Humans' 'inner salamander' capacity could regrow cartilage

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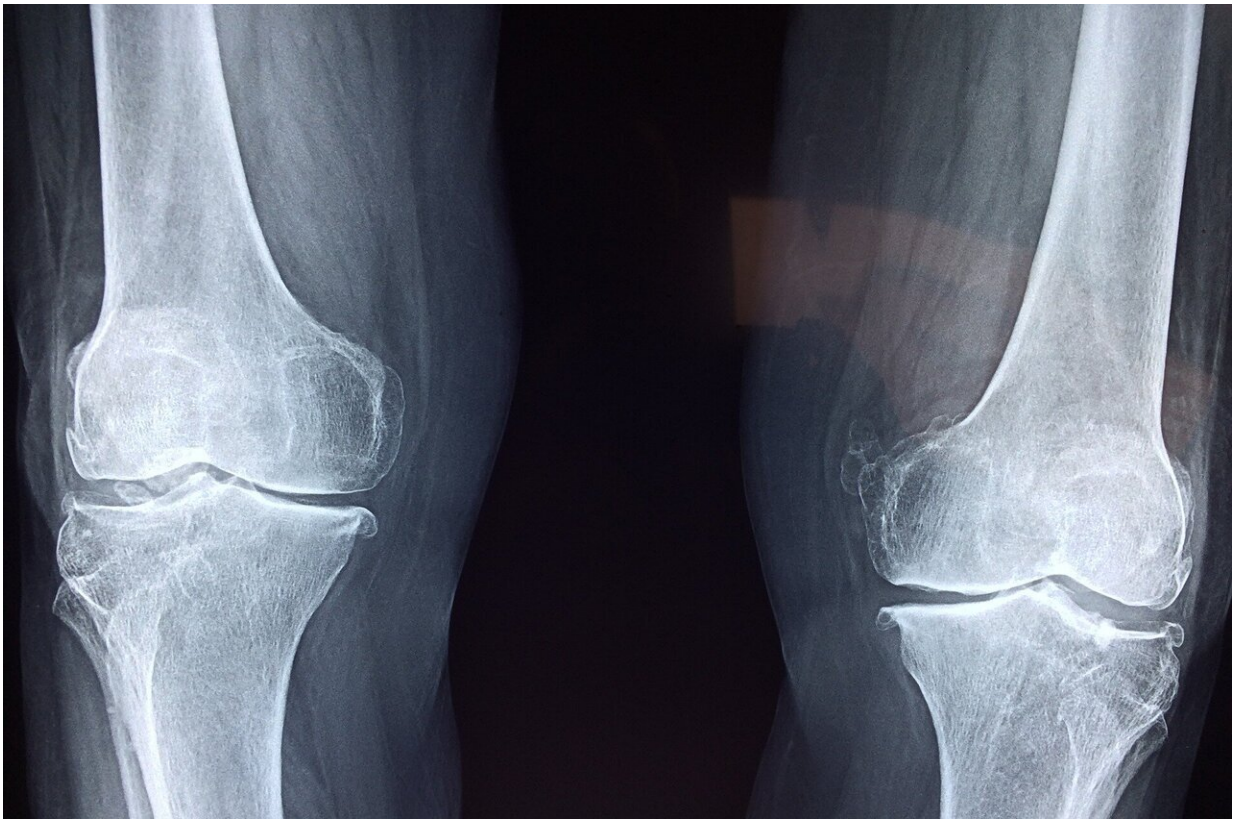

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Humans have the ability to regrow cartilage, a new study has found.

In a way similar to how salamanders and other creatures can regrow lost

limbs, humans have the capacity to repair and regenerate cartilage in their joints, researchers at Duke Health discovered.

"We believe that an understanding of this 'salamander-like' regenerative capacity in humans, and the critically missing components of this regulatory circuit, could provide the foundation for new approaches to repair joint tissues and possibly whole human limbs," said senior author Virginia Byers Kraus, a professor in the departments of medicine, pathology and orthopedic surgery at Duke.

The researchers learned that molecules called microRNA regulate the regeneration process. These microRNAs are more active in animals known for limb, fin or tail repair, including salamanders, zebrafish, African freshwater fish and lizards.

These microRNAs are also found in humans—an evolutionary artifact that provides the capability in humans for joint tissue repair, according to a press release by Duke Health.

"We were excited to learn that the regulators of regeneration in the salamander limb appear to also be the controllers of joint tissue repair in the human limb," lead author Ming-Feng Hsueh said. "We call it our 'inner salamander' capacity."

The researchers said microRNAs could be developed as treatments to prevent, slow, or reverse arthritis.

"We believe we could boost these regulators to fully regenerate degenerated cartilage of an arthritic joint. If we can figure out what regulators we are missing compared with salamanders, we might even be able to add the missing components back and develop a way someday to regenerate part or all of an injured human limb," Kraus said. "We believe this is a fundamental mechanism of repair that could be applied

to many tissues, not just cartilage."

The research team also learned the "age" of cartilage depends on where it is in the body. "Cartilage in ankles is young, it's middle-aged in the knee and old in the hips," they found. This could explain why knees and hips take longer than ankles to heal, and why arthritis is more common in hips and knees.

More than 10% of Americans older than 60 experience knee pain related to osteoarthritis, the most common disease of the knee joint. In osteoarthritis, the cartilage in the knee joint gradually wears away.

The Duke Health study was published in the journal *Science Advances*. You can read the full study here, bit.ly/310raui.

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