Theme VI – 3Rs in Academia

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Oral Presentations

Session VI-1: Evaluation of the Global Impact of the 3Rs in Education and Training

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VI-1-517

Alternative tools and approaches for replacement in veterinary education and training

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According to the InterNICHE Policy, replacement alternatives in veterinary medical education and training comprise non-animal tools and humane interactions with animals. Non-animal tools include software, virtual reality, models, mannekins and other training devices. Alternative approaches that involve animals include the use of ethically sourced animal cadavers, plastination and other preservation methods, and clinical learning opportunities with animal patients. Together with non-animal tools, they can replace animal experimentation, dissection of purpose-killed animals, and other instrumental animal use. This paper reviews some of the tools and approaches developed by teachers and companies for knowledge and skills acquisition in anatomy, physiology, pharmacology, surgery and other disciplines. It demonstrates the potential for full replacement of harmful animal use by providing case studies from veterinary faculties across the world, with particular emphasis on Canada and the US.

VI-1-560

MGDC model of sensitization about non-animal methods in education, research and testing at the national level

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India has made rapid strides in the movement of “alternatives to animal use”. The turning point has been establishment of a center for alternatives in the University system, the Mahatma Gandhi-Doerenkamp Center (MGDC), by the DZF. The NGOs of the country and MGDC got into a grand alliance. While the NGOs played their own cards, the MGDC targeted the end users - academic institutions, research organizations, industry and regulatory authorities, and dealt with each in the language they would understand. MGDC’s approach included hands-on training, thus raising alternatives to the level of a science. Even within the educational scenario, stakeholders of each domain were tackled separately. Today, India is practically an animal-dissection free country, also with great changes in the scenario of animal use in experiments and testing. MGDC is by far the best to have achieved such a dramatic change in the scenario of animal use, and stands the best model to adopt.
Social movements and legal imperatives for replacement in Serbia

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Serbia’s first Animal Protection Act came into force in 2009. Article 44 of the Act bans the harmful use of animals at primary, secondary and undergraduate levels. The Article was based on the InterNICHE Policy on Animals and Alternatives in Education and Training. This paper explores the chronology of events and factors which led to the adoption of the Act. From 2001 there were many political and social changes in the country. Students, professors and NGOs chose to think strategically in a number of fields. Many public debates on animal protection were held, with much media interest. Major technological advances made computer hardware and software affordable and very effective for education. Animal protection resolutions were adopted, the European Convention was ratified, and civil laws that guarantee conscientious objection were used. Reflections on the impact of the Act and of Article 44, including on Ethical Committees and on replacement using alternatives, will be given.

Outreach, agreements and provision of alternatives: Facilitating replacement in the Ukraine and other former Soviet states

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A major alternatives project from Ukrainian campaigners, InterNICHE and Doctors Against Animal Experiments (Germany) has achieved widespread replacement within Ukrainian life science education and training. Using the experience of InterNICHE in Russia, the work began in 2008 and is on-going. Strategies include outreach visits, demonstrations of alternatives, negotiations with teachers, formal agreements for replacement, and provision of computer hardware, software and training models. According to the signed agreements, over 50,000 animals (vertebrates and invertebrates) have been replaced in more than 50 departments. As the project is extended to include more former Soviet states including Belarus, Russia and others in Central Asia, further replacement is being achieved.

The 2015 Lush Prize for Training was awarded for this work.

The end of harmful animal use in professional and higher education: An on-going process in Brazil

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The Brazilian Network for Humane Education (RedEH) – an independent group of academics from 10 Brazilian states, and international collaborators – has been pushing for change in the field of humane education. In 2016, with the support of InterNICHE and 18 international professors and organizations, RedEH requested that the Brazilian National Council for the Control of Animal Experimentation (CONCEA) ban harmful animal use in professional and undergraduate education. This was the first formal request for a total replacement of harmful animal use in education in Brazil, and represents a historic event in the advancement of scientific education. RedEH is open to all researchers working in humane education and new teaching methods in the life and health sciences. We aim to provide a collaborative and encouraging environment, including not only researchers from the life sciences but also product design, virtual game development and science communication.

The 2015 Lush Prize for Training was awarded for this work.
Knowledge, attitudes and practices on use of live animals in training in Kenya

