Although human skin heals from injuries and wounds, many of us have scars that are left behind. Scar formation happens in adult mammals because skin regeneration does not fully occur. This poses a challenge to physicians who wish to conduct surgeries without scars appearing afterwards. In a newly published article in *Biomedicines*, a team led by researchers at the University of Tsukuba, Japan, investigated the use of the adult newt, *Cynops pyrrhogaster*, as a model system for studying scarless wound healing for technology development in surgical and cosmetic medicine.

After an injury occurs, the epidermis, which is the outer layer of the skin, can grow and migrate to fill in the wound. This is known as re-epithelialisation. Although this takes place, the original skin colour and texture are sometimes not retained, leading to the appearance of what we know as a scar. Processes called granulation and dermal fibrosis underpin scar formation, making them a focus for scientists aiming to minimise scarring following clinical procedures. Amphibians have been used as animal models for studying this because they do not scar prior to metamorphosis. However, it is not clear what happens to fully mature amphibian skin.

“We chose to examine the adult Japanese fire-bellied newt, which is a type of salamander that is well understood on the genetic level,” explains Dr. Tatsuyuki Ishii, lead author of the study. “We know adult newts are capable of complicated tissue, organ and limb regeneration. Despite that, their ability to regenerate skin has not been scientifically demonstrated.”

The team excised a small piece of skin from various body parts of adult newts, including the head, trunk, limbs and abdomen. They periodically observed the skin healing and regeneration progression for up to 2 years, making note of re-epithelialisation and dermal fibrosis, as well as recovery of texture, appendage and colour.

“Interestingly, we found that the adult newts could successfully and fully regenerate their skin at each part of the body that we examined,” describes Professor Chikafumi Chiba, senior author. “Re-epithelialization occurred at all locations, while no dermal fibrosis was observed at all.”

However, the original colour pattern of the dorsal-lateral and ventral skin was not restored. Because humans do not have such colour patterns, the researchers believed this to be a newt-specific issue. Thus, they concluded that *Cynops pyrrhogaster* could be a perfect model system for investigating skin regeneration and scar formation in humans.

The team also further studied skin regeneration in these newts at the morphological and molecular level. The wounds tended to heal within only a few days, while skin regeneration took up to 2 years to complete. Inflammatory gene markers were only briefly expressed during wound healing.

“Dermal fibrosis is often characterized by prolonged inflammation at the wound site,” explains Dr. Ishii. “Scar-free skin occurred in the newts through rapid re-epithelialization and skipping of granulation and dermal fibrosis.”

Overall, these findings will be crucial for future studies in humans focussing on efforts to prevent scarring in human skin following various medical procedures.

**2 | APL BIOENGINEERING**

Researchers from the University of Birmingham and the University of Huddersfield developed an approach to print skin equivalents. The material may play a future role in facilitating the healing of chronic wounds.

The technique is the first of its kind to simulate three layers of skin: the hypodermis, or fatty layer, the dermis and the epidermis.

To solve this problem, the scientists used suspended layer additive manufacturing (SLAM). They created a gel-like material to support the skin equivalent, twisting and altering the structure of the gel as it formed to create a bed of particles that can then support a second phase of gel injection.

During printing, the skin layers are deposited within the support gel, which holds everything in place. After
printing, the team washed away the support material, leaving behind the layered skin equivalent.

If the researchers moved a needle through the supporting gel, it repaired itself faster than other similar techniques. This results in higher resolution printing than previous methods and allows for the printing of complicated skin structures.

The authors tested the skin substitute by cutting a hole in pig tissue and printing a skin equivalent to fill the hole. After culturing the model system for 14 days, they saw signs of wound repair.

The team cannot assess chronic wound healing with the skin substitute because that process takes more time than their model allowed, which was only 14 to 21 days. However, their next step is to test longer, appropriate models for chronic deep wounds. The ultimate goal is to repair human skin and reduce scarring for all patient scenarios.

