

Hibernating frogs give clues to halting muscle wastage

July 1 2014



A burrowing frog (*Cyclorana alboguttata*) is shown emerging from dormancy. Credit: Dr. Karen Young, University of Queensland

Scientists at the University of Queensland, Australia, have identified key genes that help burrowing frogs avoid muscle wastage whilst they are dormant. These genetic insights could help prevent muscle atrophy in bedridden human patients, or even astronauts.

For most [mammals](#), including humans, when muscles are inactive over a long period, they lose condition and waste away. However, some animals can remain dormant for several months and yet suffer minimal [muscle](#) damage. These include green-striped burrowing [frogs](#) (*Cyclorana alboguttata*) which occupy arid environments in Australia. When resources are scarce, these frogs survive by burrowing underground and wrapping themselves in a cocoon of shed skin.

Lead investigator, Beau Reilly (PhD Student) says: "If we can understand the cell signalling pathways that confer resistance to muscle wasting, then these could be useful candidates to study in mammalian [muscle atrophy](#)." These could help to develop therapies to treat bedridden human patients or even astronauts, who frequently lose [muscle tone](#) when exposed to reduced-gravity conditions.

One of the genes identified is known as survivin. This appears to protect cells from a "suicide" mechanism which normally removes damaged or diseased cells. Interestingly, this gene has also been shown to be highly active in human cancer cells. Another gene, checkpoint kinase 1, regulates cell division and DNA repair.

In mammals, inactive muscles can become damaged by highly charged molecules called Reactive Oxygen Species (ROS). These are thought to degrade proteins, causing the muscles to waste away. Dormant burrowing frogs, however, seem to suffer less damage from ROS. This may be due to increased levels of protective antioxidants, including the compounds thioredoxin and sulfiredoxin. Similar results have also been found in hibernating mammals, such as squirrels.

"I am fascinated in animals that survive in extreme conditions" Miss Reilly added. "I think humans and modern medicine could learn a great deal from organisms such as burrowing frogs".

Provided by Society for Experimental Biology

Citation: Hibernating frogs give clues to halting muscle wastage (2014, July 1) retrieved 24 April 2024 from <https://phys.org/news/2014-07-hibernating-frogs-clues-halting-muscle.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.