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ANAW, in partnership with InterNICHE has since 2010 been carrying out sensitization efforts and seminars on alternatives to use of animals for training and education. Coupled to this effort ANAW played a critical role in the drafting and adoption of regulations governing use of lab animals in research in Kenya. One of the efforts in place by ANAW has been to support the adoption of alternatives for teaching purposes in science oriented institutions. Five science oriented institutions and subsequently relevant departments in each institution, were randomly selected. A survey was carried out to establish the knowledge, attitudes and practices towards use of animals; and awareness thereof, about alternatives available for use in teaching. The survey was carried out using a questionnaire administered to heads of staff and different department heads in the various schools and courses. In the 5 institutions surveyed, animals were used for teaching various units in zoology, animal science and veterinary medicine courses. In veterinary schools, most dogs and cats are used for surgery purposes while pharmacology and physiology are the courses that use animals the most. All species are used for physiology and pharmacology experiments. Most (60%) of the respondents said that they would consider introduction of alternatives, 80% of the respondents had used various alternatives at different instances; 60% of the respondents thought that introduction of alternatives would have an effect understanding of students; 60% of respondents quoted unavailability of alternatives as the major hindrance to introduction of alternatives while 20% feared that the alternatives would reduce the level of understanding and 20% were not sure if the same level of understanding would be maintained. Different animals were used for different subjects and courses as indicated above. The most commonly used animals in teaching institutions in Kenya are cats and dogs at 14%. In conclusion, most trainers and training institutions they represented were willing to use alternatives. However, serious challenges on availability and effect on quality of training provided largely contributed to the aversion in some of the training fields.
Session VI-2: Knowledge Sharing in Promoting 3Rs Advances

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VI-2-728

The North American 3Rs Collaborative – Facilitating opportunities to enhance the 3Rs in North America

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The concepts of the 3Rs are found in regulation, guidance documents and institutional policies throughout North America (NA). Many individuals in the public and animal research believe there is more to be done. There is a need for the research community to better communicate, internally and externally, about 3Rs implementation strategies and advancement of the 3Rs. This communication would serve to share ideas and help avoid duplication of efforts (an increasing concern as resources become more problematic). Increased communication can also help identify opportunities for collaboration on activities aimed at more fully implementing the 3Rs across the field. The NC3Rs stands out as a model for achieving these goals but such an effort in the NA has been elusive. Major inclusive governmental or funding initiatives are lacking. This talk will discuss a broad based collaboration, including many areas of research (academia, industry, etc.) and many areas of expertise (veterinarians, research scientists, advocates, etc.) that have come together to address this opportunity.

VI-2-384

Facilitating better knowledge exchange to accelerate progress in the 3Rs

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By mapping knowledge sources relevant to the 3Rs, examining how knowledge is being shared, and identifying possible gaps and opportunities, the European Commission’s Joint Research Centre (JRC) has identified three main areas to be addressed in order to develop strategies to improve knowledge sharing to accelerate progress in the 3Rs. The JRC has performed a review of the supply and demand status of 3Rs knowledge and created a detailed inventory of 800 knowledge sources relevant to the 3Rs. In parallel to this inventory, a public survey (of people working in the 3Rs area) was carried out which aimed to elicit individual input on what knowledge sources exist, how they are linked, and how they are currently being used to further the 3Rs.

Whilst there are many 3Rs relevant knowledge sources available, there is a need for better coordination and communication of the knowledge, as well as opportunities to enhance education and training. How this can be achieved is also explored here.

References


VI-2-162

Attitudes towards the 3Rs in animal welfare bodies at eight Swedish universities

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The attitude towards the 3Rs was surveyed among members of Animal Welfare Bodies (AWB) at eight Swedish Universities to study the AWB compliance with the EU-directive 2010/63. A questionnaire with 34 quantitative closed-ended questions received responses from 45 of 90 members.

Comparable with previous surveys (NC3Rs, 2008; Nøhr et al., 2016), correct understanding of the 3R definitions was rather high (76-93%), but also aligned with some misconceptions for all three Rs. The 3Rs were not equally considered throughout the research process. For several questions, many respondents answered “I don’t know”, more often for areas covering Replacement/Reduction, indicating a stronger emphasis on Refinement. The overall attitude towards Refinement was positive. The tasks of the AWB, e.g. giving advice on the 3Rs and follow up on animal use in projects, informing about technical and scientific development within the 3Rs, and re-homing, was often not carried out in the AWB (11-42%), or “not known” (20-44%) by the respondents.

References

Nøhr, R., Lund, T. B. and Lassen, J. (2016). The Danish 3R survey: Knowledge, attitudes and experiences with the 3Rs among researchers involved in animal experiments in Denmark. Frederiksborg: Department of Food and Resource Economics, University of Copenhagen, Denmark (IFRO Report; No. 249).
A common set of values and the 3Rs at Karolinska Institutet, Sweden

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Comparative Medicine (CM) was founded as an umbrella organization to develop a completely refurbish infrastructure for animal experiments at the Karolinska Institutet (KI). CM is built on vision that the 3Rs should permeate every aspect of care and use of laboratory animals at KI. The aim is to offer a cutting edge research environment set in a best practice and care culture fostered by the staff at CM. A thread of 3R activities based on evidence-based practice is being implemented and harmonization on the national level and within the EU is another goal. To accomplish these goals, CM has been placed directly under the Vice-Chancellor at KI. CM will have five laboratory facilities and a group of core facilities offering services to the research community consisting of 22 departments and several thousands of researchers. To live up to regulations and regulatory requirements, CM has established a backbone of support for the laboratories and the animal facilities composed of an Infrastructure unit, an Education and training unit and an Executive office. To be able to implement the 3Rs concept from the Directive 2010/63/EU, CM has created a position as “Senior 3R officer” within the executive office and with the missions to make all the tree 3R visible both externally and internally in a transparent way, and that all research performed at KI shall be aligned with the 3R intentions of the Directive. To accomplish this aspiration a program for the 3R:s have been set up at KI. Highlights of this program are (1) a yearly event where employees researchers, students and others can exchange new concepts and results around animal welfare in biomedical research and the 3Rs, (2) custom tailored educational efforts in collaboration with the LAS education office to increase knowledge and awareness of the 3Rs, (3) to embed the animal welfare officer function (AWO) in the 3R office, and (4) the senior 3R officer is the chairperson of the local animal welfare body (AWB) at KI.

