Corners

CAAT feed

Watch the Full Symposium Online: 60 Years of the 3Rs: Lessons Learned and the Road Ahead

A celebration of the 60th Anniversary of the publication of *The Principles of Humane Experimental Technique* by W. M. S. Russell and R. L. Burch.

This event, which featured some of the eminent scientists and researchers in the field of alternatives to animal testing, took place on November 22, 2019 at the Johns Hopkins Bloomberg School of Public Health in Baltimore, MD. Speakers included: Andrew Rowan, John Parascandola, Michael Balls, Alan Goldberg, Horst Spielmann, Julia Fentem, Rodger Curren, Rolf Bass, Martin Stephens, Thomas Hartung, and others. The event was sponsored by CAAT, Foundation for Chemistry Research and Initiatives, Alternatives Research & Development Foundation (ARDF), The American Cleaning Institute (ACI), International Fragrance Association (IFRA), Institute for In Vitro Sciences (IIVS), John "Jack" R. Fowle III, and the Society of Toxicology (SOT). Over 185 people watched the live stream of the event.

Visit the event playlist on CAAT YouTube Channel: https://tinyurl.com/tjhyovt

Watch Online: Food Safety Symposium

This event, co-sponsored by the Johns Hopkins Center for Alternatives to Animal Testing (CAAT) and the Johns Hopkins Center for a Livable Future (CLF), focused on risk assessment and management for food. Special guest speakers included: Bernhard Url (European Food and Safety Authority (EFSA) – Executive Director), Marta Hugas (EFSA – Chief Scientist), Martin Bloem (Johns Hopkins Center for a Livable Future (CLF) – Director), Keeve Nachman (CLF – Director of Food Production and Public Health Program), Thomas Hartung (CAAT – Director), and Katya Tsaioun (Evidence-based Toxicology Collaboration (EBTC) – Director)

The event is available to view online: https://youtu.be/5QMM9uIRjN8

Watch Online: On the Replacement of Animal Testing: Yesterday, Today, and Tomorrow

This keynote talk by Michael Balls, Emeritus Professor, Faculty of Medicine and Health Sciences, University of Nottingham, Nottingham, UK, held on September 5 at the Bloomberg School of Public Health, is now available to view online: https://youtu.be/5QMM9uIRjN8

Thomas Hartung Interviewed for Department of Health and Human Services Report: *Federal Agencies Should Assess and Report on Their Efforts to Develop and Promote Alternatives*

Researchers often use animals to study disease, test product safety, experiment, or teach. Some uses cause animals pain or distress. Federal agencies require researchers to consider alternatives to animal use, such as computer modeling or working with cell cultures.

The Department of Health and Human Services and other agencies have developed animal use alternatives and collaborate on these efforts in an interagency group. However, the agencies do not routinely measure the effect of those efforts. We recommended that HHS create a workgroup to help agencies assess and report on their progress in reducing or replacing animal use in research, see page 7 of the report.

Read the full report here: https://www.gao.gov/products/GAO-19-629#summary

Moving Beyond the Three Rs in Biomedical Research: Recent paper by Kathrin Herrmann, Francesca Pistollato, and Martin L. Stephens Profiled at EU Science Hub

A new study co-authored by the JRC prioritizes human relevant methods and the replacement of animal models in biomedical research. Read the discussion here: https://ec.europa.eu/jrc/en/science-update/moving-beyond-three-rs-biomedical-research

Helena Hogberg Named Chief Editor of *Frontiers in Toxicology* Special Section, Neurotoxicology

CAAT Deputy Director Helena Hogberg and Ellen Fritsche (Leibniz-Institut für Umweltmedizinische Forschung

(IUF) Düsseldorf, Germany) have been appointed Specialty Chief Editors of the Special Section Neurotoxicology in the journal *Frontiers in Toxicology*. Thomas Hartung is an Associate Editor for In Vitro Toxicology and Lena Smirnova is an Associate Editor for Neurotoxicology.

Lena Smirnova Wins Colgate-Palmolive Grant for Alternative Research

Lena Smirnova was awarded the SOT Colgate-Palmolive Grant for Alternative Research for her project, *Automated Synaptogenesis Screening in In Vitro Human 3D BrainSphere Model to Assess Developmental Neurotoxicity*. The 2020 SOT award recipients will be honored formally at an awards ceremony and other activities during the 59th SOT Annual Meeting and ToxExpo in Anaheim, CA, March 15-19, 2020.

Thomas Hartung Interviewed on Future Tech Podcast

Thomas Hartung was interviewed for the Future Tech Podcast with Richard Jacobs. Listen to Thomas discuss new technology advances to improve toxicity testing and disease modeling here: http://bit.ly/2NM2X6k

CAAT in *Nature*: India Pushes for Alternatives to Animals in Biomedical Research

Excerpt from Nature *(October 2019):*

Some researchers think there are alternative technologies that are good enough to switch away from animal testing, at least for researching toxicity. "The value of animal testing is strongly overestimated," says Thomas Hartung, director of the Center for Alternatives to Animal Testing at Johns Hopkins University in Baltimore, Maryland. Hartung has developed an algorithm as an alternative to animal testing that has successfully predicted the toxicity of tens of thousands of chemicals in human tissue – and in some cases has outperformed animal tests in terms of reliability. "Whenever an animal test has been systematically evaluated, the outcome was astonishingly poor," he says.

Full article in *Nature*: https://www.nature.com/articles/d41586-019-02947-0

Kathrin Herrmann Interviewed About Undercover Laboratory Footage on German TV

Undercover footage from Laboratory of Pharmacology and Toxicology (LPT), an animal testing laboratory near Hamburg, Germany, exposed horrific conditions for laboratory monkeys, dogs, and cats. A number of dogs on whom a new drug had been tested showed severe rectal bleeding and humane endpoints were not in place. Kathrin Herrmann, CAAT's Director of Refinement, who assessed animal research proposals and inspected laboratory animal husbandry for the German government for almost a decade before she joined CAAT, was interviewed for German public TV about the situation.

She was shocked by the handling and housing conditions of the animals, which did not comply with the law (as she explained in the interview). She believes this is just the tip of the iceberg, as German competence authorities have insufficient resources for proper laboratory inspections and oversight. She also told MDR that along with translatability issues due to the species differences (which contributes to the low success rate of new drugs entering the market), the additional needless pain, distress, and suffering would further compromise the data collected from these animals.

