Ice bucket craze funds nightmarish suffering for GM mice

The 'ice bucket challenge' craze that dominated social media for several weeks this summer raised £7 million for the Motor Neurone Disease Association (MNDA).[i] Many people who contributed to this impressive total were probably unaware that this British charity funds experiments on animals. At present, this includes providing more than £1 million for tests on mice, many of whom are genetically modified (GM).[ii] Some of these genetic alterations can cause the highest level of suffering that it is legal to inflict on animals in UK laboratories, and a recent experiment involving MNDA-funded researchers saw GM mice being bred to suffer a range of debilitating torments and suspended by their tails to assess abnormal behaviour.[iii] Yet for all the misery they cause, animal experiments into motor neurone disease have a dismal record in terms of actual medical progress, meaning that such research is ultimately a terrible waste of money donated in good faith.

The suffering of GM mice

The use of GM mice has increased dramatically in recent years, with researchers attempting to create mouse 'models' for almost every human illness. Yet this growing trend is based on crude and unpredictable science, and has repeatedly failed to deliver treatments and cures for patients. No matter what disease they are being bred to 'model', the creation of GM mice generally involves several painful and invasive procedures, including castration, major surgery and ear or tail mutilation. Creating just one 'founder' mouse with the required genetic alteration can entail the deaths of hundreds of others. These unwanted mice are often killed by being gassed or having their necks broken. Building and maintaining colonies of GM mice is also oppressive. This involves drastic manipulation of the animals' behaviour and reproductive cycles, such as housing 'stud males' on their own for up to two weeks, and subjecting females to overcrowding in order to synchronise their reproductive cycles. The laboratory environment is of itself a source of misery. It has been estimated that some 50 per cent of laboratory-confined mice suffer from 'stereotypies', meaning that they perform abnormal repetitive behaviours such as fur or whisker plucking.[iv]

Research supported by the MNDA

The MNDA indicates in its literature that it is currently providing £1,028,342 of funding for experiments on mice, with a strong focus on genetic modification.[v] Quite apart from the suffering described above – which applies to GM mouse research in general – some of the genetic alterations mentioned in the charity's summary of its research can cause terrible outcomes, including paralysis and death.[vi] Researchers' own documentation indicates that the Home Office (the government department responsible for licensing vivisection) classifies these 'paralysis models' as being in the highest category of legally permissible animal suffering.[vii] In recently published research that had received grant support from the MNDA, GM mice suffered muscle weakness (shown by lack of paw grip strength) and loss of body weight.[viii] In a further 'study' involving MNDA-funded researchers, GM mice were bred to suffer limb paralysis, anxiety, loss of body

weight, hunched posture and motor dysfunction, which was measured by repeated use of a rotating cylinder on which the mice try to balance to avoid falling. The animals were also suspended by their tails to assess abnormal behaviour known as 'limb clasping'.[ix]

Yet this research activity has repeatedly failed to deliver progress in the fight against motor neurone disease. Over the past ten years, around 12 experimental treatments that showed promise in animal 'models' of amyotrophic lateral sclerosis or ALS (a type of motor neurone disease) have been given to humans in clinical trials. All except one treatment failed, and the exception has only marginal benefits with regard to patient survival.[x] In terms of predicting how humans will respond to treatments, this suggests that animal 'models' of motor neurone disease have a failure rate of more than 90 per cent. The fundamental problem is that motor neurone disease is uniquely human, and it cannot be accurately 'modelled' in animals.[xi] Mice can be genetically altered to exhibit some of the symptoms of motor neurone disease, but they do not have the underlying illness.

One of the research projects currently being funded by the MNDA involves using mice who have been genetically modified to carry a faulty version of a gene called SOD1. Yet this 'model' of the disease has already been heavily criticised in the scientific literature. A study published in 2011 reviewed 13 drugs that had shown potential in the SOD1 mouse model of ALS, and found that none of these therapies showed significant success in clinical trials on humans.[xii] These dismal results are hardly surprising, given that the SOD1 mouse 'model' is an over-simplification of an inherited form of ALS that is rare to begin with. Only one in ten ALS patients have this inherited form of the disease, and less than a quarter of these cases are caused by faults in the SOD1 gene.[xiii] The MNDA is also funding research on mice bred to suffer from a faulty FUS gene, but mutations in this gene are linked to an even smaller number of ALS cases (around 0.5 per cent).[xiv] And even in these cases, the faulty gene represents just one part of a very complex picture. Genes interact with other genes and cellular components in ways that are unique to each species, and they are controlled by millions of 'switches' that regulate them in subtle and complicated ways. A study published just last month (November 19) compared the genomes of mice and humans, and found that a significant number of mouse genes were regulated in a different way from their human counterparts.[xv]

Much of the work funded by the MNDA relates to creating new mouse 'models' of motor neurone disease, or seeking to improve those that already exist. Yet for a multiplicity of reasons, animals cannot faithfully represent uniquely human diseases, or predict how people would respond to drugs designed to treat the conditions. There are several reasons why:

- There are fundamental differences between species including those relating to anatomy, organ structure and function, metabolism, chemical absorption, genetics, mechanisms of DNA repair, behaviour and lifespan.

- A genetically similar group of animals living in controlled experimental settings cannot predict the response of varied human patients living in natural conditions.

- The stress caused to animals by routine laboratory practices such as handling, blood collection, physical restraint, injections and force-feeding, as well as recovery from wounds or surgery, results in altered physiological states, which compromise test results.

- Some of the most common and debilitating adverse reactions to drugs are not outwardly visible and therefore cannot be detected in animal tests. These include nausea, mental disturbance, dizziness, fatigue, depression, confusion and double vision.

The way forward

The MNDA's funding of animal research is at odds with good science, sound ethics and public sentiment. In an NOP poll conducted on behalf of Animal Aid, 82 per cent of respondents said that they would not donate to medical research charities that fund vivisection. It is often assumed that public sympathy does not lie with rodents, but a recent government-commissioned opinion poll suggests otherwise. Even when answering a heavily biased question about which animals they consider it acceptable for use in '*medical research to benefit people*' (the evidence shows that vivisection is unlikely to benefit people), less than half of respondents felt it was acceptable to use mice.[xvi]

Animal Aid's call to avoid participating in the ALS ice bucket challenge has been greeted with a powerful surge of support, including thousands of 'likes' on social media. By abandoning cruel and unreliable animal research, the MNDA could benefit from the generosity of all those people who currently feel uncomfortable with its animal research policy and consequently avoid donating. Critically, by funding only humane and productive non-animal research, it would stand a much greater chance of contributing to genuine breakthroughs in the fight against motor neurone disease. Given the terrible burden of human suffering that this condition brings with it, a programme of rational medical research is urgently needed.

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[xv] A comparative encyclopedia of DNA elements in the mouse genome, *Nature*, Vol 515, November 2014.

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