FRAME Annual Report 2019-20

OBJECTIVES AND AIMS

The charitable objectives of FRAME, as stated in the 1969 Trust Deed, are:

1. To promote the mental and moral improvement of mankind by working to relieve the suffering to animals when being used to assess adverse human reactions in medical, biological, pharmaceutical and other associated research.

2. To promote or assist in the provision of research into acceptable new techniques and substitutes for the use of animals in such medical, biological, pharmaceutical and other associated research and promote the publication and dissemination of the results of such research conducted by and in association with the Charity and to highlight and comment on such research conducted by others.

3. The charity's fundamental aim is to promote the embedding of the 3Rs (Reduction, Refinement and Replacement) in biomedical research and development, with replacement of the use of animals as the ultimate goal. FRAME achieves its objectives through the development and promotion of non-animal research methods that enable human-focussed safety testing and disease research.

FRAME works to achieve its goals via the following strategic areas of activity:

Funding research
To ensure scientific methods for biomedical research that improve upon the use of animals continue to be developed and implemented.

Sharing information
To ensure that information about non-animal methods, how to find, and how to use them is disseminated and shared as widely as possible within the scientific community at all levels.

Creating change
To actively promote uptake of non-animal methods, ensure that barriers to adoption are reduced, and engage in constructive challenge around the inherent problems of animal models.

Building resilience
To ensure that FRAME is a sustainable and resilient organization with sufficient skills, support and income to continue its work in the long term.

FRAME supports the longest-standing lab dedicated to researching alternatives to animal testing - the FRAME Alternatives Laboratory (FAL) in the University of Nottingham Medical School. Two key principles that underpin FRAME's approach to research funding are that outputs should always be disseminated as widely as possible to ensure maximum impact, and that the development of future researchers is supported. FRAME publishes a peer-reviewed scientific journal, ATLA (Alternatives to Laboratory Animals), and the FAL environment mentors, trains and inspires students to be part of replacing the use of animals.

FRAME's websites, press releases and social media are the channels through which FRAME disseminates its activities and provides advice, consultancy and news services to industry, government, academia, and others interested in the field of alternatives to animal testing.

FRAME's training schools offers training to research scientist's expert advice on experimental design and statistical analysis to those undertaking animal procedures, in order to minimise the numbers of animals used and to maximise the value of animal research where it continues to be unavoidable.

FRAME's Structure

In 2019/20, the Board of Trustees made key decision to advertise for a Chief Executive Officer (CEO) position, and also sought to increase the size of the Board through the recruitment of new trustees. The purpose of the CEO role would be to support the Board with strategy and governance; to develop and steward key public and stakeholder relations; to take responsibility for the appropriate financial and risk management of the charity; and to provide operational leadership for the delivery of the Board's vision.

The appointed CEO would work on a part-time basis and would take responsibility for the management of the other three staff members (the Scientific Liaison Officer, and two members of staff responsible for delivery of FRAME's journal ATLA), as well as key outsourced functions including V Formation, a Nottingham based marketing and PR agency that produces content and marketing material for the charity, and Clayton & Brewill, an accountancy firm based in Nottingham that provides financial management and payroll services.

Celean Camp was appointed and took up the role in March 2020.

Significant Activities

50 years of working to advance science and protect animals

FRAME celebrated its 50th Anniversary in 2019. In recognition of this, a Young Scientists' Symposium was held at the University of Nottingham in July 2019, and a FRAME Lecture was held in London in October. We also ran a "50 facts" social media campaign, which highlighted the issues around animal testing as well as key facts about FRAME's and its impact in the field over the past five decades.

The FRAME 50th Anniversary Symposium took place on the 16th and 17th of July and gave early career scientists (postdocs and PhD students) a unique opportunity to showcase their work, in particular projects carrying out human-based, *in vitro* research or those using computer models and simulations.