Norecopa: A toolbox for the 3Rs in action

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The media are overflowing with material on animal care and use, much of which has not been specifically selected or peer-reviewed. The availability of so many resources makes it difficult to identify the best material for practising good science and the 3Rs. In addition, recent scientific reviews have revealed poor reproducibility of results from animal testing, indications of weak experimental design, and poor compliance with guidelines for reporting animal studies. If the situation is to improve, scientists need easy access to the best tools.

Norecopa has invested considerable resources in building a website of global 3R resources, coupled to an intelligent search engine. All these are available at one site: https://norecopa.no/. The search engine returns hits from all Norecopa’s resources simultaneously. Filters can be applied to increase the relevance of the results. All searches and filters generate unique URLs, making it easy to document the searches which have been performed.

Reference
https://norecopa.no

The 3Rs in action: How does Zoetis, a global animal health industry leader, promote animal well-being and the use of alternatives?

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Zoetis is ethically and legally obliged to rigorously evaluate new break-thru medicines and therapies. The daily work of the Zoetis scientist involves exploration of in vitro alternatives. Discussions during protocol design focus on methods to refine in vivo work. Ethical review occurs prior to study start, to ensure humane care and use of animals for both internal and external in vivo work. Regional ethical review boards are responsible for evaluating alternatives to animal use and maximizing animal well-being during study activity. To recognize project teams and promote understanding that the appropriate use of alternatives is integral to ethical animal use and good science, Zoetis has put in place a global 3Rs Award program. Zoetis scientists work directly with government regulators to increase the acceptance of in vitro models. Zoetis is providing veterinary vaccine leadership in the VAC2VAC project. The ultimate goal of the VAC2VAC project is to develop tests and approaches that will allow acceptance of the “Consistency Approach” for established vaccines. By providing veterinary vaccine leadership Zoetis promotes the use of alternatives externally.

Challenges in developing and implementing 3Rs alternative methods in Argentina

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Argentinian research on alternative methods had always been carried out by isolated groups. In the last few years an increase in commitment to the 3Rs has been observed. Different groups from academia, biomedical researchers, professional societies, and industries are planning strategies to improve animal welfare and incorporate alternative methods for regulatory purpose but also for use in the life sciences. Institutional Animal Care and Use Committees have been incorporated in different public or private institutions to regulate use of animals in research, teaching and testing. Courses and symposiums are being offered to spread the principles of 3Rs in academic, industrial and regulatory fields, in order to move forward the implementation of alternative methods. Although funding program for replacing animal methods remain very limited, non-regulatory alternative used by academia try to force changes. Therefore, participation of relevant stakeholder is essential to reach the goal.
Session VI-3: Training for Humane Use of Animals in Veterinary Education and Biomedical Research

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VI-3-421

Contribution of education and training to Culture of Care

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Directive 2010/63/EU on the protection of animals used for scientific purposes requires that EU Member States ensure that laboratory animal science (LAS) staff is adequately educated, trained and competent. “A working document on the development of a common education and training framework to fulfill the requirements under the Directive” was produced to guide the establishment of good quality courses and would, in the long run, promote the free movement of personnel. This process is facilitated by the Education and Training Platform for Laboratory Animals Science (ETPLAS) with stakeholders, members states, course providers and accreditation bodies, being represented. Focus of all training in LAS should be on the 3Rs. Although not specifically mentioned in the directive, crucial for the humane use of experimental animals is the correct attitude towards these (“Culture of Care”). It is essential that courses also contribute to this attitude.

References
https://www.etplas.eu/ (Education and Training Platform for Laboratory Animal Science)
http://bit.ly/2p77YYa9 (website of the LAS course at the Utrecht University)

VI-3-820

Professional development: Foundation of a strong animal care and use program

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The animal research field has gotten more sophisticated with the use of genetically engineered animals, biohazardous agents, and advanced technologies; moreover, those who work with the animals in the laboratory setting have one of the most consequential assignments in the research arena. Trained and competent personnel are the foundation of any animal care and use program. Individual career success is a combination of education, experience, continuing competence, professional development and personal commitment. Integration of training and certification into programs demonstrates institutional commitment to quality research. It also enhances the program by providing staff with knowledge and training to address problems and situations that arise and to perform their job in a professional and effective manner. Professional development programs offered through the American Association for Laboratory Animal Science, including the AALAS Learning Library and the AALAS certification process, will be presented.

