 16-slice configuration:

– **Biopsy**

This is the multislice biopsy mode. With three times 4.8 mm, the images will be reconstructed and displayed for each scan.

– **BiopsySingle**

This is a single multislice biopsy mode. One 10mm slice is aquired.

– **CARE Vision**

The CARE Vision protocol is a spiral mode without table feed, using a three times 4.8 mm slice thickness.

– **CARE VisionSingle**

The CARE Vision protocol is a spiral mode without table feed, using a 10 mm slice thickness.

– **CARE VisionBone**

The CARE Vision protocol is a spiral mode without table feed, using a three times 4.8 mm slice thickness with a bone kernel.

# Specials

For SOMATOM Emotion 6-slice configuration:

– **Biopsy**

This is the multislice biopsy mode. With three times 6.0 mm, the images will be reconstructed and displayed for each scan.

– **BiopsySingle**

This is a single multislice biopsy mode. One 10mm slice is acquired.

– **CARE Vision**

The CARE Vision protocol is a spiral mode without table feed, using a three times 6.0 mm slice thickness.

– **CARE VisionSingle**

The CARE Vision protocol is a spiral mode without table feed, using a 10 mm slice thickness.

– **CARE VisionBone**

The CARE Vision protocol is a spiral mode without table feed, using a three times 6.0 mm slice thickness with a bone kernel.

## Test Bolus

For SOMATOM Emotion 16-slice configuration:

- **TestBolus**

This mode can be used to test the start delay of optimal enhancement after the contrast medium injection.

For SOMATOM Emotion 6-slice configuration:

- **TestBolus**

This mode can be used to test the start delay of optimal enhancement after the contrast medium injection.



## Trauma Protocols

In any trauma situation, time means life and the quality of life for the survivor.

### General Information

- Check that the emergency drug trolley is well stocked and that all accessories such as in-room oxygen supply, respirator and resuscitation equipment that may be required during the examination are in working order.
- Prepare the CT room before admitting the patient, e.g., load IV contrast into the injector.
- Know, observe and practice the standard hospital operating policy for handling a patient in distress e.g. Code Blue for cardiac and respiratory arrest.
- Any possible injuries to the spinal column should be determined before beginning the examination and taken into account when shifting and positioning the patient.
- Ensure that all vital lines e.g., IV tubing and oxygen tubing are not trapped under the patient or between the table and the cradle. Make allowance for the length of tubing required for the topogram scan range.
- Never leave patients unattended at any time during the procedure.
- Observe the vital signs e.g. ECG, respiration, etc. at all times during the procedure.
- Finish the examination in the shortest possible time.



## Trauma

This is a one-range mode for fast screening for emergency studies.

For SOMATOM Emotion 16-slice configuration:

A scan range of 50 cm will be done in 11.62 s.

<b>Emotion 16</b>	<b>Trauma</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	85		
<i>Rotation Time</i>	0.6 sec.		
<i>Acquisition</i>	16 x 1.2 mm		
<i>Slice collimation</i>	1.2 mm		
<i>Slice width</i>	8.0 mm	2.0 mm	2.0 mm
<i>Feed/Rotation</i>	28.8 mm		
<i>Pitch Factor</i>	1.50		
<i>Increment</i>	8.0 mm	1.5 mm	1.5 mm
<i>Kernel</i>	B31s	B31s	B70s
<i>CTDI<sub>vol</sub></i>	9.52 mGy		
<i>Effective dose</i>	Male: 7.02 mSv Female: 8.81 mSv		



# Specials

## TraumaVol

This is a one-range mode for fast screening for emergency studies.

Three recon jobs are predefined for reconstruction: the first for axial, the second for coronal and the third sagittal studies in 3D images display view.

For SOMATOM Emotion 16-slice configuration:

A scan range of 50 cm will be done in 11.62 sec.

	<b>Trauma</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>
<i>kV</i>	130		
<i>Effective mAs/ Quality ref. mAs</i>	85		
<i>Rotation time</i>	0.6 sec.		
<i>Acquisition</i>	16 x 1.2 mm		
<i>Slice collimation</i>	1.2 mm		
<i>Slice width</i>	8.0 mm	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	28.8 mm		
<i>Pitch Factor</i>	1.50		
<i>Increment</i>	8.0 mm	8.0 mm	8.0 mm
<i>Kernel</i>	B31s	B30s	B30s
<i>CTDI<sub>Vol</sub></i>	9.52 mGy		
<i>Effective dose</i>	Male: 7.02 mSv Female: 8.81 mSv		

	<b>4<sup>rd</sup> recon.</b>	<b>5<sup>th</sup> recon.</b>
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B70s	B70s

## PolyTrauma/ PolyTrauma06s

Two combined ranges are predefined, head with neck and thorax with abdomen.



For SOMATOM Emotion 16-slice configuration:

A scan range of 12/14 cm will be done in 13.36/9.68 sec.

<b>Emotion 16</b>	<b>Head</b>	<b>Neck</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	240	150
<i>Rotation time</i>	1.0 sec.	1.0 sec
<i>Acquisition</i>	16 x 1.2 mm	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm	1.2 mm
<i>Slice width</i>	6.0 mm	5.0 mm
<i>Feed/Rotation</i>	10.6 mm	19.2 mm
<i>Pitch Factor</i>	0.55	1.00
<i>Increment</i>	6.0 mm	5.0 mm
<i>Kernel</i>	H31s	B50s
<i>CTDI<sub>vol</sub></i>	57.60 mGy	16.80 mGy
<i>Effective dose</i>		
<i>Male:</i>	2.63 mSv	3.08 mSv
<i>Female:</i>	2.88 mSv	3.37 mSv

# Specials

Take a new Topogram for the thorax and abdomen range.

A scan range of 20/40 cm will be done in 9.01/  
9.53 sec.

<b>Emotion 16</b>	<b>Thorax</b>	<b>AbdPelvis</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	50	90
<i>Rotation time</i>	0.6 sec.	0.6 sec
<i>Acquisition</i>	16 x 1.2 mm	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm	1.2 mm
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	15.4 mm	28.8 mm
<i>Pitch Factor</i>	0.80	1.50
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	5.60 mGy	10.08 mGy
<i>Effective dose</i>		
<i>Male:</i>	1.94 mSv	8.47 mSv
<i>Female:</i>	2.53 mSv	10.60 mSv

# Specials

For SOMATOM Emotion 6-slice configuration:

A scan range of 12/14 cm will be done in 9.84/13.67 sec.

<b>Emotion 6</b>	<b>Head</b>	<b>Neck</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	250	150
<i>Rotation time</i>	1.0 sec.	1.0 sec
<i>Acquisition</i>	6 x 3.0 mm	6 x 2.0 mm
<i>Slice collimation</i>	3.0 mm	2.0 mm
<i>Slice width</i>	6.0 mm	5.0 mm
<i>Feed/Rotation</i>	15.3 mm	12.0 mm
<i>Pitch Factor</i>	0.85	1.00
<i>Increment</i>	6.0 mm	5.0 mm
<i>Kernel</i>	H31s	B50s
<i>CTDI<sub>Vol</sub></i>	55.00 mGy	16.35 mGy
<i>Effective dose</i>		
<i>Male:</i>	2.58 mSv	3.09 mSv
<i>Female:</i>	2.79 mSv	3.23 mSv

# Specials

Take a new Topogram for the thorax and abdomen range.

A scan range of 20/40 cm will be done in 9.04/10.09 sec.

<b>Emotion 6</b>	<b>Thorax</b>	<b>AbdPelvis</b>
<i>kV</i>	130	130
<i>Effective mAs/ Quality ref. mAs</i>	50	90
<i>Rotation time</i>	0.8/0.6 sec.	0.8/0.6 sec
<i>Acquisition</i>	6 x 3.0 mm	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm	3.0 mm
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	15.3 mm	27.0 mm
<i>Pitch Factor</i>	0.85	1.50
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B41s
<i>CTDI<sub>Vol</sub></i>	5.10 mGy	9.18 mGy
<i>Effective dose</i>		
<i>Male:</i>	1.73 mSv	8.00 mSv
<i>Female:</i>	2.27 mSv	10.37 mSv

## HeadTrauma

A spiral mode for emergency head studies with a max. FoV of 500 mm.

For SOMATOM Emotion 16-slice configuration:

A scan range of 12 cm will be covered in 20.05 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 12 cm will be covered in 30.27 sec.



<b>Emotion 16</b>	<b>Head</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	240	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	6.0 mm	6.0 mm
<i>Feed/Rotation</i>	10.6 mm	
<i>Pitch Factor</i>	0.55	
<i>Increment</i>	6.0 mm	6.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	57.60 mGy	
<i>Effective dose</i>	Male: 2.63 mSv Female: 2.88 mSv	

# Specials

<b>Emotion 6</b>	<b>Head</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	250	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	6.0 mm	6.0 mm
<i>Feed/Rotation</i>	6.6 mm	
<i>Pitch Factor</i>	0.55	
<i>Increment</i>	6.0 mm	6.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	58.75 mGy	
<i>Effective dose</i>	Male: 2.76 mSv Female: 2.98 mSv	

## HeadTraumaSeq

A sequence mode for emergency head studies with a max. FoV of 500 mm.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 12.5 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 12.0 cm.

<b>Emotion 16</b>	<b>HeadSeq</b>	
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	270	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	2 x 5.0 mm	
<i>Slice collimation</i>	5.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Scan</i>	10.0 mm	10.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	58.32 mGy	
<i>Effective dose</i>	Male: 2.55 mSv Female: 2.81 mSv	



# Specials

<b>Emotion 6</b>	<b>HeadSeq</b>	
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	270	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	6 x 3.0 mm	
<i>Slice collimation</i>	3.0 mm	
<i>Slice width</i>	6.0 mm	6.0 mm
<i>Feed/Scan</i>	18.0 mm	18.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	59.40 mGy	
<i>Effective dose</i>	Male: 3.05 mSv Female: 3.17 mSv	

## Additional Important Information

- You can select which protocol is the emergency protocol.
- For long range scanning, please pay attention to the scannable range mark on the table mattress while positioning the patient.
- In some cases, it might be advisable to position the patient feet first so that there will be more space for the intensive care equipment around.
- The Trauma protocol is predefined with a Topo length of 1024 mm, the Poly Trauma protocol with a Topo length of 1536 mm.

**Note:** You should press the “Hold Measurement” button whenever the range shown on the real time growing topogram is long enough, in order to avoid unnecessary radiation.



## Interventional CT - Biopsy

To facilitate CT interventional procedures, we created dedicated multislice and single slice sequential modes.

Any of these protocols can be appended to a spiral protocol for CT interventional procedures, such as biopsy, abscess drainage, pain therapy, minimum invasive operations, joint studies, and arthrograms. Adjust the mAs according to the body region before loading.

10 scans are predefined. You can repeat it by clicking the chronicle with the right mouse button and select **repeat**, or simply change the number of scans to 99 before you start the first scan.

You can "Append" any routine protocol after the interventional procedure for a final check and documentation, e.g. a short range of spiral scanning for the biopsy region.

The table height can be adjusted to a minimum of 255 mm.

Zoom and pan of the images is possible within the Biopsy Mode.



## Biopsy

With this routine protocol images will be reconstructed with three time 4.8/6.0 mm or one time 10 mm slice thickness.

<b>Emotion 16</b>	<b>Biopsy</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	110
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	12 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	4.8 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	12.10 mGy

<b>Emotion 6</b>	<b>Biopsy</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	110
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm
<i>Slice width</i>	6.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	11.22 mGy

## Biopsy Single

One 10 mm slice images will be reconstructed and displayed for each scan.

<b>Emotion 16</b>	<b>Biopsy Single</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	50
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>Vol</sub></i>	5.10 mGy

<b>Emotion 6</b>	<b>Biopsy Single</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	50
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>Vol</sub></i>	4.75 mGy

## Interventional CT - CARE Vision

CARE Vision is a CT Fluoroscopic mode for interventions with 1 or 3 combined slices and up to 10 images per sec. displayed (depending on the hardware configuration).

### The Basics

Any of the predefined CARE Vision scan protocols can be appended to a spiral protocol for interventional procedures, such as biopsies, abscess drainage, pain therapy, minimum invasive operations, joint studies, and arthrograms.

The raw data will not be available for image reconstruction. In case of the FoV must be changed due to movement, insert a control scan by clicking on the chronicle with the right mouse button.

You can "Append" any routine protocol after the interventional procedure for a final check and documentation, for example, a short range of spiral scanning for the biopsy region.

With gantry tilt 0° the table height can be adjusted to minimum vertical position of 255 mm.

Automatic Patient Instruction (API) is not possible for CARE Vision.

You can change the gantry tilt on the gantry panel while the protocol is loaded.

## CAREVision

With this routine protocol, the image will be reconstructed and displayed using three times 4.8/6.0 mm or one time 10 mm slice thickness and a kernel of B30 in the CARE View mode.

<b>Emotion 16</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	4.8 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	3.75 mGy

<b>Emotion 6</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm
<i>Slice width</i>	6.0 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	3.06 mGy



## CAREVisionSingle

The images will be reconstructed and displayed with one time 10 mm slice thickness and a kernel of B30.

