

Zebrafish Larvae Feel Pain--Should This Affect How We Use Them in Research?

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👤 by Elizabeth Doughman



Animal Welfare

A new study published in the *Journal of Experimental Biology* revealed that the larvae of zebrafish are able to feel pain. Given the laboratory animal science industry's constant quest to reduce, replace, and refine, does this change the zebrafish's role in research?

The research, conducted at the University of Liverpool, suggests that, with this discovery, zebrafish larvae would be a good model for the study of pain and nociception. This could replace the use of adult zebrafish for toxicity testing with larvae just days old.

"Zebrafish are genetically very similar to humans and they have comparable physiological responses so they act as a good model species to conduct biomedical and pharmaceutical testing on," study author Dr. Lynne Sneddon explained to *ALN*.

"Currently zebrafish at this age are not protected under European legislation and so one can consider them as a replacement (one of the

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Elizabeth
Doughman

Editor in Chief, ALN Magazine

🐦 @alnmagazine

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3Rs) for adults--these larval fish show similar behavioral responses that are ameliorated by analgesic drugs and this effectively validates their use instead of adults. Very little is known about pain-relief in fish and the drugs and doses tested will help refine (3Rs) our current protocols and inform the use of analgesics to reduce pain and promote good welfare."



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Five-day-post-fertilization zebrafish embryos were exposed to dilute concentrations of acetic acid and citric acid. These two compounds, found in vinegar and cleaning agents, have distinctive sour tastes and smells. Previous research has found that these compounds irritate adult fish.

The researchers then tracked the larvae's activity.

At the most dilute concentrations of acetic acid (0.01 and 0.1%), the larvae became less active. However, greater concentrations of acetic acid (0.25%) and any concentration of citric acid (0.1, 1, and 5%) caused the fish to swim harder and further, possibly to escape the uncomfortable sensation.

When pain medication--in the form of aspirin, morphine, and lidocaine--was administered, the fish larvae's behavior returned to normal.

"We still use rodents in experiments even though we know they experience pain so this finding should not prevent us from using zebrafish but it should promote scientists to consider their welfare more. So for example, if painful procedures such as surgery are employed researchers can use a pain-relieving drug to alleviate any pain and discomfort. So these findings should inform analgesic protocols in zebrafish studies," Sneddon concluded.

"It is vitally important that we seek to embed the 3Rs in our experimental planning and seek to reduce, replace and refine where we can. Good animal welfare equals good science, so in my opinion it's a no-brainer to strive to improve the way we keep and treat experimental animals."

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