VI-3-788

Requirements and recommendations on education & training around the world – Competence and performance standards

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Requirements on education and training exist in a number of countries or regions. However, many of them are generic; only a few consider learning outcomes associated to specific functions and include supervision of competence. Recommendations are produced by professional organizations to help ensuring that personnel at all levels are not only trained according to legal requirements, but are also competent in practice. In this context, institutions and competent authorities struggle to establish mechanisms to provide training and ensure and demonstrate competence at all levels of staff. Implementation of performance standards, based on the outcome rather than on the method used to achieve it, should be the way but, how can these be applied in practical terms? A clear definition of the expected outcome and a method to assess if this has been achieved, are needed.
Theme VI, Oral Presentations

VI-3-248
ReThink3R – Design Thinking Workshops for Young Scientists

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The combination of numerous obligations, time constraints and inflexible research structures often leaves little room for young scientists performing animal experiments, to address the 3R topic and ethical concerns in a satisfying manner. In order to overcome this predicament, we are driven to offer interested scientists the possibility of dealing with the implementation of the 3Rs in various contexts through interactive Design Thinking Workshops. Design Thinking is an innovation method that combines both analytical and creative methods to find user-centered solutions in an iterative process. Here, we will present the results of the first five workshops that have been performed so far at different graduate schools and institutions in Berlin. This new workshop approach guides scientists through a difficult and emotionally complex topic and aims at training scientists in teamwork, an open-mindset and creative confidence – facilitating a change within the scientific community including awareness for the 3Rs.

VI-3-719
Lab animal welfare, science and medicine in African developing countries: Past five years

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An earlier report indicated that many African investigators, including students and some research administrators are aware and agree that it is of paramount importance to treat lab animals humanely for the sake of the science they hope to present after all the efforts. Recently, many more are willing to participate in training programs to acquire further knowledge, skills, but in particular, a reorientation towards their approach to lab animals. Animal Care and use in Research, Education and Testing, (ACURET.ORG), incorporated in Nigeria, is promoting humane animal care and use for scientific purposes in developing countries, with a year 2020 target to reach every African Country. Through two international workshop/conferences, and an Independent Training program, supported by a few local and international organizations, ACURET has reached 245 attendees from four African countries. With the proposed hybrid online higher Education program, accreditation for four regional facilities across the continent, and an African Regional Consultative Network on Lab animal welfare, science and medicine, the number of Africans skilled in humane animal care and use will be raised to an appreciable level sufficient to participate in the global harmonization discuss in lab animal welfare.

VI-3-55
Collaborating in laboratory animal science education and training: LAS interactive, an integrative online platform

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The webpage “LAS interactive” is a third-party funded collaborative approach in laboratory animal science education, that enables experts from the different areas relevant to LAS to share their collective expertise within a common platform. Contributors of LAS interactive are individuals from e.g. Max Planck Society, German Primate Center, Cost Action Primtrain, LaNIV, universities and the industry. The platform contains information on different animal species and scientific techniques but addresses the ethics underlying the use of animals in research, animal welfare and the promotion of the 3Rs as well. The legal context is based on EU legislation but incorporates differing national requirements where appropriate. Procedures are illustrated by pictures and videos of live animals or by using teaching alternatives and interactive elements.

Future forums will enable the exchange of ideas and a resources page will be available where people can share teaching material. In the next step, we will expand the platform to also include descriptions and protocols of alternative methods, thus truly integrating the LAS and alternative methods communities.

Reference
http://las-interactive.de
Session VI-4: Innovative Teaching and Training Methods Using Alternatives

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VI-4-364
The Virtual Pharmacology Lab – An online repository of free educational alternatives for practical pharmacology teaching

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An online repository of free-to-use (educational Creative Commons license) “alternatives” learning objects (LOs) has been developed to assist university faculty in teaching pharmacology practical classes that frequently use live animal preparations. The 650+ metadata-tagged LOs were acquired by disaggregating existing multimedia simulations developed by the authors (http://www.sheffbp.co.uk) and include: data traces from experiments; (HTML) text descriptions; images, diagrams; video; interactive student tasks; self-assessments. Users browse or use a keyword search facility to find individual LOs each of which has associated descriptive text, a web link (url), the code to embed them into webpages/online content, and a preview (e.g. image, animation). The granularity of the LOs enables faculty to tailor the content of their teaching materials more readily. Summary website usage statistics will be presented together with examples of teacher-created e-books illustrating how the LOs may be used.

VI-4-83
CAAT Academy: Hands-on training in 3Rs: A tentative to fill in the gap

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Over the last thirty years, dozens of validated alternative test methods exist in the EU and even more thanks to ICATM collaboration. Nevertheless, when one looks at the number of testing proposals submitted to REACH it is clear these methods are not being put to sufficient use. While ad-hoc events, tailor-made training, webinars, and scientific meetings regularly provide training in these new methods, more efforts should be invested into “after-sales” services to disseminate the emerging technologies and reach new audiences. The European Commission and the member states are actively filling the gaps in training via EU research programs such as Horizon2020, and the innovative medicines initiatives. This presentation will illustrate the mission of CAAT Academy’s 3Rs training to increase the use of validated alternative methods and provide feedback and lessons learned since its creation in 2016 on the last six hands-on trainings which gathered in total approx. 80 participants in the lab and via webinars. Last, the sustainability of such initiatives will be described and the objectives of the medium-term announced.

