Corners

The American Society for Cellular and Computational Toxicology will hold its 6th Annual Meeting on September 21-22, 2017 in Gaithersburg, MD, USA. The meeting will offer presentations on scientific and policy advancements related to acute toxicology and TSCA reform, as well as free communications. Most talks will be selected from submitted abstracts. Confirmed plenary speakers include Anna Lowit and Louis "Gino" Scarano from US EPA and Dan Wilson from the Dow Chemical Company. Scarano will participate in a closing discussion on the strategic plan EPA is tasked with writing under the Lautenberg Chemical Safety Act, which will offer meeting participants and stakeholders an opportunity to constructively and cooperatively share ideas for implementing *in vitro* and computational toxicology for industrial chemical assessment.

The meeting will also include opportunities for young scientists to participate in mentoring activities as well as vie for two annual monetary awards.

More information on the meeting, a preliminary meeting program, and abstract submission information is available at http://ascctox.org/annualmeeting. Poster abstracts will be accepted up until the meeting as space allows.

Recently, ASCCT members also participated in a webinar on multiple *in vitro* assays for developmental neurotoxicity testing given by Johanna Nyffeler from the University of Konstanz. The next webinar is to be held July 20 and will feature a presentation on *in vitro* cardiotoxicity test methods in pharmaceutical development. ASCCT webinars are open to the general public; members have access to recordings of all past webinars via an extensive video library.

For more information contact Secretary Kristie Sullivan at ksullivan@ascctox.org.

CAAT*feed*

Thomas Hartung Interviewed in New Book, *Rigor Mortis: How Sloppy Science Creates Worthless Cures, Crushes Hope, and Wastes Billions*

Excerpt:

Thomas Hartung has been experimenting for a while with brain cells that proliferate in the lab but also morph into different brain cell types, forming round clumps of cells, called organoids. The cells in his lab come from patients with autism and Down syndrome. The clumps apparently can't think – though they do generate electrical signals, just like brain cells, and organize themselves in a manner reminiscent of how they are juxtaposed in the brain. They also use the chemical signals that underlie brain function. "If we create conditions in cell culture which are mimicking the organism, we are more likely to get relevant results," he told me. "You can do personalized toxicology with these cells. If I took your cells, I could tell you are more sensitive than another person to certain drugs, for example." These are early days for this technology, but there's a rapidly growing industry around cultivating disembodied blobs of cells in the lab. The Defense Advanced Research Projects Agency, which funds far-out ideas, has poured money into this line of research at multiple labs. So has the NIH. And Hartung has private money to work on the problem as well.

Harris, Richard (2017-04-04). *Rigor Mortis: How Sloppy Science Creates Worthless Cures, Crushes Hope, and Wastes Billions* (p. 84). Basic Books.

Thomas Hartung and David Pamies Featured in Shanghai Project's *Seeds of Time* Exhibition

From its initial Chapter in 2016, the Shanghai Project has been an experiment, a laboratory for testing the boundaries of existing assumptions, and for considering how ideas might expand beyond the confines of individual silos of knowledge. *Seeds of Time* engages with the public in Shanghai through an exhibition, a publication and public programs such as screenings, performances, workshops and social interventions. Facing the specter of extinction, the Shanghai Project seeks to inspire discussion and action regarding the sustainability of our futures in the 22nd century and the potential for solutions through interdisciplinary collaboration.

Exploring the causes and effects of ecological transformation, Shanghai Project participants address sustainability through the lens of interdisciplinarity. Liu Chuang engages with the research of Thomas Hartung and David Pamies, shedding light on efforts to find scientific solutions to environmental problems.

More information: http://u-in-u.com/shanghai-project/2017/

Big Data, Big Deadlines Spur Change in Toxicity Testing

Excerpted from Chemical and Engineering News:

UL's REACHAcross software has roots in an effort to work with a big, new database – the data trove amassed at the European Chemicals Agency, which administers REACH. The software effort was led by Thomas Hartung, a professor at Johns Hopkins University's Center for Alternatives to Animal Testing who previously worked for the European Commission and helped develop the REACH legislation and organize test guidance.

