DANISH 3R-CENTER

2013 — 2023

10 YEAR ANNIVERSARY

ANNUAL REPORT 2023

Danish 3R-Center

COVER PHOTO: THE DANISH 3R-CENTER

Content

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Axel Kornerup Hansen, chairman of the board of the Danish 3R-Center, gave a presentation in which he outlined the 3R-Center's work in 2023, introduced the new board and thanked the outgoing board.

Chairman's foreword

The Danish 3R-Center has now been in existence for 10 years. Following several extensions prompted by changes in government and COVID-related shutdowns, the board has remained unchanged throughout all 10 years, with the exception of a single replacement during the last administrative extension.

The outgoing board has invested significant efforts in establishing the center, and many of the now former members have made valuable contributions in various capacities, including organizing symposiums, engaging in project work, allocating research funding, fostering an international network and facilitating the dissemination of the 3Rs within the Danish research community and among interested citizens. For this, I wish to express my profound gratitude to all board members.

On 1 April 2023, a new board was appointed for the Danish 3R-Center, consisting of three members (Axel Kornerup Hansen, Peter Bollen and Erwin Roggen) who have all been involved since the center was established in 2013, one who joined in during the brief extension of the former board (Birgitte Kousholt) and three brand new additions to the board (Lotte Martoft, Cathrine Juel Bundgaard and Terje Svingen).

The new board has embarked on its duties with great enthusiasm. In addition to four board meetings, including allocation of research funding, the board has awarded this year's 3R Prize, organized a symposium and an internal mission and vision seminar aimed at shaping a new direction for the center. While the long-term goal remains the ability to conduct research tasks without the use of laboratory animals, we must diligently strive to reduce consumption and improve the conditions for laboratory animals until that objective is realized.

Over the coming period, the board will seek to develop a long-term work plan for the entire duration of its tenure, setting out the initiatives that the center intends to launch in the forthcoming years.

The focus of our work in the upcoming year will largely revolve around securing the center's finances. We have lost one of our major contributors because they have outsourced their *in vivo* research.

At the same time, a decade of research funding shows us that Denmark now boasts a strong and competitive 3R environment which generates high quality research results from the comparatively modest funding we provide. Setting aside a total annual budget of DKK 1.5 million does not truly reflect a Danish commitment to improve, reduce and ultimately eliminate the use of laboratory animals, and the amount stands in stark contrast to investments in other areas that are considered important in our country.

It is our goal that over the next years, the Danish 3R-Center can contribute to continuing the positive trend in the use of animals for experimentation.

I hope that many will benefit from reading the annual report.

Axel Kornerup Hansen
Chairman of the board

VISION AND MISSION

On 1 April 2023, the Danish 3R-Center welcomed a new board, which decided to chart a new course for the 3R-Center, outlining a fresh vision and mission for the center's work.

VISION

There is no need for experimental animals in tomorrow's Denmark

MISSION

- The Danish 3R-Center will enhance the importance of the 3Rs for Danish laboratory animals
- The Danish 3R-Center will work for a transition from laboratory animals to animal-free methods

Since its establishment in 2013, the Danish 3R-Center has been very successful in engaging Denmark's laboratory animal facilities in the efforts to improve conditions for laboratory animals by promoting knowledge of the 3Rs. Given that the Danish 3R-Center was established with the welfare of laboratory animals in mind, recognizing their continued necessity for research purposes in the foreseeable future, we will of course remain committed to improving laboratory animal welfare on the basis of the 3Rs.

However, recent developments have made it clear that the Danish 3R-Center should also focus on existing, and particularly future, technologies that do not involve laboratory animals, as they will enable us to unlock the potential for a laboratory animal-free future.

Consequently, the Danish 3R-Center will endeavour to accumulate knowledge about animal-free research in the Life Sciences to identify potential methods that can inspire laboratory animal users to pursue explore alternative approaches.

01

RESEARCH

PHOTO: UNSPLASH

Research

An important part of the Danish 3R-Center's work is to provide financial support to 3R research projects on behalf of the Minister for Food.

Once a year, the Danish 3R-Center thus invites researchers to apply for funding of research projects that in one way or another have the potential to improve the laboratory animal area.

RESEARCH FUNDING

The Danish 3R-Center manages the allocation of DKK 1.5 million a year to support research in one or more of the 3Rs – *Replacement, Reduction and Refinement.*

Who is eligible to apply for funding?

Persons who are scientifically affiliated with an organization, institution or company in Denmark. It is possible to apply for up to DKK 500,000.

Research funding 2025

The call for the next round of applications for research funds for 2025 is planned to open in August 2024. Stay up to date on the Danish 3R-Center's website **3rcenter.dk** or sign up for the Danish 3R-Center's newsletter: **3rcenter.dk/nyhedsbrevstilmelding**

Research projects supported by the Danish 3R-Center in 2023

The Danish 3R-Center received no less than 27 applications for support, of which the following three received a total of DKK 1.5 million.

27 applications → **3** projects → DKK **1.5** million

While it is indeed satisfactory that the Danish 3R-Center receives so many qualified applications, as this indicates that the 3R-Center has managed to raise awareness of the research funds, it is also clear that the center's resources are inadequate to fully address the needs in the 3R area, and increased research funding consequently remains high on the Danish 3R-Center's wish list.

READ MORE ON 3RCENTER.DK

Did you know that...?

The Danish 3R-Center has supported a total of 31 projects since it was founded. You can find a list of all the projects in the appendix of the annual report and read more about the projects on the 3R-Center's website: **3rcenter.dk/forskning/forskningsprojekter**

Refinement of the monitoring of rainbow trout exposed to diseases

Kurt Buchmann / University of Copenhagen

The aquaculture industry is growing steadily, as fish make up an increasing share of world food intake. More than 50% of fish used for human consumption are now farmed. However, fish diseases represent a significant and persistent threat to the aquaculture economy and sustainability regardless of geographical location, species or production level.

Against this background, it is important to conduct research aimed at elucidating methods that promote health and control disease in aquaculture. With respect to research in rainbow trout, selective breeding and vaccinology are the most promising techniques for promoting health and welfare at present. However, this involves exposing the trout to a pathogen (bacterium, virus or parasite) and following the development of the disease over time.

In these experiments, it is important to remove and humanely euthanize any fish showing clinical signs of pain and discomfort. Currently, the exposed fish are monitored manually by visual inspections of the fish tanks every two hours, round the clock. The purpose of manual monitoring is to reduce the suffering of the experimental fish and to ensure rapid intervention as soon as predefined humane endpoints are reached.

However, this manual monitoring is an extremely resource-intensive and laborious process, which the current project seeks to refine. Towards this end, a consortium between the University of Copenhagen and the Danish Technological Institute endeavours to develop an automatic monitoring system using computer vision with artificial intelligence to detect instances of abnormal fish behaviour which will trigger an alarm to the observer.

This system will continuously analyze fish behaviour and visual signs of clinical conditions. The method will reduce discomfort and refine the current manual monitoring, as fish with disease can be identified and removed earlier.

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Kurt Buchmann, University of Copenhagen, presented his project *Refinement of the monitoring of rainbow trout exposed to diseases*, which has received support from the Danish 3R-Center.

RESEARCH

An ex vivo model to test potential novel drugs for treating atherosclerosis

Lasse Gøbel Lorentzen / University of Copenhagen

Atherosclerosis is a commonly occurring condition characterized by the thickening of the vessel wall due to the accumulation of biological material known as plaque. These plaques are very diverse, and the state of disease can vary enormously. While some plaques are stable and will not cause any issues for decades, others are unstable and can suddenly rupture and form blood clots with serious complications such as heart attack and stroke.

The mechanisms that lead to plaque instability are sparsely elucidated and there is a critical lack of treatments that can affect the stability of atherosclerotic plaques. A key reason is that commonly used animal models of atherosclerosis do not develop unstable plaques or blood clots in the heart and brain. This means that we lack a model that accurately reflects the mechanisms which make atherosclerosis a critical condition in humans.

