

A hidden conversation inside injured tissue may hold clues to regeneration

By Gabriela Harrod, ASU News
August 6, 2026

When tissue is damaged, healing isn't simply a matter of growing new cells. The body also has to know when to stop growing and begin rebuilding. If those steps happen out of order, the tissue may never fully recover.

Researchers, led by Arizona State University Associate Professor [Rob Harris](#), have discovered what appears to be a previously unrecognized communication system that helps coordinate those two stages of repair.

[Published in iScience](#), the study reveals that injured tissue sends tiny membrane-bound particles carrying a temporary "wait" message to neighboring cells, delaying rebuilding until enough new tissue has grown.

The findings offer a new way of thinking about regeneration. Rather than simply telling surrounding cells to grow, injured tissue appears to actively control when rebuilding begins, ensuring growth happens before cells take on their final specialized roles.

"We found that there are two steps to successful regeneration," said Harris, from the School of Life Sciences. "One is regrowing the actual size of the tissue, then repatterning it."

Think of rebuilding after a natural disaster. Construction crews don't start installing windows or painting walls before the foundation and framing are complete. Regenerating tissue faces a similar challenge.

"If you try to repattern things too soon," Harris said, "you don't end up growing anything. You just have a small, shrunken structure."

Learning from fruit flies

To understand how tissues coordinate those two jobs, Harris' lab studies regeneration in fruit flies.

Although fruit flies may seem far removed from humans, they share many of the same biological pathways that control growth and development. Their more accessible and tractable genetics also make it easier for scientists to uncover the fundamental rules that guide tissue repair.

The team's work focused on a structure called the wing disc, a larval tissue that develops into an adult wing. When researchers genetically damage part of the tissue, it can entirely regenerate, providing an ideal system for studying how living tissues rebuild themselves.

The researchers identified a gene called *Asperous* that becomes active only after injury. Surprisingly, the gene isn't needed during normal development, unlike almost all genes currently known to be involved in regeneration. Fruit flies develop normally without it, but when tissue is damaged, regeneration no longer works correctly. That suggested *Asperous* plays a role unique to the healing process.

The biggest surprise came when the team discovered how the gene works.

Rather than sending signals directly from one cell to another, *Asperous* is packaged into tiny membrane-bound particles known as extracellular vesicles. Scientists have known for years that these microscopic packages help cells communicate during normal development and have become an important focus of cancer research, where tumors use them to send signals throughout the body. Researchers are even exploring them as a way to detect cancer through noninvasive "liquid biopsies."

What hadn't been recognized was that they might also play a role in regeneration.

"To my knowledge, no one has discovered these vesicles as a mechanism of communication during regeneration in the way our research has," Harris said.

The Harris lab team found that these vesicles temporarily capture one of the body's major developmental signals, called the "Wnt" signal. During normal development, Wnt helps tell cells when it's time to organize into specialized tissues. During regeneration, however, Harris and his colleagues found that the vesicles briefly hold onto that signal instead of allowing it to spread immediately.

"It's like a stop signal," Harris said. "It says, 'Wait a minute. Don't repattern yet; not until we've restored some of the cells that we're missing.'"

Once enough new tissue has grown, the stop signal fades, allowing the rebuilding process to begin.

The discovery suggests that successful regeneration depends not only on replacing lost cells, but also on precisely timing when those cells receive instructions to become muscle, skin or other specialized tissue. The findings also introduce what appears to be an entirely new layer of communication between injured and healthy cells during regeneration.

"Everyone knows that cells talk to each other in these very characterized ways," he said. "But this whole vesicle thing is pretty new and different. This is another layer of communication."

What's next?

The researchers have already identified one important molecular message carried by these vesicles. Next, they hope to learn what other signals they transport and whether similar communication systems exist in other animals capable of regenerating more complex structures, such as mammalian digit tips. If they do, the findings could reshape how scientists study regeneration across many species.

The project also brought together expertise from across ASU. Harris' lab collaborated with [Petra Fromme](#)'s group at the [Biodesign Center for Applied Structural Discovery](#), whose expertise in protein structure helped reveal how Asperous functions. Undergraduate researchers also contributed to the project, giving students hands-on experience with cutting-edge research.

Although the research won't lead to new therapies overnight, Harris says discoveries like this demonstrate why fundamental science matters.

"The only way we can understand how our basic biology functions is by studying organisms that have very similar building blocks to us," he said. "It's like looking at the base of the pyramid."

