

Poster: free communications

## **Non-animal methodologies within biomedical research and toxicity testing**

*Andrew Knight*

Animal Consultants International (London) (GB)

e-mail: info@animalconsultants.org

High-throughput chemical testing programs within Europe and the US face marked logistical challenges associated with laboratory animal use, which is also limited by scientific constraints on human applicability, and expanding regulatory restrictions, driven by increasing social concerns about biomedical animal use. However, a range of non-animal methodologies are available within biomedical research and toxicity testing. These include: mechanisms to enhance the sharing and assessment of existing data prior to conducting further studies; physicochemical evaluation and computerized modelling, including the use of structure-activity relationships and expert systems; and the use of minimally-sentient animals from lower phylogenetic orders, or early developmental vertebral stages, as well as microorganisms and higher plants. A variety of tissue cultures, including immortalised cell lines, embryonic and adult stem cells, and organotypic cultures, are also available. *In vitro* assays utilising bacterial, yeast, protozoal, mammalian or human cell cultures exist for a wide range of toxic and other endpoints. These may be static, or perfused, and used individually, or combined within test batteries. Human hepatocyte cultures and metabolic activation systems offer potential assessment of metabolite activity. Microarray technology may allow genetic expression profiling, increasing the speed of toxin detection, well prior to more invasive endpoints. Enhanced human clinical trials utilising microdosing, and surrogate human tissues, advanced imaging modalities, and human epidemiological, psychological and sociological studies, may all increase understanding of illness aetiology and pathogenesis, and facilitate the development of safe and effective pharmacologic interventions. Particularly when human tissues are used, non-animal models may generate faster, cheaper results, more reliably predictive for humans, yielding greater insights into human biochemical processes. Greater commitment to their development and implementation is necessary, however, to efficiently meet the needs of high-throughput chemical testing programs, additional important emerging testing needs, and the ongoing development of human clinical interventions.

*Keywords: 3Rs, alternative, animal experimentation, animal model, toxicity testing, biomedical research*