CAAT*feed*

Marcel Leist and Giorgia Pallocca Receive LUSH Prizes; ALTEX Receives Commendation

CAAT received two awards and ALTEX received a commendation at the 2016 LUSH Prize ceremony on November 11 in London. CAAT-Europe Co-Director Marcel Leist Received the Science Award, and Giorgia Pallocca, who works in Leist's lab, received the Young Researcher Award. ALTEX received a commendation for services to the replacement of animals in testing in the Public Awareness category. The prize ceremony was held after a conference on Regulatory Chemical Safety on the preceding day. The conference opened with a keynote address by Thomas Hartung.

More info on the Prize and the other winners can be found at: http://lushprize.org/2016-prize/2016-prize-winners/

CAAT Celebrates its 35th Birthday with a US Board Meeting and Keynote by Tina Bahadori (EPA) on "From Data to Decisions: 21st Century Approaches to Chemical Safety Evaluations"

Tina Bahadori, EPA Exposure Scientist and National Program Director, kicked off CAAT's 35th birthday celebration and board meeting with a talk on 21st century approaches to chemical safety evaluation in Baltimore on December 1 at the Johns Hopkins Bloomberg School of Public Health.

National Public Radio (NPR) Covers CAAT's Mini-Brain Research

Some tiny clusters of brain cells grown in a lab dish are made big news at the Society for Neuroscience meeting in San Diego in November. At a press conference at the neuroscience meeting, researchers said minibrains were helping them figure out how the Zika virus can disrupt human brain formation in the early stages of fetal development. Thomas Hartung was interviewed. The complete transcript may be found here: http://www.npr.org/sections/health-shots/2016/11/13/501257433/minibrains-could-help-drug-discovery-for-zika-and-for-alzheimers

Alan Goldberg and Paul Locke Speak at The Animal Welfare Act at 50 Conference

December 2, 2016
Harvard Law School
This conference, held December 2nd at the Harvard Law School, brought together experts to assess the first 50 years of the Animal Welfare Act (AWA) and consider recommendations for the future. Alan Goldberg, CAAT's Founder and Director Emeritus, and Paul Locke, both presented.

Marcel Leist receives Research and Development Award of the state of Hamburg (Germany)

December 9, 2016
Co-director of CAAT-Europe, Marcel Leist, head of department for *in vitro* Toxicology and Biomedicine at the University of Konstanz, received the first Research and Development Award of the state of Hamburg for the "Promotion of Research on Replacement and Complementary Methods to Animal Testing". This prize was awarded by Hamburg's federal state authority for Health and Consumer Protection to Prof. Leist for "new replacement methods in neurotoxicity". The prize was shared with a team from the new German Federal Center for 3R methods (Bf3R) in Berlin, represented by Drs Christopher Weidner and Matthias Steinfath, for their work on the "right selection of animal or alternative methods for human prediction".

3D Cell Culture Experts Assemble for Inaugural New Frontiers in 3D Conference Hosted by CAAT

Experts in next-generation 3D cell culture gathered at the inaugural New Frontiers in 3D Cell Culture-based Screening Technologies Conference, held October 13 at the Johns Hopkins University in Baltimore. Conceived and organized by CAAT, InSphero AG, the National Center for Advancing Translational Sciences (NCATS), and Promega Corporation, the first annual conference brought together thought leaders from major disciplines to discuss application of 3D tissue models to improve *in vitro* assays used for drug discovery and toxicity testing.

Michael Gottesman, MD, Chief of the Laboratory of Cell Biology at the National Cancer Institute and Deputy Director for Intramural Research, National Institutes of Health, and Thomas Hartung, MD, PhD of the Johns Hopkins Bloomberg School of Public Health and Director of CAAT, delivered keynote presentations at the one-day event. Themed sessions featured presentations from some of the world's leading pharmaceutical, regulatory, and academic research groups working with 3D model systems, including Novartis, the Hubrecht Institute, Merck, the National Institute of Environmental Health Sciences (NIEHS), Pfizer, The Massachusetts Institute of Technology (MIT), University of Innsbruck, and the Russian Academy of Sciences.

Dr Gottesman, whose research interests include mechanisms by which cancers become resistant to chemotherapy, reinforced in his keynote address that traditional monolayer cell culture models used to study tumor chemoresistance have proven to be woefully inadequate. Gottesman noted, "It should come as no surprise that the world of cell culture is not flat. The meeting was an opportunity to learn about some of the new and exciting advances in 3D cell culture and appreciate the importance of this new technology in studying normal and abnormal cell behavior."

