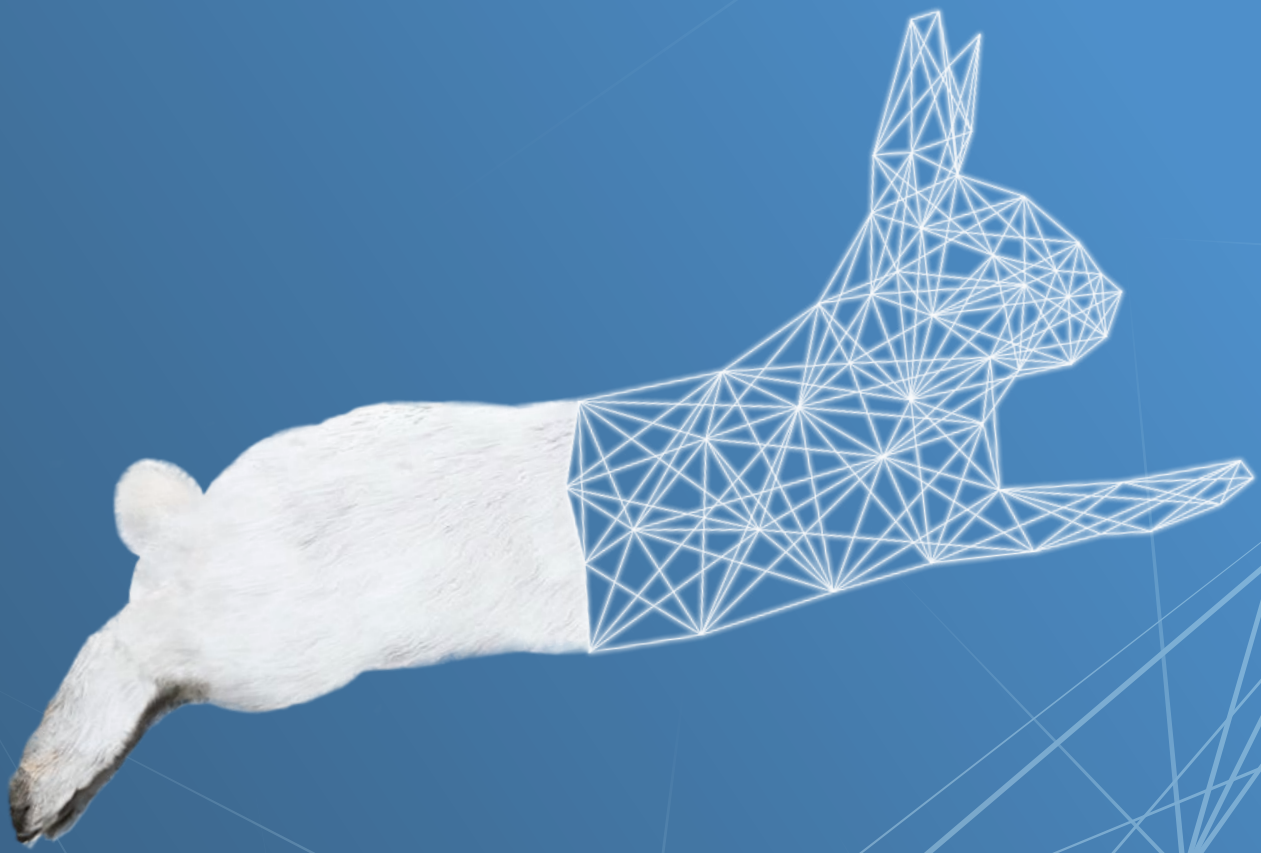
2012-2022

10-YEAR REPORT

PETA SCIENCE CONSORTIUM INTERNATIONAL e.V



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PETA Science Consortium International e.V. is recognised by the tax office Stuttgart-Körperschaften as a non-profit organisation and is registered as an association at the Stuttgart District Court under number VR 724927.

Any mention of our organisation prior to December 2020 refers to the PETA International Science Consortium Ltd.

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Letter From the Directors

PETA Science Consortium International e.V. is celebrating its 10th year of fostering a holistic approach to toxicology testing that relies on modern non-animal tests to protect human health and the environment. Taking advantage of this milestone, we're pleased to share this report, which includes just a fraction of our accomplishments from the past decade.

Our greatest asset is our team of passionate and innovative scientists and collaborators, and we're motivated by the impact our collaborative projects have had over the past 10 years. Our partnerships have advanced the field of regulatory toxicology by facilitating the development of robust non-animal testing approaches and building confidence in the use of these approaches and others. For example, as you'll read more about in this report, we worked with the US Environmental Protection Agency on research that led to a policy saving hundreds of birds each year from dietary tests that produced duplicative information, we helped fund the creation of a first-of-its-kind three-dimensional model that can be used to study the effects of chemicals on the deepest part of the human lung, and we funded a project that led to the creation of fully human-derived antibodies capable of blocking the poisonous toxin that causes diphtheria to replace the existing diphtheria treatment that is produced using horses.

Our adaptability is part of what makes us so successful – we are not restricted by red tape when taking on new projects, and we don't hesitate to take on precedent-setting projects or challenges that seem insurmountable. In addition to our work advancing methods for specific endpoints that you will read about in this report, we also tackle big-picture foundational issues underlying the entire field of toxicology testing. For example, we recently collaborated on streamlining the process for building confidence in new methods to facilitate the timely use of the best science.