<b>Emotion 16</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	3.06 mGy

<b>Emotion 6</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	2.85 mGy

## CAREVisionBone

The images will be reconstructed and displayed in the CARE View mode with three times 4.8/6.0 mm or one time 10 mm slice thickness and a kernel of B50.

<b>Emotion 16</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	4.8 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B50s
<i>CTDI<sub>vol</sub></i>	3.75 mGy

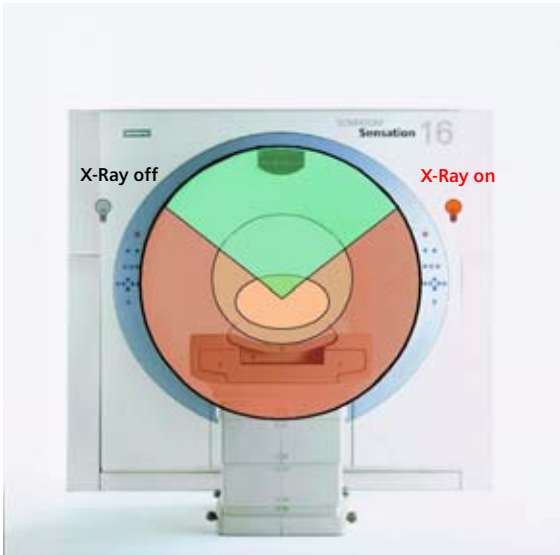
<b>Emotion 6</b>	<b>CAREVision</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	30
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm
<i>Slice width</i>	6.0 mm
<i>Feed/Scan</i>	0.0
<i>Increment</i>	1.0 mm
<i>Kernel</i>	B50s
<i>CTDI<sub>vol</sub></i>	3.06 mGy

# Specials

## HandCARE

HandCARE is a dedicated algorithm for dose reduction during the interventional procedure.

It switches off the x-ray exposure for a 100° angle between three different positions (10:00, 12:00 and 2:00 o' clock).



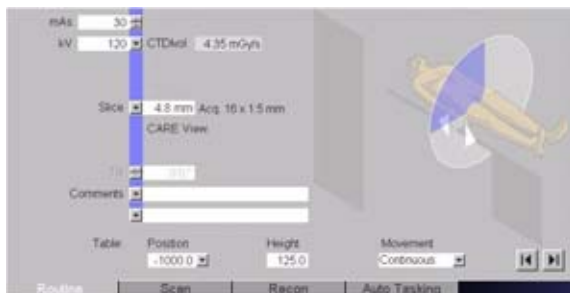
Thus provides a significant dose saving to the operator's hand, while keeping the image quality constant.

# Specials

The HandCARE item list offers “None” and three selectable protection areas. You can select this values independent of the current or a future patient position. The list elements are sorted clockwise from a view to the front of the gantry.

Values: {“None”, “10:00 o’ clock”, “12:00 o’ clock”, “2:00 o’ clock”}, default: “None”, label: “HandCARE”.

The HandCARE position is graphically displayed on the **Routine** subtask card.

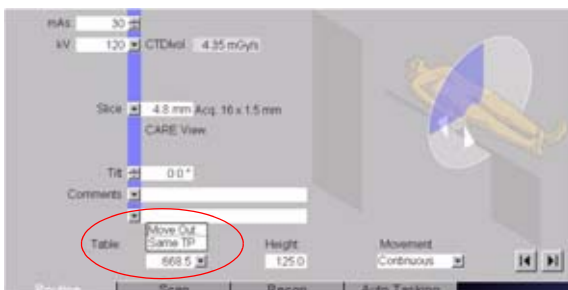


*HandCARE positions*

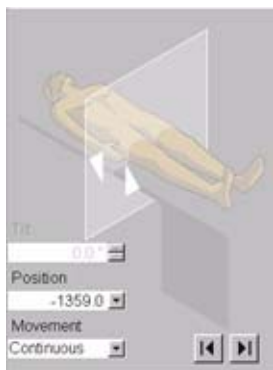
# Specials

## Application Procedure

1. Load and scan a spiral protocol of the interested body region.
2. Scroll through the images to define a target slice.
3. Click on **Same TP** under Table position, in the routine card. Move the table to the desired table position.
4. Turn on the light marker on the Gantry to localize the entry point, and then start patient preparation.
5. Open the **Patient Model Dialog**. Check the checkbox **Append**. Select one of the predefined **CAREVision** scan protocols under **Specials** protocols and then click **OK**.
6. Select the **HandCARE** position on the scan card.
7. Click **Load** and the **Cancel/Move** to scan on the pre-selected table position.
8. Press the footswitch to start the Fluoroscopy.



# Specials



*You can change the following Scan Parameters on the examination task card during radiation:*

- Gantry Tilt
- Table position
- Table movement type
- Feed in/Feed out

## Hints

- Press the footswitch either to position the needle or to control the needle position.
- Without HandCARE every time you release the footswitch max. the last scanned 3 sec. of acquired images are automatically saved to the local database.
- With HandCARE every time you release the footswitch one image per rotation is automatically saved to the local database.
- If CARE View is used, only the middle slice of the last image is displayed after release of the footswitch.

## Additional Important Information

### Pause CARE Vision Scan Range

If you pause the **CARE Vision Scan Range** the **SlicePosition** and **TableHeight** will be displayed in the Image Text.

### Reference Image Display

To display a reference image during the examination procedure, the **Viewing** task card can be displayed on a second monitor.

### Additional Dose Information

CARE Vision uses scan parameters and operating conditions, which are unique and may require additional care and radiation protection measures.

To avoid unnecessary exposure in any case, the scan time should be kept as short as possible.

## Radiation exposure to patients

- CARE Vision applies continuous exposure at moderate mA levels.
- Due to the potentially long scan times and the limited scan volume, the dose for certain slices may increase to levels significantly higher than those known from standard CT applications.
- The patient's exposure levels is usually estimated by CTDI<sub>vol</sub>.
- This unit is designed to give the average dose in the scanned volume.
- Before starting the scan, the dose rate (CTDI<sub>vol</sub> in mGy per second) is displayed on the monitor.
- During the CARE Vision scan, the accumulated dose (CTDI<sub>vol</sub>) reflecting the patient exposure is displayed on the monitor. The display scale ranges from zero to 3000 mGy.
- If the table is shifted during the examination, the accumulated dose will be distributed to different slices and will be lower than indicated by the display.
- When a new scan is loaded, the dose display starts again from zero.



## **Radiation exposure to personnel**

During the procedure the physician is in the scan room and close to the exposed scan plane.

- Take special care to avoid excessive and unnecessary radiation exposure.

Protection against primary x-ray exposure:

- In the worst case, any body parts in the scan plane may receive approximately the accumulated dose as shown on the CTDI display.
- Avoid being directly exposed to the x-ray beam.

Protection against stray radiation:

- The x-ray beam is limited to the imaged scan volume, but a significant portion of the x-rays is scattered and distributed in the scan room (stray radiation).
- Wear protective clothing to reduce exposure.
- A table with measured data of this stray radiation is included in the chapter on Safety in your SOMATOM Operator Manual.

## General Information for Biopsy and CARE Vision

### Interventional Toolbar

If you want to perform a CareVision or Biopsy Scan you can activate the new Interventional Tool Bar in the main menu under Image - Intervention.

The Interventional Toolbar will be displayed as soon as an Interventional Scan entry is being loaded.



Interventional Window 1/2/3



Save current Table Position (TP)



Auto Stop at Saved Table Position (TP)



Auto Stop at last Interventional Scan Position (SP)



Blow Up



CARE View



CARE View Blow Up

- **Interventional Window 1/2/3**

With the special window toggle button you can apply three different window settings to your image, the default values are: Abdomen (300/40), Lung (1200/-600) and Bone (1500/450).

You can choose different window settings under **Options>Configuration>Examination>Intervention**, these settings correspond to the window values list.

- **Save and Auto Stop functions**

The icon for **Auto-Stop at saved TP** will be highlighted in green, after you have pressed the button for **save current Table Position**, you will find a new entry in the Drop down menu of the subtask card. By moving the table to another position the icon will be displayed in gray until you reach the saved Table position, then it will turn to green again. If you activate the **Auto-Stop at saved TP** function and use the Joystick or the buttons on the Gantry, the table will stop automatically at the desired position so it is easier for you to reposition the patient again. This function will stay active until you press the button **Auto-Stop at saved TP** again.

The same behavior happens if you use the **Auto-Stop at Last Interventional Scan Position** function. If you press **Auto-Stop at Last Interventional Scan Position** and use the Gantry buttons to position your patient, the Gantry buttons will flash and show you in which direction you need to move the table to get back to your interventional table position again.

## • Screen layout

In the interventional Toolbar for **CARE Vision** you can change the Layout of the Display. There are three different modes available.

- Blow up (one big image)
- CARE View (three equal sized images)
- CARE View Blow up (one big and two smaller images on each side)

If you choose certain slice thicknesses and collimations in the Routine subtask card which are marked in bold letters, you will get in addition to your center an image that will be towards the head and one towards the feed. Then you can use the CARE View and CARE View Blow up mode as well for your interventional procedure.

You can change these modes while you are in the loaded process or while you are not applying radiation, the layout changes will be applied if you start scanning.

In the **Interventional Toolbar** for **Biopsy** you can change the layout of the display. There are three different modes available:

- Blow up (one big image)
- Two segment
- CARE View (three equal sized images)

The Image Layout can be changed in the interventional Toolbar regardless of the chosen slice thickness or collimation from Blow-up Mode to the two segment Mode. If you choose certain slice thicknesses and collimations, which are marked in bold letters, you have the option to get the images displayed in the CARE View Mode as well.

The changes will be applied directly during the Biopsy procedure.

# Specials

## CAREView

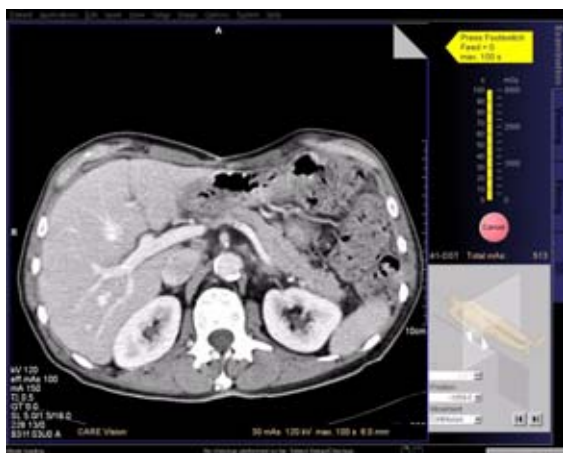
The item CAREView indicates when a combined image is displayed. When the number of Slice Positions per scan is three, CARE View is activated and shown on the **Routine** subtask card.



On the **Recon** subtask card you can select the CARE View image position, depending on the patient position, e.g. if you want to display the images which is closer to the head of the patient on the left hand side of the image area, select **Head – Left**.



# Specials

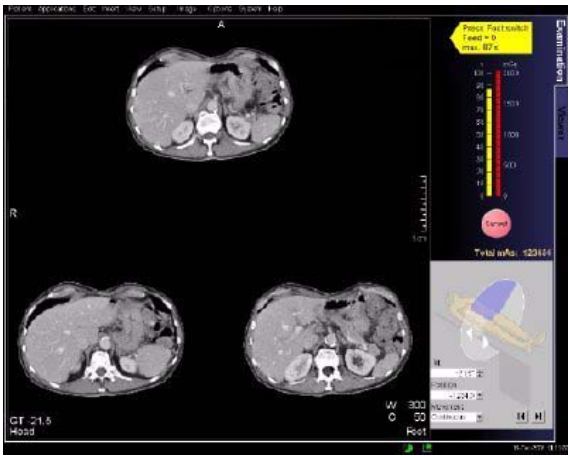


*CARE Vision and Biopsy layout for Single image display*

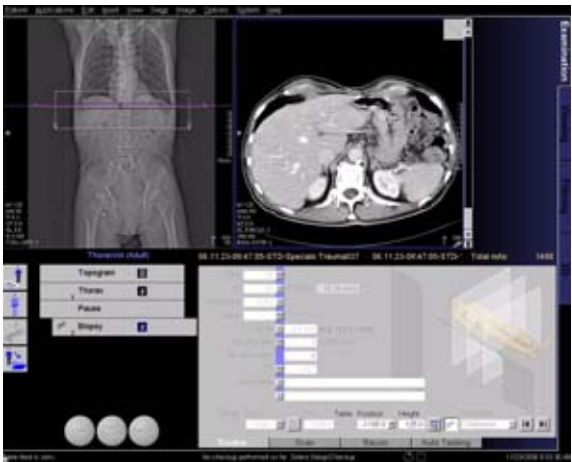


*CARE Vision layout for CAREView large-size display*

# Specials

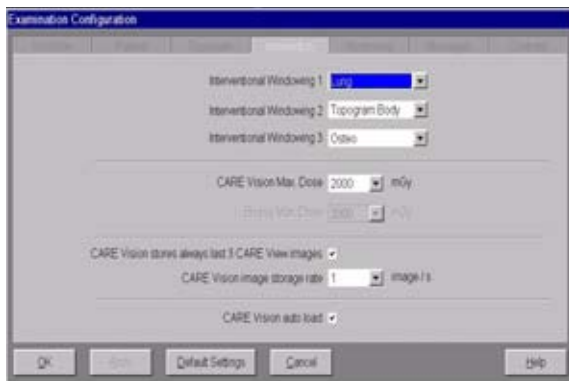


*CARE Vision and Biopsy layout for CAREView equal-size display*



*Biopsy two segment*

## Configuration



### Dose Display

The maximum displayed value of the Dose is set as a default to 2000 mGy. It is possible to configure this from 100-200 mGy under **Options>Configuration>Examination>Intervention**. Exceeding this configuration maximum value will not stop the scan, just the Dose scale bar will change to red. If you start scanning again the Dose scale bar will be reset.