Jens Kelm, PhD, InSphero Chief Technology Officer and New Frontiers Scientific Advisory Board member, said, "The presentations at the conference underscored how 3D cell-based assays are becoming a part of the daily operations in drug discovery and drug safety testing to better classify compounds using more predictive models - the key being robust, uniform, automation-friendly, and easy to use 3D cell models."

The international New Frontiers in 3D conference will be hosted in 2017 at a European site to be determined, with plans to return to the US in 2018.

Mini-Brains Made to Order: Cell-Culturing Technique Developed by JHSPH Scientists Could Revolutionize Neurological Drug Development

The *Johns Hopkins Bloomberg School of Public Health Yearbook* covered CAAT's cell-culturing technique as one of the school's notable achievements of 2016.

"Ninety-five percent of drugs that look promising when tested in animal models fail once they are tested in humans at great expense of time and money," says Thomas Hartung, MD, PhD, the Doerenkamp-Zbinden Professor and Chair for Evidence-based Toxicology at the Bloomberg School.

There are myriad reasons why seemingly promising drugs fail when tested on humans, but the most intractable problem is also the most obvious. "While rodent models have been useful," observes Hartung, "we are not 150-pound rats."

The full article may be accessed here: http://www.jhsph.edu/yearlook/mini-brains-made-to-order

Talk at New York City Bar: Updates on Animal Research and Alternatives

Paul Locke was a panelist at this free talk at the New York City Bar on November 2, 2016, which focused on recent updates on the law and animal research, including alternative methods of safety testing and the care and treatment of laboratory animals.

Upcoming Meetings

Satellite Meeting on Read-across at SOT 56th Annual Meeting and ToxExpo

March 17, 2017
Baltimore, MD

Join CAAT for a special satellite meeting on read-across following the annual Society of Toxicology meeting. This satellite meeting (10am to 4pm) will continue our discussion of Good Read-across Practice with a special focus on:

- Expanding the use and acceptance across international regulatory agencies
- Usefulness of read-across on its own or as part of weight-of-evidence
- Relevant case studies for discussion and illustration of use-cases
- Making read-across more consistent and standardized to instill more confidence in outcomes

For further information, please email Alexandra Maertens at amaerte1@jhu.edu.

CAAT Academy: Hands-on Training in Toxicology

Various locations throughout Europe
Beginning April 2017

Details at: http://media.wix.com/ugd/389a36_25f6508300e745b7b89563e68e70544b.pdf

Save the Date

10th World Congress on Alternatives and Animal Use in the Life Sciences

August 20-24, 2017
Seattle, Washington
http://wc10seattle.org/2017/home.aspx

Recent Publications outside ALTEX

Ankley, G., Escher, B., Hartung, T. and Shah, I. (2016). Pathway-based approaches for environmental monitoring and risk assessment. *Environ Sci Technol 50*, 10295-10296. https://doi.org/10.1021/acs.est.6b04425 as well as *Chem Res Toxicol 29*, 1789-1790. https://doi.org10.1021/acs.chemrestox.6b00321

Benfenati, E., Berggren, E., Fritsche, E. et al. (2016). Special issue: novel chemical hazard characterisation approaches. *EFSA J 14*, s0506. https://doi.org/10.2903/j.efsa.2016.s0506

Bowman, C. E., Zhao, L., Hartung, T. and Wolfgang, M. J. (2016). Requirement for the mitochondrial pyruvate carrier in mammalian development revealed by a hypomorphic allelic series. *Mol Cell Biol 36*, 2089-2104. https://doi.org/10.1128/MCB.00166-16

Busquet, F., Hartung, T. and Hubert, P. (2016). La fin de l'animal cobaye. In K. L. Matignin, *Revolutions Animales – Comment les Animaux sont Deveus Intelligents* (411-414). Arte Editions.

Chandrasekaran, A., Avci, H. X., Leist, M. et al. (2016). Astrocyte differentiation of human pluripotent stem cells: New tools for neurological disorder research. *Front Cell Neurosci 10*, 215.