We maintain constant contact with experts from government and regulatory agencies, industry, academia, and beyond to ensure we are at the forefront of developments in the regulatory toxicology space. We emphasise providing free training and educational opportunities for regulators and established scientists as well as early-career scientists who will shape the next generation of toxicology testing.

We also hold leadership positions, such as within the international Society of Toxicology and on the US Scientific Advisory Committee on Alternative Toxicological Methods. We serve on scientific and organising committees for toxicology conferences, participate in standards-making organisations (including the Organisation for Economic Co-operation and Development), and serve on a high-level roundtable for the implementation of the EU Chemicals Strategy for Sustainability. Our organisation is also an accredited stakeholder with the European Food Safety Authority, the European Medicines Agency, and the European Chemicals Agency; an observer of the Competent Authorities for REACH and CLP; a member of the EURL ECVAM stakeholder forum; and an observer of the Competent Authorities expert group on the protection of animals used for scientific purposes.

Harnessing the power of modern science and technology allows us, now more than ever, to make accurate predictions about the potential of substances to cause adverse effects, keeping our friends, family, and world safer. We are grateful for the fruitful partnerships we have made over the past 10 years and look forward to many more years of advancing reliable and relevant animal-free science.

Sincerely,

Amy J Clippinger, PhD

Gilly Stoddart, PhD

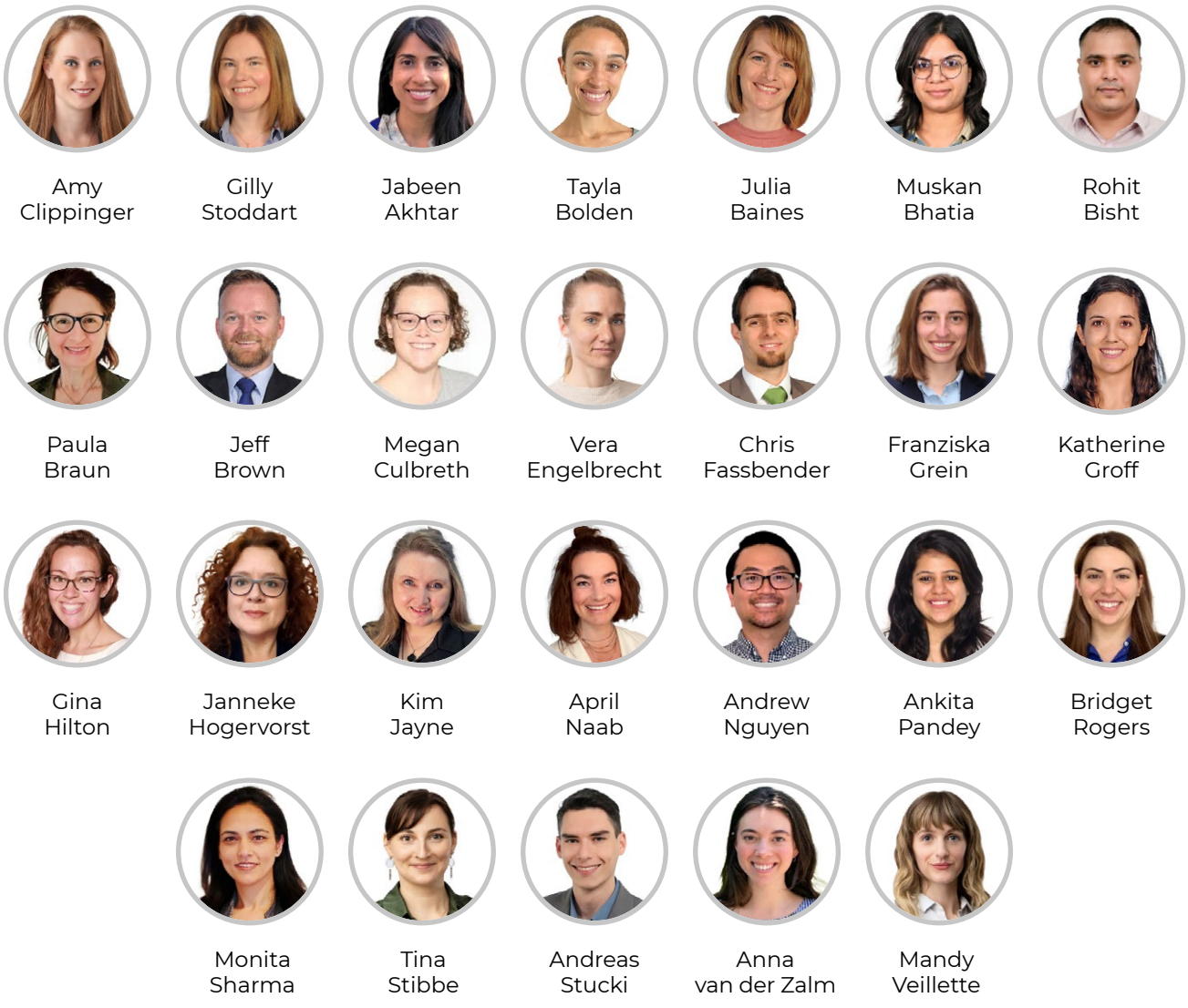
About the Science Consortium

The PETA Science Consortium International team is working to create a world in which robust toxicological assessments are conducted using state-of-the-art animal-free science that best protects human health and the environment.