### Storage rate

All three CAREView images (Head, Center and Feet) can be saved if you select it under **Configuration>Examination>Intervention** prior to your examination.

The image storage rate is also configurable under **Option>Configuration>Examination>Intervention** depending on your system. You can choose between an image storage rate of 1,2,4 (5 images/sec. for SOMATOM Emotion 16/6-slice configuration ) and 1\*3 images per second.



# Specials

## Example

3.5 second scan done.

Then at least four images are saved depending on configuration:

- **Conf: 1ima/s**
  - Central image - after 1st second
  - Central image - after 2nd second
  - Central image - after 3rd second
  - Central image - after 3,5 seconds (last)
  - All together - 4 images
- **Conf: 1ima/s + last 3 CARE View images**
  - Central image - after 1st second
  - Central image - after 2nd second
  - Central image - after 3rd second
  - Head/Central/Feet images - after 3,5 seconds
  - All together - 6 images
- **Conf: 1\*3ima/s**
  - Head/Central/Feet images - after 1st second
  - Head/Central/Feet images - after 2nd second
  - Head/Central/Feet images - after 3rd second
  - Head/Central/Feet images - after 3,5 seconds
  - All together - 12 images

## Auto load

You have the possibility to turn the CARE Vision auto "on". The system will then automatically load the CARE Vision Mode and display the axial images so that you can plan on which table position you want to perform your interventional procedure by using the "Move table position to displayed image position" function. If you prefer to reconstruct the images first you can switch this function off.

## Routine Subtask card

### **Move table/scanrange to displayed image position.**

The function **Move Table/Scanrange to displayed image position** in the Routine subtask card allows you to move the table to the position of the displayed tomo image in the selected segment. If you use the CARE View Mode you can use the Head of the Feet image for adjusting your table position as well.

### **Incremental/continuous table movement**

You can switch between incremental and continuous table movement while the scan is loaded, the default step size will be changed according to the chosen slice thickness (default is always half the current slice thickness) but adapt the increment in 0.5 steps.

### **Biopsy Icon**

In the Routine subtask card you will find a button for switching "on" the biopsy Mode for every sequential scan protocol. The box where you can define if you want to scan cranio-caudal or caudo-cranial will then change and you can decide if you want to move the table with an incremental or continuous table movement. Then the interventional Toolbar will be available as well.

### **Move table top only**

If you want to only move the Table top and have the Top Support fixed you can use the function **Move table top only** in the Routine Card. Make sure that the Top Support (table) is completely out.

## Additional Important Information

Independently from the Interventional Window buttons on the **Interventional Toolbar** you can use for faster windowing the function keys F2, F3 and F4 are implemented with standard window settings for Abdomen, Lung and Bone. Modifying them is possible under **Options> Configuration> Examination> Windowing**.

If you repeat a CARE Vision or Biopsy scan range the window setting last used will be applied to your new images. Inserting the next scan range by using the **Patient Model Dialog** will reset this function so that the default window setting will be applied.

If you want to change the window values you can do this under **Option> Configuration> Viewing> Evaluation General** but be aware you do not change it for the Interventional values only but for all window settings. If you don't want to change it for all window values you can for example change it for the Abdomen to 350/50 and save this as a new window setting with a new name, then you can apply these values as your interventional window settings and have the General window settings set as before.

## TestBolus Protocol

### TestBolus

This mode can be used to test the start delay of an optimal enhancement after the contrast medium injection.

<b>Emotion 16</b>	<b>TestBolus</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	40
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	2.60 mGy

<b>Emotion 6</b>	<b>TestBolus</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	40
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	10.0 mm
<i>Feed/Scan</i>	0.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	2.48 mGy



## Radiation Therapy Planning

The SOMATOM Emotion 16/6-slice configuration are very well suited to Radiation Therapy Planning (RTP) with its ergonomic enlarged gantry opening and its scan plane located only 35cm from the gantry front.

Using the external laser markers and the connected workstations, the system provides the complete procedure of Virtual Simulation in RTP much faster and more easily. The patient can leave the department after only a few minutes of CT scanning. The SOMATOM Emotion 16/6-slice configuration table supports all kinds of patient positioning, immobilization and verification accessories, ensuring the same patient position as on the LINAC table (for example, RT table tops, Beekleys, masks, IR cameras, new laser guidance system).

If non-diagnostic CT examinations have to be performed, dedicated low dose protocols for virtual simulation are provided.

Because external simulation SW might not be able to handle complete spiral data sets, sequence scans are available as well.

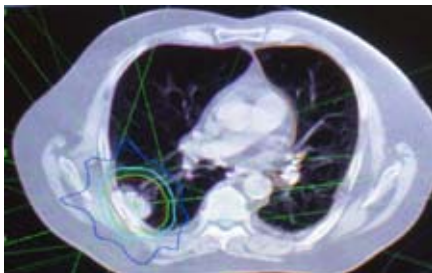
The treatment planning can be performed later, maybe when the patient is no longer present. Applications for virtual simulation are available on the COHERENCE Dosimetrist or the *syngo* Multi Modality Workplace, from where the results can be sent to the LINAC for patient treatment.

# Radiation Therapy



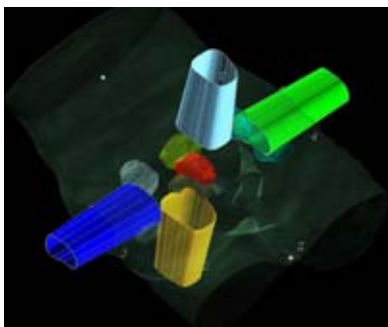
COHERENCE Dosimetrist

**Remember the challenges of Radiation Therapy...**



- Precisely locate and delineate the tumor volume
- Establish reliable external references on the patient surface

# Radiation Therapy



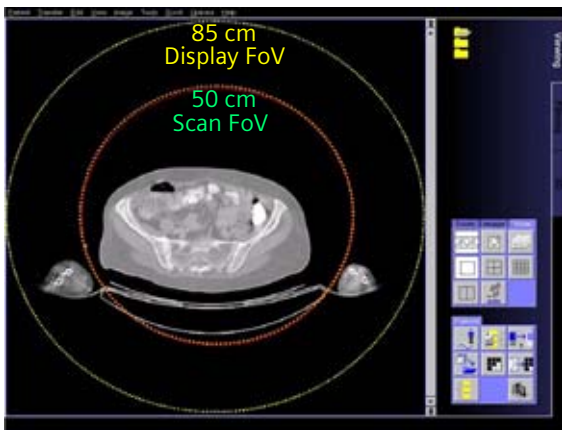
- Spare as much healthy tissue as possible
- Precisely position the patient for treatment for the entire course of treatment (typically 25-35 fractions)



# Radiation Therapy



## Benefits

- No limitations for patient set-up within 85 cm gantry opening and the ability to scan at a low table position thereby maximizing gantry "freespace"
- Complete anatomical visualization for optimized localization and dose calculation with extended 85 cm FOV



# Radiation Therapy

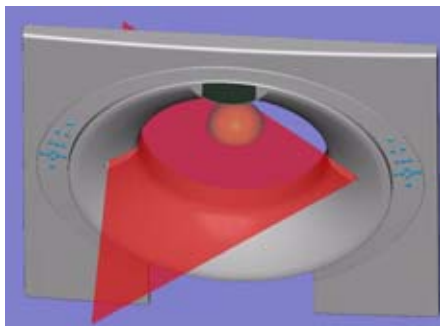
- High volume coverage in time (16 X 2.0 mm in 0.6 s) minimizing motion artifacts and breath hold time

<b>SOMATOM Emotion 16-slice configuration</b> Slice 1.5 mm Rot 0.6 s Pitch 1.5	<b>6 slice scanner RT edition</b> Slice 2.5 mm Rot 1 s Pitch 1 s
	
<b>Volume Coverage 25 cm in 10 s</b>	<b>Volume Coverage 15 cm in 10 s</b>

- Thin slice imaging for high quality DRRs (Digitally Reconstructed Radiograph) and MPRs, especially for conformal 3D therapy and IMRT (Intensity Modulated Radiation Therapy)
- Complete CT simulation solution providing higher geometrical accuracy of table and lasers and the integration of flat table inserts

# Radiation Therapy

- New long-range gantry laser lights with position adjustment possible without opening gantry covers for easier installation and synchronization with room RTP lasers



- Integrated solution for Virtual Simulation with *syngo* based COHERENCE Dosimetrist or VSim on *syngo* MultiModality Workplace
- Display of gantry tilt angle in 0.5 degree increments
- Greater accuracy of X-ray tube positioning for topogram scans:  $\pm 1$  degree
- Simplified horizontal positioning of the table. During an examination, a table feed position can be stored enabling fast and easy repositioning of a patient back to the previous table position.
- Proven DICOM connectivity to radiation therapy planning software

## Workflow

Simulation:

1. Patient positioning on CT table  
(external lasers)
2. Patient marking  
(external lasers)
3. CT scan
4. Offline: Virtual Simulation and Dose Planning

Treatment:

1. Patient positioning on the therapy table  
(external lasers)
2. Verification of irradiation area  
(light field projection)
3. Treatment

The default scan protocols provide the first recon job used for soft tissue studies and the second recon job for bone structures.



## Scan Protocols

### Overview

You can use the following scan protocols for the Radiation Therapy Planning:

For SOMATOM Emotion 16-slice configuration:

- **RT\_Head**  
Spiral mode for routine radiation therapy planning head studies
- **RT\_Thorax**  
Spiral mode for routine radiation therapy planning thoracic studies
- **RT\_Breast**  
Spiral mode for routine radiation therapy planning studies of the breast
- **RT\_Abdomen**  
Spiral mode for routine radiation therapy planning abdominal studies
- **RT\_Pelvis**  
Spiral mode for routine radiation therapy planning pelvis studies

# Radiation Therapy

For SOMATOM Emotion 6-slice configuration:

- **RT\_Head**  
Spiral mode for routine radiation therapy planning head studies
- **RT\_Thorax**  
Spiral mode for routine radiation therapy planning thoracic studies
- **RT\_Breast**  
Spiral mode for routine radiation therapy planning studies of the breast
- **RT\_Abdomen**  
Spiral mode for routine radiation therapy planning abdominal studies
- **RT\_Pelvis**  
Spiral mode for routine radiation therapy planning pelvis studies

# Radiation Therapy

## RT\_Head

### Indications:

Spiral mode for routine radiation therapy planning head studies.

For SOMATOM Emotion 16-slice configuration:

A range of 12 cm will be covered in 20.05 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 12 cm will be covered in 30.27 sec.

<b>Emotion 16</b>	<b>Head</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	240	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	10.6 mm	
<i>Pitch Factor</i>	0.55	
<i>Increment</i>	3.0 mm	3.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	57.60 mGy	
<i>Effective dose</i>	Male: 2.66 mSv Female: 2.88 mSv	



# Radiation Therapy

<b>Emotion 6</b>	<b>Head</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	250	
<i>Rotation time</i>	1.5 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	6.6 mm	
<i>Pitch Factor</i>	0.55	
<i>Increment</i>	3.0 mm	3.0 mm
<i>Kernel</i>	H31s	H60s
<i>CTDI<sub>Vol</sub></i>	58.75 mGy	
<i>Effective dose</i>	Male: 2.76 mSv Female: 2.98 mSv	

# Radiation Therapy

## RT\_Thorax

### Indications:

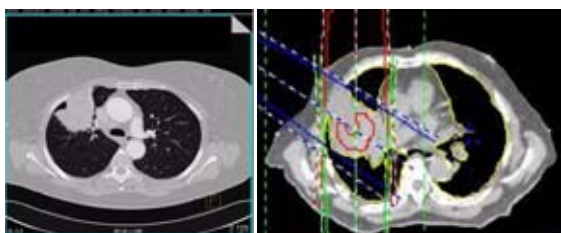
Spiral mode for routine radiation therapy planning thoracic studies.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 12.92 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 25.13 sec.