Professor Mark Coles from the University of Oxford delivered a keynote speech on "Disruptive Technologies to Accelerate and De-risk Therapeutic Development", and PhD researchers and young scientists from leading universities across the world showcased their work via presentations and posters.

The judging panel, made up of FRAME trustees and associates, awarded the prize for Best Poster to Helena Emery of Swansea University for her "Novel use of insect larvae as a substitute model for indomethacin-induced gastric damage" work. Helen's study showed that Galleria mellonella have similar immune systems to vertebrates and could be used as a substitute for indomethacin induced gastric damage, reducing the need for a mammalian model.

University of Hull student Andrew Riley's, "Move over mouse there is a new 'chip' in the block!", was given the prize for the Best Oral Presentation. Andrew's presentation discussed the use of

microfluidics in drug screening, and how a microfluidic platform can maintain the viability of thyroid tissue slices *ex vivo* for a minimum of four days, allowing for the assessment of thyroid tissue radioiodine sensitivity/adjuvant therapies in real time.

Amongst the event's delegates was Professor Eustace Johnson, who attended the event as a delegate from the University of Chester. He said:

> *"It's been fantastic. I've loved hearing from the young researchers who are up and coming in the field."*

Elliot Lilley, Senior Scientific Officer within the RSPCA Research Animals Department said:

> *"The event has been a great opportunity to look at new developments within this field and provide younger researchers with an opportunity to present their work. I'm delighted FRAME is running these events again."*

The Symposium's drinks reception was sponsored by Tissue Solutions, a provider of ethically sourced human samples required for preclinical drug development and research. Long term supporters of FRAME, Next and Boots, also supported the event; Next provided gift vouchers for each of the award winners, and Boots donated a number of products for the delegate bags.

FRAME concluded its 50th anniversary celebrations by holding its 18th Annual Lecture at The Wellcome Trust in London on Thursday 17th October. The lecture was well attended by a variety of supporters and collaborators including representatives from Boots, Unilever, The Kennel Club and the European Animal Research Association.

Professor Blanca Rodriguez, leader of the Computational Cardiovascular Science Team at the University of Oxford, gave her keynote lecture on "Human *In Silico* Trials for Drug Safety and Efficacy Evaluation". Commenting on the event, Professor Rodriguez said:

> *"I was delighted to be invited to speak at the FRAME Annual Lecture. I first came across FRAME many years ago when I attended a similar event. I was fascinated by the work FRAME carries out."*

FUNDING RESEARCH

FRAME continues to provide the FRAME Alternatives Laboratory (FAL) with an annual block grant to support the lab, staff and students in their research work using human-relevant, non-animal methods. The Scientific Liaison Officer and marketing team work closely with the lab to share information about the projects and the students benefitting from the grant.

The experimental work carried out in the FRAME Alternatives Laboratory (FAL) aims to marry excellent basic science with practical scientific alternatives to the use of animals in medical experiments.

The work in the lab can be summarised under the following 4 headings:

1. Direct replacement science – e.g. developing cell lines from human tissue that can replace animals.

2. Disease modelling – producing models of disease that are closer to the human condition and more relevant than animal models

3. Research advocacy – research that highlights that human based studies are essential for better science and can increase profit/productivity.

4. Research carried out using human patients or volunteers that demonstrates the essential differences between human subjects and animals and promotes the use of humans rather than animals where practically and ethically possible.

Cell culture projects using primary human liver, muscle and skin cells aim to produce human-relevant models of tissues and organs as a partial and eventually total replacement for animal-based studies. The lab also works on human liver progenitor cells, attempting to produce an expandable and sustainable source of hepatocytes as an alternative to relatively scarce primary human cells. In addition to using human derived cell types, FRAME is also working to improve the phenotype of cells using novel cell culture scaffolds and hydrogels derived from human tissues as a better material than cell culture plastics or animal cell derived products such as matrigel.

Cell culture models are produced as an alternative to animal use for drug discovery and toxicity and to generate *in vitro* models of human disease. Disease modelling is focussed on fatty liver disease and type II diabetes/insulin resistance in human muscle.