Atherosclerotic plaques are routinely removed during surgical procedures to relieve symptoms or avoid serious complications. These plaques are normally discarded, but we will instead collect and culture them as we believe that cultured plaques could be a useful model for testing potential novel drugs – particularly treatments targeting plaque stability. To test this, we will subject cultured plaques to a number of different treatments aimed at increasing plaque stability.

Subsequently, we will evaluate the effects of these treatments by means of a combination of histological methods and proteome analysis. This may form the basis for further development of drugs that can stabilize atherosclerotic plaques and prevent serious complications in patients with cardiovascular disease.

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Katie Bates, NC3Rs, gave a presentation titled 20 years of the NC3Rs – an overview, in which she outlined all the – highly impressive – work carried out by the British 3R centre over time. NC3Rs is indeed a source of inspiration for the Danish 3R-Center and already in its early beginnings, the Danish 3R-Center contacted NC3Rs to lay the foundation for the cooperation that exists today.

Improving personalized therapy in breast cancer with patient-derived tumour organoids

Mikkel Green Terp / University of Southern Denmark

The development and testing of novel medical treatment strategies for patients with cancer requires laboratory models that accurately reflect the clinical situation. Animal models are traditionally used to test and develop new treatment strategies, as living organisms are able to reflect how a tumour can develop and spread to other organs. However, the use of animal models may be linked to ethical considerations in relation to animal welfare. In order to find the best treatment strategies, it is necessary to test many different combinations of drugs. This often requires several animal experiments in which animals are treated daily with several different medicines, which can lead to severe suffering for the animals.

Thus, there is a need for developing alternative models that can replace animal models to test new therapeutic strategies, thereby reducing the use of laboratory animals. New techniques enable us to isolate cancer cells from patients and grow them as small tumours – called organoids – in the laboratory in plastic dishes. These organoids mimic the patient's tumour to a great extent, including how they respond to treatment.

In this project, we will use this method to examine the effects of several combinations of drugs and identify the drug combinations that appear to have the best effect. Subsequently, we will only test the most promising combinations in laboratory animals. This means that we can significantly reduce the number of animal experiments classified as severe. We are convinced that this approach will improve the development of new and innovative treatment strategies for cancer patients and also help reduce high-severity experiments in animals.

DANISH 3R-SYMPOSIUM 2023

PHOTO: DAVID KAHR

Mikkel Green Terp, University of Southern Denmark, presented his project Improving personalized therapy in breast cancer with patient-derived tumour organoids, which has received support from the Danish 3R-Center.

02

DISSEMINATION

PHOTO: KIM GRANLI

Dissemination of information

Dissemination of information has always been key to the Danish 3R-Center's work, primarily aimed at professionals with an interest in laboratory animals and alternatives. However, the 3R-Center has also deemed it important to include school pupils and interested individuals in the center's communication efforts. The Danish 3R-Center believes that knowledge about the use of laboratory animals is fundamental for enabling society to engage in informed discussions on this subject.

The Danish 3R-Center's Symposium 2023

The most important individual communication initiative for the Danish 3R-Center is the organization of the annual international 3R symposium, which has been held every year since 2014 – except in the COVID-impacted year 2020. The symposium in 2024 will consequently mark the tenth occurrence.

Each year, the symposium attracts around 200 participants, representing a significant segment of Denmark's 3R environment, which provides a unique opportunity for peer networking and mutual inspiration.

As a permanent feature of the programme, the symposium provides the Danish 3R-Center with the opportunity to present the year's work through a presentation by the chairman of the center. The researchers who have received financial support from the Danish 3R-Center during the year present the plans for their respective projects, and previous recipients present the results of their completed projects.

The Danish 3R-Center also invites national and international capacities with 3R expertise to talk about their respective spheres of work.

In addition to taking advantage of good networking opportunities, participants at this year's symposium could benefit from no less than 14 presentations, the award of the 2023 3R Prize, poster sessions and a panel discussion on challenges in the laboratory animal area.

READ MORE ON 3RCENTER.DK

Did you know that...?

You can find the programme, presentations and posters from this year's symposium at the 3R-Center's website: **3rcenter.dk/arrangementer/symposium-2023**

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Mette Gjerskov, the 3R Prize winner from 2022, won the prize for her visionary efforts as Minister of Food, which resulted in the establishment of the Danish 3R-Center. Mette Gjerskov passed away in June 2023, which was marked at this year's symposium. May she rest in peace.

DANISH 3R-SYMPOSIUM 2023

Yvonne Adams, University of Copenhagen, presented results from her project "Human derived blood-brain-barrier spheroids to study brain infections", which has received funding from the Danish 3R-Center.

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

The Danish 3R-Center's 2024 Symposium will be held on 4-5 November at Radisson Blue, Amager, Copenhagen. We expect to publish the programme and open registration in August 2024.

FREE PARTICIPATION

Bring a poster at this year's symposium and enter the competition for the first prize of 5,000 DKK

The 3R Prize

The Danish 3R-Center has awarded an annual 3R prize since 2014, and this year's winner was therefore the tenth recipient. The prize is awarded to a person who has had a broad impact within at least one of the 3Rs and is given out every year at the 3R symposium.

THE 3R PRIZE

Each year, the Danish 3R-Center presents an award to a person or group of persons affiliated with a company, university or other body working to promote the 3Rs in Denmark. The prize will be presented to the winner at the Danish 3R-Center's annual symposium. The prize comes with a diploma and DKK 10,000.

WHO CAN BE NOMINATED?

Persons or groups of persons who have a broad impact within at least one of the 3Rs. The person or group of persons must reside in Denmark and have an affiliation with a Danish company or research institution.

Submit a reasoned nomination to the Secretariat of the Danish 3R-Center.
Note: Nominations open in the summer of 2024.

Vindere af 3R-prisen

	2023	**Leif Røge Lund** The Animal Experiments Inspectorate
Mette Gjerskov The Folketing	2022	
	2021	**Rie Vinggaard** Technical University of Denmark
Dorte Bratbo Sørensen University of Copenhagen	2020	
	2019	**Thomas Bertelsen** Novo Nordisk
Birgitte Kousholt Aarhus University	2018	
	2017	**Grete Østergaard** University of Copenhagen
The QSAR team, represented by **Eva Bay Wedebye** and **Nikolai Georgiev Nikolov** Technical University of Denmark	2016	
	2015	**Hanne Gamst-Andersen** Novo Nordisk
Ellen Margrethe Vestergaard Danish Medicines Agency	2014	

3R PRIZE 2023

Leif Røge Lund (right) of the Animal Experiments Inspectorate was presented with this year's 3R Prize by Axel Kornerup Hansen, chairman of the board of the Danish 3R-Center. Leif was awarded the prize for his many years of work, which have consistently focused on laboratory animals and their welfare – first in the realm of research, followed by more than a decade at the Animal Experiments Inspectorate.

PHOTO: DAVID KAHR

Leif Røge Lund of the Animal Experiments Inspectorate wins the 2023 3R Prize

Leif Røge Lund of the Animal Experiments Inspectorate was awarded the prize for his many years of work which have consistently focused on laboratory animals and their welfare – first in the realm of research, followed by more than a decade at the Animal Experiments Inspectorate.

Axel Kornerup Hansen, chairman of the board of the Danish 3R-Center, presented the prize to Leif and explained the reasons for the award. Axel expressed admiration for Leif's continued strong focus on laboratory animal welfare, where he is constantly mindful of the fact that good welfare initiatives in one facility can benefit other facilities.

Axel also mentioned that Leif's profound insights from the research sphere, coupled with excellent human qualities, have earned him great respect from staff across the country's laboratory animal facilities in connection with inspections by the Danish Animal Experiments Directorate.

