ANTHONY BAHINSKI, PHD, MBA, FAHA

Global Head, Safety Pharmacology
GlaxoSmithKline
Mechanistic Safety & Disposition, In Vitro/In Vivo Translation
R&D Platform Technology & Science

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SUMMARY

My career spans from academic research to large Pharma, with over 19 years of experience in the pharmaceutical industry. Recognized thought leader in field of Cardiovascular Pharmacology and Physiology and Complex In Vitro Models and in development of Organ on Chip technology. Research interests include the development of organ-on-a-chip technology for efficacy, safety and toxicity evaluation of drugs, biologics, environmental toxins (small molecules or atmospheric), and nanoparticles, including mechanistic studies and disease models. For seven years, while at the Wyss Institute at Harvard, helped lead the development of these Complex In Vitro Models with the major focus of the effort on development of human "Organs on Chips" that use methods of miniaturization adapted from the computer industry to build functional microfluidic devices with living human cells as components. These tiny, complex, three-dimensional models of human organs can be used to study pathophysiological mechanisms in situ, as well as replace costly and time-consuming animal studies for drug development and toxicology applications. I am currently a member of the Science Board of the United States Food and Drug Administration, the US Environmental Protection Agency Board of Scientific Councilors and the European ORCHID consortium (Organ-on-Chip In Development).

PROFESSIONAL EXPERIENCE

PROFESSIONAL EXPERIENCE:

GlaxoSmithKline **February 2016 – present**
Global Head, Safety Pharmacology

Strategic and operational leadership responsibility for a US and UK based group specializing in Safety Pharmacology assessments. Provides functional leadership in areas of integrative pharmacology/physiology, such as cardiovascular, respiratory, CNS, renal and other highly specialized tissues/systems. Safety Pharmacology is defined by regulatory guidelines and project deliverables as well as by expertise in investigating these specialized areas of safety testing, which are applied from target selection through post-registration.

- Design, implement and execute a coordinated global strategy to deliver Specialized Safety Testing support for R&D Projects through standard and bespoke work packages investigating the risk associated with cardiovascular, respiratory, CNS, renal or other highly specialized tissues/systems. The work includes planning, conducting and interpreting findings from preclinical in vitro and in vivo studies, integration of drug disposition information and advising on clinical safety hazard/risk assessment and plans to mitigate those risks.
- Responsible for reducing attrition by supporting efforts to identify the best drug candidates, timely project issue resolution, and clinical translation of in vitro/ex vivo data by working in partnership with the Drug Design and Selection Platform and the In Vitro/In Vivo Translation Platform.
- Define, refine, and implement standards and peer review to ensure data and appropriate reports are of high quality, meet GLP requirements, and build confidence in GSK's integrity and scientific credibility with internal partners, external reviewers and Regulatory Authorities
- Implement and maintain strategic workforce planning to define project demand- workforce capacity analysis in order to enable a responsive, capable workforce

- Optimize cycle times and costs for both internal and CRO work packages related to Safety Pharmacology testing, and establish an ongoing process to monitor the efficiency of how and where work packages are completed. Partner with SciNovo to establish strong CRO partnerships and engagement plans.
- Define, implement and financially coordinate approaches to technology/knowledge transfer as a catalyst for wider externalized partnerships (commercial, academic, collaborative) in the areas of drug safety.
- Promote external networks and influence through key industry groups, scientific consortia and associated regulatory activities in the specialized safety testing area.
- Provide a structure and/or opportunities to allow staff to integrate mechanistic safety and disposition data, and translate this knowledge to the clinical setting.
- Ensure development of scientists to maintain a highly motivated, productive and innovative science platform that builds on best practices across sites and sub-disciplines to continuously improve safety pharmacology testing strategies and tactics

FDA special government Employee (SGE) Advisory Committee Member **Jan 2015 - present**
Science Board of the US Food and Drug Administration
The Science Board provides advice to the Commissioner and other appropriate officials on specific complex scientific and technical issues important to FDA and its mission, including emerging issues within the scientific community. Additionally, the Science Board provides advice that supports the Agency in keeping pace with technical and scientific developments, including in regulatory science; and input into the Agency's research agenda; and on upgrading its scientific and research facilities and training opportunities. It also provides, where requested, expert review of Agency sponsored intramural and extramural scientific research programs.