It was established in 2012 in the UK as the PETA International Science Consortium Ltd, and following Brexit in 2021, it reopened shop in Germany as PETA Science Consortium International e.V. Today, the Science Consortium consists of 25 scientists with PhD and master's degrees located in the US, UK, Germany, Belgium, France, and India who collaborate with government, industry, method developers, academics, and other NGOs to advance reliable and relevant animal-free toxicity testing approaches.

We form international partnerships and organise forums in which the best minds from diverse sectors and disciplines craft the future of toxicology testing. We design and invest in method development and validation efforts and conduct data analyses to determine the value of tests for regulatory decision-making. We also create opportunities for scientists to expand their knowledge of animal-free testing and donate equipment needed to establish the infrastructure to support innovative methods. Over the last 10 years, the Science Consortium has donated millions of euros towards the advancement of animal-free toxicity testing.

The Team



Amy Clippinger, Gilly Stoddart, Jabeen Akhtar, Tayla Bolden, Julia Baines, Muskan Bhatia, Rohit Bisht

Paula Braun, Jeff Brown, Megan Culbreth, Vera Engelbrecht, Chris Fassbender, Franziska Grein, Katherine Groff

Gina Hilton, Janneke Hogervorst, Kim Jayne, April Naab, Andrew Nguyen, Ankita Pandey, Bridget Rogers

Monita Sharma, Tina Stibbe, Andreas Stucki, Anna van der Zalm, Mandy Veillette

Our Collaborators

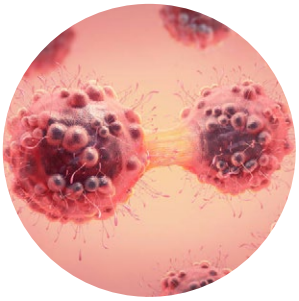
The most effective way to advance science is by including diverse perspectives at the table; therefore, we carry out all our projects in collaboration with experts from every sector to ensure we capture both the scientific and the practical needs for regulatory toxicology testing. Over the past ten years, we've had the privilege of co-authoring more than 60 scientific publications with experts from organisations such as the following:

3M | ADAMA Agricultural Solutions | Arpae | Australian Pesticides and Veterinary Medicines Authority | BASF | Bayer | Baylor University | Bergeson & Campbell | BioSurfaces | British American Tobacco | Broughton Nicotine Services | Cardiff University | Center for Veterinary Medicine | Charles River Laboratories | Confarma | Corteva Agriscience | CTL-MAT | Defense Threat Reduction Agency | DuPont | Eawag – Swiss Federal Institute of Aquatic Science and Technology | Empa | Environment and Climate Change Canada | Epithelix | EMBL's European Bioinformatics Institute | European Chemicals Agency | European Partnership for Alternative Approaches to Animal Testing | European Union Reference Laboratory for Alternatives to Animal Testing | Evonik Industries | Federal Institute for Drugs and Medical Devices | FMC | Fraunhofer Institute for Toxicology and Experimental Medicine | Free University of Brussels | German Environment Agency | German Federal Institute for Risk Assessment | Gowan Crop Protection | Health and Environmental Sciences Institute | Health and Safety Executive | Health Canada | Heidelberg University | Heriot-Watt University | Imperial College London | Institute for In Vitro Sciences | Integrated Laboratory Systems | International Iberian Nanotechnology Laboratory | International Organization for Standardization | Johns Hopkins Bloomberg School of Public Health | Joint Research Centre, European Commission | JT International | KREATiS | Labcorp Early Development Laboratories | Liverpool John Moores University | Lovelace Respiratory Research Institute | Luxembourg Institute of Science and Technology | Maastricht University | MAT Research | MatTek Life Sciences | Medical University of Innsbruck | Medicines Evaluation Board | Medtronic | Merck | Microcoat Biotechnologie | nanoRisk Analytics | National Center for Advancing Translational Sciences | National Centre for the Replacement, Refinement and Reduction of Animals in Research | National Institute for Biological Standards and Control | National Institute for Public Health and the Environment | National Institute of Environmental Health Sciences | National Institute of Standards and Technology | NeutralScience L3C | North Carolina State University | Norwegian Institute for Water Research | NSF | NTP Interagency Center for the Evaluation of Alternative Toxicological Methods | Organisation for Economic Co-operation and Development | Pacific Northwest National Laboratory | Philip Morris International | Physicians Committee for Responsible Medicine | Public Health England | PyroDex | RAI Services Company | Rich Peffer Toxicology Consulting | RTI International | Rutgers University | ScitoVation | Simulations Plus | SRC | Stockholm University | Swansea University | Syngenta | Technische Universität Braunschweig | The Clorox Company | The Dow Chemical Company | The Procter and Gamble Company | The University of Iowa | The University of North Carolina at Chapel Hill | TNO | TOXALIM Research Centre in Food Toxicology | ToxMetrics.com | ToxStrategies | UFZ – Helmholtz Centre for Environmental Research | University at Buffalo | University of Birmingham | University of Fribourg | University of Geneva | University of Konstanz | University of Luxembourg | University of Ottawa | University of Pennsylvania | University of Rochester | University of South Florida | University of Toulouse III–Paul Sabatier | US Air Force | US Army | US Consumer Product Safety Commission | US Environmental Protection Agency | US Food and Drug Administration | US Pharmacopeia | Utrecht University | Valent | Vedere Solutions | VireoAdvisors | Vrije Universiteit Amsterdam | West Virginia University | WHO Collaborating Centre for Diphtheria and Streptococcal Infections | Zwisler Laboratorium

Visit our website for a list of our publications.