The Danish 3R-Center would like to take this opportunity to congratulate Leif Røge Lund on the prize once again.

READ MORE ON 3RCENTER.DK

You can read about all recipients of the 3R Prize on the 3R-Center's website: **3rcenter.dk/om-3r-centeret/3r-prisen**

Poster awards

As a new feature at this year's symposium, the Danish 3R-Center introduced a poster award, and the programme also allowed participants to bring a poster for presentation to the symposium participants – supporting the Danish 3R-Center's ambition for more participants to present posters at the symposium to facilitate the presentation of even more 3R initiatives to the symposium participants as a source of inspiration.

The Danish 3R-Center had set up a jury of a board member and a secretariat employee to assess the posters presented. The poster awards were given to posters from Scanbur, Novo Nordisk and DTU – Technical University of Denmark.

Tine Larsen, Scanbur, first prize winner in the poster competition, received praise from Cathrine Juel Bundgaard, board member of the 3R-Center.

READ MORE ON 3RCENTER.DK

You can find the three posters on the Danish 3R-Center's website: **3rcenter.dk/arrangementer/symposium-2023**

Poster

FIRST PRIZE
DKK 5,000

Rabbit habituation to human interaction: A protocol to reduce stress and aggressive behaviour

Tine Larsen et al
Scanbur

SECOND PRIZE
DKK 3,000

Life Quality of diet-induced obese rats can be improved without affecting weight gain and glucose-tolerance

Maria Kiersgaard et al
Novo Nordisk

3RD PRIZE
DKK 2,000

Establishment of a fetal rat Leydig cell culture to investigate effects of chemicals on steroidogenesis

Caroline Despicht et al
DTU

DANISH 3R-SYMPOSIUM 2023

Julie Zimmermann, Statens Serum Institut, presented the project *Automated animal activity monitoring to reduce animal use and improve animal welfare,* which has received support from the Danish 3R-Center.

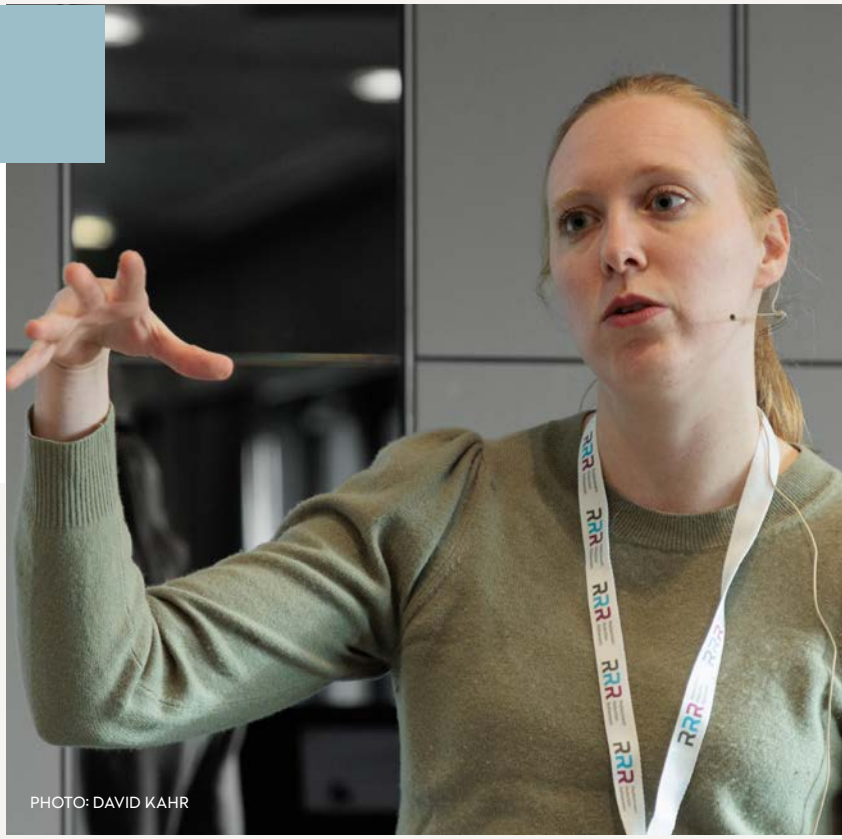

PHOTO: DAVID KAHR

Symposium satisfaction survey

In the days following the symposium, the Danish 3R-Center always carries out a satisfaction survey among the symposium participants. This year, some 100 participants took the time to respond to the questionnaire, rating their level of satisfaction (or dissatisfaction) on a scale of 1 (dissatisfied) to 5 (very satisfied), which resulted in an average rating of no less than 4.3.

Many also opted to comment on the event and suggest ideas for next year's symposium, which the Danish 3R-Center greatly appreciates, as all feedback will be reviewed for the planning of next year's symposium.

In compiling the programme for the symposium, the Danish 3R-Center not only seeks to present an interesting topic, but also to have it presented by a good communicator, which appears to be good strategy, based on the result of the satisfaction survey.

Average level of satisfaction

The Danish 3R-Center's website

READ MORE ON 3RCENTER.DK

Did you know that...?

The Danish 3R-Center published no less than 460 news articles about the 3Rs on its website in 2023?

The website is an important tool for disseminating knowledge about the 3Rs, particularly for inspiration for researchers at Denmark's laboratory animal facilities. The website thus offers a platform for staying up to date on 3R developments, as the center publishes daily news articles of relevance for researchers.

Another important task managed by the Danish 3R-Center is the dissemination of knowledge about laboratory animals to interested individuals, including schoolchildren. Much of the website's content is intended to serve this purpose. At the website, visitors can find information about experiment targets and the number and species of laboratory animals used.

The Danish 3R-Center's website

Researchers

News from the 3R world
Information about relevant events (symposiums, mini-seminars, animal welfare bodies' annual meetings, etc.)
Newsletters
Research funds
Research projects
The 3R Prize
Resources for improving your research (e.g. PREPARE)
Articles about laboratory animals and animal testing
Presentations from 3R symposiums organized by the 3R-Center
Guidelines for implementing EU Directive 2010/63/EU
Links to teaching resources (for future users of laboratory animals)
Links to tissue-sharing services
Annual reports
Statements and recommendations

Individuals/schoolchildren

Teaching materials on laboratory animals and the 3Rs
Factual and basic information about laboratory animals
- What are laboratory animals used for?
- How many laboratory animals are used?
- Which species are used in research?

Politicians and stakeholders

Goals and goal-achievement forms for the Danish 3R-Center
Minutes of board meetings
Annual reports

DANISH 3R-SYMPOSIUM 2023

Jenny Berrío, University of Copenhagen, presented the project *Fighting irreproducibility in preclinical medicine using a meta-analytical approach for detecting flaws in behavior-based testing*, which has received support from the Danish 3R-Center.

PHOTO: DAVID KAHR

Promotion of teaching materials

A few years ago, the Danish 3R-Center had teaching materials made about laboratory animals and the 3Rs – for both lower and upper secondary school students – and in 2023, the materials were promoted at the education fairs Lærfest in Copenhagen and Århus and the BigBang festival in Odense, which are all aimed at teachers to inspire their teaching.

READ MORE ON 3RCENTER.DK

Did you know that...?

In 2023, 15 Danish schools ordered class sets of the 3R-Center's teaching materials about laboratory animals.

Nature Festival in Hirtshals

The Nature Festival takes place every year in Hirtshals over a four-day period in May, gathering around 30,000 visitors with an interest in nature and related topics.

In recent years, representatives from the secretariat of the Danish 3R-Center have participated with a stand at the Nature Festival in Hirtshals to talk about the center's work and to promote its teaching materials, as one of the days at the Nature Festival is dedicated to school students and their teachers.