<b>Emotion 16</b>	<b>Thorax</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	15.4 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	10.08 mGy	
<i>Effective dose</i>	Male: 5.53 mSv Female: 7.35 mSv	

# Radiation Therapy

<b>Emotion 6</b>	<b>Thorax</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	10.2 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	8.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	9.81 mGy	
<i>Effective dose</i>	Male: 4.98 mSv Female: 6.45 mSv	

# Radiation Therapy

## RT\_Breast

### Indications:

Spiral mode for routine radiation therapy planning thoracic studies of the mammae.

For SOMATOM Emotion 16-slice configuration:

A range of 30 cm will be covered in 12.92 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 30 cm will be covered in 25.13 sec.

<b>Emotion 16</b>	<b>Breast</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	15.4 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	10.08 mGy	
<i>Effective dose</i>	Male: 5.69 mSv Female: 7.11 mSv	

# Radiation Therapy

<b>Emotion 6</b>	<b>Breast</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	90	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	10.2 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	8.0 mm	5.0 mm
<i>Kernel</i>	B41s	B70s
<i>CTDI<sub>Vol</sub></i>	9.81 mGy	
<i>Effective dose</i>	Male: 4.98 mSv Female: 6.45 mSv	

# Radiation Therapy

## RT\_Abdomen

### Indications:

Spiral mode for routine radiation therapy planning abdominal studies.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm will be covered in 9.01 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 20 cm will be covered in 17.29 sec.

<b>Emotion 16</b>	<b>Abdomen</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	15.4 mm	
<i>Pitch Factor</i>	0.80	
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	16.80 mGy	
<i>Effective dose</i>	Male: 7.36 mSv Female: 8.94 mSv	

# Radiation Therapy

<b>Emotion 6</b>	<b>Abdomen</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	8.0 mm	8.0 mm
<i>Feed/Rotation</i>	10.2 mm	
<i>Pitch Factor</i>	0.85	
<i>Increment</i>	8.0 mm	8.0 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	16.35 mGy	
<i>Effective dose</i>	Male: 6.33 mSv Female: 7.87 mSv	

# Radiation Therapy

## RT\_Pelvis

### Indications:

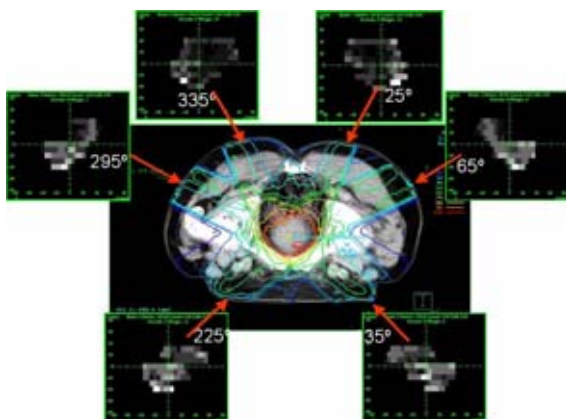
Spiral mode for routine radiation therapy planning pelvis studies.

For SOMATOM Emotion 16-slice configuration:

A range of 20 cm will be covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A range of 20 cm will be covered in 13.11 sec.





# Radiation Therapy

<b>Emotion 16</b>	<b>Pelvis</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	28.8 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	3.0 mm	3.0 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	16.80 mGy	
<i>Effective dose</i>	Male: 6.68 mSv Female: 11.42 mSv	

<b>Emotion 6</b>	<b>Pelvis</b>	<b>2<sup>nd</sup> recon.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	150	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	18.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	3.0 mm	3.0 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	16.35 mGy	
<i>Effective dose</i>	Male: 6.41 mSv Female: 10.95 mSv	

## Additional Important Information

### HU values

The HU values are of crucial importance for the therapy planning systems of radiation therapists!

- With huge objects, the CT value is independent of the kernel. With smaller objects, edge effects produced by the kernel influence the HU values as well as the scanning. Feed and collimation do not have any influence.
- An extended FoV of 800 mm means that only 500 mm are scanned, the rest will be interpolated.
- The effect on the HU values of having carbon plate tagged additionally to the patient table should be negligible and not measurable.
- CARE Dose 4D does not have any effect on the HU values.
- HU values and the conversion of the electron densities depend on the applied spectrum, e.g. kV, prefiltration(kV, prefiltration, etc.)
- HU values depend on the use of the online bone correction (PFO).



# Respiratory Gating

When imaging of the chest or abdomen is performed by CT, there may be artifacts produced causing problems with reproducibility and resolution of images due to patient respiration. Organs will move with every respiratory motion.

Especially in the radiation therapy planning using a linear accelerator for tumor treatment, normal tissues around a focus might be unnecessarily exposed to radiation if the target is located in a movable organ, because the field of irradiation has to be set wider than the actual size of the tumour due to the organ's motion during respiration.

As far as the respiratory motion is periodical and repetitive, the organs in the chest or abdomen move periodically and repetitively according to respiratory motion.

Therefore the diagnostic artifacts and image degradation, and the treatment dangers can be avoided if precise detection of respiratory motion and its consequent, synchronized imaging or irradiation is available.

# Respiratory Gating

The respiratory gating hardware (AZ-733V) is composed of a:

- Respiratory Sensor (RS) to detect patient's abdominal motions (pressure changes) to get a patient's respiratory information,
- Sensor Port (SP) to amplify and to transmit analog signals from RS,
- Wave Deck (WD) to receive the respiratory signal from the said SP and to convert them to a digital signal to be sent to the host computer (PC) of the CT system.

The respiration curve as well as scan and reconstruction parameters are displayed on the CT user interface and embedded into the examination workflow.

The respiration curve will be displayed before and during spiral acquisition and saved in the respiration file. After scanning the user can select the respiration level (in [%]) of inspiration or expiration for reconstruction. A synthetic sync signal and a respiration curve editing functionality are available.

Regarding an imaging device such as SOMATOM Emotion 6/16-slice configuration the respiratory gating functionality offers an increase of image resolution and reproducibility as well as a decrease of motion artefacts by image reconstructions based on respiratory information both needed for high-precision radiation therapy planning and treatment as well.

The mentioned increase of RT accuracy results in a decrease of RT side effects by minimizing excessive irradiation dose to healthy tissue.

## Key Features

### Respiratory Gating

- is capturing slow moving anatomical structures such as lung lesions during respiration up to a respiration cycle time of 10sec by low pitch spiral.
- helps the radio-oncologists in selecting the appropriate phase of the respiratory cycle in order to plan a treatment more accurately.
- helps visualizing the tumor excursion for a better understanding of the target volume using InSpace 4D.
- results in a more accurate description of the ROI and
- is considering tumor motion into the PTV (planned target volume).

### Respiration Monitoring

- Accurate determination of respiratory motion
- Respiration change recognition (cough, sneeze, movement)
- Support for monitoring of free-breathing and breath hold respiration protocols

## Respiration Synchronization

- Synchronization of CT data acquisition with respiration: 4D CT - prospectively Respiratory Triggering or retrospectively Respiratory Gating.
- Synchronization of 4D simulation data with respiration
- Synchronized Treatment: triggered beaming on-off on Linac (Linear Accelerator).

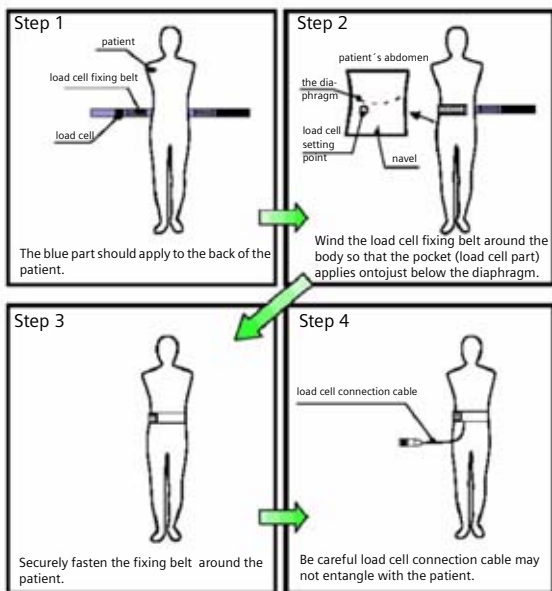
## Positioning of the respiratory sensor belt

The correct placement of the abdominal belt is essential in order to receive a clear respiratory signal resulting in precise generation of inspiration and expiration gates. Improper positioning of the respiratory belt will result in an unstable respiratory signal which is sensitive to movements of the patient during the scan and can cause image artifacts due to small metallic components of the sensor (please position the respiratory belt outside of the scan range).



# Respiratory Gating

For proper belt positioning please follow the instructions below:



For further information on the respiratory gating system AZ-733V (Anzai Medical, Japan), please refer to the Operational manual "Respiratory Gating" or Anzai User's manual.

## Scanning Information

The expected benefits in radiation treatment planning, e.g. for lung and abdominal tumors are:

- Information about tumor motion in 3D coordinates and over time
- More accurate tumor shape delineation and therefore a more precise RTP (radiation therapy planning)
- Potential for sparing of healthy tissue, minimization of PTV (planned target volume) and less side effects
- Potential for dose acceleration and higher cure rate

To minimize motion artifacts, two requirements are mandatory for a CT system:

- Fast gantry rotation to raise the temporal resolution for artifact free images
- Prospective triggering of image acquisition in a sequential mode or retrospective gating of image reconstruction in a spiral mode based on the recording of the respiratory curve in order to obtain images during inspiration and expiration phases.

## Scan Parameters

A respiratory gated lung spiral with cone correction will be provided. To be able to work also with low breathing rates, a fixed pitch factor of a min. of 0.1 is needed. Slice widths and collimation are the same as for cardio spiral.

In the **Specials** folder different scan protocols are pre-defined for different breathing rates.

# Respiratory Gating

## Temporal Resolution

Temporal resolution, also called time resolution, represents the time window of the data that is used for image reconstruction. It is essential for respiratory CT imaging. The higher the temporal resolution, the fewer the motion artifacts. A temporal resolution of a half of the Rotation Time can be achieved.

## Technical Principles

Basically, there are two different technical approaches for respiration correlated CT acquisition:

- Prospectively respiratory-triggered sequential scanning.
- Retrospectively respiratory-gated spiral scanning.

In both cases, the respiration signal is recorded and used to either initiate prospective image acquisition (triggering), or to perform retrospective image reconstruction (gating). Only scan data acquired in a user-selectable phase of the respiration cycle is used for image reconstruction.

## Respiratory Triggering

Sequential scans are triggered by respiration signal during a predefined amplitude of inhalation or exhalation.

Triggering is based on the maximum and minimum of the predicted respiration amplitude of the next 100% inspiration.

## Respiratory gating

The respiration of the patients is simultaneously recorded during the Spiral acquisition.

Data are acquired during the entire respiration cycle and Images are reconstructed by matching data to the respiration trace.

The respiration level (amplitude) is defined as an absolute value. The display of the respiratory curve is optimized by an auto adjustment regarding

- Gain (showing inspiration maximum as 100% of inspiration and expiration minimum as 100% of expiration)

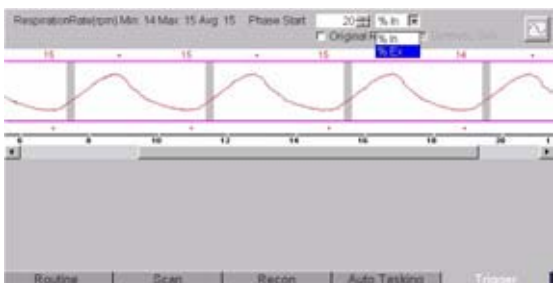
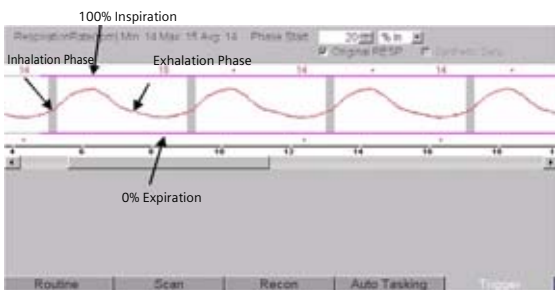
and

- Offset (showing the curve optimal to vertical display extent).

# Respiratory Gating

The timebase of the respiratory curve is realtime in an updating mode.

Images can be reconstructed at any user defined Inhalation- or Exhalation level.



Example:

- 20% Ex: Patient has exhaled to 80%
- 20% In: Patient has inhaled to 20 %

# Respiratory Gating

## Prospective respiratory triggering versus retrospective respiratory gating

With prospective respiratory triggering, the lung volume for example is covered in a "step-and-shoot" technique. The patient's respiratory signal is used to start sequential scans at a predefined respiratory level of the patient's respiratory curve. With retrospective respiratory gating, the lung volume is covered continuously by a spiral scan. The patient's respiratory signal is recorded simultaneously to allow a retrospective selection of the respiratory level used for image reconstruction. Prospective respiratory triggering has the benefit of smaller patient dose than respiratory-gated spiral scanning, since scan data is acquired at the previously selected respiratory level only. It does not, however provide continuous volume coverage with overlapping slices and misregistration of anatomical details may occur. Furthermore, reconstruction of images in different levels of the respiratory cycle for functional evaluation needs repeated CT examination of each of the desired respiration levels along the same volume in z-direction using Prospective Triggering technique. Since respiratory triggered sequential scanning depends on a reliable prediction of the patient's next Inspiration maximum and expiration minimum, the method should not be used for patients with arrhythmic breathing and irregular respiratory rates and the affinity to cough and to sigh.