According to Hartung, companies associated with the Johns Hopkins center, including Dow, BASF, ExxonMobil, and many drug and cosmetics firms, have been using read-across for years. He estimates that 75% of REACH filings include read-across-generated data derived by expert statisticians.

"The trouble is, there are very few experts who know how to do this," he says. "And they all work at the big companies." His group set out to build information technology support for nonexperts.

Hartung credits Thomas Luechtefeld, a Ph.D. student at Johns Hopkins, with spearheading the software development. "We built a web crawler for getting data out of REACH," Luechtefeld says. "The really interesting thing about REACH is that it's the largest repository for *in vivo* toxicological data ever."

For example, he says, REACH has skin sensitization data on 5,000 chemicals. Comparable public data before REACH covered about 250 chemicals.

Luechtefeld and a partner launched a spin-off, ToxTrack, to develop the software, signing a product development contract with UL two years ago. Craig Rowlands, senior toxicologist at UL, says his company saw opportunity in REACH's looming 2018 deadline for registering toxicity data on 20,000 to 40,000 chemicals. Moreover, UL sees wider application ahead for the software. It is working on a phase two of REACHAcross with broader capabilities.

Full Article: http://cen.acs.org/articles/95/i17/Big-data-big-deadlines-spur.html?h=206916587

The Beauty of Mini Brains (Scientific American)

Excerpted from Scientific American:

Lab-grown miniature brains are poised to shake up drug testing for everything from Alzheimer's disease to Zika. Each bundle of human brain cells is so tiny that it could fit on the head of a pin. Researcher Thomas Hartung and his colleagues at Johns Hopkins University created these mini brains using stem cells that, over the course of two months, morph into supporting cells and various types of neurons, which quickly connect to one another and start communicating.

These three micrographs were taken with lasers to illuminate colorful fluorescent dyes. The cells' nuclei appear purple or blue. The mini brain on the right features a tangle of axons (*pink*) – extensions of neurons that send and receive signals. More axons (*red*) and neurons that produce the neurotransmitter dopamine (*green*) are highlighted in the middle brain. The left one shows nerve cell bodies and their projecting dendrites (*both green*), as well as supporting astrocytes (*red*).

The mini brains are highly uniform, freezer-proof and relatively cheap. Hartung's start-up, Organome, plans to market them soon as a substitute for lab animals in drug testing. "We are moving into cell culture for the 21st century," he says.

Full article: https://www.scientificamerican.com/article/the-beauty-of-ldquo-mini-brains-rdquo/

Recent Events

REACHAcross Webinar

April 6, 2017

UL Environment hosted a webinar discussing the collaboration between UL and researchers from Johns Hopkins University on an automated read-across tool for REACH. How this *in silico* toxicity prediction tool will help to minimize animal use while providing the toxicity data needed for REACH registrations was discussed.

This webinar is ideal for toxicologists, REACH consultants, and product stewards who want to:

- Understand compliance challenges facing the chemical industry
- Learn how digital tools such as REACHAcross™ software can solve compliance challenges
- Understand the validity and accuracy of REACHAcross™ software

View the complete webinar here: https://ul.wistia.com/medias/nvpxe3iy9y

4th Symposium on Social Housing of Laboratory Animals and 2nd Workshop on Macaque Pair Housing