The Danish 3R-Center feels a commitment to also communicate to the population in general, as the center is partly financed by the state – and is also in favour of openness in the field of laboratory animals. The 3R-Center is therefore happy to participate in events such as the Nature Festival, and the center has already planned to participate in 2024 once again.

03

CONFERENCES AND INTERNATIONAL COOPERATION

PHOTO: THE DANISH 3R-CENTER

Conferences and international collaboration

Since the establishment of the Danish 3R-Center, it has been important for the center to raise its profile in the international 3R environment by means of participation in various conferences to improve the possibilities of setting up cooperation with foreign 3R organizations.

The conferences are also essential for generating knowledge within the secretariat. It is often during these conferences that the secretariat encounters relevant and stimulating presentations by international researchers whom we subsequently invite to also present their work at the Danish 3R-Center's own annual symposium for the benefit of researchers in Denmark.

12th World Congress on Alternatives and Animal Use in the Life Science.

27–31 August

Held every three years since 1993, the World Congress is perhaps the most important conference for the 3Rs, which is why representatives from the secretariat naturally chose to participate in order to network and seek inspiration for the work of the Danish 3R-Center.

This year, the World Congress was held in Niagara Falls (Canada) and successfully brought together approximately 900 participants from various sectors worldwide, including universities, pharmaceutical companies, animal welfare organizations, and 3R organizations, who could choose from more than 400 lectures and hundreds of posters in addition to benefiting from the many networking opportunities.

Centro 3R IV Annual Meeting: The role of 3Rs in the age of One Health: where we are and where we're going.

Milan, 13-15 September 2023

Representatives from the Secretariat of the Danish 3R-Center also attended the annual 3Rs conference of the Italian 3R Centre (Centro 3R). Centro 3R is a collaboration between a large number of Italian universities, which was evident at the conference, as the vast majority of participants were young people – probably students and younger researchers.

An important takeaway point from the conference could be that the Danish 3R-Center can benefit from strengthening cooperation with Danish universities, as the universities have an important role to play in the work to engage students and younger researchers in improving the field of animal testing.

Cooperation between European 3R centres

THE DANISH 3R-CENTER / NC3RS / 3RS-CENTRE UTRECHT LIFE SCIENCES, THE SWEDISH 3RS CENTER, CHARITÉ 3R, SWISS 3R COMPETENCE CENTRE

Perhaps the most important international collaboration for the Danish 3R-Center in recent years has been with a number of European 3R-centres. At monthly meetings, the centres keep each other updated on the work done in the respective centres and organize and hold an annual webinar conducted in English.

Over three days in June, the group held a webinar on *Culture of care* – primarily for animal technicians – with a focus on implementation. The webinar included a series of presentations followed by a panel debate based on constructed dilemmas (case studies) that may arise at a laboratory animal facility.

The webinar was well attended by 700 people from many different countries, which is certainly impressive.

The Danish 3R-Center would also like to take this opportunity to thank the group for the good cooperation, which we really appreciate. A special thank you goes to Emma Stokes and Vicky Robinson from NC3Rs for being the driving force behind the practical aspects of the collaboration.

READ MORE ON NC3RS.ORG.UK

Did you know that...?

you can find dilemmas (case studies) from the webinar on the NC3Rs website, which you can work with at your laboratory animal facility to learn more about the facility's *Culture of care:*
nc3rs.org.uk/events/webinar-series-creating-right-environment-animal-care

PHOTO: NOVO NORDISK

DANISH 3R-SYMPOSIUM 2023

Svante Winberg, Uppsala University, gave the presentation *Fishes as experimental animals.*

PHOTO: DAVID KAHR

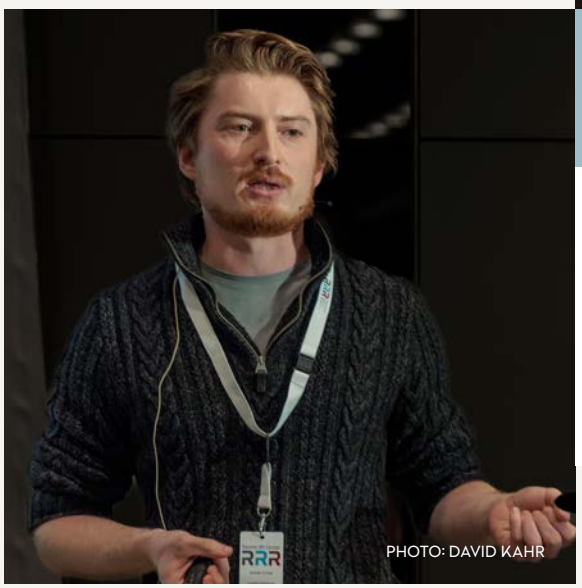

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Andrew Crump, Royal Veterinary College, gave the presentation *Animal Consciousness: Evidence & Ethics.*

EPAA Conference, 15 November, Brussels

Two representatives from the secretariat participated online in this year's EPAA meeting. EPAA (European Partnership for Alternative Approaches to Animal Testing) is a partnership between industry, authorities and animal welfare organizations aiming to collect and share knowledge and resources to accelerate the development, validation and approval of alternative methods globally.

04

EXTERNAL CONTRIBUTIONS

PHOTO: THE DANISH 3R-CENTER

External contributions

In recent years, the Danish 3R-Center has given a number of external institutions the opportunity to describe their 3R-related activities in our annual report to convey an impression of the widespread efforts in Denmark to improve the area of laboratory animals.

Aarhus University, Novo Nordisk, the Technical University of Denmark, the University of Copenhagen, LEO Pharma, Lundbeck, the University of Southern Denmark and the Danish Animal Welfare Society have assisted in this over the recent years.

DOSO's perspectives on animal testing

Anna Kornum / Bioethicist and advisory consultant for DOSO and
Lina Lind Christensen / Chairperson of DOSO and member of Danish Animal Ethics Council

DOSO is an umbrella organization for animal welfare associations, representing 21 organizations with more than 100,000 members. Our work covers a broad range of activities, from information campaigns on the conditions for production animals to managing shelters for pets and wildlife care.

Over the years, we have also worked for the elimination of animal testing through dialogue-based and pragmatic measures. We recognize that this requires a long-term commitment, which is why we have cooperated with educational institutions as well as pharmaceutical and biotechnology companies. Every year, we hold an interdisciplinary, open seminar on the World Day for Laboratory Animals on 24 April.

DOSO's overall approach to animal experimentation

DOSO regards animal testing as a serious animal welfare problem, as by definition, laboratory animals are subjected to pain, suffering, distress or lasting harm, which is contrary to the intentions of the Danish Animal Welfare Act. DOSO works actively to accelerate the development, validation and implementation of alternatives to animal testing, including through our support for the Danish 3R-Center.

Until such time as animal experimentation has been completely eliminated, DOSO will be working on legislative measures to improve the protection of laboratory animals and to introduce quotas stipulating annual reductions of the number of animals.

Our main focus is on the experiments that we consider to be superfluous and possible to eliminate in the short term, including testing of non-essential substances for less important purposes, such as DIY products, toiletries, non-medical products, gardening products, pesticides, household products, additives and Botox (botulinum toxin) for cosmetic purposes. This means that in approving animal experimentation, we must apply a more stringent interpretation of the "benefit criterion."

Phasing out animal testing in teaching

Several of our neighbouring countries have already phased out live animals from teaching at medical and biology programmes. Though only relatively few animals are used in teaching (approximately 4,200 in 2020), this is where future scientists and teachers are trained and the research culture is defined. DOSO believes that any use of live animals in teaching should be considered carefully and comply with the 3Rs *(Reduction, Refinement og Replacement).*

DOSO is promoting legislation on "conscience objections", allowing students to refuse to participate in animal testing without this negatively impacting their further academic careers. Instead, students should be offered alternative classes, and educational establishments should have core facilities for *Replacement* to ensure the constant availability of professional expertise.