Upcoming Events

CAAT at Society of Toxicology Annual Meeting

March 19, 2020
12:30-4pm
Anaheim Convention Center,
Anaheim, CA

Join CAAT for our annual satellite meeting on advancing 21st century toxicology activities. The satellite meeting provides an informal setting in which interested stakeholders can update each other on this important topic.

The meeting will feature a number of invited presentations but also leave time for an open microphone segment in which participants are welcome to make announcements or to comment on germane topics, with or without a few slides. Full details and registration information will be forthcoming. Contact Camila Januario (cjanuar1@jhu.edu) for more information.

5th International Conference on Developmental Neurotoxicity (DNT) Testing (DNT5)

April 6-8, 2020
Konstanz, Germany

The effects of chemical exposure on the susceptible developing human nervous system can cause severe lasting neurological deficits.

This conference will bring together diverse stakeholders from around the globe, including research scientists, regulators, industry representatives, academics, and pediatricians to discuss the actions to take for:

- improving the development of time-efficient and human-relevant predictive *in vitro* DNT methods, and;
- boosting their use in the risk assessment regulatory decision-making process.

Details: https://www.uni-konstanz.de/en/dnt5/about-the-event/

7th Annual 3Rs Symposium: Practical Solutions and Success Stories

June 4-5, 2020
USDA National Agricultural Library,
Beltsville, MD

The 7th Annual 3Rs symposium is co-hosted by the USDA Animal Welfare Information Center (AWIC), NIH Office of Laboratory Animal Welfare (OLAW), the Johns Hopkins Department of Molecular and Comparative Pathobiology, and the Johns Hopkins Center for Alternatives to Animal Testing (CAAT). The goal of this year's symposium is to bring together experts in replacement, reduction, and re-

finement of animal experimentation to exchange information with scientists, IACUC members, veterinarians, and animal care technicians about practical solutions and recent success stories to reduce the use of animals in research and improve their welfare.

The format includes 1.5 days of lectures and panel discussions with interactive breakout sessions in the afternoon on day 2. These lectures give participants a strong foundation in the relevant research underlying breakthroughs in the 3Rs, while the breakout sessions allow participants to receive feedback specific to their own facilities from experts and colleagues. A half-day tour of labs and research centers at the Agricultural Research Service is planned for June 3 as an optional pre-symposium event.

Details: http://caat.jhsph.edu

Summer School on Innovative Approaches in Science

June 22-25, 2020
Baltimore, MD

In response to a growing need to be conversant in innovative approaches in toxicology and biomedical sciences, this summer school will share knowledge and experience with a new generation of scientists on research and testing methods. The program will highlight modern alternatives to the use of animals – including *in vitro* and computational modeling – in toxicology and biomedical sciences. The state of scientific research will be explored through lectures and discussion.

The Summer School will be separated into two tracks: toxicology and biomedical science. The program will combine lectures from experts in the field of toxicology and biomedical science with interactive sessions to encourage discussion and facilitate networking among participants.

The program will offer:

- Modern alternatives to the use of animals in toxicology and biomedical sciences
- Diverse presentations from all major stakeholders
- Platform, poster, and networking sessions
- Welcome and networking reception dinners
- Laboratory visits
- Travel awards and more.

Details and Registration: https://www.pcrm.org/ethical-science/ethical-education-and-training/summer-school

Recent Events

CAAT Activities at the European Parliament

December 3-5, 2019
Brussels, Belgium

CAAT's activities were presented on multiple occasions at the European Parliament in Brussels.

- CAAT-Europe had a booth at the exhibition space to present its activities under the topic "Strategies for innovation in life sciences."
- Thomas Hartung gave a presentation on December 3 at an event organized by Eurogroup for Animals as part of the Strategies for Innovation in Life Sciences event.
- Kathrin Herrmann hosted a book launch on December 4 for *Animal Experimentation: Working Towards a Paradigm Change*. The book launch was co-sponsored by CAAT and Animal Free Science, see below.
- RESTORE project – in which CAAT acts as a supporter and coordinates its policy dissemination – highlighted its strategy for Advanced Therapeutical Medicinal Products on December 5 in the MEP salon.

Book Launch Event at EU Parliament

On December 4, 2019, CAAT-Europe and Animal Free Science co-organized the launch of the book *Animal Experimentation: Working Towards a Paradigm Change* (Brill open access) at the European Parliament in Brussels, Belgium, to discuss with politicians, scientists, and the interested public ways to accelerate the transition towards innovative, animal-free approaches in research, testing, and education. The event was co-hosted by the three MEPs, Tilly Metz (Greens, Luxembourg), Anja Hazekamp (Party for the Animals, Netherlands), and Eleonora Evi (5-Start Movement, Italy). The MEPs invited five scientists who are part of the book project, namely Kathrin Herrmann (CAAT, initiator and co-editor of the book); Carolin Spicher (Menschen für Tierrechte); Emily McIvor (PETA); Jan Turner (Safer Medicines Trust); and Katy Taylor (Cruelty Free International). The authors answered the MEPs' questions about why and how to shift away from the current paradigm of animal use in science, how politics and legislation of animal experimentation can facilitate this paradigm change, and the importance of human biology-based research to improve drug safety.

Recent developments in animal-free methods were highlighted as well as the opportunities that thus far have been missed to implement these. The MEPs were especially interested in the experts' ideas for a concrete EU action plan on how to reach the final goal of the European Directive 2010/63, the full replacement of live animals in science. The MEPs are now helping to distribute the book and its message, and MEP Tilly Metz started a declaration for alternatives to animal testing in the European Parliament.