May 1-5, 2017
Atlanta, GA

On May 1-2, 2017, CAAT held its 4th Symposium on Social Housing of Laboratory Animals at the Centers for Disease Control and Prevention in Atlanta, GA in conjunc-

tion with the NIH Office for Laboratory Animal Welfare, the US Department of Agriculture Animal Welfare Information Center (AWIC), and the Johns Hopkins School of Medicine's Department of Molecular and Comparative Pathobiology. This symposium was a continuation of successful symposia on this topic held in 2013, 2014 and 2016 that were instituted to address the challenges of fulfilling new US and European guidelines, the implementation of which can be formidable without basic knowledge of the animals' normal behavioral needs, ability to recognize abnormal behavior, and training to apply behavioral interventions. The first day of the symposium covered social housing of dogs, rabbits, swine, and rodents. The second day was dedicated to nonhuman primates, particularly macaques, in conjunction with the primate behavior group at Emory University, which served as the first day of their separate hands-on 2nd Workshop on Macaque Pair Housing. Selected presentations from the workshop will be posted on the AWIC website (https://www.nal.usda.gov/awic/social-housing).

Think tank on "New test strategies for developmental and reproductive toxicity (DART)"

May 15-17, 2017
Konstanz, Germany

This workshop brought together experts in the field of reproductive and developmental toxicology for extensive exchange of knowledge, definition of the status quo, identification of shortcomings and gaps in this field.

CAAT-ITLF Think Tank "Optimizing drug discovery by Investigative Toxicology: Current and future trends"

July 10-12, 2017
Ranco, Italy

"Investigative Toxicology" is a relatively young discipline in pharmaceutical safety assessment, which sees itself complementary to regulatory toxicology. Whereas regulatory toxicology's boundaries are set by international guidelines and its methods and technologies have matured over the last decade, Investigative Toxicology is more driven by the individual company needs. Investigative Toxicology is seen as a discipline, which moves safety assessment from a descriptive to a mechanistic understanding and an improved human translation. Based on such mechanistic understanding, Investigative Toxicology's primary task in drug development is the identification of the most promising (safe) drug candidates and to deselect the most toxic drugs from the portfolio as early as possible to reduce clinical attrition.

A group of 14 European-based Investigative Toxicology leaders from the pharmaceutical industry (AstraZeneca, Bayer, Boehringer Ingelheim, GSK, Janssen, Lundbeck, Merck, Novartis, Novo Nordisk, Orion Pharma, Roche, Sanofi, Servier and UCB-Biopharma) have formed the Investigative Toxicology Leader (ITL) Forum. This forum aims for an exchange of precompetitive knowledge among the companies and an interaction with experts from academia and regulatory bodies in the field of Investigative Toxicology. The objective is to elaborate robust, reliable and accepted Investigative Toxicology concepts for decision making for early safety-related attrition, de-risking, and mechanistic elucidation of effects. Another key aspect is the translation of *in vitro* to *in vivo* mechanistic data. Furthermore, the adoption of new technologies (e.g. micro-physiological systems) and assays into the drug discovery back-bone is targeted by the workshop.

Upcoming Events

CAAT Academy 2017 Hands-on Training Program in Europe

The 2017 CAAT Academy Hands-on Training sessions, which are all based in Europe, include:

- September: *In vitro* tools for assessing EDC
- September: *In vitro-in vivo* extrapolation (IVIVE) to support accurate prediction of hepatic drug disposition
- October: *In silico* tools in chemical's hazard assessments
- October: *In vitro* skin & eye models – Part 2
- October: Kidney toxicity testing – Season 2
- November: *In vitro* lung models

Website: http://www.caat-academy.org

Recent Publications

Busquet, F., Zurlo, J. and Hartung, T. (2016). Can TTIP improve laboratory animal welfare in safety testing and the 3Rs? *ILAR J 57*, 358-367. doi:10.1093/ilar/ilw022

Crawford, S. E., Hartung, T., Hollert, H. et al. (2017). Green toxicology: A strategy for sustainable chemical and material development. *Environ Sci Eur 29*, 16. doi:10.1186/s12302-017-0115-z

Nyffeler, J., Dolde, X., Krebs, A. et al. (2017). Combination of multiple neural crest migration assays to identify environmental toxicants from a proof-of-concept chemical library. *Arch Toxicol*, May 5. Epub ahead of print. doi:10.1007/s00204-017-1977-y