# Respiratory Gating

## Curve Editor

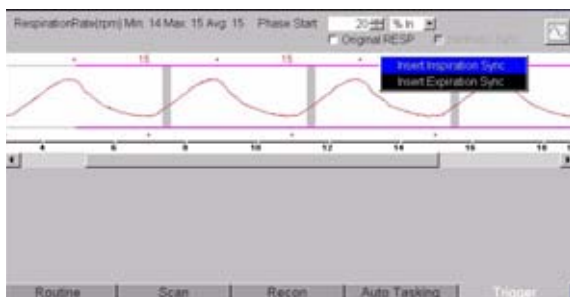
The respiration curve editor is used to modify the respiratory signal. This editing tool is available after spiral scan data has been acquired. By using the right mouse menu on the Trigger tabcard you have access to several modification tools for the respiratory Syncs (purple dots above and below the curve), such as Delete, Disable, Insert. In patients with only single or few extra respiratory peaks caused, e.g. by coughing and sighing overall image quality may be improved by editing the respiratory curve prior to reconstruction. Deleting the corresponding respiratory peaks prevents image reconstruction in the periods of coughing or arrhythmic breathing. Although respiratory-gated spiral scanning is less sensitive to variable respiratory rates than respiratory-triggered sequential scanning, the examination of patients with arrhythmic breathing that results in unpredictable variations of the respiratory cycles can result in limited image quality and should be performed in exceptional cases only.

# Respiratory Gating

The recorded Respiration curve can be edited similar to the ECG Trace editing in Cardiac CT.

Inspiration Syncs can be deleted, disabled and inserted.

Expiration Syncs can be deleted, disabled and inserted.





## Synthetic Trigger/Sync

By default, the "Synthetic Trigger" (Respiratory-triggered scanning) or "Synthetic Sync" (Respiratory-gated scanning) is activated for all predefined Respiratory scan protocols. It is recommended to always keep it activated for examinations with contrast medium.

In case of Respiratory signal loss during the acquisition, this will ensure the continuation of the triggered scans or allows a Respiratory signal to be simulated for retrospective gating. If it is deactivated, the scanning will be aborted in case of Respiratory signal loss during the acquisition.

## Workflow

### Reconstruction and Post processing

For respiratory gating a slice width of 3 mm and an increment of 1.9 mm is used for image acquisition.

Two recon jobs are predefined:

- 20% Inspiration
- 80% Expiration

If more Inspiration or Expiration phases are necessary new recon jobs can be added.

After acquisition the 4D volume data set can be reconstructed at different respiration levels to visualize the tumor movement over the whole respiration cycle and to display the anatomy in space (3D) and time (4D)

InSpace 4D as an approved 4D application minimizes the time to

- choose the appropriate phase or
- 4D data visualization in multiple planes
- Creation of 4D movie loops.

For further information on InSpace 4D please refer to the chapter InSpace 4D in the "Clinical Applications 2" application guide.

## Additional important Information

- For operating the respiratory gating system (AZ-733V, Anzai Medical, Japan), please refer to the Operational manual "Respiratory Gating" or Anzai User's manual.
- For the usage of Anzai's respiratory phantom for the respiratory gating system (AZ-733V, Anzai medical, Japan), please refer to the User's manual.
- The images are reconstructed from data acquired in one Inspiration or Expiration phase – Multi Phase reconstruction is not available. For each Inspiration or Expiration phase a new recon job can be added.
- Preview Series is not yet available. To determine the best Inspiration or Expiration phase, InSpace 4D can be used.

## Scan Protocol

### RespSeq

#### Indications:

A sequential mode for studies with respiration triggering.

For SOMATOM Emotion 16-slice configuration:

The scan length is predefined with 30.5 cm.

For SOMATOM Emotion 6-slice configuration:

The scan length is predefined with 30.3 cm.

<b>Emotion 16</b>	<b>RespSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	16
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	2.4 mm
<i>Feed/Scan</i>	19.2 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	1.79 mGy
<i>Effective dose</i>	Male: 0.92 mSv Female: 1.18 mSv

# Respiratory Gating

<b>Emotion 6</b>	<b>RespSeq</b>
<i>kV</i>	130
<i>Effective mAs/ Quality ref. mAs</i>	16
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	6 x 3.0 mm
<i>Slice collimation</i>	3.0 mm
<i>Slice width</i>	3.0 mm
<i>Feed/Scan</i>	18.0 mm
<i>Kernel</i>	B31s
<i>CTDI<sub>vol</sub></i>	1.63 mGy
<i>Effective dose</i>	Male: 1.29 mSv Female: 1.81 mSv

# Respiratory Gating

## Resp

### Indications:

A spiral mode for patients with a respiration rate per minute greater than 10 using respiration gating.

For SOMATOM Emotion 16-slice configuration:

A scan range of 30 cm will be covered in 94.95 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 30 cm will be covered in 86.04 sec.

<b>Emotion 16</b>	<b>Resp</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	320	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	1.9	
<i>Pitch Factor</i>	0.1	
<i>Increment</i>	2.1 mm	2.1 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	35.84 mGy	

# Respiratory Gating

<b>Emotion 6</b>	<b>Resp</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	230	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	1.8	
<i>Pitch Factor</i>	0.15	
<i>Increment</i>	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	25.07 mGy	

# Respiratory Gating

## RespModBreathRate

### Indications:

A spiral mode for patients with a respiration rate per minute greater than 7.5, using respiration gating.

For SOMATOM Emotion 16-slice configuration:

A scan range of 23 cm will be covered in 94.15 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 14 cm will be covered in 94.93 sec.

<b>Emotion 16</b>	<b>RespMode</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	320	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	2.5	
<i>Pitch Factor</i>	0.13	
<i>Increment</i>	2.1 mm	2.1mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	35.84 mGy	



# Respiratory Gating

<b>Emotion 6</b>	<b>RespMode</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	320	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	1.2	
<i>Pitch Factor</i>	0.10	0.10
<i>Increment</i>	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	34.88 mGy	

# Respiratory Gating

## RespLowBreathRate

### Indications:

A spiral mode for patients with a respiration rate per minute greater than 6.5, using respiration gating.

For SOMATOM Emotion 16-slice configuration:

A scan range of 18 cm will be covered in 87.23 sec.

For SOMATOM Emotion 6-slice configuration:

A scan range of 11 cm will be covered in 93.67 sec.

<b>Emotion 16</b>	<b>RespLow</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	320	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	2.1	
<i>Pitch Factor</i>	0.11	
<i>Increment</i>	2.1 mm	2.1 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	35.84 mGy	

# Respiratory Gating

<b>Emotion 6</b>	<b>RespLow</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	130	
<i>Effective mAs/ Quality ref. mAs</i>	320	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	3.0 mm	3.0 mm
<i>Feed/Rotation</i>	1.2	
<i>Pitch Factor</i>	0.10	
<i>Increment</i>	2.0 mm	2.0 mm
<i>Kernel</i>	B31s	B31s
<i>CTDI<sub>vol</sub></i>	34.88 mGy	
<i>Effective dose</i>	Male: 6.40 mSv Female: 9.14 mSv	

## Overview

The scan protocols for children are defined according to body regions - **Head, Neck, Thorax, Abdomen, Spine, Upper Extremities, Lower Extremities, Vascular** and **Specials**.

As default the quality reference mAs with CARE Dose 4D is defined for 20 kg and/or five year old children. For children older than six years, use the adult protocols with the CARE Dose 4D.

For a few protocols, 80 kV is used instead of 120 kV, either to exploit the significantly higher image contrast of iodine contrast media at 80 kV or to reach a lower dose level than possible with 120 kV.

For SOMATOM Emotion 16-slice configuration:

- **Head**

- *HeadRoutine*  
Spiral mode for routine head studies
- *HeadSeq*  
Sequential mode for routine head studies
- *InnerEarHR*  
Spiral mode for high resolution inner ear studies
- *InnerEar*  
Spiral mode for inner ear studies
- *InnerEarSeq*  
Sequential mode for routine inner ear studies
- *SinusOrbit*  
Spiral mode for routine sinus and orbital studies

# Children

- **Neck**
  - *NeckRoutine*  
Spiral mode for soft tissues routine neck studies
- **Thorax**
  - *ThoraxRoutine*  
Spiral mode for routine thorax studies
  - *ThoraxHRSeq*  
Sequential mode for high resolution lung studies
- **Abdomen**
  - *AbdomenRoutine*  
Spiral mode for routine abdominal studies
- **Spine**
  - *Spine*  
Spiral mode for routine spine studies
- **Upper Extremities/Low Extremities**
  - *ExtrRoutineHR*  
Spiral mode for routine high resolution extremity studies
  - *ExtrCombi*  
Spiral mode for the combination of thin slice and routine studies
- **Vascular**
  - *HeadAngio*  
Spiral mode for head CTAngio studies
  - *CarotidAngio*  
Spiral mode for carotid CTAngio studies
  - *BodyAngioRoutine*  
Spiral mode for body CTAngio studies
- **Specials**
  - *NeonateBody*  
Spiral mode for neonate studies

# Children

For SOMATOM Emotion 6-slice configuration:

- **Head**
  - *HeadRoutine*  
Spiral mode for routine head studies
  - *HeadSeq*  
Sequential mode for routine head studies
  - *InnerEarHR*  
Spiral mode for high resolution inner ear studies
  - *InnerEar*  
Spiral mode for inner ear studies
  - *InnerEarSeq*  
Sequential mode for routine inner ear studies
  - *SinusOrbit*  
Spiral mode for routine sinus and orbital studies
- **Neck**
  - *NeckRoutine*  
Spiral mode for soft tissues routine neck studies
- **Thorax**
  - *ThoraxRoutine/ThoraxRoutine06s*  
Spiral mode for routine thorax studies
  - *ThoraxCombi/ThoraxCombi06s*  
Spiral mode for the combination of thin slice lung and routine thorax studies
  - *ThoraxHRSeq*  
Sequential mode for high resolution lung studies

# Children

- **Abdomen**
  - *AbdomenRoutine/AbdomenRoutine06s*  
Spiral mode for routine abdominal studies
- **Spine**
  - *SpineRoutine*  
Spiral mode for routine spine studies
  - *SpineThinSlice*  
Spiral mode for thin slice spine studies
- **Upper Extremities/Low Extremities**
  - *ExtrRoutineHR*  
Spiral mode for routine high resolution extremity studies
  - *ExtrCombi*  
Spiral mode for the combination of thin slice and routine studies
- **Vascular**
  - *HeadAngio/HeadAngio06s*  
Spiral mode for head CTAngio studies
  - *CarotidAngio/CarotidAngio06s*  
Spiral mode for carotid CTAngio studies
  - *BodyAngioRoutine/BodyAngioRoutine06s*  
Spiral mode for body CTAngio studies
  - *BodyAngioFast/BodyAngioFast06s*  
Spiral mode for fast body CTAngio studies
- **Specials**
  - *NeonateBody/NeonateBody06s*  
Spiral mode for neonate studies

## General Hints

- Topograms: 256 mm lateral topograms are defined for the head modes, and 512 mm AP topograms are defined for the body modes. Please keep in mind that the children's size can be dramatically different. You should press the "Hold Measurement" button whenever the range shown on the real-time growing topogram is long enough, in order to avoid unnecessary radiation.  
In a consistent effort to reduce the total dose of an examination, all topograms of the pediatric protocols are defined at 80 kV with minimum current (50mA).
- Gantry tilt is available for sequence scanning, not for spiral scanning.
- For all head studies, it is very important for image quality purposes to position the patient in the center of the scan field. Use the lateral laser beam to make sure that the patient is positioned in the center.
- Warm surroundings and dimmed lighting are helpful to make children more cooperative.
- Sedation: Although the advent of the Multislice CT scanner has enabled the user to scan through an area of interest much faster than ever sometimes patient motion can still result in severe motion artifacts which are seen on the resultant images. This becomes a factor especially with infants and younger children who are unable to hold still for the exam. Your institution may consider sedating such patients. Of course, appropriate protocols need to be set up at your institution. For instance, the drug of choice for specific ages/weights of these patients (taking into consideration the total time of the exam), the form of administration, patient preps, adequate monitoring of the patient (pre-scan, during the exam and post-scan) etc. should all be taken into consideration.  
The proper personnel and equipment must also be readily available in the event of a problem.