Human patient and volunteer studies aim to highlight the need for human subjects rather than animal models when studying disease states and potential therapies.

The FAL's current projects concentrate on four main areas:

1. Diabetes, metabolic syndrome, exercise and obesity – effects upon skeletal muscle
2. Fatty liver disease and fibrosis/non-alcoholic steatohepatitis
3. Inflammatory bowel disease and diverticulitis
4. Breast cancer

The two approaches – cell culture and human studies – are not mutually exclusive. There is a limit to the information that can be obtained from human subjects for obvious reasons, and mechanistic detail is hard to obtain. The FAL's approach is to integrate the *in vivo* and *in vitro* approaches, such that the human studies inform our cell culture disease model approaches, which in turn produce hypotheses that can be examined in human patients or volunteers, as appropriate.

The FAL employs two full-time technicians and a research fellow, and in 2019/20 supervised seven PhD students.

PhD Students:

Areej Alsolami, Saudi Govt.
Project: "The role of lipocalin -2 as a novel myokine"

Syedia Rahman, GSK/UoN
Project: "Role of integrins in human liver fibrosis"

Andrew Willhelmsen, MRC DTP
Project: "Potential role for myostatin in muscle insulin resistance"

Matthias Nuamah, GETFund

Project: “Modelling troglitazone toxicity”

Alan Heath, BBSRC Agri-ATP
Project: “Effects of tructose loading upon hepatocyte metabolism”

Elisa Tarsitano, EPSRC DTC
Project: “Extracellular matrix-derived hydrogels as matrix for culturing liver progenitor cells”

Inchira Adala, EPSRC DTC
Project: “Generating electrospun functionalised scaffolds for culture of hepatic progenitor cells”

The information given below summarises the major achievements in the lab in the period:

Liver

- In collaboration with Dr Lisa White (School of Pharmacy) a method for producing acellular liver scaffolds from human liver tissue without the need for use of detergents such as SDS was established. The FAL has successfully grown human hepatic progenitor cells on these scaffolds and showed that, in combination with physiological hypoxia, an improved and mature hepatocyte-like phenotype can be produced in these cells. Significant increases in phase I and II enzyme expression and increased basal and inducible cytochrome P450 activity were observed.
- A new collaboration with Profs Cameron Alexander and Felicity Rose was established to develop electrospun scaffolds capable of controlled release of bioactive compounds for hepatic progenitor cell culture. The FAL has successfully cultured cells on the first set of scaffolds and is assessing cell phenotype.
- A study examining the effects of chemotherapy drugs upon hepatic steatosis and inflammation was completed. The FAL showed that 5-fluoro-uracil and irenotecan caused lipid accumulation in human but not rat hepatocytes in culture. It also demonstrated that the presence of kupffer cells was required for the development of steatosis.
- The FAL also completed a study examining the differences in liver glucose and lipid metabolism between primary human hepatocytes and transformed hepatic cell lines. The data showed that primary human cells accumulate fat in response to treatment with fructose whereas established cell lines such as Hep G2 cells do not. The study also indicated considerable inter-individual variability in response to fructose in hepatocytes from different donors.

Muscle

- The FAL completed a human volunteer study in collaboration with the MRC Versus Arthritis Centre for Musculoskeletal Ageing Research looking at intermittent calorie restriction in human subjects. The research showed that restricting calorie intake to earlier in the day improved skeletal muscle insulin sensitivity and led to an involuntary decrease in calorie intake.

Skin

- A Unilever-funded project looking at the effects of peroxisome-proliferator activated receptor (PPAR) ligands on human skin was completed. Using human skin models grown *in vitro* the FAL showed that PPAR ligands increased the rate of keratinocyte differentiation. The effects of the ligands used varied and one particular ligand, 12-hydroxy-stearate had a considerably greater effect that other compounds tested. The FAL carried out 3’RNAseq on the samples treated with the various ligands to give whole genome expression profiles. The data are novel and as they concern a compound that is commercially sensitive for Unilever, the FAL agreed to meet in early 2020 to discuss publication of the data.

