

Signpost of cancer linked to wound-healing properties

Protein linked to cancer and chronic illnesses found to have natural benefit

By Richard Harth, ASU News
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When doctors detect elevated levels of SerpinB3 in a blood test, it can signal that something is seriously wrong, from hard-to-treat cancers to severe inflammatory conditions.

SerpinB3 is a critical protein that often reveals when the body's barrier tissues, like the skin or lungs, are under serious stress from cancer or chronic illness.

But new research from Arizona State University shows that SerpinB3, long recognized as a disease marker, also has a natural role in the body: helping to heal wounds.

Skin wounds remain a major challenge for medicine. Of the roughly 6 million wounds that occur annually in the U.S., many are difficult to treat and are often linked to diabetes, burns, infection or advanced age. Together, these hard-to-heal wounds cost an estimated \$20 billion each year.

[In a new study](#), coauthors [Jordan Yaron](#), [Kaushal Rege](#) and their colleagues with the [Biodesign Center for Biomaterials Innovation and Translation](#) discovered that SerpinB3 is part of the body's natural wound-healing arsenal, helping the skin recover after damage.

The research points to new possibilities: Boosting it could improve wound healing, while blocking it may offer a way to fight aggressive cancers. The findings may also help explain SerpinB3's role in inflammatory ailments, from skin conditions to asthma.

The research appears in Proceedings of the National Academy of Sciences.

Why this research matters

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The study grew out of a convergence of the team's broader work on [bioactive materials](#) for wound repair and expertise studying a family of proteins called serpins — short for serine protease inhibitors. Serpins act as important regulators of diverse processes such as blood clotting and immune regulation throughout the body, with several serpins having apparent roles in keeping tissue breakdown and repair in balance.

"When we looked deeper into how our bioactive nanomaterials were helping tissue repair ... SerpinB3, a protein originally implicated in cancer, jumped at us as a key factor that correlated with nanomaterial-driven wound healing," Rege said. "This journey, which started from use-inspired research on biomaterials for tissue repair to uncovering the fundamental role of this protein as an injury-response mechanism in skin, has been truly fascinating. We are now building on this basic finding and investigating the role of SerpinB3 in other pathological conditions."

Rege is a professor of chemical engineering and director of the Biodesign Center for Biomaterials Innovation and Translation. Yaron is an assistant professor of chemical engineering and faculty with the center. Both investigators hold academic appointments with the [School for Engineering of Matter, Transport and Energy](#) at ASU.

SerpinB3's split identity

Many serpins are linked with disease when their balance in the body goes awry, showing up in inflammation, fibrosis and cancer. One member of this family, SerpinB3, has been used extensively in cancer tests as an indicator of aggressive disease.

SerpinB3 — also known as squamous cell carcinoma antigen-1 — was first discovered in cervical cancer tissue in 1977. It has long been applied as a biomarker of aggressive cancers in the lung, liver and skin, where high levels are tied to poor outcomes.

"For more than four decades, SerpinB3 has been recognized as a driver of cancer growth and metastasis — so much so that it became a clinical diagnostic. Yet after all this time, its normal role in the body remained a mystery," Yaron said. "But when we looked at injured, healing skin, we found that cells moving into the wound bed were producing enormous amounts of this protein. It became clear that this is part of the machinery humans evolved to heal epithelial injuries, a process that cancer cells have learned to exploit to spread. This now opens the doors to understanding how this protein is involved in many more diseases."

How SerpinB3 helps wounds close

By tracking which genes switch on during healing, the researchers found that SerpinB3 levels surged in wounded skin. The increase was especially strong in wounds covered with [advanced biomaterial dressings](#), a finding built on the group's earlier research, showing how such materials can boost the body's natural repair signals.

In lab tests, adding extra SerpinB3 made skin cells move and cover wounds faster, working as effectively as a well-known healing booster called Epidermal Growth Factor. SerpinB3 works by activating

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keratinocytes — the skin cells that normally move in to repair damage. When switched on, these cells become less sticky and more mobile, allowing them to slide into the wound and rebuild tissue.

The protein also assists the body's natural repair networks, guiding healing and new tissue growth. Treated wounds showed more neatly arranged collagen fibers, which act as a support structure, helping restore the skin's strength and integrity.

Implications for care

The researchers note that more work is needed to understand how SerpinB3 fits into the body's broader systems of healing. Because SerpinB3 speeds up repair, it could one day be developed as a treatment for stubborn wounds — like pressure sores and other ulcers that heal slowly over time.