Pallocca, G., Nyffeler, J., Dolde, X. et al. (2017). Impairment of human neural crest cell migration by prolonged exposure to interferon-beta. *Arch Toxicol*, Apr 1. Epub ahead of print. doi:10.1007/s00204-017-1966-1

Fowle, J. III. (moderator); Curren, R. D., Hartung T., Proctor, C., and Wilcox, N. (participants) (2017). Twenty-first century in vitro toxicology testing methods and the assessment of e-cigarettes. *Appl In Vitro Toxicol 3*, 3-9. doi:10.1089/aivt.2017.29011.rtl

Hartung, T., Kavlock, R. and Sturla, S. (2017). Systems Toxicology II: a special issue. *Chem Res Toxicol 30*, 869-869. doi:10.1021/acs.chemrestox.7b00038

Hartung, T., FitzGerald, R., Paul, J. et al. (2017). Systems toxicology - Real world applications and opportunities. *Chem Res Toxicol 30*, 870-882. doi:10.1021/acs.chemrestox.7b00003.

Hoffmann, S., de Vries, R. B. M., Stephens, M. L. et al. (2017). A primer on systematic reviews in toxicology. *Arch Toxicol*, in press. doi:10.1007/s00204-017-1980-3

Kaesler, S., Skabytska, Y., Chen, K.-M. et al. (2017). Staphylococcus aureus-derived lipoteichoic acid induces temporary T-cell paralysis independent of Toll-like receptor 2. *J Allergy Clin Immunol 138*, 780-790.e6. doi:10.1016/j.jaci.2015.11.043.

ecopa

ecopa Annual General Assembly

The General Assembly of ecopa elected a new board on June 14:

Member	Deputy	Period
Academia		
Tuula Heinonen (FI) (Vice-President)	Philippe Vanparys (BE)	2018-2019
Industry		
Erwin Roggen (DK)	Costanza Rovida (IT)	2018-2019
Animal Welfare		
Marianna Norring (FI)	to be nominated soon	2018-2019
Government		
Philippe Hubert (FR, President)	Stefano Lorenzi (IT)	2018-2019
Secretary		
Francois Busquet (FR)	Costanza Rovida (IT)	2018-2019
Treasurer		
Philippe Vanparys (BE)		2018-2019

Norecopa

The newsletters from the Norwegian 3R centre, Norecopa, will from now on be issued in English. The first of these is available at https://norecopa.no/news/newsletters/3-2017.

Norecopa publishes approx. 6-8 newsletters a year. They cover international events and advances related to the Three Rs, as well as news from Norway. Norecopa also maintains a comprehensive international Meetings Calendar, which is linked to the newsletters.

The latest newsletter contains the first details of new guidelines and a checklist for planning animal experiments, called PREPARE. These guidelines will be made available on Norecopa's website at https://norecopa.no/PREPARE.

IPAM

IPAM organized an event on alternative methods to animal models in dermatology in Rome on June 8, 2017.

EUSAAT

European Society for Alternatives to Animal Testing

Elections in 2017: EUSAAT Board and Audit Committee

The 2017 elections of the EUSAAT Board (EB) and of the Audit Committee (AC) will be held electronically this August. Elections are usually held during the Annual General Assembly (AGA) at the EUSAAT congresses in Linz. However, since there is no EUSAAT congress this year owing to the 10th World Congress (WC10) in Seattle, it was decided by the AGA 2016 in Linz to hold the 2017 elections electronically. The EUSAAT Board has asked the Secretary General (SG) to start planning the elections

and to consult with the AC in order to ensure that the voting procedure is in line with the statutes. It was recommended to use electronic signatures, if possible.

For the elections of the EUSAAT Board, the AC will count the votes, and for the AC, the president and the AC will count the votes.

Since new members are most welcome on the EUSAAT Board and AC, the SG will invite all EUSAAT members to serve on these committees. All candidates should provide a short CV and a photograph, which the SG will circulate with the voting documents.

