

Singapore scientists turn unwanted fat into wound-healing gel



NTU Associate Professor Andrew Tan, NTU Assistant Professor Cleo Choong and their clinical partner Dr Marcus Wong holding the various applications containing ANGPTL4. PHOTO: NTU

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SINGAPORE - Once or twice a week, a deliveryman drives up to the School of Materials Science and Engineering at Nanyang Technological University (NTU), and alights with an airtight plastic cylinder containing bags of human fat tissue labelled "biohazard".

He takes it to the lab of Assistant Professor Cleo Choong, who puts the fat tissue through a battery of centrifuges, filters and pressurised gas chambers.

She and her associates are extracting a substance that may one day heal serious skin wounds without leaving a scar - helping surgery patients, diabetics with chronic lesions, burn victims and many others.

The benefactors are liposuction patients of plastic surgeon Marcus Wong who have consented to the use of their unwanted body fat for this game-changing collaboration between an aesthetic doctor and a materials scientist.

The secret ingredient in their recipe, which is found in abundance in fat tissue and the placentas of pregnant women, is a protein called ANGPTL4.

Fellow project leader, Associate Professor Andrew Tan, whose team at NTU's School of Biological Sciences has been studying ANGPTL4 for most of the past decade, said the protein reduces the effect of Scleraxis, a gene that causes collagen fibres in healing wounds to line up parallel to one another and become more visible.

When the protein is present, the collagen forms a mesh of fibres that not only makes the scar less visible but also gives it strength in multiple directions.

Referring to the protein, Prof Tan said: "We found a 'tuning knob' that controls the amount of collagen produced, instead of turning it off completely."

ANGPTL4 does other good things as well - it stimulates cell movement to close the wound and promotes blood vessel formation.

It can be mixed into materials for easy application, such as sheets of gel for wound healing.

The researchers, who have so far tried their concoctions on lab mice, found that normal wounds healed about twice as fast with ANGPTL4, while diabetic wounds healed about three times faster with the protein, even though diabetic wounds almost never heal completely.

Furthermore, wounds dressed with ANGPTL4 develop scars that are less visible, yet stronger.

The researchers, who published their findings in the journal Scientific Reports recently, are now trying to refine the product and make it in larger amounts.

They estimate about five years to commercial availability if funding and clinical trials go smoothly.

Prof Choong said: "It could mean that, in future, a surgeon can use the patient's fat and turn it into a healing agent on the spot, to promote faster recovery of the patient's wounds after an operation."

Companies have also expressed interest in incorporating it into consumer products like adhesive plasters.

Dr Wong, who used to practise at Tan Tock Seng Hospital and now runs his own clinic at Gleneagles Medical Centre, is glad to help.

He said slow-healing wounds can have socioeconomic impacts by reducing people's mobility or prolonging hospital stays.

"Wounds are not just a surface problem," he added.