Scientists call for replacement of animals in antibody production

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Credit: University of Nottingham

Routine scientific procedures using millions of animals are still being authorised when there is a tried and tested alternative, according to a group of scientists investigating the production of antibodies.

The scientists, writing in the Cell Press journal, *Trends in Biotechnology*, say the use of animals in consumer society is effectively 'hidden' and products assumed to be 'animal-friendly' are anything but. They say an animal friendly antibody production technique using bacteriophage viruses instead of live animals is being overlooked, despite the enormous potential for reduction in animal use.

The global antibody industry is worth 80 billion dollars and relies heavily on animals to produce the antibodies that are used to detect the vast range of molecules indicative of state of health, safety or the environment. Antibody-based tests are used in consumer and

environmental safeguarding—from healthcare, over the counter, point of care and laboratory diagnostic testing to food safety, agriculture and household products.

'Substituting methods'

Dr Alison Gray, a visiting researcher at The University of Nottingham's School of Veterinary Medicine and Science, said: "The antibody-based tests that are commonly used in society appear to be far removed from animal experimentation since no animals were directly tested on. However, the target molecule to be detected is repeatedly injected into the animal, initiating an immune response. Months later, the animal is euthanased and antibodies to that molecule are extracted and incorporated into an in vitro, 'animal-free' test. So in reality, we are not replacing animals but substituting methods.

"The ultimate aim of scientists in this field should be to replace the use of animals in research and industry but due to a lack of awareness about this technology, this is not happening fast enough. The 20 year old advanced technology called 'phage display' which uses bacteriophage viruses to produce monoclonal and polyclonal antibodies is available and cost-effective and can replace a huge number of animals. In fact this technology has grown to a level of scientific sophistication that outweighs obsolete and outdated animal immunisation protocols."

New figures on animals in research

In response to the UK stats on animals use in scientific procedures, released today, Dr Alison Gray said "There is a clear opportunity for replacement here. The statistics show that 9,500 animals were used for antibody production in 2013 but in subsequent reports, the reporting procedure has changed so we can't even know how many animals are

used. Comparing the 2013 figure to the average 3,000 per year animals that were used in cosmetics testing in Europe (European stats 1999-2011) before the European wide ban, it is evident that the statistics justify their replacement."

'Unnecessary use'

Dr Andrew Bennett, Director of the Fund for the Replacement of Animals in Medical Experiments (FRAME) Laboratory which is based in The University of Nottingham's School of Medicine, said: "The paper by Dr Gray and her colleagues highlights the unusual situation in terms of antibody production. Antibodies can be made without using animals and the technology is both accessible and robust; yet thousands of animals are killed each year in commercial antibody production. Apart from the unnecessary use of animals there is also the issue of the quality of antibodies raised in animals for use in scientific research—a substantial proportion of which either perform poorly or do not work at all. Phage display technology has the potential to produce more specific and better functioning antibodies than traditional animal based methods. FRAME will be working with and supporting Dr Gray in order to promote the use of phage display technology in the future."

Seven point plan

The scientists from the Universities of Nottingham, Toronto, Utrecht and Lund in Sweden are proposing a seven point EU led action plan by the wider scientific community and biotechnology industry:

- The replacement of animal immunisation methods for antibody production, including the import of antibodies and antibody-containing products unless it can be demonstrated on a case-by-case basis that Animal Friendly affinity reagents (AFAs) cannot

be applied.

- An expert working group should be established to set up a roadmap for moving away from animal immunisation-based techniques for antibody production, in light of the scientific feasibility and commercial availability of AFAs.
- Implementation programmes should be set up to facilitate the transfer of establishments to the new technology. These should include centres of excellence for training in AFA-based technologies to ensure that antibody producers are fully supported.
- Measures should be taken to ensure that animal-derived antibodies manufactured outside the EU adhere to European standards to avoid ethics dumping in regions where animal welfare is less well regulated.
- The European Union Reference Laboratory for alternatives to animal testing (EURL ECVAM) should extend its field of activities with its international collaborative partners to include the production of AFAs and their subsequent use.
- EU and national agencies who are committed to the 3Rs and who execute EU regulations at an operational level for the commercial production of cosmetics, medicines, household products, and food or to safeguard our health or the environment should reinforce this action and no longer permit the import or use of animal-derived antibodies and antibody-containing products aimed to monitor, detect, diagnose, or extract targets of interest.
- Subsequent reports from the Commission to the Council and the European Parliament on the statistics on the number of animals used for experimental and other scientific purposes should include data on the use of animals for antibody production as an independent category.

More information: A.C. Gray et al. Animal-Friendly Affinity

Reagents: Replacing the Needless in the Haystack, *Trends in Biotechnology* (2016). DOI: 10.1016/j.tibtech.2016.05.017