By revealing SerpinB3's double life, the study shows how a deeper understanding of the body's own repair systems could lead to better treatments for wounds — and new strategies to fight cancer.

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

Main image



ASU researchers Jordan Yaron and Kaushal Rege have found that the previously mysterious protein SerpinB3 plays a vital role in the body's natural wound-healing process. Their findings could lead to better treatments for hard-to-heal wounds and open new avenues for tackling cancer

and other diseases. Graphic by Jason Drees/ASU

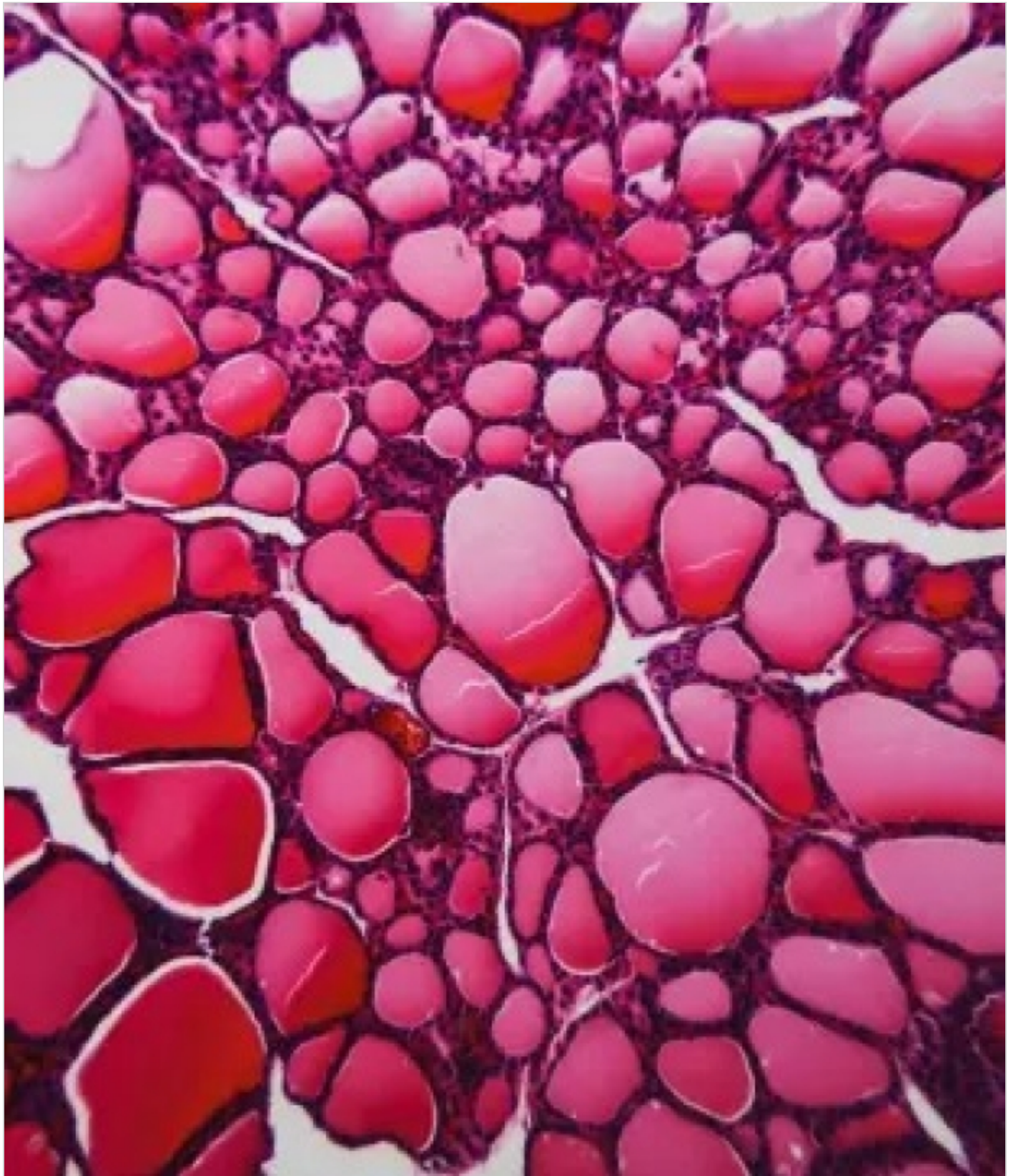
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Kaushal Rege



Jordan Yaron



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