

Tiny Heros

We've all watched superhero movies: Superman flying through the sky, Spiderman shooting his iconic webs, or Batman riding in his Batmobile. What they all have in common is their ability to do things that are surreal. While Superman may not be real, heroes certainly are. To meet a real-life superhero, we don't have to look too far. The tardigrade is right under our noses.

Tardigrades, also known as water bears, are microscopic creatures that can withstand anything from high doses of radiation to decades without water. These mystical creatures have been around for millions of years and will most likely still be alive to see the day the sun dies. On top of all of this, they are able to withstand temperatures from -272 degrees to 150 degrees celsius. They can even survive in space without any assistance for up to ten or more days.

It's difficult to describe the exact superpower they possess because their resistance does not come from an incredible healing factor, like the anti-hero Deadpool. Under most extreme conditions, cells would be destroyed. Yet, these microscopic creatures somehow manage to beat the odds. Tardigrades have a damage suppressor protein, often referred to as Dsup. Scientists at the Centre for Plant Biotechnology did a study to find out how Dsup works. Findings show that Dsup protein is "intrinsically disordered" or, in simpler terms, flexible, which means that Dsup can adjust its structure to protect the tardigrade from almost anything.

Tardigrades hold the key to many of the world's greatest mysteries. The possibilities range from things like a potential cure to cancer to enhanced humans that can easily survive a trip to Mars. So far, researchers were able to use tardigrade proteins to make human cells more resistant to the effects of X-rays. When Dsup was added to human kidney cells, results showed that the damage the kidney sustained was only half as much as normal.

The future applications of the tardigrade's abilities are limitless! But what if I told you that its capabilities can even be used to help with COVID-19? Some newly created vaccines have one big drawback: Vaccines like Pfizer's must be kept at a minimum temperature of -70 degrees Celsius, even during transportation. In less developed or rural areas, having access to a cooling system at all times is way too expensive and impractical. According to Dr. Maria Kamilari, a postdoctoral researcher in evolutionary ecology at the University of Copenhagen, adding Dsup protein to COVID vaccines should be able to stabilize the components and remove the need to keep the vaccine cold.

Some people may not consider tardigrades to be superheroes because they don't fight intense battles like the heroes we see in movies. However, being a superhero isn't always about fighting. It's about saving lives. Which is something that these water bears have the potential to do better than any vaccine or medicine.

Arbulu, R. (2020, December 22). Response to the tardigrade's high resistance may be useful for humans in the future. Retrieved from <https://olhardigital.com.br/en/2020/12/22/ciencia-e-espaco/resposta-para-alta-resistencia-do-tardigrado-pode-ser-util-para-humanos-no-futuro/?gfetch=2020%2F12%2F22%2Fscience-and-space%2Fresponse-to-the-late-resistance%27s-high-resistance-may-be-useful-for-humans-in-the-future%2F>

Bittel, J. (2016). Tardigrade protein helps human DNA Withstand radiation. Retrieved from <https://www.nature.com/news/tardigrade-protein-helps-human-dna-withstand-radiation-1.20648>

Deaton, J. (2019, October 14). What is a tardigrade? Retrieved from <https://www.nbcnews.com/mach/science/what-tardigrade-ncna1065771#:~:text=Tardigrades%20are%20semi%2Daquatic.,commonly%20found%20living%20in%20moss>

Hooper, R. (2020, August 20). Secret to tardigrades' toughness revealed by supercomputer simulation. Retrieved from <https://www.newscientist.com/article/2252583-secret-to-tardigrades-toughness-revealed-by-supercomputer-simulation/#:~:text=They%20have%20also%20breezed%20through,that%20somehow%20shields%20the%20DNA>

Pappas, S. (2020, January 16). Adorable tardigrades have a surprising, fatal weakness. Retrieved from <https://www.livescience.com/indestructible-tardigrades-cannot-survive-heat.html>

Saey, T. (2019, October 10). How tardigrades protect their dna to defy death. Retrieved from <https://www.sciencenews.org/article/tardigrades-dna-damage-radiation-death>

Sowders, T. (2020, August 05). These gummy bear-looking things will inherit the earth. Retrieved from <https://college.unc.edu/2018/08/tardigrades/>

Willmer, G. (2019, October 24). Dried-out tardigrades could point way to drug preservation, resilient crops. Retrieved from <https://horizon-magazine.eu/article/dried-out-tardigrades-could-point-way-drug-preservation-resilient-crops.html>