FENS Federation of European Neuroscience Societies

Animal Research Accomplishments

Advancing Science, Improving Health

Examples of the value of animal use in neuroscience from the FENS Committee on Animals in Research (CARE)

Knowledge generated by neuroscience research using experimental animals has led to important advances in fundamental knowledge about the function of the brain and nervous system. Such knowledge is essential for understanding and treating neurological and mental illnesses.

Neurological and mental illnesses affect people throughout the life span from childhood to old age. Compared with many other health problems most mental illness disproportionately affects the young. By contrast Alzheimer's dementia has a devastating impact as people age. The impact of dementia increases as lifespan increases across the globe and particular in the most developed countries. Not only do such illnesses cause suffering and distress but treating and caring for those affected and their families costs hundreds of billions of Euros every year[1].

Neuroscientists investigating brain function frequently work both with healthy human participants and with patients. Many neuroscientists are actively involved in developing new methods and furthering existing techniques for studying the human brain. In some cases, however, the work can only be done with animals.

Memory loss and difficulty finding one's way are early warnings of impending Alzheimer's disease. By using non-invasive neuroimaging methods with human volunteers we now know that the activity of a particular type of brain cell – a grid cell – is compromised in young adults at risk of Alzheimer's[2]. Such studies, however, were only made possible by earlier work in rats conducted over many years that first identified grid cells. The experiments with rats led to the 2014 award of a Nobel Prize to a team of researchers in the UK and Norway.

Sometimes experiments with animals do not just help us understand what is going wrong in an illness but they help develop cures and treatments. Parkinson's disease has a devastating impact on our ability to make even the simplest of movements that most of us would normally take for granted. Implantation of electrodes into a brain structure called the sub-thalamic nucleus is an important treatment received by hundreds of thousands of people with Parkinson's disease. The critical experiments that led to an understanding of the affected brain circuits were conducted in monkeys. Researchers in the USA and France who led the work received the 2014 Lasker Award that recognizes

"major advances in the understanding, diagnosis, treatment, and prevention of human disease".

Most animal research in neuroscience is conducted with rodents. Some features of the human brain, however, cannot be modelled well in the rodent. In such cases neuroscientists sometimes turn to other types of animals, such as monkeys, that share these features with the human brain. Less than 1% of experiments are of this type[3] but they can be important. For example, there are similarities in the way that the nerve pathways connect the brain to the spinal cord and the muscles in monkeys and humans. Understanding these pathways and the information they convey has been central to understanding how illnesses such as stroke affect movement. Recent research in monkeys has suggested new ways to re-establish control over a stroke-affected limb.

Neuroscientists working with animals work alongside neuroscientists investigating human brain function. Sometimes the very same individual scientist will employ computer models, human experiments, and animal experiments. The different approaches are not alternatives to one another but all are essential and complementary to one another. FENS supports research using animals when it is carefully regulated, where alternative methods are not available and high welfare standards are met.

References

1 Gustavsson, A. et al. Cost of disorders of the brain in Europe 2010. EurNeuropsychopharmacol 21, 718-779, doi:10.1016/j.euroneuro.2011.08.008 (2011).

2 Kunz, L. et al. Reduced grid-cell-like representations in adults at genetic risk for Alzheimer's disease. Science 350, 430-433, doi:10.1126/science.aac8128 (2015).

3 UK Home Office Statistics 2015