EPA special government Employee (SGE) Advisory Committee Member **Dec 2017 - present**
EPA Board of Scientific Councilors (BOSC) - Chemical Safety for Sustainability Subcommittee (term 12/2017 – 12/2020)
The EPA Board of Scientific Counselors (BOSC) provides advice, information, and recommendations to EPA's Office of Research and Development (ORD) on technical and management issues of its research programs.

European ORgan-on-Chip In Development (ORCHID) Advisory Board **Jan 2018 - present**
(2 year term) ORCHID will create a roadmap for organ-on-chip technology and the framework to build a network of relevant stakeholders. ORCHID will achieve this through 5 objectives: (i) evaluation of the technology (state of the art and unmet needs), (ii) identification of ethical issues, establishing standards and identifying measures for regulatory implementation, (iii) analysis of economic and societal impact, training and education, (iv) developing a roadmap which will guide the required R&D efforts and (v) raising awareness and building the ecosystem for organ-on-chip technology through a digital reference platform.
The ORCHID consortium is composed of six partners. Leiden University Medical Centrum (LUMC, The Netherlands) will lead the consortium (WP1), the Institute for human Organ and Disease model (hDMT, The Netherlands) will focus on the strategy and the roadmap (WP2), Fraunhofer IGB (Germany) on impact assessment (WP3), CEA Leti (France) on eco-system development and the digital platform (WP4), IMEC (Belgium) on the ethical aspects, regulation and standardization (WP5) and the University of Zaragoza (Spain) will lead dissemination (WP6). The ORCHID Advisory Board will be composed of international leaders recognized for their expertise in a field of importance to ORCHID as well as representatives of European stakeholders with interest in the outcomes of the project. The Advisory Board will provide the Project Management Board with strategic feedback regarding the project progress and contribute to maintain scientific and technological excellence of the project. The Advisory Board also aims at consolidating existing links with complementary international initiatives. Another fundamental mission of the Advisory Board is the validation of the project deliverables to ensure relevance and quality.

WYSS INSTITUTE FOR BIOLOGICALLY INSPIRED ENGINEERING, HARVARD UNIVERSITY MEDICAL SCHOOL, Boston, MA **July 2010 - Feb 2016**
Lead Senior Staff Scientist July 2010 – Feb 2016

The mission of the Wyss Institute for Biologically Inspired Engineering at Harvard University is to transform human healthcare and the environment by emulating the way nature builds. Developed as an alliance between Harvard and other premier academic and clinical partner institutions, Institute faculty and staff collaborate in high-risk,

fundamental research and science-driven technology development. A major focus of the Institute is to translate the technologies developed by its faculty and staff into commercial products and therapies through collaborations with clinical investigators and establishment of corporate alliances.

Advanced Technology Team

- Led major collaborations with FDA, NIH and DARPA in development of "Organ-on-Chips" technologies
- Development of organ-on-a-chip technology for preclinical safety and efficacy evaluation of small molecules, biologics, nanoparticles, cellular therapies, environmental safety and food safety.
- Help guide the material and device development efforts of the Enabling Technology Platforms
- Mentor staff and students in the technology translation and intellectual property areas, and provide institutional memory.
- Foster communication and interactions across the Wyss, while ensuring that Institute members translate their technologies into commercial products and therapies through partnerships with industrial and clinical collaborators.