JHU Exposome Collaborative Launch Event

November 8, 2019
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

The Exposome Collaborative at Johns Hopkins was funded to congregate the intellectual and material resources housed under the various disciplines within the environmental health sciences and engineering to evaluate the exposome in a holistic manner.

https://ehe.jhu.edu/research/the-exposome -collaborative

New publications

Dreser, N., Madjar, K., Holzer, A. K. et al. (2019). Development of a neural rosette formation assay (RoFA) to identify neurodevelopmental toxicants and to characterize their transcriptome disturbances. *Arch Toxicol*, Epub ahead of print.

doi:10.1007/s00204-019-02612-5
Escher, S. E., Kamp, H., Bennekou, S. H. (2019). Towards grouping concepts based on new approach methodologies in chemical hazard assessment: The read-across approach of the EU-ToxRisk project. *Arch Toxicol 93*, 3643-3667. doi:10.1007/s00204-019-02591-7
Kranaster, P., Karreman, C., Dold, J. E. G. A. et al. (2019). Time and space-resolved quantification of plasma membrane sialylation for measurements of cell function and neurotoxicity. *Arch Toxicol*, Epub ahead of print. doi: 10.1007/s00204-019-02642-z.
Krewski, D., Andersen, M. E., Tyshenko, M. G. et al. (2019). Toxicity testing in the 21st century: Progress in the past decade and future perspectives. *Arch Toxicol*, Epub ahead of print. doi:10.1007/s00204-019-02613-4
Ripani, P., Delp, J., Bode, K. et al. (2019). Thiazolides promote G1 cell cycle arrest in colorectal cancer cells by targeting the mitochondrial respiratory chain. *Oncogene*, Epub ahead of print. doi:10.1038/s41388-019-1142-6

Cruelty Free INTERNATIONAL
Ending animal experiments worldwide

Unlawful dog and monkey suffering uncovered at European laboratory

Cruelty Free International and SOKO *Tierschutz* have released the results of a joint investigation into the Laboratory of Pharmacology and Toxicology (LPT) animal testing facility in Mienenbüttel in Germany, which revealed shocking levels of animal suffering and breaches of domestic and European law.

Graphic undercover footage released in October showed dogs left to suffer when it was clear that they were very ill or dying, dogs kept in barren housing, monkeys violently removed from their cages and restrained in barbaric devices, gratuitous cruelty and lack of overnight care. The video has received over 1 million views on YouTube: https://www.youtube.com/watch?v=MSmAEPD86KM&feature=youtu.be

The investigation has generated widespread international media and worldwide outrage, inspiring over a million people to sign a Change.org petition to have the facility closed and thousands to protest on the streets of Hamburg. Experts also weighed in, with world renowned primatologist Jane Goodall describing what she saw in the footage as "callous, inhumane and brutal" and respected zoologist Desmond Morris deeming the facility's actions "uncaring and often deliberately callous".

A month after the footage was released, it was announced that the Mienenbüttel animal testing facility is scheduled to close in February 2020. A few weeks later, the site was raided by the local authorities and a warrant to search two further LPT sites was issued.

So far, over 90,000 people have contacted the European Commission calling for an urgent review into toxicity testing on animals across the European Union: The letter can be found here: bit.ly/2DD59sa

Humane Cosmetics Act introduced in the US Senate and House

On November 18, the new Humane Cosmetics Act was introduced in the US Senate and House, which could mean the beginning of the end for animal testing for cosmetics in the US.

The bill was introduced by a bipartisan group of legislators led by Senator Martha McSally (R-AZ) in the Senate along with Senators Cory Booker (D-NJ), Rob Portman (R-OH) and Sheldon Whitehouse (D-RI). In the House, the bill was led by Rep. Don Beyer (D-VA) along with Reps. Vern Buchanan (R-FL), Paul Tonko (D-NY), Ken Calvert (R-CA) and Tony Cárdenas (D-CA).

The bill would ensure that companies in the US end the use of animal tests for cosmetics, and, if enacted, it would also mean that selling cosmetics newly tested on animals would be prohibited.

The new Humane Cosmetics Act follows on from the work that Cruelty Free International has been doing in states across the US to restrict animal testing for cosmetics, and on the 8.3 million signatures collected with The Body Shop from supporters all over the world calling for a global end to this outdated practice.

Recommendations for EU regulation of endocrine disrupting substances

One of the big challenges for the EU under its new Green Deal for Europe will be dealing with endocrine disruptors and their impact on human health and the environment.

How to assess and manage the risks caused by substances with potential endo-

crine disrupting properties has been a long running and controversial issue. As the debate focuses on how the EU's REACH regulation addresses endocrine disrupting substances, the consequences for the animals used in testing them and the companies forced to conduct these tests is becoming more real.

To address this issue, Cruelty Free International has submitted the following recommendations to the European Commission to consider for regulatory action in Europe:

- Do not employ the routine use of studies on animals for the purposes of addressing endocrine active substance concerns – insertion of yet more animal studies into REACH is not the answer.
- Identify substances of potential concern on the basis of real-world exposures, not imported and manufactured amounts.
- Use only *in vitro* methods for the human-relevant assessment of endocrine activity in order to support the identification of substances of concern.
- For substances of potential concern, use epidemiological data to establish the link between exposure to endocrine active substances and actual, real-world adverse health outcomes.

Cruelty Free International believes that the correct approach should be based on humane and sound science rather than a tick-box approach using animal tests that would not generate the insights needed to protect human health and the environment. A new report outlining our position is available upon request; email: info@crueltyfreeinternational.org

EPISKIN seminar on the use of *in vitro* reconstructed human 3D models

The second EPISKIN International Seminar on Alternative methods to animal testing using *in vitro* reconstructed human 3D models was held on November 28-29 in Lyon, France.

The aim of the seminar was to share information on the latest and most accurate techniques on the use of reconstructed human 3D models for *in vitro* testing as well as information on the regulatory context and scientific perspectives.

Cruelty Free International's Head of Science, Dr Katy Taylor opened the seminar with a summary of the regulation of animal experiments as well as an update on the status of key *in vitro* methods and the barriers that had to be overcome in getting them adopted and accepted.

Linz conference on Alternatives to Animal Testing

The 22nd annual European Congress on Alternatives to Animal Testing was held on October 10-13 in Linz, Austria.

Scientists from many areas – academia, regulatory bodies, research institutes, the pharmaceutical industry, non-animal methods companies, and animal protection organisations – gathered to share their experience and knowledge of using and developing non-animal testing methods.

Key topics included why governments currently require that medicines be tested on animals even though there is little, if any, scientific justification for this, and what it means when large animal breeding and research institutes close for a shift towards modern, scientifically valid research methods.

Cruelty Free International's Senior Research Scientist Dr Jarrod Bailey and Senior Science Advisor Dr Emma Grange both presented at the event. Dr Bailey spoke about the cruelty of genetically modifying animals and the inability of animal tests to protect human health while Dr Grange spoke about the European chemicals regulation, REACH, and changes that may soon come as a result of actions to tackle endocrine disrupting chemicals.

EUSAAT

European Society for Alternatives to Animal Testing

Highlights of the EUSAAT 2019 Congress

which was held on October 10-13, 2019 in Linz/Austria by *Winfried Neuhaus, Annemarie Lang & Horst Spielmann*

As in the past, there were many highlights of the EUSAAT congress 2019, e.g., the cooperation agreement between EUSAAT and CCARE, the award ceremonies, keynote lectures, round table discussions, 3Rs network sessions, and the Young Scientists in Action Program (YOU-EUSAAT2019).