Carcinogenicity

Regulatory authorities require carcinogenicity testing for substances such as agrochemicals and pharmaceuticals. For decades, the rodent cancer bioassay has been routinely conducted to fulfil carcinogenicity assessment requirements, even though it has been under scientific scrutiny since the early 1970s for its lack of reproducibility and limited ability to predict human outcomes.



Research

The Science Consortium leads and supports projects developing new approaches to testing carcinogenicity that will better protect human health.

We collaborated with experts from regulatory agencies, academia, and industry to develop a framework that facilitates a move away from a "check-box" approach towards a fit-for-purpose carcinogenicity assessment without the rodent cancer bioassay (ReCAAP).

- Hilton GM, Adcock C, Akerman G, Baldassari J, Battalora M, Casey W, Clippinger AJ, Cope R, Goetz A, Hayes AW, Papineni S, Peffer RC, Ramsingh D, Riffle BW, Sanches da Rocha M, Ryan N, Scollon E, Visconti N, Wolf DC, Yan Z, Lowit A. Rethinking chronic toxicity and carcinogenicity assessment for agrochemicals project (ReCAAP): a reporting framework to support a weight of evidence safety assessment without long-term rodent bioassays. *Regul Toxicol Pharmacol.* 2022;131:105160.

Felter SP, Bhat VS, Botham PA, Bussard DA, Casey W, Hayes AW, Hilton GM, Magurany KA, Sauer UG, Ohanian EV. Assessing chemical carcinogenicity: hazard identification, classification, and risk assessment. Insight from a Toxicology Forum state-of-the-science workshop. *Crit Rev Toxicol.* 2022;51(8):653-694.

Awarded the 2022 Best Paper Award by the Society of Toxicology Regulatory and Safety Evaluation Specialty Section.

Hosted Webinars

Each of our webinars reaches hundreds of scientists, making them a useful tool for sharing knowledge. In addition to presenting webinars, the Science Consortium regularly hosts them on topics including carcinogenicity testing.

We hosted a webinar on the use of computational and AOP-based approaches for carcinogenicity assessments, as part of an ongoing webinar series on the use of new approach methodologies in risk assessment.

Through our leadership in the Society of Toxicology Carcinogenesis Specialty Section, we co-organised and moderated six webinars on *in silico* and *in vitro* tools for carcinogenicity assessment.

Ecotoxicity

Ecotoxicity testing is conducted to assess the potential impact of a substance on the environment. The Science Consortium is reducing the number of animals used to assess the environmental effect of chemicals.

Research

The Science Consortium leads collaborative efforts to replace the use of birds and fish in ecotoxicity testing.

Avian Toxicity

In conjunction with the EPA, we analysed existing data to demonstrate that the results of avian dietary testing are not used in chemical risk management and do not contribute to protecting terrestrial bird populations. This data analysis provided the foundation for a 2020 EPA policy that describes the ability to waive the avian sub-acute lethal dietary test for waterfowl and upland gamebird species.

With the EPA, we are conducting a retrospective review of avian reproduction data from hundreds of pesticide active ingredients to identify whether sufficient information for decision-making can be obtained using one bird species instead of two.

- Hilton G, Odenkirchen E, Panger M, Waleko G, Lowit A, Clippinger AJ. Evaluation of the avian acute oral and sub-acute dietary toxicity test for pesticide registration. *Regul Toxicol Pharmacol.* 2019;105:30-35.

Aquatic Toxicity

We are co-leading an OECD project to develop Integrated Approaches to Testing and Assessment using *in silico* and *in vitro* methods to replace the acute fish toxicity test.

We are co-leading an OECD project that involves conducting statistical analyses and simulations of data from fish toxicity tests to determine whether the water control can be eliminated in aquatic toxicity testing when a solvent control is used.

- Paparella M, Scholz S, Belanger S, Braunbeck T, Bicherel P, Connors K, Faßbender C, Halder M, Lillicrap A, Liska R, Schirmer K, Stoddart G, Thomas P, Walter-Rohde S. Limitations and uncertainties of acute fish toxicity assessments can be reduced using alternative methods. *ALTEX.* 2020;38(1):20-32.

Hosted Webinars

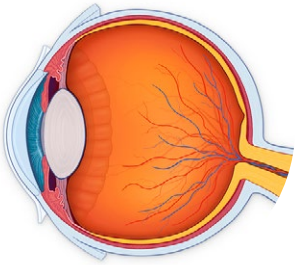
Our webinars facilitate global harmonisation of the use of non-animal approaches by reaching an international audience.

We hosted two webinars on new approaches to ecotoxicology testing, as part of an ongoing webinar series on the use of new approach methodologies in risk assessment.