Irritable Bowel Syndrome/Diverticulitis

- The FAL established a new collaboration with Dr Jonna Jolanka (University of Helsinki) studying the role of gut microbiota in inflammatory bowel conditions. We also generated gene expression data from a cohort of healthy volunteers to allow us to compare patient data with normal subjects. The results indicate that current therapy with the drug 5-ASA may actually delay improvements in symptoms and gene expression in IBS patients. In two separate studies on diverticular patients, our data indicate that short term (1 month) treatment with 5-ASA may be beneficial, but that longer term therapy (9 months) appears to increase inflammatory gene expression. We also found that there was considerable inter-patient variability in terms of gene expression profiles and gut microbiota between individuals.

C. Outputs

Publications

LA Wyatt, LN Nwosu, D Wilson, R Hill, I Spendlove, AJ Bennett, BE Scammell, and DA Walsh, (2019), 'Molecular expression patterns in the synovium and their association with advanced symptomatic knee osteoarthritis', *Osteoarthritis Cartilage*, 27(4):667-675.

Z Huggett, J Brameld, A Bennett, and A Salter, (2019), *'*Comparison of primary human hepatocytes and HepG2 cells as models to study the development of hepatic steatosis'*, Proceedings of The Nutrition Society,* 78(OCE1).

Submitted

R Jones, P Pardeep, J Mallinson, A Nixon, T Taylor, A Bennett, and K Tsintzas, 'Two weeks of early time restricted feeding (eTRF) improves whole-body and skeletal muscle insulin sensitivity in healthy men', Submitted to *American Journal of Clinical Nutrition*.

In preparation

The following manuscripts concern completed projects where all data has been collected, which were submitted in 2020. We will use the preprint server bioRxiv to publish all papers once ready for submission.

F Al-Rashed, I Kerr, A Foss, and A Bennett, "Complement activation increases drusen-like deposits whilst protecting against loss of barrier function in a Model of Age-related Macular Degeneration", for submission to *Scientific Reports*, submitted February 2020.

F Abukunna, M Owen, N DeVivo, D Gomez, G Aithal, and A Bennett, "The effect of acellular liver scaffolds and physiological hypoxia on human hepatic bipotent progenitor cell differentiation", for submission to *Stem Cell Reports*, submitted March 2020.

JS Hammond, M Owen, N De Vivo, G Aithal, DN Lobo, and A Bennett, "The pathogenesis of irinotecan-induced liver injury: lipid accumulation is induced by treatment of human hepatocytes with irinotecan and 5-flourouracil and is associated with *de novo* lipogenesis", for submission to *Clinical Science*, submitted March 2020.

C Lam, J Jolanka, FAbukunna, A Bennett, and R Spiller, "Effects of Mesalazine upon mucosal gene expression and gut microbiota in patients with IBS-D", target journal to be agreed, submitted April 2020.

PhD Students

The following students have successfully completed their PhD in 2019:

Hazulin Mohd Radzuan, "The effect of obesogenic and inflammatory factors in regulating adipocyte lipid chaperone proteins"

Robert Jones, "Effects of nutritional intervention upon skeletal muscle protein synthesis and insulin sensitivity"

Tara Stirland, "PPAR alpha and Lipid binding chaperones in human skin"

Zoe Huggett, "Comparison of primary human hepatocytes and hepatoma cell lines as models to study the development of hepatic steatosis"

Conference Presentations

Work from the lab has been presented at the following conferences:

- FRAME 50th Anniversary Symposium
- NC3R's Midlands 3R's Symposium
- EPSRC MRC Centres for Doctoral Training in Tissue
- Engineering and Regenerative Medicine Joint Conference
- 11th International Meeting of the Portuguese Society for Stem Cells and Cell Therapies (SPCE-TC)

Presentations/Meetings with industrial partners

- Glaxosmithkline (Stevenage): meeting to discuss integrin project
- Unilever (Colworth Park): meeting and presentation on PPAR skin project and effects of fructose on hepatic steatosis.
- Sygnature Discovery: meeting to introduce FRAME and the FAL and discuss potential areas of interest.
- Xenogesis: meeting to discuss potential collaboration – agreed to generate preliminary data for submission of a BBSRC CASE studentship proposal looking at enhancing detection of metabolites from slowly metabolised compounds using primary hepatocytes.