VI-4-189
ExPharm Pro – A computer assisted learning software for undergraduate students

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ExPharm Pro is an online software package for simulating animal experiments in pharmacology. It consists of five experiments namely the effect of drugs on frog heart, dog blood-pressure-heart rate, frog esophagus and rabbit eye and bioassay of histamine using guinea pig ileum. These experiments are available in two modes namely tutorial and examination modes. The tutorial mode includes detailed instructions. The animal tissue/whole animal along with the equipment setup is displayed on the screen for testing the drug effects. On application of drugs, the responses appear on the screen in realistic animated sequences. The data obtained by the student can be recorded in a table and a few questions will be displayed for the students to answer. The data and the answers are stored on the server and managed by an inbuilt students’ management system. The examination mode displays tasks to be carried out by the student by choosing and doing an appropriate experiment. The answers and the steps carried out will be stored on the server for the teacher to evaluate the same. This software which is widely used in India has many more features and will be demonstrated to the delegates.

VI-4-510
Use of the Elnady Technique for preserving specimens in education and training

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Seeking to avoid the harmful use of animals is a necessity for veterinary education and training. Alternatives such as computer software and virtual reality, manikins and models, and plastinated specimens, are powerful training tools but may not always provide sufficient hands-on experience. The Elnady Technique, a modified form of plastination, is simple and inexpensive. The developed specimens are realistic, dry, durable and flexible. The potential of using such specimens is broad. Organs, systems and whole cadavers can be developed for basic anatomy and dissection. For clinical skills, the technique has been successfully used in surgical suturing, upper respiratory endoscopy in the horse, dystocia in the cows and mare, amongst other procedures. It can also support the study of embryology, pathology, parasitology and internal medicine. Using a body donation program, animals that die naturally or in accidents, or that are euthanized for medical reasons, can be preserved with the Elnady Technique. This can help ensure a sufficient number of specimens for veterinary education and training, and contribute to the ending of the harmful use of animals.
Evaluation of educator and student use of and attitudes toward dissection and dissection alternatives

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Animal dissection has been routinely practiced in American biology classrooms for decades. With technological advancements, more states adopting student choice measures, and increased awareness about ethical concerns surrounding dissection, many useful dissection alternatives have been developed. To understand the current use of animal dissection and alternatives, and attitudes toward the practices, a nationwide survey of middle and high school biology teachers and students was conducted. A similar survey was administered to students and mentors of the 2016 Intel International Science and Engineering Fair, the world’s largest international pre-college science competition. Survey results, as well as suggested strategies to reduce animal use in education, in line with the 3 R’s principle, will be shared.

Reference

Understanding the cultural factors that contribute to the lack of uptake of non-animal alternatives for dissection in secondary education

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Advocacy groups have worked on the issue of animal dissection for many years, however, the pace of change is slow and animals are still widely used for dissection in North American secondary science education. This practice still occurs despite evidence that non-animal alternatives: 1) are often superior in educational merit compared to dissection; 2) are more economical; and 3) provide a safe, inclusive educational experience; and despite the ethics-based, Three Rs argument that if suitable non-animal alternatives exist then they must be used. We sought to better understand why these practical and ethical arguments have not led to greater uptake of alternatives. We surveyed science teachers in British Columbia, Canada about their views on dissection to identify possible points of resistance to non-animal alternatives. This presentation will share preliminary results and offer a discussion of possible steps that can be taken to shift the culture of science teaching so that non-animal alternatives are more readily adopted.
Session VI-5: Acceptance and Implementation of the 3Rs in Asia

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VI-5.795
3Rs implementation to Japanese regulations

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The main regulation for animal welfare is Animal Welfare Act (The Act) in Japan. The Act was revised several times since it was amended in 1973. The revision of The Act in 2005, 3Rs were stated. Refinement is the mandatory issue but Reduction and Replacement may be just statements without penalties for these two Rs violation. Japanese regulatory system is relied on the notifications by the ministries. The ministry of health notified JaCVAM and ICATM as important references in alternative test methods for cosmetics. JaCVAM published many validated alternative methods in its website such as corrosion test, sensitization test, skin irritation test, eye irritation test and pyrogen test etc. The most of industries now refer this website for their developing activities. The most recent notifications include alternative test methods for medical devices, pharmaceuticals and regeneration medicinals after the revision of the Pharmaceutical Affairs Act in 2014.

VI-5.93
Assessing current practice of the Three Rs principles: A national survey in Korea

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Scientists planning research involving the use of animals are required to examine the possibilities for replacement, reduction or refinement (Three Rs) by Korean law. Through this process, researchers could prevent unintended duplication of animal experimentation and may acquire improved methods: to reduce or replace animal use and refine procedures to minimise pain and distress to animals. Based on our national survey of Korean IACUC members and researchers in 2012, assessing the practice of literature searching to comply with the need to use Three Rs alternatives, 12% of respondents had no relevant experience on the literature search on Three Rs alternatives. 25% of respondents were not aware of how or where to find information on alternatives to animal use. The survey showed that 72% of respondents used only PubMed (Medline) and Google search engines to look for Three Rs alternatives to avoid unnecessary duplication.