To meet the legal requirements of the statutes, both EUSAAT Board and AC have decided that members who have not paid their membership fees in full cannot participate in the elections, neither as candidates nor by voting.

EUSAAT AGA 2017 at EUROTOX 2017 in Bratislava

The EUSAAT Board has decided to hold the AGA 2017 during the EUROTOX 2017 Congress http://www.eurotox2017.com/ on September 10-13, 2017 in Bratislava, Slovakia. As several members of the EUSAAT Board and AC including the president will not be able to attend EUROTOX 2017, the agenda of the AGA 2017 will be reduced compared to previous years. The planning of the EUSAAT 2018 congress as well as the financial report of the SG will be the major topics of discussion.

The SG will inform the members about the time and venue of the AGA 2017 when circulating the invitation and agenda.

On behalf of the EUSAAT Board
Horst Spielmann, SG

EU-ToxRisk

Interested audience and stakeholders will find the scientific results of the EU-ToxRisk project frequently published in peer-reviewed journals. As the project has a multidisciplinary approach and as it covers several endpoints and target organs, i.e., repeated dose and developmental toxicity as endpoints for the liver, kidney, lung and the neuronal system, the results of the EU-ToxRisk project will be reported in a variety of different scientific journals. This corner highlights exemplary publications which illustrate the multidisciplinary features of the project and present the strategy and the fitness of the overall concept of the project.

The EU-ToxRisk project started out with a summer school and an internal mandatory workshop on implementation of good practice approaches and measures for quality assurance. The first paper introduced here is a t^4 workshop report by Pamies et al. (2017) supported by EU-ToxRisk. David Pamies revises and updates the guidance for Good Cell Culture Practice for modern cell culturing technologies. The authors address the unique procedures of stem-cell driven systems, of organotypic culture methods, the complexity of model systems and long-term cultures. Furthermore, special quality assurance needs of iPSC methodologies are addressed. Moreover, the report describes the establishment of an International GCCP Collaboration, an initiative aiming at the development and implementation of cell culture quality standards in research and development (contact caat@jhsph.edu).

The second article supported by EU-ToxRisk to be presented here is by Schildknecht et al. (2017). This publication deals with one of the most important animal models in neurotoxicologicy and neuropharmacology. It is based on the toxicant MPTP that is metabolized *in vivo* to MPP^+, which then causes Parkinsonean symptoms. MPTP has hardly been studied *in vitro*, as it requires complex metabolism and cell-cell interactions. An important recent development, described in the publication, is the establishment of an *in vitro* model. This model is being used in the EU-ToxRisk project. One of its most important features is that it is based on the use of human neurons.

Rounding off, the third publication to be presented here is a review article coordinated by Jan Hengstler (Leibniz Research Centre for Working Environment and Human Factors at the Technical University Dortmund, Germany). Cholestasis is one of the most important manifestations of liver toxicity. Therefore, its understanding is essential for *in vitro* modeling. In this information-rich but focused work, the initiating events in genetically susceptible and non-susceptible individuals are discussed. This has major implications for the assembly of AOP, as planned by EU-ToxRisk. The toxicity of the "second hit" and the role of bile salt in this relation is hypothesized. This includes thoughts on the role of bile salt mediated toxicity, on anatomy features, i.e., canalicular and ductular networks and the critical leakage spots of bile salt. The authors also are concerned with the question of how a "downstream" immunological injury of the biliary tree may lead to an "upstream" damage of the bile ducts, canaliculi, and liver tissue, including the role of biliary pressure in this context. Furthermore, the mechanisms that affect adhesion molecules and junctional complexes and their significance in primary sclerosing cholangitis and extrahepatic cholestasis are elucidated.