Other FRAME related activities

- Alternatives to Animals lecture to Nottingham Drug Discovery MSc cohort.
- Experimental design training to 1st and 2nd year Nottingham BBSRC DTP students -2 days training given with Amy Beale.
- Invited reviewer: NC3R's quinquennial review – Early Career Awards section.

Publications arising from FAL research during 2019/20

- Z Hugget, JM Brameld, A Bennett, and AM Salter, 2019, "Comparison of primary human hepatocytes and HepG2 cells as models to study the development of hepatic steatosis", *Proceedings of The Nutrition Society*, 78(OCE1).

In addition to work at the FAL, FRAME funded two summer studentships. The summer studentships are open to students at universities across the UK and are completed in the establishment where they study.

Elentina Gjoni, BSc Biomedical Sciences student at Brunel University London, worked on "Developing a novel assay to study biofilm formation in Galleria mellonella." Elentina's study involved injecting

different strains of Acinetobacter baumannii, a bacterial pathogen known to cause hospital-acquired infections, into the Galleria (the Honeycomb moth).

Elentina's results suggested that there may be a substance within the Galleria mellonella that could make Acinetobacter baumannii infections easier to treat. The study shows that Galleria mellonella could be used as a model organism to study biofilm formation and could therefore replace larger organisms such as mice and rats in the future.

Commenting on her studentship, Elentina said:

> *"This project has allowed me to build on my competence and independence in the laboratory by giving me the opportunity to design and carry out my own experiments and learn the different ways in which data can be analysed and presented. I was able to carry out research that has never been done before, which was an exciting learning experience for me."*

Rachele Bacchetti, BSc Biomedical Science student at the University of Sheffield, worked on the "Development of a synthetic skin model to test the efficacy of therapeutic ultrasound in skin healing." In Rachele's project, fibroblasts were used to test whether ultrasound produces changes in the composition of the extracellular matrix, a three-dimensional complex of proteins and other molecules which supports surrounding cells.

The results showed that 1.5 MHz pulsed ultrasound caused an increase in fibronectin and collagen I and a decrease of collagen VI in the fibroblast extracellular matrix after a week of treatment. These results indicate that the fibroblast model could be used to assess the effectiveness of ultrasound treatments without the need to test on animal models.

Commenting on her studentship, Rachele said:

> *"Thanks to the summer studentship, I have gained new laboratory skills that have helped me to build my confidence and will enable me to be more independent in future projects. The opportunity has also helped me to realise how much I enjoy laboratory-based work and data handling and analysis, and that I'd like to further my studies as a PhD candidate."*

FRAME also awarded the Department of Biomedical Sciences at the University of Hull with a grant to support second year undergraduate, Elizabeth Gwerkere, on an ongoing project which aimed to create a 3D cancer model that could be used to help characterise a new strategy for enhancing anti-tumour responses in cancer patients.