Elgogary, A., Xu, Q., Poore, B. et al. (2016). Combination therapy with BPTES nanoparticles and metformin targets the metabolic heterogeneity of pancreatic cancer. *Proc Natl Acad Sci U S A 113*, E5328-36. Epub ahead of print. https://doi.org/10.1073/pnas.1611406113

Escher, B. I., Hackermüller, J., Polte, T. et al. (2016). From the exposome to mechanistic understanding of chemical-induced adverse effects. *Environ Int*, in press. https://doi.org/10.1016/j.envint.2016.11.029

Hartung, T. (2017). Utility of the adverse outcome pathway concept in drug development. *Expert Opin Drug Metab Toxicol 13*, 1-3. http://dx.doi.org/10.1080/17425255.2017.1246535

Hoffmann, S., Hartung, T. and Stephens, M. (2016). Evidence-based toxicology. *Adv Exp Med Biol 856*, 231-241.

Kilic, O., Pamies, D., Lavell, E. et al. (2016). Microphysiological brain model enables analysis of neuronal differentiation and

chemotaxis. *Lab Chip 16*, 4152-4162. https://doi.org10.1039/C6LC00946H

Kleiderman, S., Gutbier, S., Ugur Tufekci, K. et al. (2016). Conversion of nonproliferating astrocytes into neurogenic neural stem cells: Control by FGF2 and Interferon-γ. *Stem Cells 34*, 2861-2874. https://doi.org/10.1002/stem.2483

Pamies, D. and Hartung, T. 21st century cell culture for 21st century toxicology. *Chem Res Toxicol*, in press. https://doi.org/10.1021/acs.chemrestox.6b00269

Pendse, S. N., Maertens, A., Rosenberg, M. et al. (2016). Information-dependent enrichment analysis reveals time-dependent transcriptional regulation of the estrogen pathway of toxicity. *Arch Toxicol 2016*, in press. https://doi.org/10.1007/s00204-016-1824-6

Russo, D. P., Kim, M. T., Wang, W. et al. (2016). CIIPro: A new read-across portal to fill data gaps using public large-scale chemical and biological data. *Bioinformatics*, in press. https://doi.org/10.1093/bioinformatics/btw640

Shinde, V., Perumal Srinivasan, S., Henry, M. et al. (2016). Comparison of a teratogenic transcriptome-based predictive test based on human embryonic versus inducible pluripotent stem cells. *Stem Cell Res Ther 7*, 190. https://doi.org/1186/s13287-016-0449-2

Waldmann, T., Grinberg, M., König, A. et al. (2016). Stem Cell Transcriptome responses and corresponding biomarkers that indicate the transition from adaptive responses to cytotoxicity. *Chem Res Toxicol*, in press. https://doi.org/10.1021/acs.chemrestox.6b00259

ecopa

Norecopa

The Scandinavian Society for Cell Toxicology (SSCT) and European Consensus Platform for Alternatives (*ecopa*), cordially invite you to participate in the joint *ecopa*-SSCT workshop in Helsinki June 14-16, 2017. The program will provide you with the up-to-date methodology and their scientific and regulatory relevance in key areas of toxicology and disease models.

Deadline for Abstracts: March 31, 2017.
For abstract submission and registration, see http:www.ficam.fi

The Three Rs principle of Replacement, Reduction and Refinement has achieved worldwide recognition as a means of reducing the impact of science on animals. Norecopa and the RSPCA have published an open-access paper in the journal *Animals* about a less well-known but equally useful principle that complements the Three Rs, proposed by the American biomathematician Carol M. Newton in the 1970s.

Smith, A. J. and Hawkins, P. (2016). Good Science, Good Sense and Good Sensibilities: The Three Ss of Carol Newton. *Animals 6*, 70. https://doi.org/10.3390/ani6110070

EUTOXRISK

EU-ToxRisk: Year One

EU-ToxRisk, the European Horizon2020 project aiming to develop a human-relevant risk assessment and hazard description as well as a reliable predictive approach for consumer safety, turns one. The large-scale project involving 39 institutions and over 100 scientists from academia, regulatory bodies and industry across manifold life science disciplines kicked off in January 2016. EU-ToxRisk aims to define refined property descriptors for compounds (read-across), to model kinetics and ADME *in silico*, to optimize AOP for test compounds, and to evaluate biological response patterns (biological read-across) by implementing state-of-the-art organoid and cell culturing techniques at macro and micro scale. As the product of the consortium must be fit for regulatory use, representatives from regulatory authorities are involved in every aspect of the progress of the project.