Some basic facts about the EUSAAT 2019 Congress

The EUSAAT 2019 congress had 267 participants, which is remarkable given the fact that it had to be postponed on very short notice from August in the holiday season to October. We had 30 sessions with 146 lectures and 2 poster sessions with 77 posters. For the first time we introduced "YOU" – the Young Scientists in Action Events – at the EUSAAT 2019 Congress and, due to generous sponsoring, 20 young colleagues were awarded EUSAAT Young Scientists Travel Awards (YSTA). Details of the scientific program are given below. The Abstract book is available at: https://doi.org/10.14573/altex.apr

Cooperation Agreement between EUSAAT and CCARE and between EUSAAT and SHSOT

At the EUSAAT 2019 Congress, *Winfried Neuhaus, President of the European Society for Alternatives to Animal Testing (EUSAAT)* and *Shujun Cheng, President of the Chinese Center for Alternatives Research & Evaluation (CCARE)* signed the following memorandum and a cooperation agreement to strengthen our two societies' friendship, capabilities and interactions.

1. We agree to mutually exchange information relevant to our scientific and educational activities. This mutual information exchange will be made but not necessarily limited to the following means:
2. Encouraging experts in our fields of joint interest, e.g., alternatives to animal experimentation (3Rs), to exchange visits in order to share their expertise.
3. The mutual arrangement, whenever possible, to visit academic meetings, symposium and workshops in this field.
4. The mutual exchange of educational tools concerning the 3Rs.
5. Any other activities to strengthen our two societies' friendship and advance their respective missions.

This agreement sets the stage for continued and sustained engagement between the EUSAAT and CCARE societies.

The same kind of memorandum and cooperation agreement between EUSAAT and SHSOT was signed by *Winfried Neuhaus, President of the European Society for Alternatives to Animal Testing (EUSAAT)* and *Shujun Cheng, Secretary General of the Shanghai Society of Toxicology (SHSOT)*.

Award Ceremonies

The *Björn Ekwall Memorial Award for 3Rs Lifetime Achievements*, which is sponsored by the Björn Ekwall Memorial Fund (BEMF), was awarded to *Jan van der Valk*, Utrecht University, NL, for his contribution to replacing fetal calf serum (FCS) in cell and tissue culture media. Stina Oredsson, President of the BEMF, introduced the winner and presented the award at the Award Ceremony on October 11, 2019.

The *ALTEX Prize 2019* for the best article published in ALTEX in 2018 was awarded to *Fabian Grimm* et al., Texas A&M University, now ExxonMobil Biomedical Sciences, Inc. for the article "A human population-based organotypic *in vitro* model for cardiotoxicity screening" published in *ALTEX 35*, 441-452. ALTEX Editor Sonja von Aulock introduced the winner and presented the award at the Social Event on October 12, 2019.

Keynote Lectures

Jürgen Hescheler – Opening Lecture
Director, Institute for Neurophysiology, University of Cologne, DE-Cologne
Update on human stem cells – scientific, ethical and legal challenges

Susanna Louhimies
Policy coordinator at the European Commission, BE-Brussels
Implementing Directive 2010/63/EU – current status and next steps

Christoph Giese
Director QC and CATS at ProBioGen AG, DE-Berlin
Human Artificial Lymph Node Model (HuALN) for biopharmaceutical testing and disease modelling *in vitro*

Mihael H. Polymeropoulos
President and CEO, Vanda Pharmaceuticals Inc., US-Washington DC
Challenging FDA's requirement for long term studies in dogs for the safety assessment of drugs and pharmaceuticals

Jan van der Valk – Björn Ekwall Memorial Award Lecture
NL-Utrecht University
History of *in vitro* methods. Lessons learned?

Round Table Discussions

International impact of closing research animal facilities in Europe

Moderator: *Horst Spielmann, DE-Berlin*
Panelists: *Elizabeth Baker, US-Washington DC; Julia Baines, UK-London; Jürgen Hescheler, DE-Cologne; Birgit Reininger-Gutmann, AT-Graz; Christa Thöne-Reineke, DE-Berlin*

Each participant gave a short introduction of her/his background and commented on the following questions

1. How did you learn about the closing of the 2 outstanding animal facilities in the UK?
2. If you are from the UK – what is the background for these decisions?
3. How was this communicated in your country, in the general media, in scientific journals, within the scientific community?
4. What is the response in your country within the scientific community, by animal welfare NGOs and by regulatory and funding agencies?
5. Which consequences do you anticipate for the scientific community in your country?
6. How does this fit with implementing the 3Rs?

The audience then joined a very lively discussion, which quite unexpectedly proved that most of the attendants were not informed about the closing of two internationally outstanding centers of excellence of mouse genetics and about the political and scientific decisions that led to their being closed.

Establishing an International 3Rs Centers Network

Moderator: *Winfried Neuhaus, EUSAAT President, AT-Vienna*
Panelists: *Dagmar Jírová, NIPH SZU, CZ-Prague; Helena Kandarova, SNP 3Rs, SK-Bratislava; Hajime Kojima, JaCVAM, JP-Tokyo; Annemarie Lang, Charité 3R & BB3R, DE-Berlin; Adrian Smith, Norecopa, NO-Oslo; Györgyi Szabo, Semmelweis University, HU-Budapest*

After an introduction about numbers of experimental animals, EU-wide initiatives, and future challenges in the 3Rs field in Europe, Winfried Neuhaus invited the panelists to describe the focus of the 3Rs activities of their centers, their mission, their funding, and their collaborations with academia, regulatory and government agencies and with animal welfare NGOs. Questions such as, in how far the 3Rs are recognized as an own topic in the panelists' country and what kind of support (also governmental) they receive for 3Rs work, were discussed.

As a major point, it was highlighted that 3Rs should be implemented in basic research and discussed how basic researchers can be involved in this process. Winfried Neuhaus then introduced his vision and the current development of a European Network of 3Rs Centers and invited the round table panelists to comment and discuss this proposal. All panelists indicated the need for this 3Rs Centers Network and the proposed information channels on 3Rs activities and welcomed Winfried's initiative to coordinate the establishment of the 3Rs Centers Network. Since there is no national funding available for such an activity, it was agreed that this is a typical EU project for which funding by the EU Commission should be available.

