

## NUS scientists develop gel that heals diabetic wounds three times faster

Having diabetes often means having slow-healing wounds like chronic diabetic foot ulcers.

With more than half a billion people living with diabetes worldwide and that number projected to more than double to 1.3 billion people in the next 30 years, a team of researchers from the National University of Singapore (NUS) has developed a magnetic gel that promises to heal diabetic wounds three times faster and lower the rate of amputations.

The team has come up with a wound-healing hydrogel loaded with two types of US Food and Drug Administration-approved skin cells and tiny magnetic particles. The gel is applied to a bandage and placed on the wound.

To maximise therapeutic results, the team built a prototype wireless magnetic device to activate the skin cells on the gel, accelerating the healing process.

When exposed to a dynamic magnetic field generated by the ex-

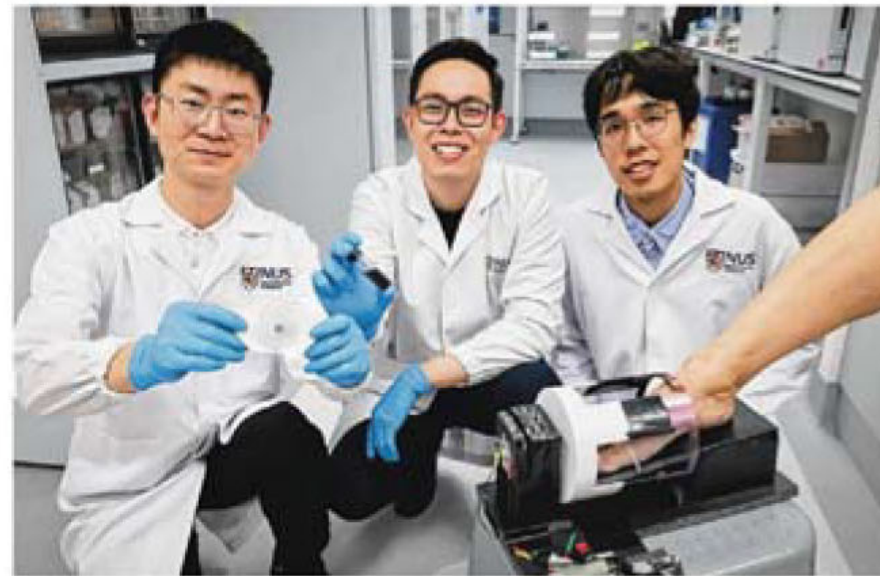
ternal device, the magnetic particles move around – not too vigorously – moving the cells with them.

Lab tests have shown that the treatment with magnetic stimulation heals diabetic wounds three times faster than current conventional approaches.

“We have identified this ‘sweet spot,’” said Assistant Professor Andy Tay of the Department of Biomedical Engineering at the NUS College of Design and Engineering, and principal investigator at the NUS Institute for Health Innovation and Technology.

“By applying gentle mechanical stimulation, the skin cells (on the bandage) interact with the patient’s own skin cells, giving them a ‘workout’ to heal wounds. This approach not only accelerates wound healing but also promotes overall wound health, reducing the chances of recurrence.”

Prof Tay added: “Conventional dressings do not actively heal



(From left) Dr Le Zhicheng, Assistant Professor Andy Tay and Dr Shou Yufeng with the magnetic wound-healing gel and a prototype magnetic device to activate the skin cells on the gel, accelerating wound healing. ST PHOTO: GAVIN FOO

wounds. They just prevent them from worsening. The patient (also) needs to change the dressing often, resulting in huge costs for them

and the healthcare system.”

The research, published in scientific journal *Advanced Materials*, was in collaboration with sci-

entists from the Agency for Science, Technology and Research, or A\*Star; Nanyang Technological University; Sun Yat-sen University in Guangzhou, China; and Wuhan University of Technology in Wuhan, China.

The team aims to start human trials in two years.

Another unconventional – and perhaps the oldest – way of treating diabetic foot ulcers is the use of maggot therapy, which is found to be effective and efficient in debriding non-healing foot ulcers. Debriding refers to the removal of damaged tissues from a wound.

Maggot debridement therapy is used in several public hospitals here, including the Singapore General Hospital (SGH), National University Hospital and Khoo Teck Puat Hospital.

Medical-grade maggots are produced and supplied by home-grown medical device company Cuprina.

Its laboratory director, Mr Carl

Baptista, said: “Maggots are able to distinguish between healthy and unhealthy tissue on a biochemical level, and actively seek out and consume (dead) tissue from wounds. The treatment is still not so widely accepted because of the ‘ick factor’, not just by the patients but also by doctors and nurses.”

The therapy is used to treat poor-healing chronic wounds, persistent wounds, or when patients are not suitable for other debridement methods.

“In addition to patients with diabetic foot ulcers, maggot debridement therapy can also be used for patients with other wounds like venous leg ulcers or pressure injuries on the lower limb,” said SGH’s head of vascular surgery Chong Tze Tec.

He said the team at SGH did a study in 2021 with 15 patients completing maggot debridement therapy, and found two in three did not require further amputation.

Judith Tan