To complete the picture of EU-ToxRisk, two recent workshops shall be present-

ed here. A workshop on "Data Handling" was held in April 2017. It followed new EU guidance on FAIR data, and intended to implement an understanding of the importance of the FAIR criteria (Findable, Accessible, Interoperable, and Re-usable). In this workshop, common approaches for calculation of summary parameters from experimental data were discussed and agreed. The second workshop was on "New test strategies for developmental and reproductive toxicity (DART)", which was held in May 2017. DART is a key area of health concern, one of the large systemic toxicity areas not yet covered by accepted animal-free methods. It remains one of the most animal-intensive areas of regulatory toxicology. The development of animal-free approaches is particularly important in this area. This workshop brought together relevant experts in the field of DART, including the Acting Assistant Administrator for US EPAs Office of Research and Development and relevant EU-ToxRisk partners, to discuss functionality and fitness-for-purpose of promising non-animal DART approaches from academic, industrial and regulatory points of view.

At the present time point the project's progress corresponds to the schedule of the project set by the European Commission. Further progress will be shared in the next issue and on other platforms (at twitter (@EU_ToxRisk) and facebook (public group and page)).

Mardas Daneshian

References

Pamies, D., Bal-Price, A., Simeonov, A. et al. (2017). Good Cell Culture Practice for stem cells and stem-cell-derived models. *ALTEX 34*, 95-132. doi:10.14573/altex.1607121

Schildknecht, S., Di Monte, D. A., Pape, R. et al. (2017). Tipping points and endogenous determinants of nigrostriatal degeneration by MPTP. *Trends Pharmacol Sci 38*, 541-555. doi:10.1016/j.tips.2017.03.010

Jansen, P. L., Ghallab, A., Vartak, N. et al. (2017). The ascending pathophysiology of cholestatic liver disease. *Hepatology 65*, 722-738. doi:10.1002/hep.28965

NTP National Toxicology Program
U.S. Department of Health and Human Services

UNITED STATES ICCVAM Advancing Alternatives to Animal Testing

Roadmap for New Approaches for Evaluating Chemical Safety Discussed at ICCVAM Public Forum

A roadmap for moving closer to the goal of replacing animals in U.S. safety testing, as well as collaborations that made progress to date possible, were highlighted at the May 23 Interagency Coordinating Committee on the Validation of Alternative Methods public forum. Presenters' slides and the webcast recording of the ICCVAM public forum are available at https://ntp.niehs.nih.gov/go/iccvamforum-2017.

Many of the presentations for this year's annual forum, held at the National Institutes of Health in Bethesda, Maryland, described collaborations among U.S. federal agencies, between federal agencies and stakeholder groups, and among countries. Some of these efforts have already reduced the need to use animals for chemical safety testing. Other efforts advanced technologies that may improve hazard prediction while further reducing animal testing.

Most public comments at the forum focused on the roadmap, which was presented by NICEATM Director Warren Casey. Representatives from industry, animal welfare organizations, and other commenters welcomed the roadmap effort and discussed topics the roadmap should address.

More information about the roadmap is available at https://ntp.niehs.nih.gov/go/natl-strategy. Comments on the roadmap will be accepted through August 31. A draft document will be discussed at the September 18-19 meeting of the Scientific Advisory Committee on Alternative Toxicological Methods (more information at https://ntp.niehs.nih.gov/go/32822). SACATM advises NICEATM, ICCVAM, and the National Institute of Environmental Health Sciences director on ICCVAM activities. The final roadmap document is anticipated to be published in December.

FDA Partners with Industry to Develop Organs-on-Chips

On April 11, the U.S. Food and Drug Administration announced a multi-year research and development agreement with Emulate, Inc., to evaluate the company's "Organs-on-Chips" technology in laboratories at the FDA's Center for Food Safety and Applied Nutrition. The project will focus first on developing a liver chip, but the agreement may expand to kidney, lung, and intestine models in the future. The ultimate goal is to predict how specific organs will respond to potential chemical hazards found in foods, cosmetics, or dietary supplements more precisely than with current methods.