The panelists of the round table discussion had chaired and/or participated in several sessions on 3Rs Centers and they are summarized in the following list:

Sessions on 3Rs Centers in Europe & international – national and local centers

Mohammad Abdulkader Akbarsha, IN-Tiruchirappalli: A Society for Alternatives to Animal Experiments in India: An Update.

Anna Maria Bassi, IT-Genoa: Italian Centro3Rs commitment: 1 year after the opening of the activities.

Tatsiana Hlinkina, BY-Minsk: Animal experiments or humane alternatives: awareness raising campaign in Belarus

Dagmar Jírová, CZ-Prague: 3Rs Center at the National Institute of Public Health in the Czech Republic

Helena Kandarova, SK-Bratislava: Slovak National Platform for Three Rs (SNP 3Rs) in Science, Education, Research and Development

Hajime Kojima, JP-Tokyo: Asian Consortium for Three Rs

Franz Lamplmair, BE-Brussels: At crossroads between regulation, science and industrial application: the EPAA, a public-private initiative for the 3Rs

Annemarie Lang, DE-Berlin: Charité 3R – the 3R Center of Charité Universitätsmedizin Berlin

Birgit Reininger-Gutmann, AT-Graz: Austria goes 3R – The RepRefRed Society

Adrian Smith, NO-Oslo: Norecopa – Working to advance harmonization and dissemination of best practice in animal research and testing

3Rs Centers Meeting

The fourth 3Rs Centers Meeting took place at EUSAAT 2019 on October 12. 20 representatives from 17 different institutes participated. New members from Austria, Belgium, France and Germany were welcomed and introduced themselves. Future steps were discussed focusing on dissemination strategies (e.g., consensus papers for different stakeholders) and funding (via, e.g., additional COST action proposals).

YOU – Young Scientists in Action Events at the EUSAAT 2019 Congress

The YOU EUSAAT 2019 events were aimed at young and early career scientists (up to 35 years) that have already worked or plan to work in the field of the 3Rs. We wanted to encourage the dialogue of young scientists among themselves and with experienced mentors who have been working in the field for a long time to give the opportunity to establish new professional networks. We started with a fully booked pre-registration meet-up that allowed the participants to introduce themselves and start up an exchange with other young scientists. In addition, during a young scientist's session, Barbara Birk gave an outstanding keynote lecture on her own experiences and different career path opportunities, "*Similarity of a career in the field of 3Rs and a Trans-Alpine Crossing*", which was inspiring not only for young scientists. Finally, the meet-the-mentors session hosted at Maria's Weinbar provided the perfect atmosphere for lively discussions of scientific ideas and career experiences between mentors and young scientists (drinks and snacks were kindly sponsored by EUSAAT and PETA). We appreciate that the following colleagues served as mentors in this session:

Christa Thöne-Reineke (*Refinement, Animal Welfare & Ethics*)

Stefan Hippenstiel (*Tissue Culture, Disease Models, Lung, Charité 3R*)

Chantra Eskes (T*oxicology, Swiss 3RCC*)

Christopher Fassbender (*Ecotoxicology, PETA*)

Barbara Birk (*Implementation of alternative methods in industry, BASF*)

Young Scientists Travel Awards 2019

The EUSAAT Board is pleased that several sponsors again agreed to provide funding for the *EUSAAT Young Scientists Travel Awards Program (EUSAAT YSTA)*. The German *Foundation SET* was the main sponsor of the YSTA program, and we received additional funding from *EPAA* (European Partnership for Alternatives to Animal Experiments), *LUSH* cosmetics company and *EUSAAT*.

We received around 40 applications by young colleagues for the YSTA funding and the following 20 colleagues were granted and presented their research topics as oral presentations either in the general program or in one of the two special YSTA sessions:

Stephan Altmann, DE-Würzburg: Glyco-engineering as a tool to control the behavior of bone marrow-derived mesenchymal stromal cells in biofabrication processes

Lada Bělastová, CZ-Prague: Safety testing of adult novelties using methods *in vitro*

Marco Campisi, IT-Turin: Modelling the human blood-brain-barrier microvasculature and nanocarrier transport on a microfluidic chip

Karoline Diesing, DE-Berlin: Development of an *in vitro* trabecular human bone model integrated in a perfusion system to simulate glucocorticoid-induced osteoporosis

Avner Ehrlich, IL-Jerusalem: Micro-physiological flux balance platform unravels the dynamics of drug induced steatosis

Dario Ferrari, CH-Bern: Development of a fibrosis on-chip tool for drug efficacy testing

Katharina Hohlbaum, DE-Berlin: Towards an automated surveillance of well-being in mice using deep learning

Justus Horstmann, DE-Saarbrücken: *P. aeruginosa* infected co-culture of human cystic fibrosis bronchial epithelial cells as a preclinical test system for anti-infectives

Ayesha Idrees, IT-Turin: Development of 3D skin model and 3D skin infection model, as advanced testing tools for the bio-

evaluation of novel antimicrobial biomaterials for treating infected wounds
Nathalie Jung, DE-Frankfurt/Main: Using ex vivo human skin for the assessment of drug transport across the skin barrier with label-free Raman microscopy
Daniela Pacheco, IT-Milan: Engineering *in vitro* Lung Microbiota for Antimicrobial Treatment
Dominique Peter, DE-Berlin: Establishment of a murine 3D cell culture model of the endometrium
Giulia Raggi, CH-Bern: Recreating a human pulmonary alveolar-capillary barrier on a Lung-on-Chip
Audet Rapet, CH-Bern: An *in vitro* lung-on-chip system to model inflammation of the alveolar-capillary barrier
Maren Schenke, DE-Hannover: Differentiation of motor neurons for *in vitro* potency testing of Botulinum Neurotoxins
Priscila Schilrreff, AR-Buenos Aires: A reconstructed human skin model containing macrophages to set up a delayed wound healing model of cutaneous leishmaniasis
Christian Schmidt, DE-Munich: Tissue-on-a-Chip
Roberta Visone, IT-Milan: Beating organs-on-chip as advanced tools in drug screening: engineered *in vitro* models of human organs and diseases
Constantinos Voniatis, HU-Budapest: A novel model for mechanical assessment of biomaterials
Eva Zittel, DE-Karlsruhe: Integrating Organ-on-a-Chip devices on a multimodal, microfluidic platform

Sponsoring

Main sponsors of the EUSAAT 2019 congress were again Austrian Federal Ministry of Science, the Austrian Federal Ministry for Labor, Social Affairs, Health and Consumer Protection and Vienna, Austrian Federal Ministry of Sustainability and Tourism (all in Vienna-AT). In addition, we received funding from the State of Upper Austria (Linz-AT), EPAA (European Partnership for Alternatives to Animal Experiments, Brussels-BE), the German SET Foundation (Frankfurt-DE), the MatTek Company (Bratislava-SK) and LUSH cosmetics company (London-UK). We are also indebted to 12 exhibitors, who provided funding and promoted 3Rs non-animal methods in the scientific sessions.