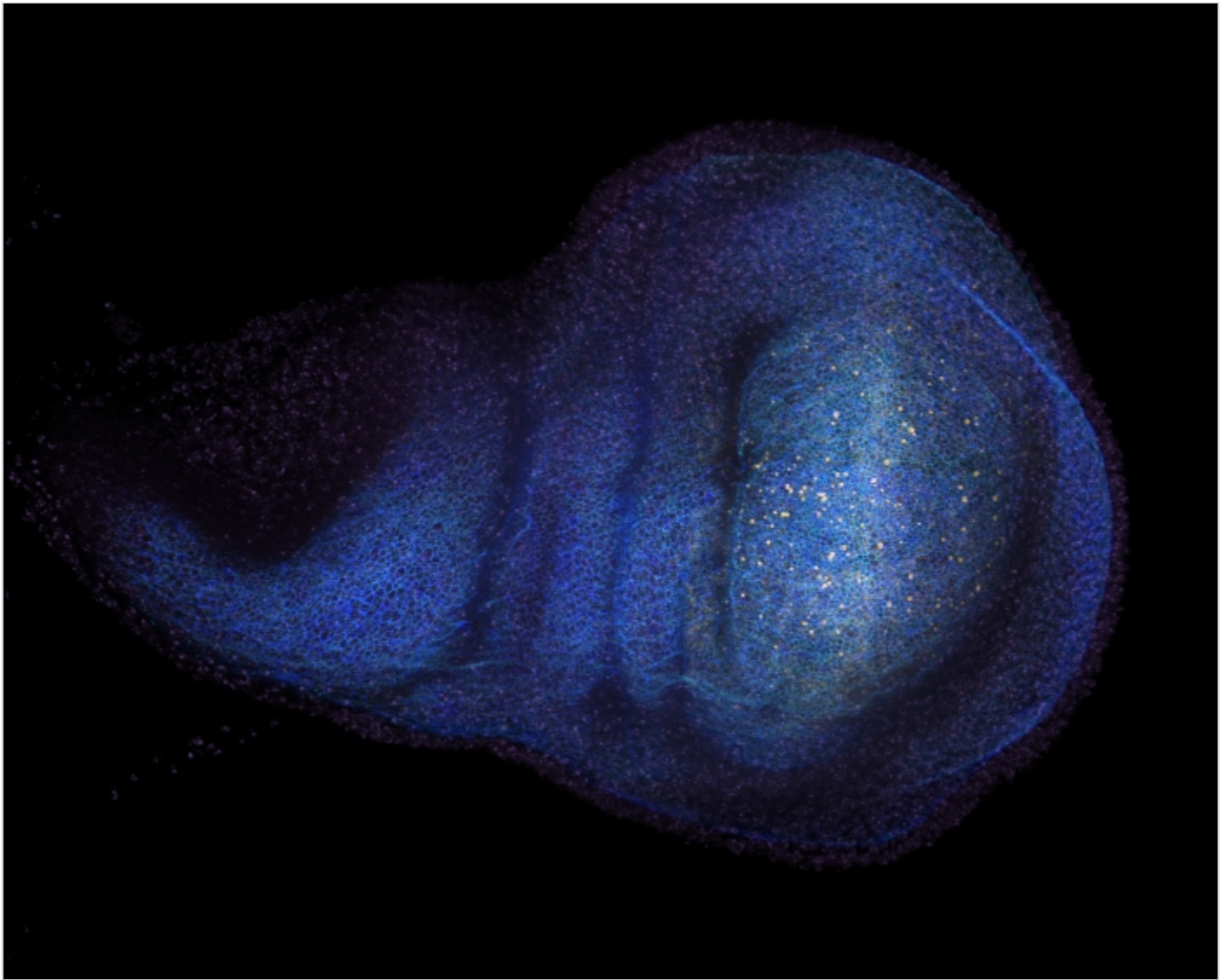
For Harris, the study answers one important question while opening many more.

"When you think you've almost got the whole picture, you realize there's 10 times more. We don't know what we don't know."

That, he says, is what makes studying regeneration so compelling. Every discovery reveals another piece of the puzzle — and brings scientists one step closer to understanding how the body rebuilds itself after injury.

This story originally appeared on [ASU News](#).

Main image



A *Drosophila* wing imaginal disc expressing Asperous, a damage-induced extracellular EGF-domain protein required for regeneration. Asperous associates with the Wnt signaling molecule, limiting its distribution and preventing premature activation of late patterning programs during tissue repair. Asperous-containing extracellular vesicles are highlighted in gold within the wing pouch. Cell junctions are shown by DE-Cadherin (cyan), the apical membrane marker Crumbs (blue) and nuclei by DAPI (purple). Photo courtesy of Maksym Dankovskyy/ASU