

Docket #: S23-487

Eliminating "Zombie" Nerve Cells to Treat Chronic Pain After Injury

Researchers at Stanford have discovered a new cellular target for treating chronic pain caused by injury or surgery, opening the door to a potential new class of non-addictive pain medications.

Chronic pain affects 1 in 3 Americans and becomes increasingly common with age, with more than half of adults over 65 living with at least one chronic pain condition. Despite the scale of the problem, treatment options remain limited, and many widely-used pain medications carry serious risks of addiction and abuse.

This technology is based on the discovery that certain nerve cells involved in transmitting pain signals can become senescent or "zombie-like". Senescence is a dysfunctional state where cells cannot die off naturally and instead release inflammatory signals that keep the nervous system in a heightened state of pain sensitivity. Stanford researchers also found that these senescent cells accumulate after injury and increase with age.

By targeting these cells with a class of drugs called senolytics, already being explored for diseases like Alzheimer's, researchers were able to significantly reduce pain in animal models without disrupting normal sensation. This approach could form the basis of a new generation of non-addictive pain medications.

Stage of Development

Proof of concept - in vivo

Applications

- Non-addictive pain medications for patients with chronic pain following injury or surgery
- Treatments for age-related chronic pain conditions

- Platform for developing drugs that selectively clear dysfunctional nerve cells

Advantages

- First known approach to target senescent "zombie" nerve cells for pain relief
- Short treatment course may produce long-lasting relief
- Senescent cells confirmed in human nerve tissue, supporting potential for clinical translation

Publications

- Donovan, L. J., Brewer, C. L., Bond, S. F., Laslavic, A. M., Pena Lopez, A., Colman, L., ... & Tawfik, V. L. (2025). "[Aging and injury drive neuronal senescence in the dorsal root ganglia.](#)" *Nature Neuroscience*, 28(5), 985-997.

Patents

- Published Application: [WO2025137459](#)

Innovators

- Vivianne Tawfik
- Lauren Donovan

Licensing Contact

Cheryl Cathey

Senior Licensing and Strategic Alliance Manager

[Email](#)