3 | JOHNSON & JOHNSON

3.1 | Microsoft

Johnson & Johnson Medical Devices Companies Announces Strategic Partnership with Microsoft to Further Enable its Digital Surgery Solutions

The Johnson & Johnson Medical Devices Companies announced that it will collaborate with Microsoft to further enable and expand JJMDC’s secure and compliant digital surgery ecosystem. The Microsoft Cloud will help JJMDC realise its vision of driving innovation that advances skills, improves workflow and enhances surgical decision making for a better overall customer experience and improved patient and economic outcomes.

JJMDC’s innovative medical technology exists across an ecosystem that includes next generation robotics, world-class instrumentation, advanced imaging and visualisation, data and analytics, artificial intelligence, machine learning and digital solutions. To mobilise the potential of these assets and make a clinical difference for patients, it is imperative to establish robust connectivity with, and between, all elements of the ecosystem with a seamless, interconnected network that meets surgeons where they are in their workflow and patients where they are in their healthcare journey.

“Collaborating with Microsoft will help take our digital approach to the next level as we create a best-in-class, unified platform across our innovative surgical technologies,” said Larry Jones, Group CIO and Global Vice President, Medical Devices, Johnson & Johnson. “It brings together our collective expertise and is an exciting step towards creating a connected patient journey across the entire care continuum, before, during, and after a procedure.”

As part of the strategic partnership, Microsoft will serve as JJMDC’s preferred cloud provider for the company’s digital surgery solutions and help JJMDC build out its digital surgery platform and internet of things (IoT) device connectivity. By harnessing the power of the Microsoft Cloud, including Azure, artificial intelligence (AI) and machine learning, Microsoft 365 and Dynamics 365, the companies expect to work together to deliver innovation across the following areas:

- Innovating to improve patient outcomes through artificial intelligence, machine learning and data insights.
- Increasing JJMDC device connectivity, insights and intelligence using Azure IoT and Edge Computing technologies.
- Increasing the pace of digital innovation and transformation across the JJMDC digital surgery ecosystem using Azure capabilities and services.

“At the Johnson & Johnson Medical Devices companies, we’re shaping a future where medical intervention is smarter, less invasive, and more personalized,” said Peter Schulam, MD, PhD, Global Head, Medical Affairs, Clinical Affairs and Pre-Clinical Research, Johnson & Johnson Medical Devices Companies, and Leader, Office of Digital Innovation. “We’re excited to collaborate with Microsoft on this important work as we continue to expand our digital surgery assets and capabilities, develop innovative and advanced instrumentation, and make a meaningful clinical difference for customers and patients.”

4 | ASTRAZENECA

4.1 | New Vaxzevria data further support its use as third-dose booster

Positive results from a preliminary analysis of an ongoing safety and immunogenicity trial (D7220C00001) showed that Vaxzevria (ChAdOx1-S [Recombinant]), when given as a third-dose booster, increased the immune response to Beta, Delta, Alpha and Gamma SARS-CoV-2 variants, while a separate analysis of samples from the trial showed increased antibody response to the Omicron variant.

The results were observed among individuals previously vaccinated with either Vaxzevria or an mRNA vaccine.

A separate Phase IV trial reported in a preprint with The Lancet on SSRN showed that a third dose of Vaxzevria substantially increased antibody levels following a primary vaccine series with CoronaVac (Sinovac Biotech).
These data add to the growing body of evidence supporting Vaxzevria as a third-dose booster irrespective of the primary vaccination schedules tested. The Company is submitting these additional data to health authorities around the world given the urgent need for third-dose boosters.

The D7220C00001 safety and immunogenicity trial showed that Vaxzevria continued to be generally well tolerated. Further analyses from the trial are expected in the first half of 2022.

Previous studies support Vaxzevria as a third-dose booster as part of a homologous or heterologous schedule. In a sub-analysis from the COV001 and COV002 trials, a third dose of Vaxzevria given at least 6 months after a second dose significantly boosted antibody levels and maintained T-cell response. It also resulted in higher neutralising activity against the Alpha, Beta and Delta variants, compared with a two-dose regimen. The COV-BOOST trial also showed that a third-dose booster of Vaxzevria induced significantly higher immune responses compared with controls against the Delta variant and original strain following a primary vaccine series of Vaxzevria or Pfizer BioNtech (BNT162b2).

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