More details about the agreement are available in an FDA blog article by FDA ICCVAM representative Suzanne Fitzpatrick at http://bit.ly/2ovDVNC.

Recent NICEATM Publications and Media Coverage

– A paper in *Journal of Chemical Information and Modeling* describes computer models that use molecular structures to estimate the physicochemical features of a wide range of chemicals. The models may be useful for researchers seeking to assess human toxicity of chemicals that have little experimental data available. The paper was recognized in the April issue of the NIEHS Environmental Factor newsletter as an NIEHS Intramural Paper of the Month. Zang et al. (2017). In silico prediction of physicochemical properties of environmental chemicals using molecular fingerprints and machine learning. *J Chem Inf Model 57*, 36-49. doi:10.1021/acs.jcim.6b00625

– NICEATM Deputy Director Nicole Kleinstreuer and a number of NICEATM collaborators in academia, industry, and animal welfare organizations commented on progress toward replacing animals for chemical safety testing in the April 24 issue of *Chemical and Engineering News*. The article "Big Data, Big Deadlines Spur Change in Toxicity Testing" is available at http://bit.ly/2osK26z.

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

IIVS Opens New Respiratory Toxicology Laboratory

IIVS officially opened its new respiratory toxicology laboratory on June 12, 2017. The new state-of-the-art facility allows the modeling of respiratory exposures of aerosols, smoke, particulates, vapors and gases onto *in vitro* and *ex vivo* tissue models to gain better insights into potential human health risks to inhaled chemicals and particulates.

In addition to aerosol exposure capabilities, IIVS has developed automated methodologies to deliver nanoliter microdroplets topically onto tissue models in a manner not previously achievable using conventional micropipettor dosing techniques. These procedures allow for extremely uniform, volume-controlled deliveries of liquids to precisely model vapor droplet deposition onto a variety of epithelial tissue surfaces.

By working with IIVS, industry will have the ability to rapidly evaluate potential respiratory hazards associated with novel ingredients and chemistries for use in fragrances, personal care products, household, automotive, and institutional cleaning products, and a wide range of traditional and emerging tobacco products.

For more information, visit http://www.iivs.org.

IIVS Scientists to Present at the American Chemical Society National Meeting

Several IIVS scientists will be presenting at the 254th American Chemical Society (ACS) meeting, August 20-24, 2017 in Washington, DC. The ACS is the world's largest scientific society.

– "Advanced *in vitro* test systems provide human-relevant results to support regulatory decision-making", Holger Behrsing.
– "Changes in TSCA Drive New Strategies for Eye Irritation Hazard Assessments", Hans Raabe
– "Relevance of the test system: When 21st century tools can't ensure test method acceptance", Quanshun Zhang
– "*In Vitro* methods available for chemical risk assessment under Amended TSCA for skin sensitization evaluation", Tinashe Ruwona

For more information about the ACS meeting, visit https://www.acs.org.

Free Webinar on Skin Tone Modulation

IIVS hosted a free one-hour webinar on June 29 on optimized *in vitro* testing platforms using pigmented tissue models that assess the capacity of ingredients and formulations that impact skin tone. Guest speakers included IIVS study director, Dr Gertrude-Emilia Costin, and Johnson & Johnson principal scientist, Dr. Manpreet Randhawa. A recording of the webinar will be made available on http://www.iivs.org.

Read the Latest IIVS Publications

Behrsing, H., Raabe, H., Manuppello, J. et al. (2016). Assessment of in vitro COPD models for tobacco regulatory science: Workshop proceedings, conclusions and paths forward for in vitro model use. *Altern Lab Anim 44*, 129-166.

Behrsing, H. P., Huang, S. and Constant, S. (2017). The use of human 3D reconstructed airway cultures for tobacco product evaluation: Precision low-volume exposures at the apical site. *Appl In Vitro Toxicol* 3, 56-67. doi:10.1089/aivt.2016.0028

For the latest IIVS news, visit http://www.iivs.org.