PFIZER, INC., St. Louis, MO (formerly Pharmacia, Inc., / Upjohn) **2001 - 2010**
St. Louis Site Lead – Global Safety Pharmacology 2008 - 2010
Research Fellow - Drug Safety Research & Development

Global Safety Pharmacology (GSP) Leadership Team

- Managed all aspects of successful implementation of GSP operation model, fostering new culture of unburdened organization and fast and effective decision-making
- Effective and streamlined project and portfolio decision making and resource management
- Deployed and delivered continuous productivity improvements through efficient uses of resource
- Developed and implemented talent/succession development plans
- Developed technology investment strategy to increase confidence in translation of effects to man and to increase our technical competence
- Led scientific excellence within GSP organization

Pfizer Research Unit Interface – Point of Contact: Pfizer Regenerative Medicine

- Member of Pfizer Regenerative Medicine Extended Leadership Team
- Point of Contact and interface for Safety Pharmacology with Inflammation and Indications Discovery Research Units

St. Louis Site Lead, Global Safety Pharmacology 2005 - 2008
Associate Research Fellow - Drug Safety Research & Development

Strategic Alliances (Internal Pfizer Secondee, Business Development) 2005
Business Development Group - Pfizer Global Research and Development

Associate Research Fellow - Pfizer Global Research and Development 2003 – 2005
Worldwide Safety Sciences - Head, In Vitro Safety Pharmacology

Research Advisor – Kalamazoo, MI 2003
Worldwide Safety Sciences - Pfizer Global Research and Development

Research Advisor – Kalamazoo, MI 2001 – 2003
Pre-Clinical Toxicology ID / Safety Pharmacology - Pharmacia Corporation

PROCTER & GAMBLE PHARMACEUTICALS, MASON, OH **1994 - 2001**
Senior Scientist - Research Project Leader, Antiarrhythmics Discovery 1999 - 2001
Head - Cardiac Electrophysiology Laboratory
Cardiovascular Research

Senior Scientist - Cardiovascular Research 1998 - 1999

Head - Cardiac Electrophysiology Laboratory

Research Scientist 1994 - 1998
Cardiac Research - Next Generation Antiarrhythmic Project
Head - Cardiac Electrophysiology Laboratory

UNIVERSITY OF CINCINNATI SCHOOL OF MEDICINE, Cincinnati, Ohio **1992 - 1994**
New Investigator - NIH "Program of Excellence in Molecular Biology of Heart and Lung"

New Investigator - NIH "Program of Excellence in Molecular Biology of Heart and Lung" **1989 – 1992**
Department of Molecular Genetics, Biochemistry and Microbiology

THE ROCKEFELLER UNIVERSITY, NEW YORK, NY **1986 - 1989**
Postdoctoral Associate - Laboratory of Cardiac Physiology

EDUCATION

Masters of Business Administration, Xavier University, Cincinnati, OH

Doctorate in Physiology, Temple University, Philadelphia, PA

Bachelor of Science in Biology, Drexel University, Philadelphia, PA

SELECTED ACCOMPLISHMENTS

Wyss Institute for Biologically Inspired Engineering at Harvard University

- Lead Senior Staff Scientist coordinating efforts between FDA, NIH and Wyss on grant funded by the first joint NIH-FDA initiative focused on advancing Regulatory Science. Grant provides $3.3M to adapt the lung-on-a-chip for direct application of aerolized drugs and nanotherapeutics, and to link this device to the Heart-on-a-Chip device using microfluidics to create a 'Heart-Lung Micromachine' for drug testing and safety evaluation.
- Lead Senior Staff Scientist coordinating efforts between FDA and Wyss on grant funded ($5.6 million) by the FDA on developing organ chips for use in developing medical countermeasures for acute radiation syndrome.
- FDA/DARPA Microphysiological Systems Project - Lead Senior Staff Scientist coordinating efforts between FDA and DARPA on grant funded ($37 million) by DARPA on developing organ chips for use in drug testing and safety evaluation. Member of Wyss Institute team that developed funded project proposal for DARPA BAA, including technology development, validation and commercialization. Funding level is equivalent to "Series B"; $37 million over 5 years.
- Leadership role in developing industrial relationships and outreach that will guide the research and development efforts at the Wyss Institute.
- Provide clear and compelling direction for prototype development of novel human cell-based microsystems, and guide applied research primarily focused on achieving commercial proof-of-concept and demonstration of commercial viability.
- Assess potential market opportunities and risks and to develop strategic plans for successful technology transfer and commercialization.
- Co-author of 14 publications and co-inventor on 6 patent applications relevant to "Organ-on-Chip" technology and microphysiological systems

Appointed to EPA Board of Scientific Councilors (BOSC) - Chemical Safety for Sustainability Subcommittee (term 12/2017 – 12/2020)
The EPA Board of Scientific Counselors (BOSC) provides advice, information, and recommendations to EPA's Office of Research and Development (ORD) on technical and management issues of its research programs.

