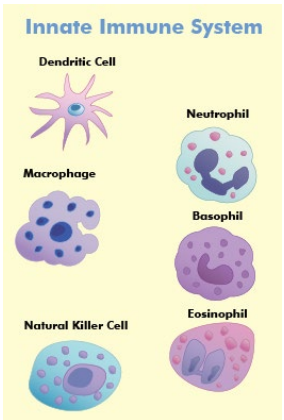
LAY ABSTRACT – ALISON PECQUET

Exposure to perfluorooctanoic acid (PFOA) decreases neutrophil migration response to injury in zebrafish embryos

The man-made chemical called PFOA, short for perfluorooctanoic acid, is used in many consumer products, such as non-stick cookware, water resistant outerwear, stain resistant coatings, cleaners, and even fire-fighting foams. PFOA can be found everywhere in the environment, including drinking water, and because it is a very stable chemical, it does not break down in the environment easily. This means that nearly all Americans have been exposed to PFOA and have small amounts of PFOA in our blood. This is a concern because PFOA has been found to suppress the immune system, which means that exposed people may become sick more often.

Our research team decided to investigate how PFOA was suppressing the immune system by testing the effect of PFOA on neutrophil response. The neutrophil is the 'first responder' of the innate immune system and is involved in 'neutralizing' and killing bacteria. So, if PFOA stops neutrophils from killing bacteria, it could lead to increased sickness. We used a zebrafish to test the effect of PFOA because it has a very similar immune system to humans. We found that if we expose the fish to PFOA while they were growing up, that it significantly reduced neutrophil function. This suggests that humans exposed to PFOA during development, perhaps in utero, may have reduced neutrophil function. This could result in a susceptibility to more infections and increased sickness later in life, along with other immune problems, and may help to explain how PFOA suppresses the immune system.

To view the full peer-reviewed article visit: https://doi.org/10.1186/s13104-020-05255-3. Alison Pecquet is a PhD candidate at the University of Cincinnati College of Medicine with a concentration in Environmental Genetics and Molecular Toxicology mailto:pecqueam@mail.uc.edu

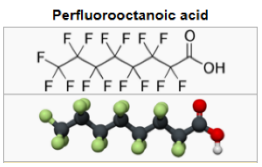


Innate immune system: The first and fastest acting cells and processes involved in attacking bacteria, viruses, or other harmful substances in your body.

Immune suppressant: An agent that suppresses or reduces the strength of the body's immune system.

Neutrophil: A type of white blood cell that is the first responder of the innate immune system to arrive at the site of infection or wound and begin clearing the infection or healing the wound.

PFOA: Perfluorooctanoic acid or PFOA, is a man-made chemical that is found in the environment because it is hard to break down. Many Americans are exposed to PFOA in drinking water and PFOA can be detected in our blood.



Zebrafish: A freshwater minnow that is used as a model to study human disease. Because zebrafish and humans share over 70% of their genes, they are being used to help reduce animal testing in mice and rats. Zebrafish innate immune systems are very similar to those in humans and so effects to the immune system in exposed zebrafish are probably very similar to what would be seen in exposed humans.