Exceptions may be considered for laboratory animal science courses and medical/surgical specializations, though surgical simulators for both human and veterinary medicines have undergone revolutionary developments.

Improvement of basic and applied research

In Denmark, the largest number of laboratory animals are used in the categories "basic research" and "applied research", including medical product development. Within these knowledge-intensive categories, DOSO believes that there is room for improvement. We believe that the "significant benefit" criterion should be tightened and given more weight in the assessment of the relevance of an experiment. We also encourage a more critical, ethical reflection in the assessment of basic research projects.

We are also concerned about the increasing share of laboratory animals with edited or modified genotypes, as creating new animals with harmful phenotypes or unresolved behavioural and physiological needs must be considered a welfare risk. DOSO is particularly critical of experiments that expose animals to chronic pain, anxiety or depression. This is seen in animal models concerning certain neurological and psychiatric disorders, for instance. When keeping laboratory animals, it is essential to prioritize their daily welfare by providing adequate housing facilities, enrichment and positive reinforcement training to reduce the use of force.

Mapping of hidden use

DOSO wants statistics from the Animal Experiments Inspectorate to clearly show the real consumption of animals for scientific purposes. It is estimated that an unreported number of animals are used indirectly, such as those excluded on the basis of unwanted sex or genotype, non-laboratory animals killed for tissue or organ donation, animals used for maintaining genetically modified strains and all surplus breeding animals. We also want to obtain insight into the outsourced experiments ordered by Danish companies abroad. These experiments should be subject to control by the Animal Experiments Inspectorate and included in the annual statistics.

Belief in dialogue

Since 2012, DOSO has marked the World Day for Laboratory Animals on 24 April with an industry seminar. First in a partnership with the Danish Animal Welfare Society and then in collaboration with the University of Copenhagen. We believe that it is essential to maintain a regular dialogue between users of laboratory animals and animal welfare organizations.

It is also important to provide the general population with access to participate and learn about the ongoing experiments in Denmark as well as the arguments and efforts made against the use of animals. This means that there is also a public information element to the dialogue.

Once again, we are organizing a seminar this year (2024) at Frederiksberg Campus, and anyone interested may register.

PHOTO: PERNILLE SCHOUSBOE

Nick Jukes (Interniche) has been highly profiled at various laboratory animal events globally for several years – pictured here at the World Day for Laboratory Animals – for instance giving talks on alternatives to laboratory animals used in teaching.

05

NATIONAL COMMITTEE FOR THE PROTECTION OF ANIMALS USED FOR SCIENTIFIC PURPOSES

PHOTO: THE DANISH 3R-CENTER

The Danish National Committee for the Protection of Animals used for Scientific Purposes (the national committee)

In Denmark, we both have a 3R-Center and a national committee. As the seven members of the committee also function as the board of the Danish 3R-Center, many will probably have difficulties distinguishing between the two initiatives, which is why this annual report will also present the committee's work.

In short, the committee has mainly been concerned with animal welfare over the years, which is why *Refinement* and *Culture of care* have been particularly interesting areas of focus for the Danish National Committee for the Protection of Animals used for Scientific Purposes – especially in relation to initiatives that can be readily implemented at Denmark's laboratory animal facilities.

This also means that Denmark's animal technicians play a central role in the work of the committee, as the animal technicians engage with the animals on a daily basis and can therefore contribute with ideas for welfare improvements – for instance in relation to housing and enrichment.

The new board has an ambition to also include Replacement in the committee's future work.

The Danish National Committee for the Protection of Animals used for Scientific Purposes

Directive 2010/63/EU of the European Parliament and of the Council of 22 September 2010 on the protection of animals used for scientific purposes orders Member States to set up a national committee for the protection of these animals.

The National Committee for the Protection of Animals used for Scientific Purposes works to promote the use of the 3R principles. The committee is set up to advise the Animal Experiment Council/ the Animal Experiments Inspectorate and Denmark's animal welfare bodies* in matters relating to the acquisition, breeding, accommodation, care and use of laboratory animals and to facilitate the sharing of best practices.

Note: The establishment of a national committee is consequently mandated by EU law, unlike the Danish 3R-Center which is a national initiative.

** Holders of a permit to carry out experiments on animals or breed laboratory animals must be affiliated with an animal welfare body at the company/institution where the experiments are conducted/the animals are bred. If this does not exist, it must be created.*
Read more about the animal welfare bodies at ***natud.dk****.*

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Kathrine Just Andersen, the Danish Medicines Agency, gave the presentation The Joint 3R Working Party in EMA.

Annual Meeting of the Animal Welfare Bodies 2023

In Denmark, the Annual Meeting of the Animal Welfare Bodies is the national committee's most significant individual initiative – particularly in relation to positively impacting Denmark's animal welfare bodies – as the vast majority of Denmark's animal welfare bodies are represented at the meeting, which the National Committee for the Protection of Animals used for Scientific Purposes also clearly expects.

The Annual Meeting of the Animal Welfare Bodies is a forum for lectures, workshops and networking – primarily centred on laboratory animal welfare. With the majority of the animal welfare bodies being represented, the annual meeting provides a good opportunity for information from the national committee and knowledge from presenters and the workshop to transpire into Denmark's laboratory animal facilities.

The theme for the 2023 Annual Meeting of the Animal Welfare Bodies was *the animal keeper's role in improving welfare at the animal facility,* which was reflected in the talks at the event, with a large number of animal keepers from universities and the pharmaceutical industry giving presentations on this subject.

In recent years, the annual meeting has also included a marketplace where meeting attendants can inspire each other by presenting new welfare initiatives that have improved conditions for laboratory animals at their respective workplaces.

All presented initiatives automatically participate in a competition for DKK 5,000, which will be awarded to the initiative that a jury consisting of representatives from the secretariat and the committee finds particularly interesting.

Trine Berthing and her colleagues from the National Research Centre for the Working Environment won this year's poster competition for the initiative *Daily oral dosing of nanoparticles in rats – gavage versus snack,* which aims to dose rats without the use of a gavage.

Find the poster here:
3rcenter.dk/nyhed/snack-vs-gavage.

Annual Meeting of the Animal Welfare Bodies 2024

The annual meeting will be held on 4 June (save the date) at Lundbeck in Valby. The programme is expected to be published during April 2024 on **natud.dk**

READ MORE ON NATUD.DK

Did you know that...?

you can find programmes and presentations from previous annual meetings on the Committee's website:
natud.dk/dyrevelfaerdsorganer/dvo-aarsmoede

DANISH 3R-SYMPOSIUM 2023

Johan Ulrik Lind, Technical University of Denmark, gave the presentation *Instrumented and 3D printed human tissue models.*

PHOTO: DAVID KAHR

Website natud.dk

By contrast with the Danish 3R-Center's website, which mainly addresses researchers and the general public, the committee's website is primarily aimed at Denmark's animal technicians. It gives them access to news within their work areas, and they can find useful knowledge about accommodation, handling and various trial procedures.

The website also provides information about the recommended structure of the animal welfare body and information about the tasks that the animal welfare body must manage.

The committee's website is also where you will find information about the Annual Meeting of the Animal Welfare Bodies.

PHOTO: DAVID KAHR

DANISH 3R-SYMPOSIUM 2023

Laurence Walder (right) and **Luisa Ferreira Bastos** (centre), **Eurogroup for Animals** gave the presentation *A Humane Deal: Transitioning to a new era of science, together.* Pictured to the left is Birgitte Kousholt from the 3R board who functioned as moderator at the symposium.

Project: Contract research laboratories

The Committee for the Protection of Animals used for Scientific Purposes often launches projects on its own initiative. In 2023, the Committee initiated work aimed at benefiting animals used in both domestic and foreign contract research laboratories.

The intention is for this initiative to lead to the creation of a checklist for companies to employ in their interactions with contract research laboratories, thereby ensuring the best possible conditions for the animals. The Committee anticipates presenting the results of this work during 2024.