Appointed to the Science Board of the US Food and Drug Administration (2015-2018).
The Science Board shall provide advice to the Commissioner and other appropriate officials on specific complex scientific and technical issues important to FDA and its mission, including emerging issues within the scientific community. Additionally, the Science Board will provide advice that supports the Agency in keeping pace with technical and scientific developments, including in regulatory science; and input into the Agency's research agenda; and on upgrading its scientific and research facilities and training opportunities. It will also provide, where requested, expert review of Agency sponsored intramural and extramural scientific research programs.

Appointed to Advisory Board of European ORgan-on-Chip In Development (ORCHID) (2018 – 2020)
ORCHID will create a roadmap for organ-on-chip technology and the framework to build a network of relevant stakeholders. The ORCHID Advisory Board is composed of international leaders recognized for their expertise in a field of importance to ORCHID as well as representatives of European stakeholders with interest in the outcomes of the project. The Advisory Board will provide the Project Management Board with strategic feedback regarding the project progress and contribute to maintain scientific and technological excellence of the project. The Advisory Board also aims at consolidating existing links with complementary international initiatives. Another fundamental mission of the Advisory Board is the validation of the project deliverables to ensure relevance and quality.

Elected as Vice President-Elect (2018) and Councilor (Executive Committee; 2014-2016) of the Cardiovascular Toxicology Specialty Section (CVTSS) of the Society of Toxicology (SOT).
The Mission of the Specialty Section is to serve as the catalyst for the interaction and development of members of the Society of Toxicology with a vested interest in cardiovascular toxicology. The Specialty Section is committed to the identification, prevention, and/or amelioration of cardiovascular toxicities. The principal endeavor of this commitment is to encompass cardiovascular toxicology spanning mechanistic, translational, clinical, and epidemiology studies in regards to pharmacological, occupational, and public health.

Elected as Councilor (Executive Committee; 2016-2018) of the Drug Discovery Toxicology Specialty Section (DDTSS) of the Society of Toxicology (SOT).
DDTSS is a specialty section created to fulfill the growing need for incorporating predictive and integrative toxicological approaches early in drug discovery and development. Early application of these approaches is the key to identifying potential liabilities and providing necessary perspective that helps reduce attrition of drug candidates at later stages of the process. The overarching goal is to provide an integrated understanding of a drug candidate's liabilities prior to its advancement into non-clinical development and clinical evaluation. This specialty section seeks to foster discussion and provide guidance around appropriate application of technologies and approaches that may refine or compliment traditional animal-based toxicology models. It also aims to identify gaps in novel and emerging technologies that require further development and application.

Elected to the Board of Directors of the Safety Pharmacology Society (2013-2015)
The Safety Pharmacology Society is a nonprofit organization that promotes knowledge, development, application, and training in Safety Pharmacology; a distinct scientific discipline that integrates the best practices of pharmacology, physiology and toxicology. The specific responsibility areas of the Board of Directors are:

- Planning the future direction of the association;
- Establishing broad policies to guide the operation of the association;
- Setting financial objectives and monitoring their achievement.

National Cancer Institute (NCI) Investor Forum Review Committee (multiple years since 2012, including 2018)
Assessed small businesses to present at NCI Investor Forum. Evaluated Technology and commercial potential. The NCI SBIR Investor Forum represents a pivotal opportunity for current NCI SBIR recipient companies to showcase their innovative technology to the investment community.

2012 NIH SBIR/STTR Small Business Review Panel - Cardiovascular Sciences
Member of NIH panel to review **small business grant** applications in the Cardiovascular Sciences (Meeting: ZRG1 CVRS-N 10)

Member of Planning Committee for Institute of Medicine (IOM) of the National Academy of Sciences Workshop (2011): Advancing Regulatory Science for Medical Countermeasure Development
Workshop was held as collaboration between the IOM's Forums on Drug Discovery, Development, and Translation (the Drug Forum) and Medical and Public Health Preparedness for Catastrophic Events (the Preparedness Forum to explore issues related to Advancing Regulatory Science for Medical Countermeasure Development.