# Children

- Oral and rectal contrast administration: Depending on the reason for the exam/status of the patient, oral contrast may or may not be given to these patients. In general, oral contrast is recommended to opacify the intestinal tract, as unopacified bowel can have the appearance of abdominal fluid or mass effect. Oral, as well as rectal contrast may be required. Usually, a diluted mixture of iodine and water is used as an oral agent. Different substances can be added to this mixture to help reduce the bitter taste and make it more pleasing to the child (apple juice, fruit drink mixes are just a few of these). Barium may of course be used in some cases as well. Negative contrast agents such as water are becoming more popular for delineation of stomach or bowel wall borders, or when 3D reconstructions are needed. You need to be aware of all the contraindications of any of the contrast agents you use. Please refer to the specific vendor's recommendations.
- I.V. contrast administration: In general, 1 – 2 ml per kg of body weight should be applied, however, since the scanning can be completed in just a few seconds, please keep in mind that the total injection time should not be longer than the sum of start delay time and the scan time – do not inject contrast after the scanning is completed.

The use of CARE Bolus is recommended in order to achieve optimal contrast enhancement.

Both start delay time and injection rate are exam-/patient-dependent. I.V. injection with a power injector is recommended for all scans whenever possible. Some guidelines to follow with respect to flow rate are noted in the chart below.

Note: These injector guidelines are based on an antecubital injection site. These guidelines may need to be adjusted if the site is more peripheral.

Needle Size (gauge)	Flow Rate (ml/sec.)
22	1.5
20	2.0 – 3.0
18	3.0 – 5.0

Central lines and ports may need to be hand injected or power injected at a very low flow rate (1 ml/sec.).

PIC lines and 24 gauge (or smaller) lines are usually hand injected. All of these protocols should be decided on by your institution's appropriate personnel.

- Applications with 80 kV: For CTA protocols, the tube voltage was set to 80 kV and the mAs values were raised by a factor of 1.5 over the reduced 120 kV values. This measure roughly reduces the dose again by a factor of 2. At a lower kV, substances with a high atomic number (such as iodine) have a significantly higher CT value (= vascular contrast). Iodine CT values at 80 kV are about 50% higher than at 120 kV. 80 kV was also used for applications when the lowest achievable mAs at 120 kV was still higher than necessary for sufficient noise level (for technical reasons, generators need to operate at a certain minimum current for stable operation). For applications such as neonate or airway scanning, the low tube output at 80 kV can be used to further reduce the dose to the patient.
- To further optimize MPR image quality we recommend that you reduce one or more of the following: collimation, reconstruction increment and slice width for image reconstruction.

## Head Kernels

The endings "s" or "f" depend on the rotation time.

- For head scans of small children, the kernels C20s, C30s (for example, for soft tissue studies) and C60s (for example, for sinuses are provided) should be chosen instead of the "adult" head kernels H20s, H30s and H60s.
- For soft tissue head studies, the standard kernel is H40s; softer images are obtained with H30s or H20s, H10s, sharper images with H50s. The kernels H21s, H31s, H41s yield the same visual sharpness as H20s, H30s, H40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using H31s, H 41s instead of H30s, H40s.
- For the standard head protocols, we propose C20s and C30s.
- High resolution head studies should be performed with H60s, H70s (for example, for dental and sinuses) and H80s, H90s (for example, inner ear).

## Body Kernels

The endings "s" or "f" depend on the rotation time.

- As standard kernels for body tissue studies B30s or B40s are recommended; softer images are obtained with B20s or B10s (extremely soft). The kernels B31s or B41s have about the same visual sharpness as B30s, respectively, B40s, the image appearance, however, is more agreeable due to a "fine-grained" noise structure; quite often, the low contrast detectability is improved by using B31s, B41s instead of B30s, B40s.
- For higher sharpness, as is required for example, in patient protocols for cervical spine, shoulder, extremities, thorax, the kernels B50s, B60s, B70s, B80s are available.
- The special kernels are mostly used for "physical" measurements with phantoms, for example, for adjustment procedures (S80s), for constancy and acceptance tests (S80s, S90s), or for specification purposes (S90s).

For special patient protocols, S80s and S90s are chosen, for example, for osteo (S80s).

It is mandatory to position the area of interest in the center of the scan field. Use ExtrCombi mode when a scan FoV > 25 cm is necessary.



## Scan Protocols

### HeadRoutine

#### Indications:

Spiral mode for routine head studies, for example, tumors, hydrocephalus, hemorrhaging, abnormalities, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 12 cm covered in 20.05 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 8.5 cm covered in 56.13 sec.



# Children

<b>Emotion 16</b>	<b>Head</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	230
<i>Rotation time</i>	1.5 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	4.0 mm
<i>Feed/Rotation</i>	10.6 mm
<i>Pitch Factor</i>	0.55
<i>Increment</i>	4.0 mm
<i>Kernel</i>	C30s
<i>CTDI<sub>Vol</sub></i>	36.80 mGy
<i>Effective dose</i>	Male: 2.83 mSv* Female: 2.89 mSv*

<b>Emotion 6</b>	<b>Head</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	230
<i>Rotation time</i>	1.5 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	2.4 mm
<i>Pitch Factor</i>	0.40
<i>Increment</i>	5.0 mm
<i>Kernel</i>	C30s
<i>CTDI<sub>Vol</sub></i>	42.32 mGy
<i>Effective dose</i>	Male: 1.70 mSv* Female: 1.69mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 120 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children, who are older than age 6, should be scanned with an adult protocol as the skull by this time is fully grown.
- When bone structure is of interest, use kernel C60s for image reconstruction.
- An advanced algorithm allows for improved head image quality, without additional post-processing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.
- To work **without** CARE Dose 4D use for children  
< 6 month 90 mAs  
6 month-3 years 150 mAs  
3-6 years 220 mAs.





## HeadSeq

### Indications:

Sequential mode for routine head studies for children, for example, tumors, hydrocephalus, hemorrhaging, abnormalities, etc.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 8.5 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 9.0 cm.

<b>Emotion 16</b>	<b>HeadSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	260
<i>Rotation time</i>	1.5 sec.
<i>Acquisition</i>	2 x 5.0 mm
<i>Slice collimation</i>	5.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	C30s
<i>CTDI<sub>vol</sub></i>	37.44 mGy
<i>Effective dose</i>	Male: 1.83 mSv* Female: 1.96 mSv*

# Children

<b>Emotion 6</b>	<b>HeadSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	260
<i>Rotation time</i>	1.5 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	6.0 mm
<i>Feed/Scan</i>	12.0 mm
<i>Kernel</i>	C30s
<i>CTDI<sub>Vol</sub></i>	40.82 mGy
<i>Effective dose</i>	Male: 1.86 mSv* Female: 1.84 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 117 mm was used.

# Children

<b>Contrast medium IV injection</b>	
<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/ Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children, who are older than age 6, should be scanned with an adult protocol as the skull by this time is fully grown.
- When bone structure is of interest, use kernel C60s for image reconstruction.
- An advanced algorithm allows for improved head image quality, without additional post-processing.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.
- To work **without** CARE Dose 4D use for children  
< 6 month 90 mAs  
6 month-3 years 150 mAs  
3-6 years 220 mAs.



## InnerEarHR

### Indications:

Spiral mode for high-resolution inner ear studies, for example, malformations of the inner ear, inflammatory changes, pathologies of the mastoid process, tumor processes of the pyramids, post-traumatic changes, etc.

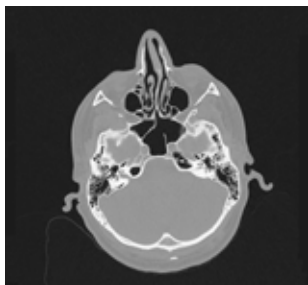
**Note:** Same as for adults except for the FoV of 300.

For SOMATOM Emotion 16-slice configuration:

A typical range of 4.0 cm covered in 24.22 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 4.0 cm covered in 17.69 sec.



# Children

<b>Emotion 16</b>	<b>InnerEar</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	50
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.6 mm
<i>Feed/Rotation</i>	1.8 mm
<i>Pitch Factor</i>	0.75
<i>Increment</i>	0.4 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	10.30 mGy
<i>Effective dose</i>	Male: 0.25 mSv* Female: 0.25 mSv*

<b>Emotion 6</b>	<b>InnerEar</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	90
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	6 x 0.5 mm
<i>Slice collimation</i>	0.5 mm
<i>Slice width</i>	0.6 mm
<i>Feed/Rotation</i>	2.6 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	0.5 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	17.19 mGy
<i>Effective dose</i>	Male: 0.12 mSv* Female: 0.11 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 45 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children, who are older than age 6, should be scanned with an adult protocol as the skull by this time is fully grown.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.
- To work **without** CARE Dose 4D use for children  
< 3 years 40 mAs  
3-6 years 60 mAs.





## InnerEar

### Indications:

Spiral mode for routine inner ear studies, for example, malformations of the inner ear, inflammatory changes, pathologies of the mastoid process, tumor processes of the pyramids, post-traumatic changes, etc.

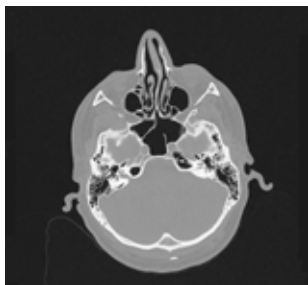
**Note:** Same as for adults except for the FoV of 300.

For SOMATOM Emotion 16-slice configuration:

A typical range of 4.0 cm covered in 7.21 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 4.0 cm covered in 9.84 sec.



# Children

<b>Emotion 16</b>	<b>InnerEar</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	50
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	16 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.75 mm
<i>Feed/Rotation</i>	7.7 mm
<i>Pitch Factor</i>	0.80
<i>Increment</i>	0.5 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	8.90 mGy
<i>Effective dose</i>	Male: 0.27 mSv* Female: 0.28 mSv*

<b>Emotion 6</b>	<b>InnerEar</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	90
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.25 mm
<i>Feed/Rotation</i>	5.1 mm
<i>Pitch Factor</i>	0.85
<i>Increment</i>	1.0 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	16.56 mGy
<i>Effective dose</i>	Male: 0.13 mSv* Female: 0.12 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 45 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children, who are older than age 6, should be scanned with an adult protocol as the skull by this time is fully grown.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.
- To work **without** CARE Dose 4D use for children  
< 3 years 40 mAs  
3-6 years 60 mAs.



## InnerEarSeq

### Indications:

Sequential mode for routine inner ear studies, for example, Inflammatory changes, tumorous processes of pyramids, cerebellopontine angle tumors, post-traumatic changes, etc.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 4.3 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 8.3 cm.

**Note:** Same as for adults except for the FoV of 300.

<b>Emotion 16</b>	<b>InnerEarSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	50
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	12 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.6 mm
<i>Feed/Scan</i>	7.2 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	10.00 mGy
<i>Effective dose</i>	Male: 0.23 mSv* Female: 0.23 mSv*

# Children

<b>Emotion 6</b>	<b>InnerEarSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	90
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	6 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	6.0 mm
<i>Kernel</i>	H90s
<i>CTDI<sub>Vol</sub></i>	16.56 mGy
<i>Effective dose</i>	Male: 0.41 mSv* Female: 0.42 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 40 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children, who are older than age 6, should be scanned with an adult protocol as the skull by this time is fully grown.
- In order to optimize image quality versus radiation dose, scans are provided within a maximum scan field of 300 mm with respect to the iso-center. No recon job with a field of view exceeding those limits will be possible. Therefore, patient positioning has to be performed accurately to ensure a centered location of the skull.
- To work **without** CARE Dose 4D use for children  
< 3 years 40 mAs  
3-6 years 60 mAs.





## SinusOrbit

### Indications:

Spiral mode for routine spiral studies of the sinuses and paranasal sinuses, for example, sinusitis, pneumatization, polyposis, malformations, tumors etc.

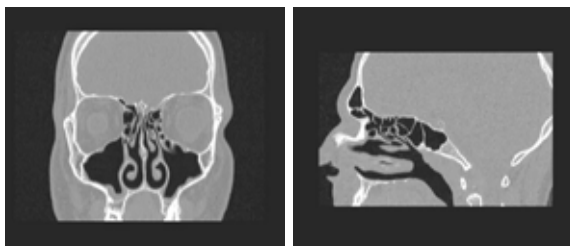
Spiral mode for routine studies of the orbitae, for example, fracture.

For SOMATOM Emotion 16-slice configuration:

A typical range of 6 cm covered in 9.81 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 4 cm covered in 9.84 sec.