We hosted a webinar on the use of the (zebra) fish embryo acute toxicity test to predict short-term toxicity to fish, as part of a webinar series on fulfilling REACH testing requirements.

Eye Irritation and Corrosion

Information about a substance's potential to cause damage if it comes into contact with the human eye is often part of a regulatory submission. The rabbit eye test – which was developed nearly 80 years ago and never demonstrated to be reliable or relevant to humans – is increasingly being replaced with *in chemico, in vitro, and ex vivo* testing methods.



Research

Test methods that do not involve live rabbits, many of which are recognised by the Organisation for Economic Co-operation and Development, can be used to assess the ability of a substance to cause eye irritation or corrosion in humans. Our work has helped to advance reliable and human-relevant testing approaches for eye irritation and corrosion and to build confidence in new methods by considering their fitness for purpose, reliability, and human-relevance.

In partnership with government agencies and private laboratories, we conducted a scientific review of eye irritation test methods and demonstrated that methods that do not use live rabbits were as reflective of human biology as those that did – if not more so – and that their results were more consistent.

Alongside government agencies and industry, we provided technical and financial support for the *in vitro* and *ex vivo* testing of agrochemical formulations of interest to the EPA in order to demonstrate the value of these methods.

Van der Zalm A, Barroso J, Browne P, Casey W, Gordon J, Henry TR, Kleinstreuer NC, Lowit AB, Perron M, Clippinger AJ. A framework for establishing scientific confidence in new approach methodologies. *Arch Toxicol.* 2022;96(11):2865–2879.

A poster by the same name was awarded the 2022 Edward Carney Predictive Toxicology Award by the American Society for Cellular and Computational Toxicology.

Clippinger AJ, Raabe HA, Allen DG, Choksi N, van der Zalm A, Kleinstreuer N, Barroso J, Lowit AB. Human-relevant approaches to assess eye corrosion/irritation potential of agrochemical formulations. *Cutan Ocul Toxicol.* 2021;40(2):145-167.

Awarded the 2022 Best Paper Award by the Society of Toxicology *In Vitro* and Alternative Methods Specialty Section.

Donations

We donate equipment to ensure contract research organisations are able to conduct *in chemico, in vitro,* and *ex vivo* testing.

We donated a laser-light beam opacitometer to US research organisation the Institute for In Vitro Sciences (IIVS) that can be used to measure opacity in the bovine corneal opacity and permeability test, a method that replaces the use of live rabbits.

Hosted Webinars

Online training is fundamental to understanding the applicability of eye irritation test methods and how to use their results to make regulatory decisions. In addition to giving many presentations, the Science Consortium regularly hosts educational webinars.

We hosted a webinar on *in vitro* and *ex vivo* approaches to eye irritation testing, as part of an ongoing webinar series on the use of new approach methodologies in risk assessment.

We hosted a webinar on *in vitro* and *ex vivo* testing strategies to assess eye irritation, as part of a webinar series on using non-animal methods to meet REACH requirements.

Inhalation Toxicity

A major focus area for the Science Consortium is the development and implementation of human-relevant *in silico* and *in vitro* testing approaches that replace inhalation testing in animals.

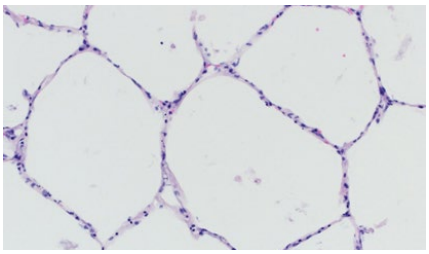
Research

Our work in this area includes funding method development and testing, awarding researchers with tissues and equipment to conduct *in vitro* testing, collaborating on the development of adverse outcome pathways, organising topical workshops and webinars, and publishing peer-reviewed journal articles on our work.

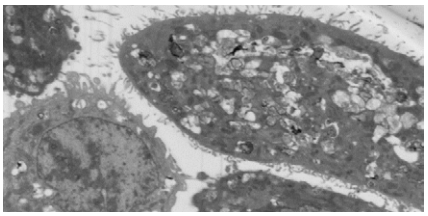
We collaborated with MatTek Life Sciences and provided the company with funding to help develop a three-dimensional reconstructed human tissue model of the lower respiratory tract called EpiAlveolar. We conducted testing using the model and published the results.

We designed proof-of-concept testing to show how *in vitro* systems can assess the toxicity of inhaled substances. Chemical testing is being conducted at the Flemish *in vitro* research organisation VITO using a two-dimensional cell line and a three-dimensional human tissue model (Epithelix's MucilAir) grown at the air–liquid interface.

We provided IIVS with funding to test human precision-cut lung slices. Our studies demonstrate the comparable viability and functionality of fresh and cryopreserved slices, facilitating access to their use.



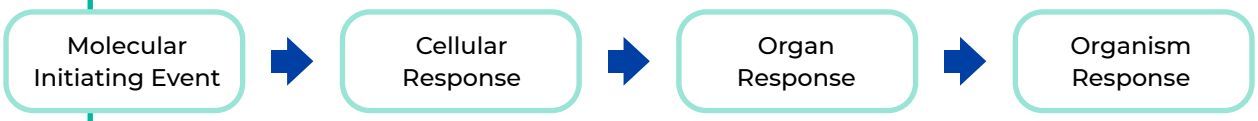
We partnered with and funded the Luxembourg Institute of Science and Technology to transition a commonly used lung cell line, A549 cells, to an animal-free, chemically defined media.