EU-ToxRisk project

The EU-ToxRisk project is developing a robust toxicity testing strategy, integrating state-of-the-art *in vitro* and *in silico* technologies for mechanistic, animal-free safety assessment, applicable across industry sectors and acceptable for regulatory purposes.

At the project midpoint (36 months), two of the most relevant outcomes of the project will be finally released: (i) the EU-ToxRisk NAM-enhanced Read-Across (RAx) Advisory Document; and (ii) the EU-ToxRisk Integrative Testing Platform. The next phase will focus on *ab initio* hazard identification, and discussions with regulators, industry stakeholders, and international toxicology programs on this are ongoing.

The EU-ToxRisk Advisory Document on NAM-enhanced RAx was built on the foundations of the first round of project RAx case studies, addressing repeated-dose toxicity (RDT) as well as developmental and reproductive toxicology (DART) endpoints. The Advisory Document is the consolidated result of feedback, critical observations, and endorsements on taken approaches as drawn from the EU-ToxRisk Regulatory Advisory Board (RAB), from the OECD, and from multiple regulatory toxicologists involved in the discussions.

In more detail, the reports of four of the most mature case studies, describing the read-across question, the taken approach (i.e., what NAM to select), the results obtained, and the drawn conclusions were shared with the regulatory community for their review and feedback.

Learnings, achievements, and pitfalls of such approaches were also discussed in a lively and fruitful workshop organized by EU-ToxRisk last May in Espoo (Finland). In parallel, these same four case studies were submitted to the OECD for review in its "IATA Case Study Project". From these two review processes, the common learnings will be extracted and listed in the Read-Across Advisory Report that will be delivered later this year. The Advisory Document targets the broader toxicology community and contains practical instructions for registrants of NAM-supported read-across dossiers on its applications in different regulatory contexts. Its application will improve the submission quality of read-across cases by registrants and thereby increase successful acceptance rates of non-animal approaches.

The collected experience and expertise on the application of NAM as part of Integrated Approaches to Testing and Assessment (IATA) framework for regulatory testing constitute the basis for the setting-up of the EU-ToxRisk Integrative Testing Platform. The EU-ToxRisk Integrative Testing Platform plans to offer on-demand, fit-for-purpose packages to interested stakeholders. The platform will integrate results from different sources and use the integrated results in both safety assessment and investigative toxicology. It is based on NAM-based risk assessment, as developed in the EU-ToxRisk project, and will be offered

commercially to end-users as testing services and expert consultancy to the larger risk assessment community.

EU-ToxRisk publications

The previously introduced Read-Across Advisory Report will be structured along with the EU-ToxRisk RAx framework, which was recently published by Escher et al. (2019). In this publication, the EU-ToxRisk read-across approach and its application in case studies are extensively described. This approach integrates mechanistic knowledge into human hazard assessment. It illustrates how MIEs and KEs from *in vitro* assays together with *in silico* model and simulation tools can be used to prove (dis)similarity or a consistent trend within a read-across assessment. By this approach, the uncertainty of the prediction for the target compound can be reduced.

To facilitate the use of NAM in a regulatory context, extensive documentation of reproducibility and predictivity are required. In Krebs et al. (2019), the authors describe the details and the practical application of an annotated toxicity test method template (ToxTemp) that was developed by the EU-ToxRisk project. The ToxTemp comprises all requirements of OECD Guidance Document 211 (GD211) on method documentation. It gives broad space to the inclusion of acceptance criteria for test elements, and comprehensive and transparent definition of the test system. Such a template was endorsed by more than 30 experts from industry, regulatory bodies, and academia. The ToxTemp will be iteratively implemented and updated with the aim to improve the quality of the developed NAM.

Some examples of refined EU-ToxRisk *in vitro* test systems have been recently published. Hiemstra et al. (2019) describe a novel adaptation to the already established HepG2-based fluorescent protein reporter platform. Such a platform was established to monitor adaptive stress response activation following DILI drug treatment. The test system was now improved to increase its metabolizing capacity by the use of 3D liver-like spheroid cultures. This new approach was challenged with several chemicals. The results indicate that the test system is a promising tool for mechanism-based identification of compounds with liability for DILI.

In the area of DART, Dreser et al. (2019) describe the establishment of a human stem cell-based test to detect development neurotoxicity. The original test method was based on the detection of transcriptome changes. Now, this endpoint has been anchored to a functional read-out, the ability of toxicants to interfere with the normal capacity of neural precursor cells to self-organize to neural rosettes. Several established toxicants (like valproic acid) led to distinctly different tissue organization and differentiation stages that can be measured quantitatively.

Outlook

The 3rd EU-ToxRisk Open Symposium will take place on February 11-12, 2020 in Egmond aan Zee, The Netherlands. This event aims to host a platform for industry, regulatory and academic stakeholders on practical issues related to the submission of RAx justifications in risk assessment. On this occasion, the regulatory and scientific foundation of the EU-ToxRisk Advisory Document on new approach method (NAM)-enhanced read-across (RAx) also will be presented. The participants also will be introduced to the recent scientific highlight of the project and its progress towards the establishment and validation of next-generation risk assessment (NGRA). International perspectives on the application of NGRA frameworks will be offered. Finally, interaction and involvement of interested stakeholders with the EU-ToxRisk NAM-based Testing Commercialization Platform will be promoted. More information can be found on the event website[1].

References

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 681002.

Giorgia Pallocca and Marcel Leist

[1] https://cmt.eurtd.com/events/event/view/254487/eu-toxrisk-open-symposium-general-assembly-2020

LUSH PRIZE

SUPPORTING ANIMAL-FREE TESTING

A breathing lung-on-a-chip and women's reproductive organs on-a-chip join the 2020 Lush Prize shortlist

Lush Prize announced its 2020 shortlist on January 6th. Among the projects shortlisted were:

- a team from Brunel University in London working on organ-on-a-chip platforms using human cells to replicate female organs (vagina, ovaries, placenta and breast) to better understand the causes and treatment of women's diseases.
- a Swiss start-up company called AlveoliX who have created a lung-on-a-chip with a moving "microdiaphragm" connected to a soft porous membrane where human cells are cultured.