# Children

<b>Emotion 16</b>	<b>Sinus Orbi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	50			
<i>Rotation time</i>	1.0 sec.			
<i>Acquisition</i>	16 x 0.6 mm			
<i>Slice collimation</i>	0.6 mm			
<i>Slice width</i>	3.0 mm	3.0 mm	1.0 mm	1.0 mm
<i>Feed/ Rotation</i>	7.7 mm			
<i>Pitch Factor</i>	0.80			
<i>Increment</i>	3.0 mm	3.0 mm	0.7 mm	0.7 mm
<i>Kernel</i>	C60s	C30s	C60s	C30s
<i>CTDI<sub>Vol</sub></i>	8.90 mGy			
<i>Effective dose</i>	Male: 0.29 mSv* Female: 0.31 mSv*			

# Children

<b>Emotion 6</b>	<b>Sinus Orbi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	50			
<i>Rotation time</i>	1.0 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	3.0 mm	3.0 mm	1.25 mm	1.25 mm
<i>Feed/ Rotation</i>	5.1 mm			
<i>Pitch Factor</i>	0.85			
<i>Increment</i>	3.0 mm	3.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	C60s	C30s	C60s	C30s
<i>CTDI<sub>Vol</sub></i>	9.20 mGy			
<i>Effective dose</i>	Male: 0.04 mSv* Female: 0.04 mSv*			

\* The conversion factor for a 7-year-old child, and a scan range of 60 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children older than age 6 should be scanned with an adult protocol.
- The second recon job is defined with kernel H60s and with an overlap for visualizing bone structures with MPR.
- To work **without** CARE Dose 4D use for children  
< 3 years 40 mAs  
3-6 years 60 mAs.

## NeckRoutine

### Indications:

Spiral mode for routine neck studies, for example, tumors, lymphoma, abscesses, etc.

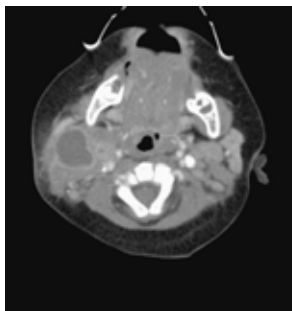
### NeckRoutine:

For SOMATOM Emotion 16-slice configuration:

A typical range of 15 cm covered in 7.21 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 8.27 sec.



# Children

<b>Emotion 16</b>	<b>Neck</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	50	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	16 x 1.2 mm	
<i>Slice collimation</i>	1.2 mm	
<i>Slice width</i>	5.0 mm	1.5 mm
<i>Feed/Rotation</i>	28.8 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	1.0 mm
<i>Kernel</i>	B50s	B50s
<i>CTDI<sub>Vol</sub></i>	3.60 mGy	
<i>Effective dose</i>	Male: 0.69 mSv* Female: 0.71 mSv*	

<b>Emotion 6</b>	<b>Neck</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	50	
<i>Rotation time</i>	0.8 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	2.5 mm
<i>Feed/Rotation</i>	18.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	1.5 mm
<i>Kernel</i>	B50s	B50s
<i>CTDI<sub>Vol</sub></i>	3.55 mGy	
<i>Effective dose</i>	Male: 2.03 mSv* Female: 2.12 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 170 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- If necessary, scan down to the aortic arch or mediastinum to include the entire lesion.
- Cooperative children can be instructed to hold their breath during the acquisition.
- Children older than age 6 should be scanned with an adult protocol.
- To work **without** CARE Dose 4D use for children  
< 3 years 40 mAs  
3-6 years 60 mAs





## ThoraxRoutine/ ThoraxRoutine06s

### Indications:

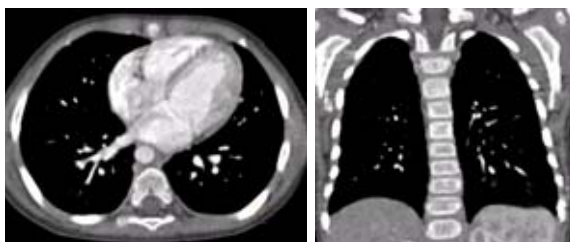
Spiral mode for routine thorax studies, for example, pneumonia, tumors, metastases, lymphoma, vascular abnormalities etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 15 cm covered in 4.33 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 6.20 sec.



# Children

<b>Emotion 16</b>	<b>Thor Routine</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	39			
<i>Rotation time</i>	0.6 sec.			
<i>Acquisition</i>	16 x 1.2 mm			
<i>Slice collimation</i>	1.2 mm			
<i>Slice width</i>	3.0 mm	3.0 mm	1.5 mm	1.5 mm
<i>Feed/ Rotation</i>	28.8 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	3.0 mm	3.0 mm	1.0 mm	1.0 mm
<i>Kernel</i>	B41s	B60s	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	2.81 mGy			
<i>Effective dose</i>	Male: 1.21 mSv* Female: 1.49 mSv*			

# Children

<b>Emotion 6</b>	<b>ThorRoutine</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	26	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 2.0 mm	
<i>Slice collimation</i>	2.0 mm	
<i>Slice width</i>	5.0 mm	5.0 mm
<i>Feed/Rotation</i>	18.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	5.0 mm	5.0 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	1.85 mGy	
<i>Effective dose</i>	Male: 1.69 mSv* Female: 1.98 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 150 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- The first and second recon jobs are defined for visualization of the mediastinum and the lungs, respectively.
- To work **without** CARE Dose 4D use for children
  - < 15 kg 17 mAs
  - 15-24 kg 20 mAs
  - 25-34 kg 30 mAs
  - 35-54 kg 60 mAs

## **ThoraxCombi/ ThoraxCombi06s**

### **Indications:**

Combining thin slice and routine thorax studies with one spiral scan, for example, thorax studies in general and interstitial changes in the lungs.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 11.20 sec.

# Children

<b>Emotion 6</b>	<b>ThorC ombi</b>	<b>2<sup>nd</sup> recon.</b>	<b>3<sup>rd</sup> recon.</b>	<b>4<sup>th</sup> recon.</b>
<i>kV</i>	110			
<i>Effective mAs/ Quality ref. mAs</i>	39			
<i>Rotation time</i>	0.8/0.6 sec.			
<i>Acquisition</i>	6 x 1.0 mm			
<i>Slice collimation</i>	1.0 mm			
<i>Slice width</i>	3.0 mm	3.0 mm	1.25 mm	1.25 mm
<i>Feed/ Rotation</i>	9.0 mm			
<i>Pitch Factor</i>	1.50			
<i>Increment</i>	3.0 mm	3.0 mm	0.8 mm	0.8 mm
<i>Kernel</i>	B60s	B41s	B60s	B41s
<i>CTDI<sub>Vol</sub></i>	3.24 mGy			
<i>Effective dose</i>	Male: 2.82 mSv* Female: 3.33 mSv*			

\* The conversion factor for a 7-year-old child, and a scan range of 150 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

### Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- For the 2<sup>nd</sup> reconstruction the Autoload into MPRthick Range on the 3D Card is activated. The images will be automatically loaded into 3D, MPRthick, and a coronal MPRthick Range will pop up. Please notice, if you are not satisfied with the Range preset, adapt the parameters to your needs and link them to the series.
- To work **without** CARE Dose 4D use for children  
< 25 kg 25 mAs  
25-34 kg 45 mAs  
35-54 kg 65 mAs





## ThoraxHRSeq

### Indications:

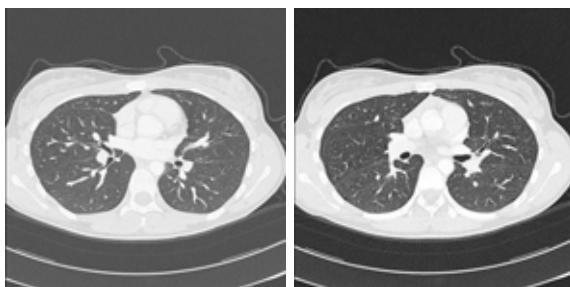
Sequence mode for high-resolution lung studies, for example, interstitial changes in the lungs, using a 10 mm feed.

For SOMATOM Emotion 16-slice configuration:

A scan range is predefined with 15.1 cm.

For SOMATOM Emotion 6-slice configuration:

A scan range is predefined with 15.0 cm.



# Children

<b>Emotion 16</b>	<b>ThoraxHRSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	36
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	1.2 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	0.81 mGy
<i>Effective dose</i>	Male: 0.31 mSv* Female: 0.39 mSv*

<b>Emotion 6</b>	<b>ThoraxHRSeq</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	36
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	1 x 1.0 mm
<i>Slice collimation</i>	1.0 mm
<i>Slice width</i>	1.0 mm
<i>Feed/Scan</i>	10.0 mm
<i>Kernel</i>	B90s
<i>CTDI<sub>Vol</sub></i>	0.24 mGy
<i>Effective dose</i>	Male: 0.20 mSv* Female: 0.24 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 200 mm was used.

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- If you want to acquire the patient at full inspiration or full expiration, you should practice breathing with the patient a few times before beginning the scan to improve reproductibility.
- To work **without** CARE Dose 4D use for children  
< 35 kg 30 mAs  
35-54 kg 40 mAs



## AbdomenRoutine/ AbdomenRoutine06s

### Indications:

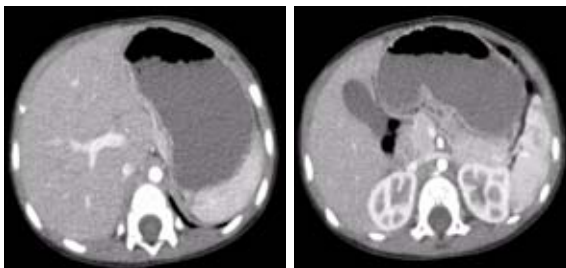
Spiral mode for routine studies in the region of abdomen and pelvis, for example, tumors, lymphoma, abscesses, post-traumatic changes, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20.0 cm covered in 5.37 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 30.0 cm covered in 11.20 sec.



# Children

<b>Emotion 16</b>	<b>AbdRoutine</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	60
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	28.8 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	4.32 mGy
<i>Effective dose</i>	Male: 2.78 mSv* Female: 3.38 mSv*

<b>Emotion 6</b>	<b>AbdRoutine</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs</i>	60
<i>Rotation time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	18.0 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	4.26 mGy
<i>Effective dose</i>	Male: 7.95 mSv* Female: 12.17 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 200 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Delayed scans may be required for the kidneys & bladder.
- Rectal contrast may be required for evaluation of pelvic mass.
- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- To work **without** CARE Dose 4D use for children
  - < 25 kg 30 mAs
  - 25-34 kg 55 mAs
  - 35-54 kg 100 mAs





## Spine/ SpineRoutine

### Indications:

Spiral mode for spine studies, for example, post-traumatic changes, tumors, malformations, orthopedic indication, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 15 cm covered in 26.04 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 16.71 sec.



# Children

<b>Emotion 16</b>	<b>Spine</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	110	
Effective mAs/ Quality ref. mAs	60	
Rotation time	1.0 sec.	
Acquisition	16 x 0.6 mm	
Slice collimation	0.6 mm	
Slice width	2.0 mm	1.0 mm
Feed/Rotation	6.2 mm	
Pitch Factor	0.65	
Increment	2.0 mm	0.7 mm
Kernel	B41s	B60s
CTDI <sub>Vol</sub>	4.80 mGy	
Effective dose	Male: 1.28 mSv* Female: 1.43 mSv*	

<b>Emotion 6</b>	<b>SpineRoutine</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	110	
Effective mAs/ Quality ref. mAs	78	
Rotation time	1.0 sec.	
Acquisition	6 x 2.0 mm	
Slice collimation	2.0 mm	
Slice width	3.0 mm	2.5 mm
Feed/Rotation	10.2 mm	
Pitch Factor	0.85	
Increment	3.0 mm	1.5 mm
Kernel	B41s	B60s
CTDI <sub>Vol</sub>	5.54 mGy	
Effective dose	Male: 2.36 mSv* Female: 4.86 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 160 mm was used.

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- To work **without** CARE Dose 4D use for children
  - < 25 kg 30 mAs
  - 25-34 kg 55 mAs
  - 35-54 kg 120 mAs



## SpineThinSlice

### Indications:

Spiral mode for the spine when Multi Planar Reformation (MPR) are intended, for example, post-traumatic changes, tumors, malformations, etc.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 47.45 sec.

<b>Emotion 6</b>	<b>SpineThinSlice</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	110	
<i>Effective mAs/ Quality ref. mAs</i>	78	
<i>Rotation time</i>	1.0 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	2.0 mm	1.25 mm
<i>Feed/Rotation</i>	3.3 mm	
<i>Pitch Factor</i>	0.55	
<i>Increment</i>	2.0 mm	0.8 mm
<i>Kernel</i>	B41s	B60s
<i>CTDI<sub>Vol</sub></i>	6.47 mGy	
<i>Effective dose</i>	Male: 2.55 mSv* Female: 3.02 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 160 mm was used.

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- To work **without** CARE Dose 4D use for children
  - < 25 kg 40 mAs
  - 25-34 kg 70 mAs
  - 35-54 kg 90 mAs

## ExtrRoutineHR

### Indications:

Spiral mode for high-resolution bone studies, for example, tumors, post-traumatic changes, orthopedic indications, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 6 cm covered in 35.33 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 10 cm covered in 35.33 sec.

<b>Emotion 16</b>	<b>ExtrHR</b>
<i>kV</i>	110
<i>Effective mAs/ Quality ref. mAs**</i>	50
<i>Rotation time</i>	1.0 sec.
<i>Acquisition</i>	4 x 0.6 mm
<i>Slice collimation</i>	0.6 mm
<i>Slice width</i>	0.6 mm
<i>Feed/Rotation</i>	1.8 mm
<i>Pitch Factor</i>	0.75
<i>Increment</i>	0.4 mm
<i>Kernel</i>	U90s
<i>CTDI<sub>Vol</sub></i>	4.70 mGy
<i>Effective dose</i>	Male: 0.01 mSv* Female: 0.01 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 60 mm was used.