- Patel VS, Amin K, Wahab A, Marimoutou M, Ukishima L, Alvarez J, Battle K, Stucki AO, Clippinger AJ, Behrsing H. Cryopreserved human precision-cut lung slices provide an immune competent pulmonary test system for "on-demand" use and long-term cultures. ***Submitted***.
- Stucki AO, Sharma M, Verstraelen S, Jacobs A, Poelmans D, Remy S, Maes F, Frijns E, Hollanders K, Geerts L, Voorspoels S, Van Laer J, Clippinger AJ. Two-and three-dimensional human cell-based *in vitro* systems to assess respiratory toxicity of silane vapors. Poster presented at: XVIth International Congress of Toxicology; 2022; Maastricht, the Netherlands.
- Chary A, Groff K, Stucki AO, Contal S, Stoffels C, Cambier S, Sharma M, Gutleb AC, Clippinger AJ. Maximizing the relevance and reproducibility of A549 cell culture using FBS-free media. *Toxicol In Vitro*. 2022;83:105423.
- Barosova H, Maione AG, Septiadi D, Sharma M, Haeni L, Balog S, O'Connell O, Jackson GR, Brown D, Clippinger AJ, Hayden P, Petri-Fink A, Stone V, Rothen-Rutishauser B. Use of EpiAlveolar lung model to predict fibrotic potential of multi-walled carbon nanotubes. *ACS Nano*. 2020;14(4):3941-3956.

Adverse Outcome Pathways

Adverse outcome pathways (AOPs) use existing information to understand the key events that lead to an adverse outcome when an organism is exposed to a substance. AOPs can be used to design biologically relevant testing approaches using *in vitro* methods that query specific key events. We collaborated with Health Canada on the development of an AOP for lung fibrosis (AOP 173) and with industry partners on an AOP network for decreased lung function (AOPs 411, 424, and 425).

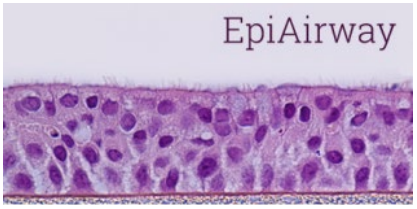


- Luettich K, Sharma M, Yepiskoposyan H, Breheny D, Lowe FJ. An adverse outcome pathway for decreased lung function focusing on mechanisms of impaired mucociliary clearance following inhalation exposure. *Front Toxicol.* 2021;3:750254.
- Clippinger AJ, Ahluwalia A, Allen D, Bonner JC, Casey W, Castranova V, David RM, Halappanavar S, Hotchkiss JA, Jarabek AM, Maier M, Polk W, Rothen-Rutishauser B, Sayes CM, Sayre P, Sharma M, Stone V. Expert consensus on an *in vitro* approach to assess pulmonary fibrogenic potential of aerosolized nanomaterials. *Arch Toxicol.* 2016;90(7):1769-1783.

Donations

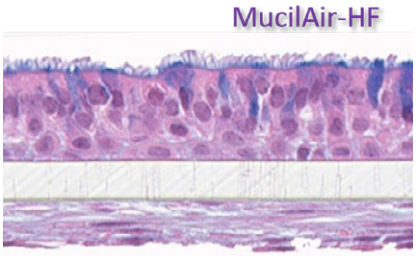
To ensure researchers have the best technology available to test the inhalation toxicity of chemicals without using animals, we partner with method developers to donate cutting-edge tools, such as human-derived three-dimensional tissue models and exposure devices. These donations help researchers overcome the initial hurdle of investing in the infrastructure to transition to animal-free testing and gain confidence in the use of novel testing approaches.

In partnership with MatTek Life Sciences, we awarded two laboratories in Austria and the UK with free three-dimensional reconstructed human respiratory tissue.



In partnership with MedTec Biolab Inc, we awarded a free CelTox Sampler to the Canadian Centre for Alternatives to Animal Methods.

In partnership with Epithelix Sárl, we awarded free three-dimensional reconstructed human respiratory tissue models to three laboratories in Germany, the UK, and the US.



We donated five VITROCELL *in vitro* inhalation exposure devices to laboratories in Belgium, the UK, and the US.

Workshops

Organising and leading workshops is a mainstay of our inhalation toxicity work.

The first Science Consortium workshop took place in 2015 at the EPA's William Jefferson Clinton Federal Building in Washington, DC. Experts from government, academia, and industry discussed the design of an *in vitro* system for predicting the development of pulmonary fibrosis.

In 2016, we co-organised a workshop with NICEATM focused on alternative approaches to acute inhalation toxicity. As a result of the discussion at that workshop, the Science Consortium is conducting proof-of-concept testing to evaluate the ability of *in vitro* systems to predict respiratory toxicity (through the INSPiRE initiative).