Both these projects were thought to offer promising routes to replace the use of animals in chemical safety testing with more human-relevant scientific data. In total, 58 projects from 21 countries were shortlisted for the £250,000 prize fund. The full shortlist is available on the Lush Prize website at www.lushprize.org.

For the first time this year, Lush Prize were pleased to announce that the shortlist contained a group from Turkey, where awareness-raising of animal welfare issues is just beginning to take off. As before, it also contained nominations from as far afield as China, New Zealand, Chile and Slovakia.

We have reproduced the full 2020 shortlist for the Science Prize below. Computational toxicology projects were most frequently shortlisted in this category, with six of the 14 shortlisted groups working in this area. This will partly be a consequence of Lush Prize altering its criteria in 2019 to focus on computational solutions, and may be a consequence of an upsurge in interest in this area too.

The next most frequently shortlisted projects were organs-on-chips, where four projects made it through to the final cut, including the two mentioned above. The Science Prize winner in 2018 was the blinking eye-on-a-chip from the BIOLines Research Group at the University of Pennsylvania.

The winners of the 2020 Lush Prize will be chosen by an expert panel of judges on January 24th in London but will not be publicly announced until the Lush Prize Awards Ceremony in May.

2020 Lush Prize – Science Category Shortlist		
Nadine Dresser at University of Konstanz	Germany	Early neurodevelopmental disturbances during sensitive periods of stem cell differentiation
Laboratory of Environmental Chemistry and Toxicology – Istituto di Ricerche Farmacologiche Mario Negri, IRCCS	Italy	QSAR modelling of ToxCast assays relevant to the molecular initiating events of AOPs leading to hepatic steatosis
Organs-on-a-chip Team / Smart Microfluidics, SIMTech (A*STAR)	Singapore	Organ-on-chip platform for culture and testing of biopsies and 3D cell cultures
Kyung-Min Lim – MCTT HCE	South Korea	Expansion of utilization of 3D tissues in Korea
AlveoliX	Switzerland	A human breathing lung-on-chip model for reliable and predictive *in vitro* testing
The MIE Atlas Team	UK	*In Silico* Models to Predict Human Molecular Initiating Events
Organ-on-a-chip team at Brunel University London	UK	Development of organ-on-a-chip systems to study women's health
Wyss Institute, Harvard University	USA	Human Organs-on-Chips
VeriSIM Life	USA	Development of BIOiSIM, a bio-simulation platform for rapid creation and validation of predictive biological models
Medical Device In Vitro Irritation Team (MD-IV-IT)	USA	*In Vitro* Irritation Testing of Medical Devices
Center for Alternatives to Animal Testing	USA	Big data and A.I. for Toxicology
Thomas Luechtefeld	USA	Computational applications to model chemical hazards and collect biochemical data
Azra Raza – Columbia University	USA	Tissue Repository
Eugene Muratov – StopTox	USA	STopTox: An *in-silico* platform as an alternative to animal testing for acute systemic and topical toxicity

TEDD – Tissue Engineering for Drug Development and Substance Testing

Markus Rimann leader of TEDD

Dr Markus Rimann took over the lead of the Competence Centre TEDD. He superseded Prof Michael Raghunath in this role effective August 2019. Dr Rimann is the leader of the 3D Tissues and Biofabrication group at the Zurich University of Applied Sciences ZHAW, and has been actively engaged in TEDD since its establishment in 2010. Markus Rimann completed his PhD at the ETH Zurich in 2009, where he worked on developing a somatic gene therapy approach to improve cutaneous wound healing. As a postdoc at the Centre for Applied Biotechnology and Molecular Medicine (CABMM) at the University of Zurich, he focused on the use and tracking of mesenchymal stem cells (MSCs) for the treatment of osteoporosis. Since 2011, he works at the Zurich University of Applied Sciences (ZHAW) in the Tissue Engineering team of Prof. Graf-Hausner and Prof. Michael Raghunath. His research is mainly application-driven. He is interested in developing organotypic model systems and making them available to industry as well as to clinics for substance testing. More information about Markus: https://www.zhaw.ch/de/ueber-uns/person/rimm/

TEDD Board Meeting 2019

On October 8, 2019, the TEDD Steering Committee and Advisory Board together with the TEDD Core Team gathered to discuss the past year of TEDD activities and to plan 2020. TEDD's steering committee consists of experienced academic and industrial professionals: Markus Rimann, ZHAW; Katharina Maniura, Empa; Jens Kelm, PreComb Therapeutics AG; Oliver Peter, Actelion; and Giuseppe Perale, IBI-S.A. The international Advisory Board mentors the Steering Committee according to the international needs and requirements. It is composed of Ursula Graf-Hausner, graf 3dcellculture; Markus Ehrat, EK Biosciences GmbH; Uwe Marx, TU Berlin; Thomas Singer, F. Hoffmann-La Roche; and Marcus Textor, ETH Zurich. During the meeting Marc Thurner from mimiX Biotherapeutics Ltd was nominated as new member of the Advisory Board. Head of TEDD Markus Rimann updated the Board on the network. TEDD currently has 112 members, 67% from industry, 29% from academia and 4% from other institutions, such as clinics and non-profits. 30% of the network members are from outside of Switzerland.

Delegations from China, Hong Kong and USA hosted by TEDD

On October 21-25, TEDD hosted a delegation of scientists, who are active in the area of tissue engineering, in particular, organ-on-chip technologies, from Asia and USA. The tour was prepared by Prof. Markus Textor, Prof. Michael Raghunath and Dr Markus Rimann, and coordinated by Dr Katarzyna Kopanska. The delegation included Prof. Zhongze Gu, Prof. Ningping Huang, Dr Zaozao Chen from South-East University (SEU), Nanjing and Suzhou; Prof Kenneth Lee from Chinese University of Hong Kong; and Dr Danilo Tagle from NCATS National Centre for Advancing Translational Sciences, National Institutes of Health, MD, USA.