\*\* Adjust the mAs value to the body region.



# Children

Emotion 6	ExtrHR
kV	110
Effective mAs/ Quality ref. mAs**	50
Rotation time	1.0 sec.
Acquisition	6 x 0.5 mm
Slice collimation	0.5 mm
Slice width	0.6 mm
Feed/Rotation	3.0 mm
Pitch Factor	1.00
Increment	0.3 mm
Kernel	U90s
CTDI <sub>Vol</sub>	4.25 mGy
Effective dose	Male: 0.01 mSv* Female: 0.01 mSv*

\* The conversion factor for a 7-year-old child, and a scan range of 60 mm was used.

\*\* Adjust the mAs value to the body region.

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- To work **without** CARE Dose 4D use for children  
< 25 kg 26 mAs  
25-34 kg 40 mAs  
35-54 kg 80 mAs

## ExtrCombi

### Indications:

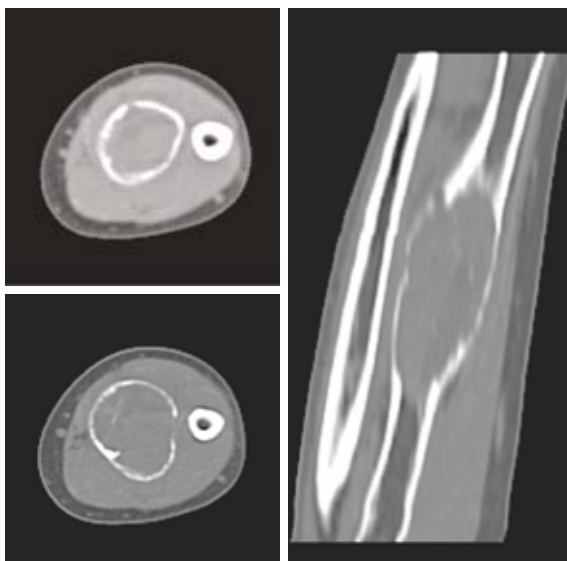
Spiral mode for the combination of bone and soft tissue studies, for example, masses, trauma, disorders of the joint etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 10 cm covered in 8.94 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 10 cm covered in 13.11 sec.



# Children

<b>Emotion 16</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	110	
Effective mAs/ Quality ref. mAs	25	
Rotation time	1.0 sec.	
Acquisition	16 x 0.6 mm	
Slice collimation	0.6 mm	
Slice width	3.0 mm	1.0 mm
Feed/Rotation	14.4 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.7 mm
Kernel	B41s	B70s
CTDI <sub>Vol</sub>	2.00 mGy	
Effective dose	Male: < 0 mSv* Female: < 0 mSv*	

<b>Emotion 6</b>	<b>ExtrCombi</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	110	
Effective mAs/ Quality ref. mAs	25	
Rotation time	1.0 sec.	
Acquisition	6 x 1.0 mm	
Slice collimation	1.0 mm	
Slice width	3.0 mm	1.25 mm
Feed/Rotation	9.0 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.8 mm
Kernel	B41s	B70s
CTDI <sub>Vol</sub>	2.08 mGy	
Effective dose	Male: < 0 mSv* Female: < 0 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 100 mm was used.

## Contrast medium IV injection

*Start delay*      *exam dependent*

*Flow rate*      *dependent upon needle size/Access site*

*Total amount*      *1 – 2 ml per kg of body weight*

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- To work **without** CARE Dose 4D use for children  
    < 25 kg 26 mAs  
    25-34 kg 35 mAs  
    35-54 kg 70 mAs



## HeadAngio/ HeadAngio06s

### Indications:

Spiral mode for head CT Angio studies, for example, cerebral vascular abnormalities, tumors etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 6 cm covered in 3.70 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 6 cm covered in 5.20 sec.

<b>Emotion 16</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	80	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation time</i>	0.6 sec.	
<i>Acquisition</i>	16 x 0.6 mm	
<i>Slice collimation</i>	0.6 mm	
<i>Slice width</i>	2.0 mm	1.0 mm
<i>Feed/Rotation</i>	14.4 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	2.0 mm	0.7 mm
<i>Kernel</i>	C30s	C30s
<i>CTDI<sub>vol</sub></i>	6.16 mGy	
<i>Effective dose</i>	Male: 0.20 mSv* Female: 0.21 mSv*	

# Children

<b>Emotion 6</b>	<b>HeadAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
<i>kV</i>	80	
<i>Effective mAs/ Quality ref. mAs</i>	80	
<i>Rotation time</i>	0.8/0.6 sec.	
<i>Acquisition</i>	6 x 1.0 mm	
<i>Slice collimation</i>	1.0 mm	
<i>Slice width</i>	2.0 mm	1.25 mm
<i>Feed/Rotation</i>	9.0 mm	
<i>Pitch Factor</i>	1.50	
<i>Increment</i>	2.0 mm	0.8 mm
<i>Kernel</i>	C30s	C30s
<i>CTDI<sub>Vol</sub></i>	6.40 mGy	
<i>Effective dose</i>	Male: 0.16 mSv* Female: 0.16 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 60 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children older than age 6 should be examined with an adult protocol.
- CARE Bolus may be used to optimize the bolus timing with a triggering threshold of 120 HU, or use manual triggering.
- An advanced algorithm allow for improved head image quality, without any additional post-processing.
- To work **without** CARE Dose 4D use for children  
< 3 years 100 mAs  
3-6 years 150 mAs





## CarotidAngio/ CarotidAngio06s

### Indications:

Spiral mode for carotid CT Angio studies, for example, carotid stenosis or occlusion, vascular abnormalities of the carotids or vertebral arteries, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 17 cm covered in 8.28 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 20 cm covered in 14.53 sec.



# Children

<b>Emotion 16</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	80	
Effective mAs/ Quality ref. mAs	40	
Rotation time	0.6 sec.	
Acquisition	16 x 0.6 mm	
Slice collimation	0.6 mm	
Slice width	3.0 mm	1.0 mm
Feed/Rotation	14.4 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.7 mm
Kernel	B41s	B31s
CTDI <sub>Vol</sub>	1.28 mGy	
Effective dose	Male: 0.29 mSv* Female: 0.28 mSv*	

<b>Emotion 6</b>	<b>CarotidAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	80	
Effective mAs/ Quality ref. mAs	60	
Rotation time	0.8/0.6 sec.	
Acquisition	6 x 1.0 mm	
Slice collimation	1.0 mm	
Slice width	3.0 mm	1.25 mm
Feed/Rotation	9.0 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.8 mm
Kernel	B41s	B31s
CTDI <sub>Vol</sub>	1.98 mGy	
Effective dose	Male: 1.79 mSv* Female: 1.83 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 170 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children older than age 6 should be scanned with an adult protocol.
- CARE Bolus may be used to optimize the bolus timing with a triggering threshold of 120 HU, or use manual triggering.
- To work **without** CARE Dose 4D use for children  
< 3 years 100 mAs  
3-6 years 150 mAs



## BodyAngioRoutine/ BodyAngioRoutine06s

### Indications:

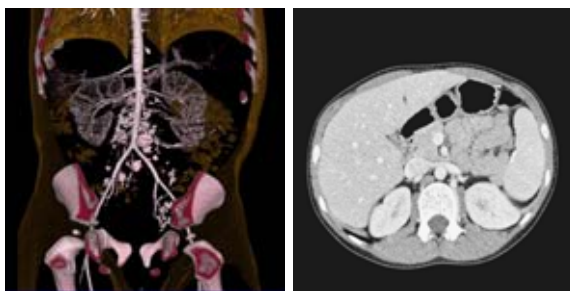
For abdominal CT Angio studies, for example, vascular abnormalities, aneurysms, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 20.0 cm covered in 9.53 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15.0 cm covered in 11.20 sec.



# Children

<b>Emotion 16</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	80	
Effective mAs/ Quality ref. mAs	80	
Rotation time	0.6 sec.	
Acquisition	16 x 0.6 mm	
Slice collimation	0.6 mm	
Slice width	3.0 mm	1.0 mm
Feed/Rotation	14.4 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.7 mm
Kernel	B41s	B31s
CTDI <sub>vol</sub>	2.56 mGy	
Effective dose	Male: 1.34 mSv* Female: 1.66 mSv*	

<b>Emotion 6</b>	<b>BodyAngio</b>	<b>2<sup>nd</sup> reconstr.</b>
kV	80	
Effective mAs/ Quality ref. mAs	80	
Rotation time	0.8/0.6 sec.	
Acquisition	6 x 1.0 mm	
Slice collimation	1.0 mm	
Slice width	3.0 mm	1.25 mm
Feed/Rotation	9.0 mm	
Pitch Factor	1.50	
Increment	3.0 mm	0.8 mm
Kernel	B41s	B31s
CTDI <sub>vol</sub>	2.64 mGy	
Effective dose	Male: 0.04/2.18 mSv* Female: 2.50 mSv*	

\* The conversion factor for a 7-year-old child, and a scan range of 200 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- Children with a body weight of more than 55 kg should be examined with an adult protocol.
- CARE Bolus may be used to optimize the bolus timing. Set the ROI for monitoring scan in the abdominal aorta with triggering threshold of 120 HU, or use manual triggering.
- To work **without** CARE Dose 4D use for children
  - < 25 kg 40 mAs
  - 25-34 kg 75 mAs
  - 35-54 kg 130 mAs





## BodyAngioFast/ BodyAngioFast06s

### Indication:

Spiral mode for fast abdominal CT Angio studies, for example, vascular abnormalities, aneurysms, ect.

For SOMATOM Emotion 6-slice configuration:

A range of 15 cm will be covered in 11.20 sec. with BodyAngioFast06s

<b>Emotion 6</b>	<b>BodyAngioFast</b>
<i>kV</i>	80
<i>Effective mAs/ Quality ref. mAs**</i>	80
<i>Rotation time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0/1.0 mm
<i>Slice collimation</i>	2.0/1.0 mm
<i>Slice width</i>	3.0 mm
<i>Feed/Rotation</i>	21.0/9.0 mm
<i>Pitch Factor</i>	1.75/1.50
<i>Increment</i>	3.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>vol</sub></i>	2.32/2.64 mGy
<i>Effective dose</i>	Male: 2.68/2.63 mSv* Female: 4.21/4.12 mSv*

## NeonateBody/ NeonateBody06s

### Indications:

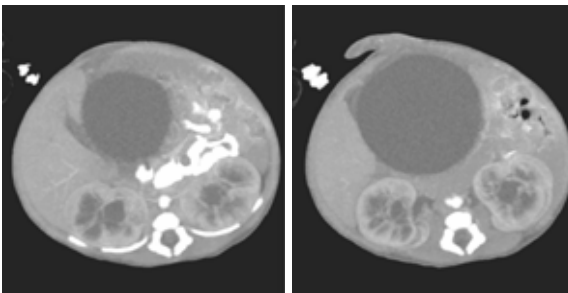
Spiral mode for neonate body studies, for example, tumors, abnormalities, malformations, abscesses, etc.

For SOMATOM Emotion 16-slice configuration:

A typical range of 15 cm covered in 4.33 sec.

For SOMATOM Emotion 6-slice configuration:

A typical range of 15 cm covered in 6.20 sec.



# Children

<b>Emotion 16</b>	<b>NeonateBody</b>
<i>kV</i>	80
<i>Effective mAs/ Quality ref. mAs</i>	35
<i>Rotation time</i>	0.6 sec.
<i>Acquisition</i>	16 x 1.2 mm
<i>Slice collimation</i>	1.2 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	28.8 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	1.02 mGy
<i>Effective dose</i>	Male: 0.96 mSv* Female: 1.07 mSv*

<b>Emotion 6</b>	<b>NeonateBody</b>
<i>kV</i>	80
<i>Effective mAs/ Quality ref. mAs</i>	35
<i>Rotation time</i>	0.8/0.6 sec.
<i>Acquisition</i>	6 x 2.0 mm
<i>Slice collimation</i>	2.0 mm
<i>Slice width</i>	5.0 mm
<i>Feed/Rotation</i>	18.0 mm
<i>Pitch Factor</i>	1.50
<i>Increment</i>	5.0 mm
<i>Kernel</i>	B41s
<i>CTDI<sub>Vol</sub></i>	1.02 mGy
<i>Effective dose</i>	Male: 3.23 mSv* Female: 4.12 mSv*

\* The conversion factor for a 8-week-old child, and a scan range of 150 mm was used.

## Contrast medium IV injection

<i>Start delay</i>	<i>exam dependent</i>
<i>Flow rate</i>	<i>dependent upon needle size/Access site</i>
<i>Total amount</i>	<i>1 – 2 ml per kg of body weight</i>

## Hints

- CARE Bolus may be used to optimize bolus timing. Set the ROI for monitoring scan in the abdominal aorta with triggering threshold of 120 HU, or use manual triggering.

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