- Clippinger AJ, Allen D, Jarabek AM, Corvaro M, Gaça M, Gehen S, Hotchkiss JA, Patlewicz G, Melbourne J, Hinderliter P, Yoon M, Huh D, Lowit A, Buckley B, Bartels M, BéruBé K, Wilson DM, Indans I, Vinken M. Alternative approaches for acute inhalation toxicity testing to address global regulatory and non-regulatory data requirements: an international workshop report. *Toxicol In Vitro.* 2018;48:53-70.
- Clippinger AJ, Ahluwalia A, Allen D, Bonner JC, Casey W, Castranova V, David RM, Halappanavar S, Hotchkiss JA, Jarabek AM, Maier M, Polk W, Rothen-Rutishauser B, Sayes CM, Sayre P, Sharma M, Stone V. Expert consensus on an *in vitro* approach to assess pulmonary fibrogenic potential of aerosolized nanomaterials. *Arch Toxicol.* 2016;90(7):1769-1783.

Hosted Webinars

Webinars provide a platform to reach scientists with information about respiratory toxicity testing.

We organised a series of 21 webinars that serve as a resource for researchers about ways *in silico* and *in vitro* models can be used in an integrated approach.

With the EPA, Unilever, and Syngenta, we organised a three-part webinar series on using *in silico* and *in vitro* approaches to assessing potential respiratory toxicants.

Pyrogenicity

Before drugs and medical devices can be marketed, regulators require testing to demonstrate that they are not contaminated with substances that trigger a fever response. Collectively termed pyrogens, these substances are commonly derived from bacteria, fungi, and viruses. While non-animal tests to detect pyrogens – such as the monocyte activation test (MAT) and the recombinant Factor C test (rFC) – have been available for decades, they have not yet been widely adopted to meet regulatory requirements.

Research

The Science Consortium is working to accelerate adoption of the MAT and the rFC by government agencies and companies.

We funded testing that is necessary to demonstrate to the FDA that the MAT can be used to reliably detect pyrogens on medical devices. The results from this testing will be submitted to the FDA MDDT programme.

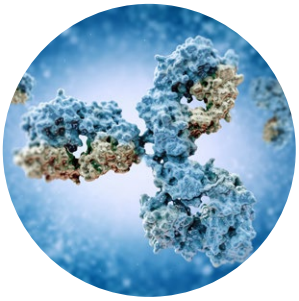
Workshops

Our workshops provide a forum for discussion and opportunities to collaborate on the creation of roadmaps for modernising toxicology testing.

We co-organised a workshop with NICEATM on using the MAT to meet pyrogen testing requirements for medical devices. As a result of this workshop, the Science Consortium is collaborating with companies and the FDA through the FDA MDDT programme to gain the agency's seal of approval for using the test with this class of products.

- Brown J, Clippinger AJ, Briglia CF, Casey W, Coleman K, Fritsch A, Hartung T, Maouyo D, Muller T, Reich J, Robert L, Roeder R, Sanchez G, Sawyer AY, Solati S, Tirumalai R, Zwisler W, Allen D. Using the monocyte activation test as a stand-alone release test for medical devices. *ALTEX*. 2021;38(1):151-156.

Recombinant Antibodies



Antibodies are essential tools used in research, diagnostics, and therapeutics. The Science Consortium advances the development, validation, and use of animal-free recombinant antibodies that reliably allow for high affinity and specificity for their targets. This transition to animal-free sequence-defined recombinant antibodies is essential to addressing the reproducibility crisis in research.

One way to use recombinant antibodies is as life-saving antitoxins that replace antibodies that rely on the century-old practice of production in horses. Animal-derived antitoxins have high batch-to-batch variability, can induce serum sickness in humans, and increase the risk of virus and disease transmission between species. When produced in animals, global health authorities routinely experience shortages of these essential medicines because of manufacturers' inability to ensure consistent production of finished products that meet minimum standards of consistent performance. Human-derived recombinant antibodies, by contrast, can neutralise toxins while avoiding the problems inherent in animal-derived serums. Importantly for health authorities, antitoxins made from recombinant antibodies can be reproduced in unlimited identical batches that ensure finished products are consistently effective.

Research

The Science Consortium funds projects to develop life-saving recombinant antibody antitoxins using phage display technology.

We funded the phage display–based creation of fully human recombinant antibodies capable of neutralising diphtheria, a potentially deadly infectious disease. The work was carried out at the Institute for Biochemistry, Biotechnology, and Bioinformatics at the Technische Universität Braunschweig (TUBS). After having developed this recombinant diphtheria antitoxin, we are now engaging regulatory agencies worldwide to discuss an animal-free preclinical safety-testing pathway.

We co-funded, with the Center for Contemporary Equine Studies, the development of fully human recombinant monoclonal antibodies capable of neutralising black widow spider venom. The work is being carried out by TUBS and the Ensenada Center for Scientific Research and Higher Education.

- Wenzel EV, Bosnak M, Tierney R, Schubert M, Brown J, Dübel S, Efstratiou A, Sesardic D, Stickings P, Hust M. Human antibodies neutralizing diphtheria toxin *in vitro* and *in vivo*. *Sci Rep.* 2020;10(571).

Donations

The Science Consortium co-organised a recombinant antibody challenge, through which grants are offered to researchers to purchase recombinant antibodies for use in research and testing. As a result of this award, researchers have been provided with numerous antibodies free of cost, and this grant opportunity remains open.