DANISH 3R-SYMPOSIUM 2023

The symposium offered a panel debate on the theme *Challenges in the Field of Experimental Animals?* with a selection of speakers from the symposium and representatives from the Danish 3R-Center.

PHOTO: DAVID KAHR

06

THE BOARD

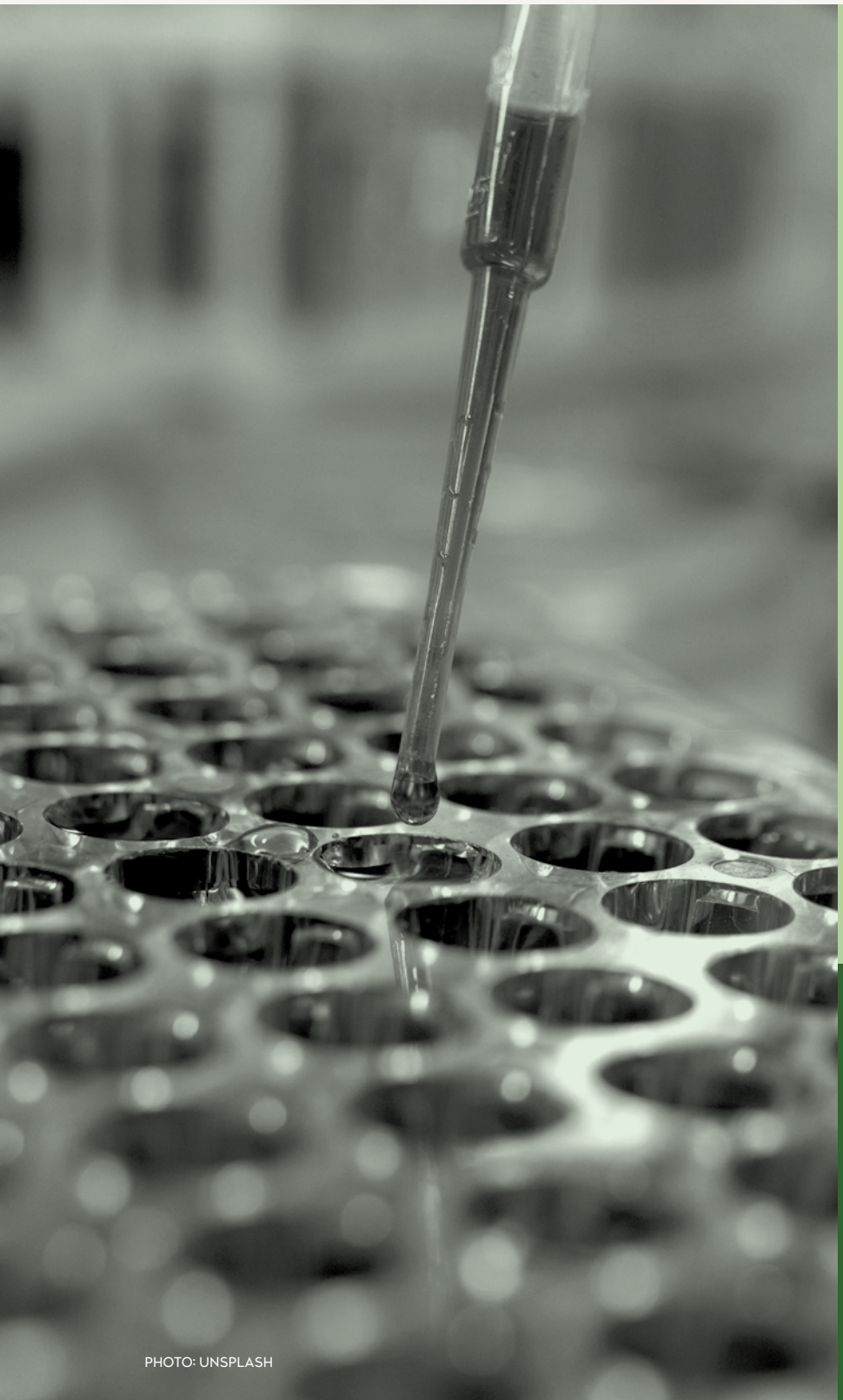

PHOTO: UNSPLASH

The board

New board

As mentioned previously, a new board was appointed for the Danish 3R-Center on 1 April. Upon assuming their positions, each board member has expressed their thoughts about the work at hand.

PHOTO: KIM GRANLI

Axel Kornerup Hansen
University of Copenhagen
Chairman of the board,
board member since 2013

When we started the 3R-Center in 2013, my vision was to ensure real improvements in the welfare of animals used for research and development and to optimize the scientific results achieved from the individual animal, thus reducing the number of animals needed in each experiment.

I still think it is a major problem that so many animals actually go to waste in research because animal experimentation often fails to yield results that are translatable to humans. I have embraced a vision that there will be a future in which we do not – merely for the sake of research – expose animals to stress beyond what we would accept for other animals under animal welfare legislation.

We are still far from realizing this, which is why I still believe that more needs to be done to improve our use of animals, with better animal models and research methods that enable us to use fewer animals in relation to obtaining our health goals for humans. I think that in the past 10 years, the 3R-Center has contributed substantially to approaching these objectives, but our resources are too limited to do the work at the 3R-Center that would enable Denmark to make significant progress within a short time horizon.

Birgitte Kousholt
Aarhus University
Board member since 2021

Birgitte Kousholt is a qualified veterinarian and holds a PhD degree from Aarhus University. She continued her employment at Aarhus University, first as a post doc. and then as an experimental animal veterinarian, and most recently also as head of the large animal facility at the Department of Clinical Medicine. She received the 3R Prize in 2018 for her work on implementation of the 3Rs at Aarhus University (Department of Clinical Medicine).

Birgitte's vision for the 3Rs involves active work on research and education within each of the 3Rs.

New methods must be developed to address questions that previously required animal experimentation; methods to minimize pain, stress, and suffering, and to enable animals to exhibit their normal behaviour must be researched and taught; research efforts to reduce the number of animals included in experiments must be strengthened. Interdisciplinary collaboration is crucial for obtaining all 3Rs.

Birgitte will contribute through her experience as a scientist, veterinarian and manager and with her knowledge of systematic reviews (review articles) in the AUGUST group (Aarhus University Group for Understanding Systematic reviews and meta-analyses in Translational preclinical science) which she co-founded.

Birgitte has the following ambitions for the 3R-Center's work: "We must work with all aspects of 3Rs. We must ensure that we develop alternatives to using animals in experimental studies; we must focus particularly on the matters that improve living conditions for the animals that are still being used in experiments, and we must leverage existing knowledge and optimize planning and reporting to reduce the number of animals in experiments.

READ MORE ON 3RCENTER.DK

Did you know that...?

the Danish 3R-Center and the National Committee for the Protection of Animals used for Scientific Purposes hold six board meetings a year?
You can find minutes of the meetings here:
3rcenter.dk/om-3r-centeret/referater-fra-bestyrelsesmoeder

Cathrine Juel Bundgaard
Novo Nordisk
Board member since 2023

Cathrine Juel Bundgaard is a qualified veterinarian with a master's degree in experimental animal science. Cathrine has more than 20 years of experience as a laboratory animal veterinarian, both from the academic world and the pharmaceutical industry. Cathrine has a broad knowledge of and interest in the 3Rs.

The reason why I want to contribute to the work of the Danish 3R-Center is that I would like to assist in furthering the implementation of the 3Rs in research and teaching, particularly in relation to the prospects of a future without experimental animals. Things have progressed rapidly over the past ten years, and the 3R-Center has played a significant role in this development in Denmark. I believe that the 3R-Center must support the continued development towards a future in which researchers naturally consider animal-free methods for achieving scientific goals before opting to use animals.