External Advisory Board, Dept. of Biomedical Engineering, School of Engineering and Applied Science, Washington University, St. Louis
Member of External Advisory Board consisting of members from various industry and academic organizations. Key focus:

- Serve as sounding board for any aspects of Biomedical Engineering (BME) education and research
- Provide feedback to department, particularly about educational issues

Member of Review Editorial Board of Frontiers in Pharmacology of Ion Channels and Channelopathies, a Specialty of the journal Frontiers in Pharmacology

Pfizer - St. Louis Site Lead for Global Safety Pharmacology (GSP) organization.
Member, responsible for global management of one of the largest safety pharmacology groups in pharmaceutical industry, including developing yearly budget (St. Louis and Global Safety Pharmacology), personnel evaluation, hiring, technology development and investment in external technologies (small business, academia, biotech).

- Responsible for all aspects of Safety Pharmacology for St. Louis site (In Vitro, In Vivo, CNS, CV, and Respiratory).
- Established small animal in vivo cardiovascular evaluation capability at St. Louis site.

Pfizer Research Unit Interface – Point of Contact: Pfizer Regenerative Medicine
Focused on:

- Evaluation and prioritization of external research technology (small business, Biotech) for integration into Pfizer program.
- Development of Safety and Research Strategy in conjunction with Regenerative Medicine Leadership Team
- Member of Regenerative Medicine Extended Leadership Team
- Championed investigation and development of stem cell technology as novel system for in vitro toxicology evaluation.

Pfizer Drug Safety Technology Council
Member, Global Safety Sciences Technology Board. Key focus:

- Evaluation of external technologies (small business, Biotech) to fill Pfizer gaps and needs. Evaluated technology based on strength of science and commercialization potential.
- Fostering innovation within Safety Sciences, by supporting the development and evaluation of high priority technologies aligned with Worldwide Safety Sciences business objectives,
- Facilitating the implementation of successful technologies to improve confidence in the safety of Pfizer's portfolio.

Pfizer Cardiovascular Safety Council (CVSC)
Member, focused on optimizing drug development and reducing attrition by serving as internal subject matter experts that:
•Provide single point of contact for expert advice to project teams and due diligence teams on cardiovascular related issues
•Develops strategies to influence internal and external environment with respect to cardiovascular safety
•Provides forum to integrate non-clinical and clinical research strategies

Drug Safety Team Lead
Team leader responsible for all aspects of safety evaluation and strategy for projects. Projects focused on Inflammation, Pain and Oncology. Understanding of mechanisms of action and target to assess safety concerns and develop appropriate strategy

SOCIETY MEMBERSHIPS

Safety Pharmacology Society

American Heart Association
Inaugural Fellow of the American Heart Association (FAHA)
Basic Science Council

Biophysical Society

Biomedical Engineering Society

Society of Toxicology

PATENTS

Replacement of polydimethylsiloxane with clear, flexible, and castable polyurethane in the fabrication of microfludic devices for applications such as tissue engineering and drug screening
PCT/US12/36920 filed 05/08/12 Pub#WO2012154729 - In Nat'l Phase
U.S. Utility 14/116,481 filed 11/08/13 Pub#2014-0199764 - Pending
Ingber, Donald E.,; Domansky, Karel; Leslie, Daniel Christopher; Hamilton, Geraldine A.; **Bahinski, Anthony**

Microfluidic Aerosol Drug Delivery
PCT/US12/37096 filed 05/09/12 Pub#WO2012154834 - In Nat'l Phase
U.S. Utility 14/116,477 filed 11/08/13 Pub#2014-0158233 - Pending
Ingber, Donald E.; Leslie, Daniel Christopher; Domansky, Karel; Hamilton, Geraldine A.; **Bahinski, Anthony**