The research group at the University is interested in the impact of CO2 levels on tumours, as its supervisor Dr. Barbara Guinn explains:

> *"Since 2006, we started to notice that slight changes in CO2 levels (but not hypoxia) caused changes in antigen levels in tumour cells – these are the proteins recognised by the immune system that can cause tumour destruction when targeted by immunotherapy. We now want to see whether we can demonstrate the same phenomena in a tumour spheroid model.*
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> *"The use of spheroids as models of early tumour growth enables us to investigate the impact of a lack of CO2 and nutrients on tumour structure and antigen expression. Spheroids are balls of tumour cells grown in culture that can circumvent the need for animals to form a 3D tumour structure."*

Last year, FRAME awarded a grant to Dr Leda Mirbahai and PhD Student Julia Constantinou to help fund research into characterising the water flea Daphnia magna as an invertebrate model for ageing research. The project involving the University of Birmingham and the University of Warwick has recently published the article "Ageing differently: Sex-dependent ageing rates in Daphnia magna" in *Experimental Gerontology* [A Constantinou, J Sullivan, and L Mirbahai, (2019), "Ageing differently: Sex-dependent ageing rates in Daphnia magna", *Experimental Gerontology* 121 (2019), pp 33 – 45].

Alternatives to Laboratory Animals (ATLA)

2019/20 saw the completion of the process of transferring production of FRAME's journal, ATLA, to SAGE Publishing, with the aim of increasing the reach and impact of the journal with the support of a major publishing partner. The full archive of past issues has now been successfully moved onto the ATLA website on the SAGE platform for easier access and searching.

Six issues were published this year and sent to subscribers around the world. As part of FRAME's mission, and with the kind support of the Phoebe Wortley Talbot Charitable Trust, hard copies were distributed free of charge to resource centres and libraries in many countries where the implementation of the 3Rs and animal alternatives is less advanced than in the UK. Papers were published by authors from a wide range of countries, including Brazil, India, Japan, Sri Lanka and the USA, in addition to the UK and other European countries.

This year, the Lush Prize winners were featured in ATLA again to mark the progress achieved in the area of Replacement that is recognised by this biennial award. In addition, FRAME advertised for a new Editor in Chief to drive forward a longer-term vision and strategy for the journal.

Sharing Information: Communication, Education & Training

FRAME's work is shared with the scientific community, relevant industry, regulatory bodies, Government, the media as well as the general public via the website, social media channels (Facebook, Twitter, LinkedIn and Instagram), and biannual issues of FRAME News, our supporter magazine, produced under the guidance of V Formation.

Scientific progress made by FRAME this year has been communicated to scientists by publication of original research in peer-reviewed scientific journals, and by making presentations to scientific conferences. FRAME's journal, Alternatives to Laboratory Animals (ATLA) remains a platform for dissemination of cutting-edge research in the field of alternatives.

Corporate and other supporters are kept up to date by means of a programme of regular communication through opt-in emails, face-to face visits, as well as use of the business contacts website LinkedIn.

In October 2019, the Director of the FAL, on behalf of FRAME, carried out a day of Experimental Design Training for around fifty year one, BBSRC funded PhD students at the University of Nottingham, supported by FRAME's Scientific Liaison Officer. This is a key area of the charity's education work, alongside the training school to engage and educate scientists using animals in research to reduce and refine animal use and employ good science. This training will continue to form part of the University of Nottingham's Doctoral Training Program going forward.

FRAME Training Schools

FRAME, in partnership with universities, NGOs and projects, delivers regular industry accredited Training Schools in Experimental Design and Statistics to increase awareness among scientists about the need to reduce animal numbers in experiments and to refine procedures. Participants gain a better understanding of how to properly design and effectively analyse their experimental programmes so that they can go on to produce higher quality science, which has made the most efficient use of a minimum number of animals.

In August 2019, to facilitate the continued delivery of this essential training course and in order to develop further training provision relating to the 3Rs and ethics, FRAME began a 3-year collaborative arrangement with the Centre for Applied Bioethics, University of Nottingham.

Following the very successful delivery of the 12th Training School at the University of Nottingham in January 2019, alongside planning the 13th event, the Training School team developed a new one-day Further Training in Experimental Design course in collaboration with the EU Horizon 2020 VetBioNet Project (https://www.vetbionet.eu/). The new course is aimed at giving participants the opportunity to undertake further training to either improve their confidence in teaching experimental design (stream 1) or to gain more in-depth knowledge of the process and execution of statistical analysis of various experimental designs (stream 2). During this unique one-day course, participants will receive small group tuition in their chosen stream from experts in the field. This day course is designed for those who already have an understanding of Experimental Design.