Particularly the strategies for working with Refinement and Reduction are starting to be well implemented in most research environments, so even though we need to maintain focus on them, I believe the vision is to invest more focused efforts on disseminating knowledge about animal-free methods and working towards channelling more resources into their development and promoting the creation of career opportunities in this field. The 3R-Center can help with this, for instance by safeguarding good, useful communication and helping to establish a broad-based debate on animal experimentation and alternative methods.

Erwin L. Roggen
3Rs Management and Consulting ApS
Board member since 2013

My 3R vision has always been to drive the application and acceptance (in industry and authorities alike) of testing methods and strategies that help safeguard health and safety without using animals. The increasing quality of applications for 3R research funding over the years, including animal-free methods, suggests that the Danish 3R-Center has made a positive difference.

The 3R-Center has also been successful in driving knowledge gathering and sharing, sharing experiences and establishing best 3R practices, communications, teaching/training and facilitation. However, there is still a long way before these methods become common and the first-line choice.

As targets for the 3R-Center's future work, I consider it important to aim to establish a mindset in the laboratory-animal environment where exploring animal-free methods is the first choice when testing, developing and marketing new products and only when such methods do not provide the solution move on to considering animal models. As most academic research groups, but also small biotech companies, might find it expensive and financially difficult to achieve the ambition of establishing animal-free development environments, I believe that the future board should give highest priority to establishing such environments.

Lotte Martoft (left)
Aim2Achieve
Board member since 2023

Lotte Martoft is a qualified veterinarian and holds a PhD degree from the University of Copenhagen. She brings 25 years of experience of conducting and managing experimental animal research in the pharmaceutical industry and a broad background and insight into all aspects of the 3Rs. Since 2022, Lotte has been a member of the national committee of the Swedish 3Rs Center, where she also chairs the national committee's Group of Experts.

Lotte's perspectives on the work on the board of the Danish 3R-Center:
"Working for replacement, reduction and refinement of animal experimentation is my passion. As a board member of the Danish 3R-Center and the Committee for the Protection of Animals Used for Scientific Purposes, I aim to contribute efficiently to promoting and implementing the 3Rs in Danish and European contexts alike.

As a scientist, I consider all 3Rs to be decisive for improving the quality of research. Developing new animal-free methods that can improve the quality of research and bring us closer to a future without experimental animals is a source of inspiration for me. I remain open to change and base my work on a conviction that change is best facilitated by engaging central stakeholders in active collaboration. Though we all want a future without animal experimentation, we may have different ideas of how to get there. My goal is to enhance cooperation between the different players to achieve this common goal.

As a veterinarian, long-standing staff manager and scientist, I consider it essential that, for as long as we use animal in experiments, we continue focusing on refining animal experimentation and optimizing animal care and facilities. I wish to contribute to promoting the principles of *Culture of Care* with animal welfare improvements and support for animal technicians and researchers in their endeavours for increased openness about their work."

Peter Bollen
University of Copenhagen
Board member since 2013

When the Danish 3R-Center started, I focused particularly on Refinement and on advising scientists wanting to conduct animal experiments. This was mainly based on assessing the severity of the projects and focusing on methods to reduce the severity.

My vision was to secure embedment of the 3R principles in research environments and society, which would be implemented through various dissemination efforts in both research environments and society at large – such as at the annual science festival for school students, Science Calling *(Videnskaben på Besøg)*, where I have made a great number of talks about laboratory animals and the 3Rs. I definitely believe that the Danish 3R-Center has been able to communicate its message broadly.

Over the 10 years that have passed since the establishment of the 3R-Center, I have noticed a gradual shift in the board from an approach based on 3R principles alone to intensified focus on NAMs (Non-Animal Methods). I certainly approve of this change, which is why I still believe that going forward, the center should also include this wider area of focus.

Terje Svingen

Technical University of Denmark Board member since 2023

Terje Svingen has a background in molecular development biology and heads a research group at the Technical University of Denmark which works with reproductive toxicology.

The group's primary objective is to contribute to improved protection of humans from the harmful effects of environmental chemicals – particularly the effects that may occur during embryonic development.

Terje's vision for the 3Rs is to contribute to reducing the number of animals used for testing industrial chemicals at the same time as protecting humans and nature against the harmful effects that can arise from exposure to environmental chemicals. Based on an enhanced understanding of the mechanisms of action behind harmful effects in animals and humans, we are now far better equipped to develop and use alternative, animal-free testing methods to predict the effects that may arise in humans. Supporting and further developing New Approach Methodologies within chemicals testing will get us a long way towards significantly reducing the use of laboratory animals.

Within the framework of the 3R-Center, Terje wishes to contribute to all 3Rs principles – for instance by developing and promoting the use of so-called Adverse Outcome Pathways (AOPs) as a tool to support testing and regulation of harmful chemical substances using animal-free methods.

Status report on the board's work over 10 years

In connection with the appointment of a new board in 2023, the former board produced an article outlining the key activities carried out under the auspices of the Danish 3R-Center and the Committee for the Protection of Animals Used for Scientific Purposes in the period from the establishment of the center in 2013 to the resignation of the board at the end of March 2023. This status report is accompanied by a complete list of all the tasks performed during the ten-year period.

Find the status report for ten years of board work (in Danish) here:
3rcenter.dk/ressourcer/artikler-om-forsoegsdyr-og-dyreforsoeg

PHOTO: THE DANISH 3R-CENTER

APPENDIX

Appendix

The following is an overview of all the projects that have received support since the Danish 3R-Center was founded in 2013.

Overview of supported projects, 2014–2023

Project	R	Project Manager	Status	Publication
2014				
'Artificial blood vessels' – a model for investigating diabetic arteriosclerosis	Replacement	**Mette Bjerre** Aarhus University	Completed	To be published once additional studies have been done and more results achieved
Standardizing gut microbiota in mice as a tool for reducing the number of animals in the individual experiments	Reduction	**Axel Kornerup Hansen** University of Copenhagen	Completed	Published in Scientific Reports in March 2017 (link at the Danish 3R-Center's website)
Refinement of animal models of pain: Development of methods to limit pain in laboratory rats used in pain research	Refinement	**Klas Abelson** University of Copenhagen	Completed	Published in the Scandinavian Journal of Laboratory Animal Science, March 2020 (link at the Danish 3R-Center's website) Plos One in January 2020 (link at the Danish 3R-Center's website)
Pathological and immunological consequences of murine blood sampling	Refinement	**Dorte Bratbo Sørensen** University of Copenhagen	Completed	Published in the Journal of the American Association for Laboratory Animal Science in May 2019 (link at the Danish 3R-Center's website)
2015				
Developing an in vitro method to predict acute pulmonary toxicity from impregnation spray products	Replacement	**Jorid Birkelund Sørli (previously Søren Thor Larsen)** The National Research Centre for the Working Environment	Completed	Published in ALTEX Online First in August 2017 (link at the Danish 3R-Center's website)
Can chickens be immunized with an aerosol combined with vaccination? Investigating a non-invasive method for production of antibodies	Refinement	**Otto Kalliokoski** University of Copenhagen	Completed	Not published (negative results) (link to the report on the Danish 3R-Center's website)
Artificial skin in a Petri dish as an alternative to laboratory animals	Replacement	**Mette Elena Skindersø (June Lissa Hansen)** Statens Serum institut	Completed	Report published on the Danish 3R-Center's website.