Workshop

Organising expert working meetings has led to the development of strategies to advance the availability and use of recombinant antibodies.

In 2019, we co-organised an expert meeting with NICEATM to outline a pathway to improving the quality and reproducibility of research by accelerating the production and use of animal-free recombinant antibodies.

- Groff K, Allen D, Fiebig M, Cosson P, Casey W, Clippinger AJ. An approach to identifying quality research antibodies. *BioTechniques*. 2022;73(4):167-170.
- Groff K, Allen D, Casey W, Clippinger AJ. Increasing the use of animal-free recombinant antibodies. *ALTEX*. 2020;37(2):309-11.
- Groff K, Brown J, Clippinger AJ. Modern affinity reagents: recombinant antibodies and aptamers. *Biotechnol Adv*. 2015;33(8):1787-98.

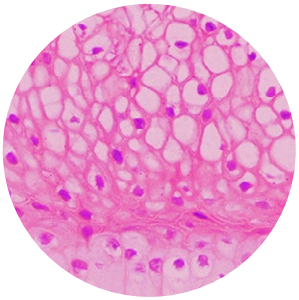
Hosted Webinars

Webinars are an important tool for educating other scientists about recombinant antibody technology.

With NICEATM and EURL ECVAM, we organised a webinar series on the applications and benefits of animal-free recombinant antibodies.

Vaginal Irritation

Personal lubricant products are classified by the US Food and Drug Administration (FDA) as Class II medical devices and are subject to FDA Center for Devices and Radiological Health–required testing that is not requested in Europe or much of the rest of the world. The battery of tests required in the US includes a lethal vaginal irritation test that uses rabbits despite the availability of animal-free test methods.



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Research

In line with the FDA's Predictive Toxicology Roadmap, which specifically calls for optimising *in vitro* methods that can be used to evaluate personal lubricants, the Science Consortium is working across sectors to gain FDA approval for a non-animal method to replace the rabbit vaginal irritation test.

We worked with personal lubricant manufacturers to gain FDA acceptance of data from the human repeat insult patch test instead of vaginal irritation and skin sensitisation testing using animals.

We funded testing and are collaborating with personal lubricant manufacturers, IIVS, and the FDA to validate an *in vitro* human cell–based testing approach to assessing vaginal irritation. This effort is in support of a submission to the FDA MDDT programme.

- Costin G-E, Hill E, Brown J, Clippinger AJ. Qualification of a non-animal vaginal irritation method admitted as nonclinical assessment model (NAM) in the Incubator Phase of the United States Food and Drug Administration (US FDA) Medical Devices Development Tool (MDDT). *Toxicol In Vitro.* 2019;62:104680.

Early-Career Scientist Travel Awards

As university programmes often lag behind in providing a comprehensive education in human-relevant, animal-free research methods, the Science Consortium regularly offers travel awards to equip the next generation of toxicologists with the knowledge and skills needed to implement modern animal-free tests. These awards cover travel and other expenses so that early-career scientists – including undergraduate and graduate students and post-doctoral fellows – can attend important conferences and workshops where they can advance their knowledge of non-animal testing methods and participate in networking opportunities that can help further their careers. These travel awards complement our other awards, such as providing researchers with free laboratory equipment and tools.

Congratulations to our Early-Career Scientist Award winners!

Institute for *In Vitro* Sciences Practical Methods for *In Vitro* Toxicology Workshop

Aline Chary

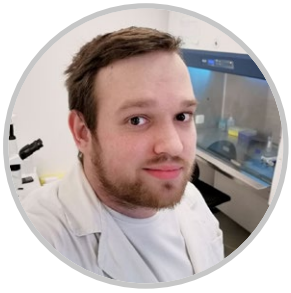
Baylor Steele

María Laura Gutiérrez

Brett Winters

Joint Research Centre Summer School on Non-Animal Approaches in Science

Patricia Zoio



Peter Pôbiš
(poster award)

Summer School on Innovative Approaches in Science

Viviana Stephanie
Costa Gagosian

Tiffany Yanez Zapata

Elena Chung

Lung *In Vitro* Event for Innovative & Predictive Models

Alicia Reyes Valenzuela

Society of Toxicology Annual Conference

London Harper

International Congress on *In Vitro* Toxicology

Kristin Bircsak

List of Acronyms

CLP	Classification, Labelling and Packaging regulation
EPA	US Environmental Protection Agency
EURL ECVAM	European Union Reference Laboratory for alternatives to animal testing
FDA	US Food and Drug Administration
IIVS	Institute for In Vitro Sciences, Inc.
MAT	Monocyte Activation Test
MDDT	Medical Device Development Tools
NICEATM	National Toxicology Program Interagency Center for the Evaluation of Alternative Toxicological Methods
OECD	Organisation for Economic Co-operation and Development
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
ReCAAP	Rethinking Carcinogenicity Assessment for Agrochemicals Project
TUBS	Institute for Biochemistry, Biotechnology, and Bioinformatics at the Technische Universität Braunschweig

PETA SCIENCE CONSORTIUM INTERNATIONAL e.V.

Advancing 21st Century Toxicology

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For updates on developments in non-animal test methods, funding opportunities, webinars, events, and more from the Science Consortium, sign up for our e-mails at: **thepsci.eu/about/email-list/**

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