

New study gives clues on why exercise helps with inflammation

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Researchers have long known that moderate exercise has a beneficial impact on the body's response to inflammation, but what's been less understood is why. New research coming out of York University done

on a mouse model suggests that the answers may lie at the production level of macrophages—white blood cells responsible for killing off infections, healing injury and otherwise acting as first responders in the body.

"Much like if you train your muscles through exercise, we showed that exercise of moderate intensity ended up training the precursors of those macrophages in the [bone marrow](#)," says Faculty of Health Associate Professor and York Research Chair Ali Abdul-Sater with the School of Kinesiology and Health Science. "The way that exercise is doing this is by changing the way those cells breathe, essentially, how they use oxygen to generate energy and then changing the way they access their DNA."

While many studies look at temporary boosts to the [immune system](#) immediately after exercise, this study, published in the *American Journal of Physiology-Cell Physiology*, found these changes occurred even a week later, suggesting that the changes were long-term.

We often hear about inflammation in the body in the context of its negative effects, but inflammation is the body's response to infection and other stressors, and some level of inflammation is necessary and desirable.

"Inflammation is amazing, it's a very important part of our normal immune response," says Abdul-Sater. "What we're concerned about is excessive inflammation. Heart disease, diabetes, many cancers and [autoimmune diseases](#), all essentially begin because there was an inappropriate inflammatory response."

He says it is around the six-to-eight-week mark into the exercise regimen where changes really became apparent, compared with sedentary mice. "There's a lot of rewiring that's taking place in the circuitry of how the cells breathe, how the cells metabolize glucose, how the cells then access

DNA. So all that just takes time."

Abdul-Sater says that because the inflammatory response is a very ancient one, this aspect of the immune system is generally very similar across mammals, and he expects the research would translate well to humans. In the next phase, Abdul-Sater and collaborators from the university will collect [immune cells](#) from human volunteers who will do exercises of various intensities to see which workout routines are most beneficial to balance the [inflammatory response](#). They will also look at inflammation in mice in more complex infectious diseases similar to COVID-19 and autoimmune disease, where overactive inflammatory responses lead to poor outcomes.

"People that got seriously ill from COVID-19, went into what is called a cytokine storm essentially, they released this massive number of cytokines, those mediators that are produced by inflammatory cells, which then cause that accumulation of fluid in lungs."

While the findings that exercise is beneficial will not come as a surprise, Abdul-Sater says he hopes that by finding the underlying mechanisms of the beneficial impact, this knowledge can be put to good use.

"The thing with humans is there's no intervention that will work on everyone. We know that, but what this study suggests is that moderate and persistent exercise not only improves metabolic health, but also will improve immune health in the long run."

More information: Mayoorey Murugathasan et al, Moderate exercise induces trained immunity in macrophages, *American Journal of Physiology-Cell Physiology* (2023). [DOI: 10.1152/ajpcell.00130.2023](https://doi.org/10.1152/ajpcell.00130.2023)

Provided by York University

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