Integrated Human Organ-on-chip Microphysiological Systems HU/UT
PCT/US12/68725 filed 12/10/12 Pub#WO2013086486 - In Nat'l Phase
U.S. Utility 14/362,841 filed 06/04/14 Pub#2015-0004077 - Pending
U.S. CONT 14/928,039 filed 10/30/15 Pub#2016-0145554 - Pending
Ingber, Donald E.; Cunningham, Robert; Hamilton, Geraldine A.; Parker, Kevin Kit; Levner, Daniel; Goss, Josue A.; Wikswo, John; Samson, Philip; Reiserer, Ronald; McLean, John; McCawley, Lisa; Markov, Dmitry; Cliffel, David; **Bahinski, Anthony**; Block III, Frank Emmanuel; McKenzie, Jennifer Robin; Hinojosa, Christopher David

Integrated Human Organ-on-chip Microphysiological Systems HU
PCT/US12/68766 filed 12/10/12 Pub#WO2013086502 - In Nat'l Phase
U.S. Utility 14/363,105 filed 06/05/14 Pub#2014-0342445 - Pending
Ingber, Donald E.; Parker, Kevin Kit; Hamilton, Geraldine A.; **Bahinski, Anthony**

(TEER chip) Electrode integration into organs on chip devices with improved transparency and flexibility
PCT/US16/67294 filed 12/16/16 - Pending
Ingber, Donald E.; Henry, Olivier Y.; Novak, Richard; **Bahinski, Anthony**; Wen, Norman; Van der meer, Andries; Villenave, Rémi; Hamkins-Indik, Tiama

Microfluidic shear flow test platform
PCT/US17/17980 filed 02/15/17 - Pending
Ingber, Donald E.; Novak, Richard; Mayor, Elizabeth; **Bahinski, Anthony**; Masoumi, Nafiseh; Mayer, John

PUBLICATIONS
(21 selected of 41 publications)

Bahinski,A., Nakao,M. and Gadsby,D.C. : Potassium translocation by the Na/K pump is voltage insensitive. *Proc. Natl. Acad. Sci. USA*, 85:3412-3416, 1988.

Bahinski,A., Nairn,A.C., Greengard,P. and Gadsby,D.C. : Chloride conductance regulated by cyclic AMP-dependent protein kinase in cardiac myocytes. *Nature*, 340:718-721, 1989.

Yatani,A., Wakamori,M., Mikala,G. and Bahinski,A. : Block of transient outward-type cloned cardiac K^+ channel currents by quinidine. *Circ. Res.* 73: 351-359, 1993.

*Tang, S., *Mikala, G., *Bahinski,A., Yatani, A., Varadi, G. and Schwartz, A. : Molecular localization of ion-selectivity sites within the pore of a human L-type cardiac calcium channel. *J. Biol. Chem.*, 268: 13026-13029, 1993. (*co-first authors)

Tang, S., Yatani, A., Bahinski, A., Mori, Y. and Schwartz, A. : Molecular localization of regions in the L-type calcium channel critical for dihydropyridine action. *Neuron*, 11: 1013-1021, 1993.

Bahinski, A., Yatani, A., Mikala, G., Tang, S., Yamamoto, S. and Schwartz, A. : Charged amino acids near the pore entrance influence ion-conduction of a human L-type Ca^{2+} channel. *Mol. Cell. Biochem.* 166: 125-134, 1997.

Claycomb, W.C., Lanson, N.A., Jr., Stallworth, B.S., Egeland, D.B., Delcarpio, J.B., Bahinski, A. and Izzo, N.J., Jr. : HL-1 Cells: A cardiac muscle cell line that contracts and retains phenotypic characteristics of the adult cardiomyocyte. *Proc. Natl. Acad. Sci. USA*, 95: 2979-2984, 1998.

Chaudhary, K.W., Barrezueta, N., Bauchmann, M., Milici, A.J., Beckius, G., Stedman, D., Hambor, J., Blake, W., McNeish, J.D., Bahinski, A. and Cezar, G.G.: Embryonic Stem Cells in Predictive Cardiotoxicity: Laser Capture Microscopy Enables Assay Development. *Toxicol Sci*, 90(1): 149–158, 2006.