The new one-day course was due to take place following the 13th Training School in Experimental Design and Statistics at Moredun Research Institute, Edinburgh in April 2020. Due to the coronavirus pandemic, this event has been rescheduled for April 2021. Further details can be found at: https://frame.org.uk/training-events/training-school/.

Going forward, the Training School team is working to develop flexible course delivery options and training provision that can respond to novel challenges, such as the current pandemic. Now more than ever, it is important to be able to meet training requirements digitally rather than face-to-face, therefore the team is developing innovative online material and contingency options to deliver the Training Schools virtually, until it is safe to once again provide in person tuition.

Policy and Influence

FRAME continues to influence policy at regulatory and UK governmental level through membership of the Home Office Animal Welfare Stakeholder. Regular meetings at the Home Office are attended by the Scientific Liaison Officer. Other meetings and events attended include meetings with local business networks, local NC3Rs meetings and symposia, conferences with potential scientific and business audiences and the LUSH Prize Conference. Home Office and EU figures were reviewed and commented upon by the Scientific Liaison Officer.

For the first time, FRAME conducted an online survey to assess public attitudes to animal testing and to measure how informed and aware the public is about animal testing and research for medical, chemical and cosmetic purposes. The survey was open for three months and gathered over 400 responses from a range of different countries and fields. Whilst not a comprehensive assessment, the study provided an insight into some worrying misconceptions still held.
The responses revealed that the overwhelming majority of people (93.4%) think more needs to be done to replace and reduce the use of animals in testing and research.

The survey also found that that over half of people think the use of animals in all testing and research could be stopped immediately, and that 42% of people see greater funding of alternatives as the most important factor in helping to end the use of animals in testing and research. It also revealed that:

- 93% of the general public think more needs to be done to replace and reduce the use of animals in testing and research.
- 52% of people think stopping the use of animals in all types of research and testing could happen immediately.
- 42% of people see greater funding of alternatives as the most important factor in helping to end the use of animals in testing and research.
- 75% of survey respondents see the pharmaceutical industry as the biggest user of animals for research and testing.

FRAME CEO, Celean Camp, commented:

> *"Three-quarters of survey respondents view the pharmaceutical industry as being the biggest user of animals for research and testing, when it is in fact academia and university-led research. This is a very common misconception. Indeed, the most recent Home Office report on the Annual Statistics of Scientific Procedures on Living Animals Great Britain (2018) tells us that 56% of the experimental procedures carried out in 2018 were for basic research, and 26% for regulatory testing purposes.*
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> *"We know that stopping the use of animals in all research and testing is not going to happen overnight. Developing validated alternative models and ensuring their use is not a quick process; scientists need support and training to find, access and implement alternatives, and develop the skills to move towards more accurate, human-relevant models."*

FRAME Corporate Supporters for 2018-2019:

1. Avon
2. Boots
3. Biosline
4. British Association for Chemical Specialties (BACS)
5. Johnson & Johnson
6. Next
7. Neals Yard Remedies
8. Smith & Nephew Group
9. The Kennel Club

This year FRAME reached an agreement with Avon to use the FRAME logo on their packaging. Avon has now reformulated their products and moved to 'cross-border ecommerce' to ensure their products will no longer undergo animal testing anywhere in the world – including China – across any of their brands. As a long-term corporate partner, FRAME is excited to help AVON share their commitment to the end of laboratory animal testing with their customers.

It is clear that FRAME has a vital independent role to play in developing and promoting new, valid and effective biomedical alternatives to animal-based research. FRAME will continue to spearhead and promote new methods exploiting *in vitro* and human tissue-based studies to facilitate and educate others on how non-animal science can address specific human biomedical needs.