There is little specific information or resources on Three Rs alternatives readily available in the Korean language. The term, “alternatives”, is often misinterpreted as only “replacement” in Korean. Searching for Three Rs alternatives is not a structural part of the research process, and searching skills are limited.

To help with this language barrier and acquiring basic information on the Three Rs, the authors developed an independent, non-profit platform website and published three Korean guide books on the Three Rs concept and searching guide. They are a Korean version of “The Three Rs and Humanity Criterion”, written by Professor Michael Balls in 2009 and published by FRAME, a 2nd Korean translation version of “The 3Rs Good Practice: Effective Search Strategies to comply with the 3Rs”, published by the Joint Research Centre’s European Union Reference Laboratory for Alternative to Animal Testing (EURL ECVAM), and Korean Supplement referred on Korean research culture.

This paper summarizes key findings from our national survey conducted among Institutional Animal Care and Use Committees (IACUCs) in May 2016. A link to the online questionnaire was set up and distributed to IACUCs in Korea. There were 347 IACUCs registered to the Korean government agency in 2015. The Korean government agency (Animal Protection & Welfare Division, Animal, Plant and Fisheries Quarantine and Inspection Agency, Ministry for Food, Agriculture, Forestry and Fisheries) sent out a supporting letter to each IACUC asking them to encourage participation in the survey within their institutions. In addition, complementary Korean guide books, published by the authors, were delivered to each respondent who completed the questionnaire. The questionnaire comprised four categories: 1) general information, 2) knowledge of Three Rs principles and applying Three Rs in searching practice, 3) searching skills and education status, 4) interesting methods for further training. Some questionnaires were comparable to the earlier survey results conducted by Choe et al. (2012). To gain more insight into how Korean IACUCs, researchers, educators, and administrative staffs were aware and applying Three Rs information in their work, four different types of questionnaire were prepared based on the participants’ roles.

A total of 510 respondents filled out the questionnaire, representing 84 IACUCs, 296 researchers, 28 educators, and 102 administrative staffs. Their affiliated institutions comprised: government and public (29.6%), academia (36.3%), medicine (5.9%), industry (23.1%), and 5.1% from other institutions. The results were analysed by the professional survey consultant company, Insight Korea Research & Consulting. The findings of this survey include that fewer than half of the researchers (47.6%) were familiar with methods for searching the literature for information on Three Rs and they find this to be a challenging task. Most respondents (82.7%) recommended that specific training on Three Rs searching skills should be included in the required training course. Therefore, it is important to consider whether Three Rs information is readily available and whether scientists are effectively accessing it. The ability to access and implement information on the Three Rs is essential for ethical and scientific reasons, because this can improve animal welfare and scientific outcomes, as well as to the saving of resources. It can prevent the unnecessary duplication of studies, improve experimental design, and ensure that existing and new alternative methods are used as widely as possible. Promotion and protection of laboratory animals comprise one of the core competencies of well-educated personnel involved in their use.
VI-5-801

The 3Rs in Singapore: Developing supportive infrastructure and networks for world-class animal-based research and teaching

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In the early 2000s, the National Advisory Committee on Laboratory Animal Research was established in Singapore to develop guidelines on the care and use of animals for scientific purposes. These guidelines were released a year later and have become the primary standard for local regulatory agencies and institutions. In adopting this document, institutional animal care and use committees were formed which have helped increase awareness in considering the 3Rs whenever the use of animals is necessary. Since then, we have played on the advantages of being a small country, making progress in streamlining animal-based research and teaching in Singapore. From the establishment of national breeding centres and imaging facilities to standardising health statuses between organisations, this has not only eased collaborations but also reduced the need for duplication. Strong partnerships between the bigger animal facilities have also led to a greater pool of resources especially for training and lending expertise. These are some of the initiatives that exemplify the commitment of the country as a whole to the responsible use of animals for scientific advancement.

VI-5-45

Comparison of application between EpiSkin™ and Epikutis® skin model in skin irritation and skin corrosion assay

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Currently there were two types of reconstructed human skin models (EpiSkin™ and Epikutis®) in Chinese Market. Both models were made of reconstructed human epidermis (obtained from human derived non-transformed epidermal keratinocytes) which closely mimics the histological, morphological, biochemical and physiological properties of the upper parts of the human skin. Here we compared two models in skin irritation and skin corrosion assay in vitro. According to OECD Guide line 439 and 431, we compared two models in quality control, test method, results evaluation, transportation, etc. It is showed that there were differences in quality control (viability and barrier function), test method (dose and exposure time), results evaluation, operability and cost. Each model has its merits and demerits, but both models could meet the OECD Guide line requirement of sensitivity, specificity and accuracy in these two assays. It will be a good alternative to animal test in cosmetics toxicology test in China.

