



JOINT NEWS RELEASE

Singapore, 27 Jul 2022

NTU Singapore and Cuprina upcycle frog skin into clinical-grade collagen for chronic wounds and skin healing

A new clinical-grade collagen made from discarded bullfrog skin is leapfrogging from the lab bench to clinics soon.

The collagen is developed by materials scientists from **Nanyang Technological University, Singapore (NTU Singapore)** in collaboration with Singapore medical technology firm **Cuprina Wound Care Solutions (Cuprina)**, which specialises in developing products that treat chronic wounds, such as those suffered by diabetes patients.

Through NTU's innovation and enterprise company, **NTUitive**, the patented technology for converting waste bullfrog skin into skin wound healing products has been exclusively licensed to Cuprina for scale-up and commercial production.

If successful, this new product will complement Cuprina's flagship product MEDIFLY, a bio-dressing made of live, medical-grade *Lucilia cuprina* maggots, which is used in Maggot Debridement Therapy.

MEDIFLY is clinically proven to eliminate chronic wound infections and reduce amputation rates caused by wounds, especially in cases associated with diabetic foot ulcers, and is used by hospitals and specialist clinics across Singapore.

Chronic wounds affect 1 in 20 patients in Singapore. Coupled with diabetes affecting 1 in 10 patients and a rapidly aging population, the risk of developing a chronic wound is high and demand for affordable chronic wound care is expected to increase.

As part of the scale-up, Cuprina has established a Good Manufacturing Practice (GMP) compliant satellite lab at the Life Science Incubator in Singapore, to replicate NTU's collagen extraction and dressing product development.

Founder and Chief Technology Officer of Cuprina Holdings, Mr Carl Baptista, said: “Our focus is always on promoting and encouraging natural wound healing, intervening only to help the body do what it does organically. With NTU’s patented technology, we can develop a line of natural, amphibian-derived collagen products that are highly compatible with the human body. It is this compatibility that leads to improved healing outcomes over what is currently available.”

Mr Baptista added that existing research documents the complementary effects that maggot therapy and collagen have on instances of wound healing. These studies focus on bovine collagen, but what intrigued Cuprina about amphibian-derived collagen, was its potentially greater biocompatibility with humans compared to traditional collagen sources, and therefore its ability to improve the quality of wound healing.

Sustainable way to turn waste into treasure

Currently, 20 million tonnes¹ of fishery by-products, such as fins, scales, and skins, are discarded every year, and the combined annual consumption of frog flesh and fish is estimated to be around 100 million kilograms.

Using this seafood waste to create valuable collagen is a sustainable way to up-cycle and reduce waste for Singapore, as the country is driving towards its Zero Waste Masterplan and encouraging a circular bioeconomy.

This research and commercialisation effort will help Singapore to achieve its aim of becoming a sustainable, resource-efficient, and climate-resilient nation, says **Associate Professor Dalton Tay** from NTU’s **School of Materials Science and Engineering**, an expert in animal and plant biomass valorisation, who developed the innovation.

“As part of the NTU 2025 Strategic Plan and its Sustainability Manifesto, we are developing innovative ways to turn waste into useful materials to tackle some of humanity’s greatest challenges. NTU’s expertise of transforming waste biomass into valuable feedstocks is now highly sought after by industry looking towards sustainable sources. In our partnership with Cuprina, we are glad to be able to fulfil both the circular bioeconomy aims and the healthcare demands of Singapore with one innovation,” explains Assoc Prof Tay.

By using this collagen-rich marine by-product as a raw material, the team hopes to reduce wastage and the product cost of pure collagen at scale, so as to bring an affordable but effective wound-care solution to the public.

¹ [1 Fishery Wastes as a Yet Undiscovered Treasure from the Sea: Biomolecules Sources, Extraction Methods and Valorization](#) published in Marine Drugs, 2020, 18(12), 622.

Earlier this year, Cuprina's joint proposal with NTU to develop and fast-track the commercialisation of this unique collagen product was announced as one of the winning entries of the **Sustainability Open Innovation Challenge** organised by **Enterprise Singapore**.

How the new collagen patch helps healing

Wounds typically go through three phases of healing – inflammatory, proliferative, and maturation – the process is highly complex and requires specific interventions at each phase. Cuprina designs and tailors products for each phase to optimise healing.

During the inflammatory phase, the body produces enzymes that prevent infection from entering the bloodstream. However, the enzymes also prevent unwanted matter from being pushed out of the body, thus making it difficult for the wound to heal. MEDIFLY works with these enzymes to clean up and disinfect the wound, and prepare the site for the next phase. This activity is vital to ensure the effects of the new collagen patch can be fully maximised to produce optimal healing results.

For the second phase, the collagen patch aims to provide a scaffold for the white blood cells and healing agents to coagulate and form a protective layer for the healing to begin. It will also encourage faster recovery by keeping the healing wound moist.

In the final phase, the collagen patch will continue to encourage faster recovery by keeping the healing wound moist and providing collagen as a “building block” material for skin to mature.

Mr David Quek, CEO of Cuprina Holdings said partnership with NTU is the perfect example of how cutting-edge medical products can be developed while simultaneously removing waste from the environment.

“The purpose driving our business is harnessing the power of nature to fuel sustainable development. Sustainability and development are not mutually exclusive, to us they are highly compatible. Our partnership with Assoc Prof Dalton Tay and his team at NTU provides a unique opportunity to combine sustainable practices in the form of waste valorisation with novel wound care product development. Like Cuprina, pushing the boundaries of science is in NTU's DNA - we could not ask for a better partner,” Mr Quek added.

The two-year research and scale-up partnership includes plans for the conduct of clinical trials in local hospitals to validate its safety and efficacy.

END

Media contact:

Lester Kok
Senior Assistant Director
Corporate Communications Office
Nanyang Technological University, Singapore
Tel: +65 6790 6804
Email: lesterkok@ntu.edu.sg

Izzy Colthurst-Kang
Project & Partnerships Manager
Cuprina Wound Care Solutions
Email: izzy@cuprina.com.sg

About Nanyang Technological University, Singapore

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,000 undergraduate and postgraduate students in the Engineering, Business, Science, Medicine, Humanities, Arts, & Social Sciences, and Graduate colleges.

NTU is also home to world-renowned autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI) and Energy Research Institute @ NTU (ERI@N).

Under the NTU Smart Campus vision, the University harnesses the power of digital technology and tech-enabled solutions to support better learning and living experiences, the discovery of new knowledge, and the sustainability of resources.

Ranked amongst the world's top universities, the University's main campus is also frequently listed among the world's most beautiful. Known for its sustainability, over 95% of its building projects are certified Green Mark Platinum. Apart from its main campus, NTU also has a medical campus in Novena, Singapore's healthcare district.

For more information, visit www.ntu.edu.sg

About Cuprina Wound Care Solutions

Cuprina Wound Care Solutions, a Cuprina Holdings company, specialises in the development of products to treat chronic wounds. Founded in 2019 with a vision to take patients from chronic to closure, the company seeks to develop an end-to-end product line informed by cutting-edge scientific research and innovation that will improve the lives and outcomes of chronic wound sufferers. The company's heritage in applied entomology inspires a unique approach to wound care solutions that incorporates insights from the natural world, culminating in innovative products. For

more information, visit www.cuprina.com.sg/woundcaresolutions or follow [@CuprinaWoundCareSolutions](https://www.linkedin.com/company/cuprina-wound-care-solutions) on LinkedIn.