Chaudhary, K.W., O'Neal, J., Mo, Z-L., Fermini, B., Gallavan, R. and Bahinski, A.: Evaluation of the Rubidium Efflux Assay for Pre-clinical Identification of HERG Blockade. *Assay Drug Dev Technol*, Vol. 4, Number 1: 73-82, 2006.

Flagg, T.P., Cazorla, O., Remedi, M.S, Haim, T.E, Tones, M.A., Bahinski, A., Randal E. Numann, R.E., Kovacs, A., Schaffer, J., Nichols, C.G., and Nerbonne, J.M.: Ca^{2+}-Independent Alterations in Diastolic Sarcomere Length and Relaxation Kinetics in a Mouse Model of Lipotoxic Diabetic Cardiomyopathy. *Circ. Res.* 104 (1): 95-103, 2009.

Mo, Z-L., Faxel, T., Yang, Y-S., Gallavan, R., Messing, D. and Bahinski, A.: Effect of compound plate composition on measurement of hERG current IC50 using PatchXpress. *J Pharm Tox Methods*, Jul-Aug; 60 (1):39-44, 2009.

Haim, T.E, Wang, W., Flagg, T.P., Tones, M.A., Bahinski, A., Randal E. Numann, Nichols, C.G., and Nerbonne, J.M.: Palmitate Attenuates Myocardial Contractility Through Augmentation of Repolarizing Kv Currents. *Journal of Molecular and Cellular Cardiology*, Feb;48(2):395-405, 2010. Epub 2009 Oct 24.

Hughes RO, Rogier DJ, Devraj R, Zheng C, Cao G, Feng H, Xia M, Anand R, Xing L, Glenn J, Zhang K, Covington M, Morton PA, Hutzler JM, Davis JW 2nd, Scherle P, Baribaud F, Bahinski A, Mo ZL, Newton R, Metcalf B, Xue CB: Discovery of ((1S,3R)-1-isopropyl-3-((3S,4S)-3-methoxy-tetrahydro-2H-pyran-4-ylamino)cyclopentyl)(4-(5-(trifluoromethyl)pyridazin-3-yl)piperazin-1-yl)methanone, PF-4254196, a CCR2 antagonist with an improved cardiovascular profile. *Bioorg Med Chem Lett.* 2011 Jan 15. [Epub ahead of print]

Domansky K, Leslie DC, Fraser JP, Hamilton GA, Bahinski A and Ingber DE: Non-absorbing, clear, flexible, and castable polyurethane for fabrication of microfluidic devices. *Conference Technical Digest , μTAS 2011 15th International Conference on Miniaturized Systems for Chemistry and Life Sciences*, in press, 2011

Jang K-J, Hamilton GA, McPartlin L, Bahinski A, Kim HN, Suh K-Y and Ingber DE: Human kidney proximal tubule-on-a-chip for drug transporter studies and nephrotoxicity assessment. *Conference Technical Digest , μTAS 2011 15th International Conference on Miniaturized Systems for Chemistry and Life Sciences*, 2011

Leslie DC, Domansky K, Hamilton GA, Bahinski A and Ingber DE: Aerosol drug delivery for lung on a chip. *Conference Technical Digest , μTAS 2011 15th International Conference on Miniaturized Systems for Chemistry and Life Sciences*, 2011

Kim SB, Koo KI, Bae H, Dokmeci MR, Hamilton GA, Bahinski A, Kim SM, Ingber DE and Khademhosseini A: A mini-microscope for *in-situ* monitoring of cells. *Lab on a Chip*, 12:3976-3982, 2012

Domansky K, Leslie DC, McKinney J, Fraser JP, Sliz JD, Hamkins-Indik T, Hamilton GA, Bahinski A, Ingber DE: Clear castable polyurethane elastomer for fabrication of microfluidic devices. *Lab on a Chip*, 2013 Oct 7;13(19):3956-64

Huh D, Kim HJ, Fraser JP, Shea DE, Khan M, Bahinski A, Hamilton GA, Ingber DE. Microfabrication of Human Organs-on-Chips. Nature Protocols 2013; 8:2135-2157.