The project started out with a focus on implementation of good practice approaches, measures for quality assurance and effective communication between the different disciplines involved. This was realized during the first summer school and internal mandatory workshop of the project. Partners with experience in industrial quality assurance and with data banking implemented measures for quality control and transparency of experimental data. Herein, the project benefits also from the experience of its associated partner EURL-ECVAM. In this regard, work in the first year has resulted in the setup of a methods database with comfortable web-based input structure, a definition of data format files and their link to the methods database, and in the setup of an internal validation group for cell-based assays.

In parallel, the consortium started the main objective: the case studies. The case study concept focuses on a holistic approach for a human-relevant toxicological evaluation of various compounds (chemicals and pharmaceuticals). A first focus is on read-across. The initial eight case studies are related to valproic acid analogues, phenols, conazoles and phenoxy carboxylic acids, with repeated dose and developmental toxicity as endpoints for the target organs liver, kidney, lung and the neuronal system. The endpoints of interest so far are *inter alia* steatosis, teratogenic effects (e.g., neural tube effects), redox cycling and oxidative stress, mitochondrial toxicity, peroxisome proliferation, organic anion transporter interference, microtubule impairment and endocrine disruptive effects. The fast progress of the well-coordinated case studies added to the overall enthusiasm of the consortium.

The global interaction with interested stakeholders, an inherent characteristic of the project, is demonstrated by the project's activities during 2016. In a series of workshops and training modules, the consortium involved relevant external scientists and entities. These included EURL-ECVAM representatives as trainers during the first summer school in Egmond aan Zee, renowned international scientists from academia as speakers during the Good Read-Across Practice forum in Brussels, and OECD representatives as instructors during the EU-ToxRisk AOP workshop in Vienna. A collaboration with the US Tox21 consortium was initiated and the first workshop meeting took place in September in Mainz to ensure alignment of research activities and collaboration on specific case studies and technologies. This transatlantic link is of mutual benefit, as both consortia pursue ultimate integration of new approach methodologies for risk assessment.

The successful outreach and visibility of the project in this first year is underlined by over 15 publications, as well as keynotes, satellites and symposia at relevant scientific meetings such as EUROTOX, SOT, the PARERE workshop at EURL ECVAM, the OECD EAGMST meeting, the OpenPHACTS and OpenTox workshops, the EDC-MixRisk symposium, and the EUSAAT conference and the European Commission's conference on non-animal approaches.

The drive, the enthusiasm, the performance of the co-ordination, the internal and external communication, and the scientific achievements in the first year, especially regarding the *in vitro* and *in silico* work on the case studies, indicate that the EU-ToxRisk project is on the right track to fulfill expectations in coming years.

Planned activities for 2017 include: a workshop on developmental neurotoxicity (January 2017 in Konstanz), a winter school on regulatory toxicology and read-across and a workshop on Next Generation RNA Sequencing (February 2017 in Barcelona), a FDA/EUToxRisk meeting as well as a Tox21/EU-ToxRisk follow-up workshop during the SOT (March 2017 in Baltimore), a DART workshop (May 2017 in Konstanz) and participation at EUROTOX 2017 (Bratislava, September 2017).

Looking forward to a fruitful 2017,
Mardas Daneshian and Bob van de Water

New EPA Guidance for Testing Pesticides Will Reduce Animal Testing

On November 30, the U.S. Environmental Protection Agency (EPA) published "Guidance for Waiving Acute Dermal Toxicity Tests for Pesticide Formulations and Supporting Retrospective Analysis." The new guidance expands the potential for data waivers for acute dermal studies and includes a policy statement to waive all acute lethality dermal studies for formulated pesticide products. EPA expects this waiver guidance to reduce laboratory animal use by at least 2,500 animals every year. The guidance document is available at https://www.epa.gov/pesticide-registration/bridging-or-waiving-data-requirements.

Kleinstreuer Receives Lush Cosmetics' Young Researcher Prize

On November 2, NICEATM Deputy Director Nicole Kleinstreuer received the Lush Cosmetics' Young Researcher Prize recognizing her efforts to eliminate animal use for chemical safety testing. Kleinstreuer was one of five researchers in the Americas who received the award at a ceremony at Lush Cosmetics headquarters in Vancouver.

Kleinstreuer is the first U.S. federal government employee to receive a Lush Prize. She was also among a group of U.S. federal employees named as finalists for the Lush Science prize for advancing non-animal approaches to identify endocrine-active substances.

