

New technique could reduce number of animals needed to test chemical safety

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A new way of testing the safety of natural and synthetic chemicals has been developed by scientists with funding from the Biotechnology and Biological Sciences Research Council (BBSRC). Their research, published in the journal *Ecotoxicology*, could reduce the number of fish needed to test the toxicity of a range of chemicals including pharmaceuticals and environmental pollutants.

The researchers, led by Professor Awadhesh Jha of Plymouth University, have managed to coax cells from the liver of a [rainbow trout](#) to form a ball-shaped structure called a spheroid in a [petri dish](#). This ball of cells behaves much more like normal [animal tissue](#) than cells grown in traditional ways in the lab and so can give researchers a more accurate picture of how an animal's body would respond to a chemical in the environment.

[Fish](#) are used to test whether both new and existing chemicals like pharmaceuticals can damage wildlife or the environment. Because a large number of spheroids can be produced from a single fish the use of this technique could mean less fish are needed to do these tests.

Professor Jha explains "This is a real breakthrough in our efforts to reduce the numbers of fish needed for toxicology testing. It is very important for the health of people, wildlife and whole [ecosystems](#) that we understand the effect of chemicals, both natural and manmade, in the environment, but we must strive to avoid the use of animals wherever possible."

One of the most impressive aspects of the fish spheroids is that they can be maintained in the lab for over a month. Many environmental pollutants cause health problems because they accumulate over time and become more concentrated further up the [food chain](#). Because the fish spheroids can be maintained for longer time periods than normal [cell cultures](#) scientists can test the effect of long-term exposure to a potential toxin.

The fish spheroids were produced by a BBSRC-funded CASE student, Matthew Baron, who is being supervised by Professor Jha and his colleagues at Plymouth and AstraZeneca Safety Health and Environment. At present, scientists can use flat layers of fish cells to replace some live animal tests but these break down quickly and do not behave like real tissues. Spheroids are already well established models for testing on mammalian cells but this is the first time that they have been developed from fish cells.

Because the liver filters blood it is often the main organ where potential environmental toxins accumulate and are broken down by the body and so is the most important organ for testing toxicity. The researchers also hope to produce spheroids from fish gill cells, as the gills are another important site of toxin accumulation. By combining these two types of spheroids in a single system the researchers hope to develop a 'virtual fish' which could give a clear picture of how a particular chemical would affect a live animal.

Professor Douglas Kell, BBSRC Chief Executive said "Everyone wants to see fewer animals used in testing so this is great news. The UK has always led the way in efforts to reduce, refine and replace the use of animals in research. Whilst the use of some animals will remain important to ensuring that the medicines and other chemicals are safe to use and won't damage the environment, we are making great strides in the combining of new laboratory techniques and computer modelling to

avoid using animals wherever possible."

More information: *Ecotoxicology* 2012, [DOI: 10.1007/s10646-012-0965-5](https://doi.org/10.1007/s10646-012-0965-5)

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