VI-5-562

The 3Rs change after 10 years KSAAE activities

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In 1999, the concept of “3R” was officially introduced from 3rd World Congress on Alternatives to Animal Use in the Life Sciences, and Korea also established the 2007 Korean Society for Alternative to Animal Experiments (KSAAE) in order to play a pioneering role in research, development, education and supervision to suggest the principle of proper animal use. Recently, a public interest in protecting animals through legislation for protection and welfare of animals has increased greatly in Korea, and in particular in the fields of assessment of safety and toxicity, new options and alternatives for restriction in animal use and protection and welfare of animals are urgently required. Although the use of laboratory animals in safety and toxicity studies is somewhat inevitable, the development of humanitarian alternative test methods based on the respect of life is consistently necessary. Along with the development of advanced technology, we hope that in the future we will be able to predict and evaluate safety and toxicity without using laboratory animals, so we want to constantly make an effort.

Since the animal use in testing European cosmetic raw materials and products was banned in 2013, ban on animal testing in the field of cosmetics has been expanding worldwide, and Korea has also been unable to distribute or sell cosmetics made through animal experiments from February 2017. In addition, various activities are carried out to promote research on the alternatives to animal use, mainly by the National Institute of Food and Drug Safety Evaluation, and research on animal-free alternatives will be greatly expanded from now on.

In response to the needs of the times, KSAAE provides infrastructure for the research and development of alternatives to animals and a place where members from various fields can gather together and make assertive academic activities. We will continue to pay the necessary efforts to improve domestic research level to the world level.
Session VI-6: The 3Rs in Research and Funding Opportunities for 3Rs Research

Co-Chairs
Mardas Daneshian, CAAT-Europe, University of Konstanz, Konstanz, Germany
Kristina Adams, USDA, NAL, Animal Welfare Information Center, Beltsville, MD, United States

VI-6-779
Awareness of the economic potential of non-animal approaches mirrored by governmental funding schemes

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The scientific progress of non-animal methodologies in the last decade reveals how the near future of safety sciences and basic research may look like. The evolution of these methodologies implies the combination of in vitro and in silico approaches and the integration of information from manifold of sources in order to predict safety issues and to tackle questions from basic research. Contrary to animal-based approaches, non-animal methodologies approaches comprise manifold of aspects which can be patented and licensed. Thus, there is a huge economic potential of non-animal methodologies. The presentation will focus on governmental funding schemes and measures to correlate these schemes with the awareness of the economic potential of non-animal approaches.

VI-6-792
Finding funding opportunities in 3Rs research

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For many of the same reasons that alternatives information in the literature is often difficult to tease out, finding funding opportunities for 3Rs focused research can be difficult. In the field of animal research, and especially when looking for 3Rs information, searching requires sophistication on the part of the searcher that for the most part does not exist. The US Department of Agriculture’s Animal Welfare Information Center (AWIC) has long provided training on how to develop and implement effective search strategies for finding information in the literature about the 3Rs relevant to specific animal study proposals. In this brief talk, I will highlight some funding resources that are available for 3Rs research. I will also discuss strategies for finding US federally funded research projects that incorporate the 3Rs, even if it is not the primary focus of the grant.

VI-6-600
European Commission support for research into the 3Rs

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The European Commission (EC) has supported long-term 3Rs research through successive EC Framework Programmes for Research and Innovation, including the current seven-year programme Horizon 2020 (H2020: 2014 to 2020). During the last decade, EC funding has averaged more than EUR 35 million per year to new research projects. During 2012-2017, seventy research projects were running at various stages of implementation, with EUR 350 million from EC programmes. As part of this effort, fourteen projects were co-financed by industry (by the Innovative Medicines Initiative or Cosmetics Europe), providing an additional EUR 120 million. The main research activities are targeted at better and more cost-effective safety and efficacy testing of chemicals, nanoparticles, vaccines and drugs. In this context, the EU-ToxRisk project, funded with EUR 30 million under H2020, has the ambition to open a new era of safety sciences. Further opportunities for funding in H2020 will be presented.

VI-6-806
Funding research and validation of alternative methods in the United States

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Funding opportunities for the validation of alternative methods in the US. Small businesses involved in alternative methods development to apply for funding offered by the National Institute of Environmental Health Sciences (NIEHS). These awards are intended to support the validation of promising alternative test methods that replace or reduce animal use in toxicity testing/screening. Priority areas for alternative test method development and validation include (but are not limited to) ocular toxicity testing, reproductive and developmental toxicity testing, carcinogenicity testing, and acute toxicity testing. This talk will provide an overview of current funding opportunities for small businesses and other grant programs aimed at research which supports the 3Rs.
VI-7-621

**Risk of bias in animal research**

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Experiments conducted without taking measures to reduce the risk of bias do not fully realise their potential. Potential risks of bias in an experiment include threats to internal, external and construct validity and publication bias poses further limitations to the utility of animal research.