Project	R	Project Manager	Status	Publication
2016				
Development of computer models for predicting chemicals' impact on thyroid hormones	Replacement	**Marianne Dybdahl** DTU-FOOD	Completed	Published in Computational Toxicology in January 2017 and Computational Toxicology in 2017 (link at the Danish 3R-Center's website)
Using cell cultures to minimize the need for laboratory animals in developing and manufacturing vaccines for farmed fish	Reduction/ Refinement	**Niels Lorenzen** University of Aarhus	Completed	Supplementary experiments must be conducted to enable publication
Towards better brain cancer treatment with novel in vitro models and fewer animal experiments	Replacement	**Bjarne Winther Kristensen** University of Southern Denmark	Completed	Published in the Journal of Neuro-Oncology in August 2016 and PLOS ONE in May 2016 (link at the 3R-Center's website)
2017				
Use of primary isolates from human kidney to study the molecular aspects of blood pressure regulation	Replacement	**Henrik Dimke** University of Southern Denmark	Completed	No plans for publication
Implementation of pain-treatment methods for rats used as a model for inflammatory arthritic pain	Refinement	**Klas Abelson** University of Copenhagen	Completed	Published in Heliyon in November 2022 and Comparative Medicine October 2022 (links at the Danish 3R-Center's website)
Development of cell-based assays for measuring antibody-mediated protection against the chlamydia bacterium	Replacement	**Jes Dietrich** Statens Serum Institut	Completed	Published in the Journal of Quantitative Cell Sciences in March 2018 (link at the Danish 3R-Center's website)
2018				
Murine Passport	Reduction	**Axel Kornerup Hansen** University of Copenhagen	Completed	Published in Scientific Reports in August 2022 (link at the Danish 3R-Center's website)
New advanced blood-infection model	Replacement	**Thomas Emil Andersen** University of Southern Denmark	Completed	Published in Scientific Reports in March 2021 (link at the Danish 3R-Center's website)
Transport and metabolism of fungicides in the human placenta	Replacement	**Bjarne Styrishave** University of Copenhagen	Completed	Publication information unknown
2019				
Impact of shelter enrichment of metabolic cages in studies of protein metabolism	Refinement	**Helle Nygaard Lærke** University of Aarhus	Completed	Publication information unknown
Genetic modification of mice without a need for extensive breeding	Reduction	**Per Svenningsen** University of Southern Denmark	Completed	No plans for publication
Study and analysis of internal validity within Danish preclinical research	Reduction	**Birgitte S. Kousholt** University of Aarhus	Completed	Published in PLOS ONE in November 2022 and Animals in September 2023 (links at the Danish 3R-Center's website)

Project	R	Project Manager	Status	Publication
2020				
New methods for exploring the interplay of cells, surrounding tissue and mechanical forces in vascular disorders	Replacement	**Julián Albarrán-Juárez** Aarhus University	Completed	Published in Cells in August 2021 (link at the Danish 3R-Center's website).
Meta-analyses to identify the shortcomings of behavioural testing in preclinical medicine	Replacement	**Otto Kalliokoski** University of Copenhagen	Expected completion: early 2024.	
Introduction of new human *ex vivo* model systems to study tumorigenesis in kidney cancer	Replacement	**Kirsten Madsen** University of Southern Denmark	Expected to be completed in the beginning of 2024.	
2021				
Human derived blood-brain-barrier spheroids to study brain infections	Replacement	**Yvonne Adams** University of Copenhagen	Completed	
Automated monitoring in animal models for studies of vaccines against viral infections	Reduction Refinement	**Gabriel Pedersen** Statens Serum Institut	Completed	
Cellular heterogeneity as predictor for the differentiation and regenerative potential of bone marrow stromal cells	Replacement	**Ali Jasim Mohammad Jamil** University of Southern Denmark	Expected to be completed in March 2024	
2022				
Use of ultrasound for early diagnosis of necrotizing enterocolitis in laboratory premature piglets	Refinement	**Thomas Thymann** University of Copenhagen	Expected to be completed in late 2023	
PluriLum assay: A novel stem cell-based assay for testing of chemicals' embryotoxic effects	Replacement	**Rie Vinggaard** Technical University of Denmark	Completed	
Replacement of meningioma animal models with a meningioma *ex vivo*/organoid model to test pharmacological advances in meningioma treatment	Replacement	**Mikkel Schou Andersen** University of Southern Denmark	Expected to be completed in late 2024	
2023				
Refinement of the monitoring of rainbow trout exposed to diseases	Refinement	**Kurt Buchmann** University of Copenhagen	To be completed in May 2024	
An *ex vivo* model to test potential novel drugs for treating atherosclerosis	Replacement	**Lasse Gøbel Lorentzen** University of Copenhagent	To be completed in November 2024	
Optimering af personaliseret Improving personalized therapy in breast cancer with patient-derived tumour organoids	Replacement	**Mikkel Green Terp** University of Southern Denmark	To be completed in November 2024	

Statements, recommendations and reports

The Danish 3R-Center's board and the National Committee for the Protection of Animals used for Scientific Purposes have published the following statements, recommendations and reports:

- The Danish 3R-Center thinks that a broader understanding of the concept of replacement of experiments on animals is needed (Danish 3R-Center's board, 2019).
- Danish animal welfare bodies function excellently (Statement by the National Committee for the Protection of Animals used for Scientific Purposes, 2021).
- A higher number of laboratory animals in Denmark is not necessarily negative (National Committee for the Protection of Animals used for Scientific Purposes/the Danish 3R-Center, 2018).
- Recommendation on antibodies (Statement by the National Committee for the Protection of Animals used for Scientific Purposes, 2021).
- Use of animals in teaching (Statement by the Danish 3R-Center and the National Committee for the Protection of Animals used for Scientific Purposes, 2021).
- Laboratory-animal facilities and COVID-19 (Report prepared by the National Committee for the Protection of Animals used for Scientific Purposes/the Danish 3R-Center, March 2022).
- Experimental animals with the highest degree of suffering in 2021 (Report prepared by the Danish 3R-Center, March 2022).

READ MORE ON 3RCENTER.DK

These are all available on the Danish 3R-Center's website:
3rcenter.dk/om-3r-centeret/udtalelser

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3RCENTER.DK

The Danish 3R-Center in brief

The Danish 3R-Center is a collaboration involving the Danish Ministry of Food, Agriculture and Fishery, the Danish Animal Welfare Society, DOSO (Cooperation Organisation of Animal Welfare Bodies), Lundbeck and Novo Nordisk. The Danish 3R-Center works to promote the 3Rs in Denmark to bring focus to bear on alternatives to animal experimentation and create even better conditions for laboratory animals.

The Danish Animal Welfare Society
"In the view of the Danish Animal Welfare Society, the use of laboratory animals must be restricted wherever possible. This is why the Danish Animal Welfare Society actively supports the Danish 3R-Center's efforts to replace, reduce and refine the use of laboratory animals. In particular, we have great confidence that efforts to promote the development and knowledge of alternatives to laboratory animals will contribute to realizing DAWS' ambition to phase out the use of laboratory animals."

DOSO (Cooperation Organisation of Animal Welfare Bodies)
"The overarching aim of DOSO is to abolish animal experimentation. Towards this end, DOSO is actively engaged in promoting the development, validation and implementation of alternatives to animal testing based on the 3R principles. Making an active effort and supporting the Danish 3R-Center provides a good opportunity to achieve this goal."

Lundbeck
"To facilitate the development of safe and effective medicinal products, we have to use laboratory animals at Lundbeck. We continuously seek to optimize the conditions for these animals, and we use alternative methods wherever possible. For this reason, it was a natural choice for us to support the Danish 3R-Center so that we can stay abreast of 3R developments. With this collaboration, we support the continued development of all 3Rs while staying up to date on new ideas and initiatives that can benefit our laboratory animals."

Novo Nordisk
"It is still not possible to develop medicine that is efficacious and safe for patients without using laboratory animals. Novo Nordisk and the Danish 3R-Center share the same wish to promote the development of alternatives to animal testing, reduce the use of laboratory animals, improve conditions for laboratory animals and disseminate knowledge about alternatives to animal testing. Novo Nordisk actively works to achieve these goals, which is why we also actively support the Danish 3R-Center."