Alépée N, Bahinski A, Daneshian M, De Wever B, Fritsche E, Goldberg A, Hansmann J, Hartung T, Haycock J, Hogberg H, Hoelting L, Kelm JM, Kadereit S, McVey E, Landsiedel R, Leist M, Lübberstedt M, Noor F, Pellevoisin C, Petersohn D, Pfannenbecker U, Reisinger K, Ramirez T, Rothen-Rutishauser B, Schäfer-Korting M, Zeilinger K, Zurich MG. State-of-the-art of 3D cultures (organs-on-a-chip) in safety testing and pathophysiology. *ALTEX*. 2014;31(4):441-77. doi: http://dx.doi.org/10.14573/altex1406111. Epub 2014 Jul 14. Review.

Esch EW, Bahinski A, Huh D. Organs-on-chips at the frontiers of drug discovery. *Nat Rev Drug Discov*. 2015 Apr;14(4):248-60. doi: 10.1038/nrd4539. Epub 2015 Mar 20. Review. PMID: 25792263

Benam KH, Villenave R, Lucchesi C, Varone A, Hubeau C, Lee HH, Alves SE, Salmon M, Ferrante TC, Weaver JC, Bahinski A, Hamilton GA, Ingber DE. Small airway-on-a-chip enables analysis of human lung inflammation and drug responses in vitro. *Nat Methods*. 2015 Dec 21. doi: 10.1038/nmeth.3697. [Epub ahead of print] PMID:26689262

Marx U, Andersson TB, Bahinski A, Beilmann M, Beken S, Cassee FR, Cirit M, Daneshian M, Fitzpatrick S, Frey O, Gaertner C, Giese C, Griffith L, Hartung T, Heringa MB, Hoeng J, de Jong WH, Kojima H, Kuehnl J, Leist M, Luch A, Maschmeyer I, Sakharov D, Sips AJ, Steger-Hartmann T, Tagle DA, Tonevitsky A, Tralau T, Tsyb S, van de Stolpe A, Vandebriel R, Vulto P, Wang J, Wiest J, Rodenburg M, Roth A. Biology-inspired microphysiological system approaches to solve the prediction dilemma of substance testing. *ALTEX*. 2016 May 15. doi: 10.14573/altex.1603161. [Epub ahead of print]

Torisawa YS, Mammoto T, Jiang E, Jiang A, Mammoto A, Watters AL, Bahinski A, Ingber DE. Modeling Hematopoiesis and Responses to Radiation Countermeasures in a Bone Marrow-on-a-Chip. *Tissue Eng Part C Methods*. 2016 May;22(5):509-15. doi: 10.1089/ten.TEC.2015.0507. Epub 2016 Apr 20.

Kim HJ, Lee J, Choi JH, Bahinski A, Ingber DE. Co-culture of Living Microbiome with Microengineered Human Intestinal Villi in a Gut-on-a-Chip Microfluidic Device. *J Vis Exp*. 2016 Aug 30;(114). doi: 10.3791/54344.

Benam KH, Novak R, Nawroth J, Hirano-Kobayashi M, Ferrante TC, Choe Y, Prantil-Baun R, Weaver JC, Bahinski A, Parker KK and Ingber DE. Matched-Comparative Modeling of Normal and Diseased Human Airway

Responses Using a Microengineered Breathing Lung Chip *Cell Systems*, 2016 Nov 23;3(5):456-466. Epub 2016 Oct 27. PMID: 27894999

Villenave R, Wales SQ, Hamkins-Indik T, Papafragkou E, Weaver JC, Ferrante TC, Bahinski A, Elkins CA, Kulka M, Ingber DE. Human Gut-On-A-Chip Supports Polarized Infection of Coxsackie B1 Virus In Vitro. *PLoS One*. 2017 Feb 1;12(2):e0169412. doi: 10.1371/journal.pone.0169412. eCollection 2017. PMID: 28146569

Kerecman Myers D, Goldberg AM, Poth A, Wolf MF, Carraway J, McKim J, Coleman KP, Hutchinson R, Brown R, Krug HF, Bahinski A, Hartung T. From in vivo to in vitro: The medical device testing paradigm shift. *ALTEX*. 2017;34(4):479-500. Epub 2017 May 25. PMID: 28539002