Information about the Lush Prize and a list of all winners are available on the Lush Prize website at http://lushprize.org/. Video summaries of work by winners of the Young Researcher Prize from the Americas are available on the Lush Cosmetics website at http://www.lushusa.com/on/demandware.store/Sites-Lush-Site/en_US/Stories-Article?cid=article_young-researcher-americas-2016.

Allen to Receive SOT Enhancement of Animal Welfare Award

David Allen will be awarded the Society of Toxicology (SOT) 2017 Enhancement of Animal Welfare Award. Allen, of Integrated Laboratory Systems, Inc., is the Principal Investigator on the NICEATM support contract. He is also a past president of SOT's In Vitro and Alternative Methods specialty section and current president of the American Society for Cellular and Computational Toxicology.

The Enhancement of Animal Welfare Award is presented annually to an SOT member to recognize contributions made towards development and application of methods that replace, refine, or reduce use of experimental animals. Allen will receive the award at the SOT annual meeting in March 2017 in Baltimore, MD.

NICEATM Activities at 2017 SOT Annual Meeting

NICEATM and ICCVAM will be presenting two special sessions at the 2017 SOT annual meeting in Baltimore, MD.

– "Developing an Implementation Strategy for Toxicity Testing in the 21st Century" is programmed for Monday, March 13, at 12:00 noon in room 340. This session will provide an update on ongoing efforts towards developing a strategy for the safe, effective, and timely implementation of 21st century toxicity testing approaches in the U.S. This session may be of special interest to meeting attendees from industrial, academic, animal welfare, and regulatory sectors.
– "ICCVAM Tools for Validation and Regulatory Application of Alternative Methods" is programmed for Wednesday, March 15, at 1:30 p.m. in room 337. Speakers from ICCVAM agencies will present overviews of their online resources available to support alternative methods development.

NICEATM will also present seven posters on current projects to develop new bioinformatics tools and alternative methods for skin sensitization and developmental toxicity. A full list of NICEATM and ICCVAM activities at SOT will be available in early February at http://ntp.niehs.nih.gov/go/niceatm-sot17.

ICCVAM Webinar to Explore Incorporating Chemical Information

On January 24, 2017, ICCVAM will present its third Communities of Practice webinar on the topic, "Incorporating Chemical Information: Resources, Limitations, and Characterizing the Domain of Applicability for 21st Century Toxicity Testing." The webinar will emphasize the importance of understanding the structural and functional diversity of chemicals used in developing and validating alternative approaches to traditional *in vivo* toxicology test methods. It will also feature next generation chemoinformatics techniques that are being used to fully characterize chemical lists and highlight case studies where such techniques have been successfully applied.

This webinar is being organized by NICEATM on behalf of ICCVAM and hosted by the U.S. Environmental Protection Agency's National Center for Computational Toxicology. The webinar is free and open to the public, although registration is

required to attend. More information and a link to registration are available at http://ntp.niehs.nih.gov/go/commprac-2017.

NICEATM Webinar Series to Discuss Application of Data Science to Zebrafish Studies

In early 2017, NICEATM will be hosting three webinars on the topic "Using Informatics to Improve Data Analysis of Chemical Screening Assays Conducted in Zebrafish." Webinar speakers will discuss current issues that need to be addressed to facilitate the broader use of zebrafish for chemical safety screening studies and how data science can be applied to address some of those issues.

The small size and rapid development of the zebrafish make it a useful model for mid- to high-throughput developmental toxicity screening studies; however, deficits in several key areas hinder its broader adoption. In an effort to address these deficits, the National Toxicology Program has launched the Systematic Evaluation of the Application of Zebrafish in Toxicology (SEAZIT) program. One issue SEAZIT is addressing is variability in the endpoints measured and nomenclature used for endpoints. NICEATM is organizing the upcoming webinar series in support of the SEAZIT program to consider how this issue can be addressed through implementation of standardized nomenclature systems known as ontologies.

The series will include three webinars:

- Introduction to Zebrafish Screening: Thursday, February 2, 2017, 11:30 a.m.-1:00 p.m. EST
- Ontology 101: Thursday, February 16, 2017, 11:30 a.m.-12:30 p.m. EST
- A Review of Relevant Ontologies and Application of Reasoners: Thursday, March 2, 2017, 11:30 a.m.-12:30 p.m. EST

The webinars are free and open to the public, although registration is required to attend. More information and a link to registration are available at http://ntp.niehs.nih.gov/go/zfweb-2017.