The researchers visited various Swiss academic and industrial organizations. At the ETH D-BSSE, Dept. of Biosystems Science and Engineering, led by Prof Andreas Hierlemann, they saw microfluidic multi-organ platform and gravity-driven perfusion systems for cell culture. At the ETH D-HEST, Dept. of Health Sciences and Technology, they were hosted by Prof Viola Vogel, head of Dept. and Applied Mechanobiology Laboratory and Prof Marcy Wong, head of the Institute for Biomechanics, where they were shown the state-of-art bioprinting of cartilage. At ARTORG Centre Organs-on-Chip Technologies, Prof Olivier Guenat and his colleagues demonstrated 3D microphysiological lung-on-chip and prostate-on-chip systems. The delegation also visited industrial partners at F. Hoffmann-La Roche, InSphero and Cytosurge to discuss current innovations. As a final part of the program, all visiting scientists presented during the TEDD Annual Meeting and Sino-Swiss Workshop on Tissue Engineering.

TEDD Annual Meeting 2019

The TEDD Annual Meeting took place on October 23-24, 2019 at Zurich University of Applied Sciences in Wädenswil. The first day of the meeting was the Sino-Swiss Workshop on Tissue Engineering. The purpose of this meeting was to initiate a collaboration alliance between Southeast University (SEU) and industrial and academic partners in Switzerland, who are active in the field of tissue engineering. Several Swiss scientists presented topics such as 3D bioprinting for organs-on-a-chip, microphysiological systems for drug development, responsive hydrogels, lung organ-on-chip, and microsensors. The Swiss company partners presented the most current interests of the industry: 3D models for automation-compatible and translational drug discovery, lung-on-chip for drug transport and safety studies, automation of tissue therapy manufacturing. Dr Danilo Tagle from NCATS, USA, presented the US strategy to successfully translate organotypic model systems into routine industrial applications. Finally, we hosted experts from swissnex, who showed how to connect the collaboration dots between China and Switzerland, and from the Swiss National Foundation, who presented the opportunities and grants for collaboration with China.

The second day of the Annual Meeting was entirely dedicated to cell sources and stem cell generation for drug development.

We discussed how stem cells have already been used in the drug discovery process and how novel technologies can be applied to attain widespread adoption of stem cell technology by the pharmaceutical and biotech industry. Speakers presented topics from cardiac tissue engineering, isolation and cultivation of mesenchymal stem cells under physiological conditions, to oral progenitors for tissue repair, reprogramming cells into stem cells. Keynote speaker Prof Zhongze Gu talked about multiple key technologies for organoids and organ-on-chip-research.

We listened to presentations of two leading stem cells companies: STEMCELL Technologies and REPROCELL who talked about pluripotent stem cell and organoid research and how to produce GMP-grade induced pluripotent stem cells for drug screening and translational medicine. We also hosted sixteen companies that work on many aspects of 3D cell culture generation and analysis during the extended lunch break as exhibitors. Networking breaks, where people can personally connect and interact, are vital parts of TEDD Annual Meetings.

The TEDD Annual Meeting is also an opportunity to summarize the past year and look into the future. Markus Rimann, head of TEDD, presented the status of the network, recent activities and achievements, and the upcoming events. Scientists from the physical part of the TEDD, Centre for Cell Biology and Tissue Engineering, presented on the most current science and tools that they have developed at ZHAW. The meeting was closed by Markus thanking the participants for their contribution as well as the core team, Dr Katarzyna Kopanska and Simon Stebler, for organizing and coordinating the meeting.

More info: https://bit.ly/2PWC1lr

TEDD Events 2020

TEDD University Visit: Human 3D Tissue Models for Hazard Assessment and Cancer Research: An overview of research activities at the Adolphe Merkle Institute at the University of Fribourg

31.01.2020

The Adolphe Merkle Institute (AMI) is an independent competence center at the University of Fribourg that focuses on research and education in the domain of soft nanomaterials.
https://bit.ly/2PytBS4

Dechema 3D Cell Culture 2020

12.05.-14.05.2020

From bench to applications: Get updated about 3D cell culture as predictive model systems and the translation from models to applications!
https://dechema.de/en/3DCC2020.html

Biointerfaces International 2020 with Science and Translation Sessions

25.08.-27.08.2020

In 2020, TEDD co-organizes the BIC 2020. We will host a special Translational Session dedicated to the scientific and technological challenges in the development of tissue- and organ-like laboratory models to replace animal testing (3R: Replace, Reduce, Refine concept).
http://www.biointerfaces.ch/international/2020/

TEDD University Visit: University of Applied Sciences Northwestern Switzerland (FHNW)

01.09.2020

FHNW researches the entire healthcare value creation chain. The spectrum ranges from the development of medical products and drugs, technologies and production processes through to their production and market launch.
https://bit.ly/2S5qZgd

TEDD Annual Meeting 2020

21.10.20-22.10.2020

Celebrate ten years of TEDD network. The topic is in discussion.
https://bit.ly/34wiCwN

TEDD on Alternatives in Swiss Newspapers

Two Swiss newspapers featured TEDD in articles regarding alternatives to animal experimentation. The report in *Zürichsee-Zeitung* on November 12, 2019 (https://bit.ly/2rRt9Wi) described efforts of Zurich University of Applied Sciences concerning the replacement of animal experimentation with *in vitro* cell-based systems. TEDD was pointed out as playing a crucial role for the university as a leader in raising awareness among students and professionals about alternative methods to animal experimentation. More importantly, TEDD actively drives the innovation in pharma and biomedical industry by taking part in the development and implementation of 3D organotypic models into routine applications for drug discovery.

The *Neue Zürcher Zeitung* (NZZ) published the article "Miniorgans instead of animal experiments: How Swiss scientists want to end the suffering of the mice" (https://bit.ly/2M9rLoV). Markus Rimann, head of TEDD, was featured, among scientists from ETH, as a leader in alternatives to animal testing for the industry. Markus' team at the Institute of Chemistry and Biotechnology ICBT, ZHAW uses the 3D bioprinting technology to produce human tissues. The article pointed out the recent project on the development of human skeletal muscle tissue together with Novartis as an alternative to the use of animal tissues.

TEDD Participation in Animalfree Research Forum

Dr Markus Rimann and Dr Katarzyna Kopanska took part in this year's Animalfree Research Forum entitled "Animal free education" on October 31, 2019. The meeting focused on animal use in Switzerland and abroad for education and training purposes in biosciences and veterinary medicine. The questions discussed by the speakers were: Is it necessary to use animals for educational and training goals? What are the available alternatives? Do alternatives provide the same learning outcomes as the use of animals? What are the barriers to animal-free experimentation? Markus is on the foundation board of Animalfree Research. His statement on current topics can be found in the organization's newsletter *Resultat* (https://animalfree-research.org/themen/resultat/).