



Zebrafish are making a splash

Zebrafish, named for their black and white stripes, are helping us answer some big questions about MS. **Dr Carl Tucker**, Aquatics Facilities Manager at the University of Edinburgh, tells us about the work he does to look after these tiny fish.



laboratory, but we really need to know how all these cells interact with each other. And for that you need a living organism.

I work closely with Professor David Lyons, a researcher based here at the University of Edinburgh. He's doing some brilliant research on zebrafish and MS. And our zebrafish are also used to study all sorts of other conditions, like heart disease, various cancers and kidney function, to name a few.

Good science needs good animal welfare

We take the welfare of our fish very seriously. In fact, at Edinburgh there's an entire department dedicated to the care of research animals. The UK's laws around animal research are among the

After nine years serving in the British Army, I returned to the UK to do a marine biology degree, followed by a PhD. I went on to set up the first zebrafish facility at the University of Edinburgh. We now have over 3500 fish tanks, which are home to tens of thousands of zebrafish.



Unlike humans, they can regenerate all their organs – even the heart! But for scientists, the best thing about zebrafish is that the embryos are almost completely transparent. So you see all the processes going on inside their bodies.

Sharing our DNA with fish

It might seem surprising that fish can help us understand human conditions like MS, but we actually share approximately 70% of our DNA with zebrafish. We can find out a lot of important information just from looking at individual cells in a

A special little fish

Zebrafish are pretty unique. At five days old, a zebrafish embryo is only 5mm long but is practically a complete fish with all its major organs.

most stringent in the world. Scientists who use animals in their research do a lot of training and are required to get lots of different licenses. The government can do inspections and if a lab is found to be violating the law, it can have very serious consequences and the research can be stopped.

Our zebrafish are fed three times a day with a special balanced diet, and the water quality is constantly monitored to make sure it's ideal at all times.

Under UK law all experimental procedures must assess the possible harms to an animal. The

vast majority of procedures are considered mild – this means the impact on the fish is minimal. If it's possible that pain may occur, we let the fish swim about in a bath of a liquid containing anaesthetic, which they take in through their gills.

I know some people find it peculiar that fish are used for medical research, but if we want to stop conditions like MS, we need animals to help us understand them. I love my job, because we're working to help people living with painful and debilitating conditions.

The MS Society's position on the use of animals in research

Funding research that uses animals is not a decision we have taken lightly. Research using animals is vital in advancing our understanding of MS. And it's been critical in the development of new treatments. Many current disease modifying therapies were only possible as a direct result of testing and experiments involving animals.

We're actively supporting innovative alternatives that can reduce the number of animals used in research. For example, our researchers are now growing human stem cells in a dish for basic experiments. And the MS Society Tissue Bank helps researchers all around the world use donated post-mortem tissue when this is a suitable alternative.

All our research is reviewed by an independent ethical board, usually at a hospital or university. This is made up of both scientists and members of the public. Before any project can go ahead, the board must be persuaded that there is no suitable alternative to the use of animals.

We expect all our researchers to follow the principle of the 3Rs of animal research and:

- Reduce the number of animals used
- Refine experiments to minimise any suffering
- Replace animal experiments with alternatives wherever possible.

We are signatories to the Concordat on Openness which commits scientists to be open and honest about the ways in which animals are used in medical research.



Zebrafish and MS

Professor David Lyons and his team are doing lots of different projects with zebrafish to better understand MS.



Clearing up myelin debris

This project is looking at how myelin debris is cleared in the brains of zebrafish. By testing the effect of different drugs on the rate of clean-up, David and his team aim to identify potential myelin repair treatments for MS.

Can you have too much myelin?

David has also looked at what happens in zebrafish and mice when myelin-making cells make more myelin than the nerve fibres need. He found that when excess myelin was present, it was sent to the wrong part of the nerve.

Using robots to study myelin repair

Researchers have developed a new way to study myelin repair in zebrafish, using a machine with a robotic arm. The fish travel along a tube and are put under a high-powered microscope which can count their myelin-making cells in seconds.