Update of the National Library of Medicine's ToxTutor Resource

The National Library of Medicine, an ICCVAM member agency, recently updated its ToxTutor resource. ToxTutor is a self-paced Web tutorial for users of NLM chemical and toxicology databases that covers the key principles of toxicology. The ToxTutor update incorporates recent advances in the science of toxicology, provides more information on alternatives to animal testing, and features responsive design to support use on mobile devices. ToxTutor is available at https://toxtutor.nlm.nih.gov/.

Recent and Forthcoming NICEATM Publications

- A paper in Chemical Research in Toxicology describes a model of the androgen receptor pathway that incorporates eleven high throughput screening assays: Kleinstreuer et al. (2016). Development and validation of a computational model for androgen receptor activity. *Chem Res Toxicol*, http://pubs.acs.org/doi/full/10.1021/acs.chemrestox.6b00347.

  The article has been selected as an ACS Editor's Choice Article. This selection was based on recommendations by the scientific editors of ACS journals from around the world. With this designation, this article becomes open access, meaning it can viewed by anyone regardless of institutional affiliation or subscription status.
- Two forthcoming articles summarize workshops organized or co-organized by NICEATM:
  - Hamm, J. et al. (in press). Alternative approaches for identifying acute systemic toxicity: moving from research to regulatory testing. *Toxicology In Vitro*.
  - Wagner, L. et al. (in press). In search of acceptable alternatives to the murine histamine sensitisation test (HIST): What is possible and practical? *Pharmeuropa Bio and Scientific Notes*.

IIVS
Institute for In Vitro Sciences
Advancing Science & Animal Welfare Together

IIVS Conducts 4th Annual Training in China While China FDA Approves First Non-Animal Test Method

IIVS conducted its 4th annual training of CFDA provincial regulators in Hangzhou, China in early November. Following the training, IIVS and stakeholders around the world welcomed the announcement (http://bit.ly/2ivdu8q) by the CFDA that data from a non-animal test method can now be used to substantiate the safety of cosmetics made in China. The test, known as the In Vitro 3T3 NRU Phototoxicity Assay (OECD Test Guideline 432), measures a chemical's potential to cause harm after exposure to light. (See article below about training video.)

Training by IIVS scientists is a key component of a Memorandum of Understanding between the CFDA's National Institute for Food and Drug Control (NIFDC) and IIVS, and is designed to assist the CFDA with the adoption and implementation of non-animal methods. To date over 400 scientists have received hands-on training in non-animal methods, including the 3T3 Phototoxicity Assay. These training efforts are supported by IIVS' Industry Council for the Advancement of Regulatory Acceptance of Alternatives (ICARAA).

Training Video Available for In Vitro 3T3 NRU Phototoxicity Assay

Funded by a grant from the European Partnership for Alternative Approaches to Animal Testing (EPAA), IIVS has released a technical training video for the In Vitro 3T3 NRU Phototoxicity Assay (OECD TG 432). The 19-minute video is a detailed description of the key steps of the method and is created to help scientists from industry and regulatory agencies perform the test in their own laboratories. Many industries around the world, including the cosmetics and pharmaceuticals sectors, assess phototoxicity to ensure the safety of their products.

The Phototoxicity video is the second training video produced by IIVS with EPAA's support – the first described the Bovine Corneal Opacity and Permeability (BCOP) assay (OECD TG 437). Both videos are in English (with subtitled versions in Chinese and Portuguese) and are freely available on the IIVS YouTube Channel (http://bit.ly/2ilAJB2).

Observational Training Spots Available for 2017 Training Workshop

Jan. 9-12, 2017

Observation spots are still available for the IIVS 2016 Practical Methods for In Vitro Toxicology Workshop January 9-12 at IIVS in Gaithersburg, MD.

During this intensive, three-day, program, participants will hear from experts in the *in vitro* toxicology field, and gain laboratory experience and instruction through observation. Learn more, view a sample agenda and register at http://conta.cc/1YlllV7.

IIVS to Present at Fraunhofer Translational Lung Research Seminar

Dr Holger Behrsing, IIVS Principal Scientist for respiratory toxicology, will present "*Pragmatic Use of 3D Lung Models to Evaluate Exposure-Induced Adverse Effects that May Contribute to Pulmonary Disease*," at the 16th Fraunhofer translational lung research seminar Models of Lung Disease (http://bit.ly/2iD8cF3). The seminar, to be held in January 2017, will examine the current possibilities of experimental lung research and compare different models and experimental approaches.