Systematic review of a non-random sample of in vivo studies suggests that only a third of studies report randomisation and blinded assessment of outcome and less than 1% report a sample size calculation. Studies not reporting measures to reduce the risk of bias were associated with reporting inflated effect sizes. In an assessment of publication bias in the in vivo stroke literature we estimate that 1 in 6 experiments remain unpublished and this leads overestimation of around 30% of reported treatment effects.

For animal research to be useful experiments need to be designed, conducted, analysed and reported with care taken to reduce the introduction of potential sources of bias.

VI-7-362

**NC3Rs resources to improve the design and reporting of animal research**

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The reproducibility of biomedical research using animals has come under scrutiny in recent years, and quality standards in the design, analysis and reporting of in vivo research have been flagged as concerns. The NC3Rs has been working in this area over the last ten years and led the development of two key resources to support researchers and improve the design, analysis and reporting of in vivo experiments. The ARRIVE guidelines consist in a 20 item checklist, which summarise the minimum information necessary to describe a study in a comprehensive and transparent manner. The guidelines cover the main aspects of a scientific publication and make recommendations on the reporting of the study design, experimental procedures, animal characteristics, housing and husbandry, and statistical analysis. Several studies are investigating the impact of the guidelines and their usability. The Experimental Design Assistant is a web application with a supporting website, which helps researchers design animal experiments, by increasing the transparency of the experimental plan, and providing feedback and dedicated support for randomisation, blinding and sample size calculation. The objective of these resources is to maximise the output of research using animals. Wide dissemination and uptake are essential to ensure the science emerging from animal research is fully exploited.

**References**


Session VI-7 (Part 2): The Importance of Experimental Design in Animal Experiments

Co-Chairs
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VI-7-629
The problems with small sample sizes
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The routine use of small sample sizes undermines the reliability and reproducibility of research findings. Small studies have lower statistical power and are therefore more likely to miss genuine effects, and any significant results have a higher likelihood of being false-positive or inflated estimates. The results from small studies are more variable and thus more susceptible the effects of questionable research practic-es such as p-hacking, hypothesizing after the results are known, and selectively publishing positive results. Such unreliable research is inefficient, wasteful and unethical. Adopting best-practices to improve reproducibility is therefore a priority. This requires attention to sound methodological design, using realistic effect size estimates to perform power calculations to determine the sample sizes needed to produce reliable, reproducible, and clinically meaningful results.

VI-7-363
Demonstration of the Experimental Design Assistant
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The Experimental Design Assistant (EDA; https://eda.nc3rs.org.uk) is a free web-based tool which was developed by the NC3Rs. It guides researchers through the design and analysis of in vivo experiments. The EDA allows you to build a stepwise visual representation of your experiment, providing feedback and dedicated support for randomisation, blinding and sample size.

Features include:
- Computer-aided design tool to develop a diagram representing the experimental plan
- Critical feedback on the experimental plan – using computer-based logical reasoning
- Statistical analysis suggestions
- Sample size calculation
- Randomisation sequence generation
- Support for allocation concealment and blinding
- Web-based resources to improve knowledge of experimental design and analysis

This demonstration will provide an introduction to the tool and provide guidance on getting started. There is no requirement for any previous knowledge of the EDA. Ultimately, the use of a tool such as the EDA will lead to carefully designed experiments that yield robust and reproducible data using the minimum number of animals consistent with scientific objectives.

Reference

VI-7-597
Power failure: Larger sample sizes fail to solve the reproducibility problem in animal research
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Reproducibility in animal research is alarmingly low. Various threats to reproducibility have been identified, including poor scientific rigor, low statistical power, analytical flexibility, and publication bias. However, reproducibility is mainly a function of external validity. Both theoretical and empirical evidence indicate that standardization generates spurious results accounting for poor reproducibility. Multi-lab studies with as few as 2 to 4 labs greatly increase the reproducibility of results, without a need for larger sample sizes. Therefore, heterogenization rather than standardization is needed to improve reproducibility. Importantly, larger sample sizes will not solve the problem. Quite to the contrary, higher statistical power yields results that are more precise but less accurate. More representative study samples to enhance external validity may thus be the only way out of the reproducibility crisis, helping to avoid wasting animals for inconclusive research.

VI-7-356
Effectiveness of education for better animal experiments and Reduction
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Concerns over poor study quality and experimental design have been well aired. Poor design is contrary to the principle of Reduction as it leads to animal use being higher or less effective than it could be. Raising awareness of the problem has been an important stimulus to improving matters but there also seems to be a need for better education in design. Workshops in experimental design that concentrate on key understandings and develop skill in identifying design faults and appropriate designs for different experimental questions have been run with as few as 2 to 4 labs greatly increase the reproducibility of results. Without a need for larger sample sizes. Therefore, heterogenization rather than standardization is needed to improve reproducibility. Importantly, larger sample sizes will not solve the problem. Quite to the contrary, higher statistical power yields results that are more precise but less accurate. More representative study samples to enhance external validity may thus be the only way out of the reproducibility crisis, helping to avoid wasting animals for inconclusive research.

Reference