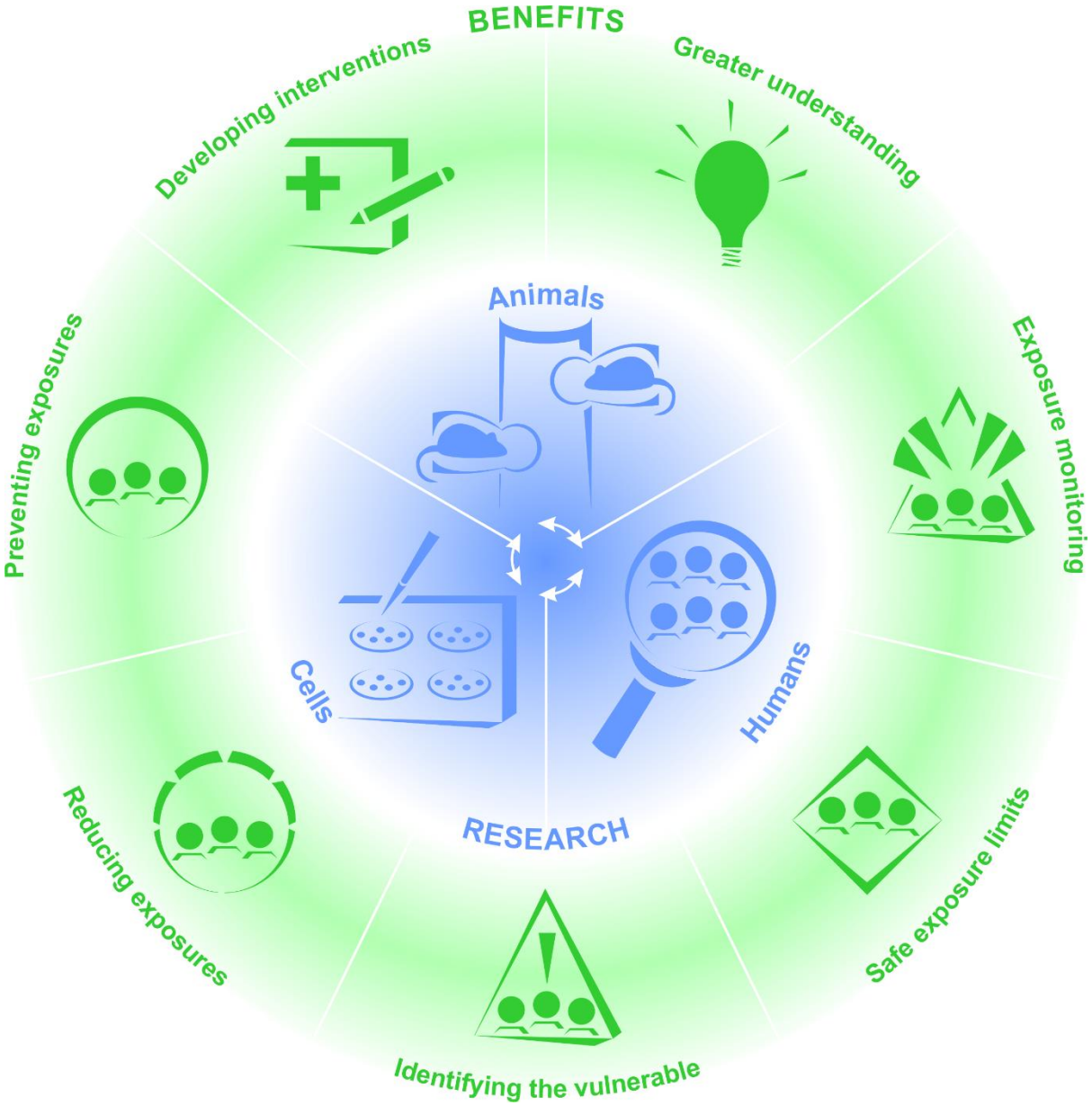
The use of animals in safety science by BTS members

Research on animals is tightly regulated in the UK under the Animals (Scientific Procedures) Act 1986 (ASPA) implemented by the Animals in Science Regulation Unit (ASRU) within the Home Office. All research involving animals requires approval by ASRU under three licences: personal (PIL), project (PPL), and establishment (PEL) licences. This ensures that only trained and competent researchers can perform specific programmes of work at suitable establishments. Licences are continually reviewed and establishments are regularly inspected by ASRU.



Examples of research performed by BTS members

Inhalation Toxicology

As a Toxicologist, I am involved in research using animals under these licences to investigate the potential adverse effects of inhaled substances, such as diesel particulates, nanomaterials, bioaerosols (airborne particles of biological origin such as pollen, bacteria or fungi) and e-cigarette aerosols. It remains difficult to fully assess the response of the respiratory system and other parts of the body to inhaled substances without using animal models. Such responses involve multiple cells, tissues, systems and biological processes, all of which contribute to the uptake, transport, accumulation, metabolism and excretion of inhaled substances throughout the body, and cannot yet be completely modelled using non-animal alternatives.

To-date, my research on animals has focused on mice. Although there are differences between humans and mice, with respect to the biological processes I am interested in, mice share many similarities with humans. For example, many of the same cells, genes and proteins (eg. receptors and enzymes) involved in the response to inhaled substances are common to both mice and humans. Depending upon the study hypothesis, mice are exposed to inhaled substances via two main methods: directly inhaling substances within a special tube or cage, or 2) placing small volumes of substances into the nasal cavity under short term anaesthesia. Since I am interested in the early biological processes that drive the toxicological response, exposures are designed to cause no, or only minor, adverse effects (typically immune-related responses such as inflammation and hypersensitivity). Introducing greater adverse effects can activate further biological processes in response to the toxicological outcome, not the original exposure. It is important to distinguish between those cells, genes and/or proteins causing, and those that result as a consequence of, the toxicological outcome to fully understand the potential adverse effects of inhaled substances such as air pollution, pollen, fungal spores and e-cigarette aerosols. This provides valuable information that can be used to devise strategies for monitoring exposures in human populations, deciding upon safe exposure levels, identifying vulnerable populations, reducing and preventing exposures, and developing interventions/treatments.

Alongside the animal research, I am also involved in complementary studies using cell-based systems or human cohorts. These studies help to develop hypotheses for testing in animals, provide an opportunity to further investigate specific biological processes of interest, and validate the relevance of findings for humans. This is important to help replace, reduce and refine the use of animals for research wherever possible.

Government Scientist