Dr Phan holding his proprietary mixture of proteins and sugars that keeps umbilical cord tissue alive. He discovered the use of stem cells in umbilical cord lining in making cells for the skin, cornea, bone and other body parts.
ST PHOTO: LAU FOOK KONG

People

Birthing new skin with umbilical cord stem cells

umbilical cord, after his wife gave birth. He tried the placenta first, and realised quickly that that the blood it came with made it too contaminated to work with. He took a break in his lab, and had a "eureka" moment, which eventually changed his life.

He said: "I turned my eye to the next bottle, which had the umbilical cord floating in there. It was very clean and there was no blood contamination – white in colour, floating beautifully in the bottle

Hospital (SGH) then, Professor Lee Seng Teik. Prof Lee offered Dr Phan a job on his team in 1997 and he was tasked with healing wounds and creating skin cells.

"We had to take the skin cells from the patient's unburnt area and expand them in the lab, and put it back on them," he said.

Sometimes the cell did not do well and needed time to expand.

"It wasn't scalable. The whole process was very expensive. We only

Doctor's fascination with wound healing turns into a $700m biotech company

Jalelah Abu Baker

Wounds may cause some to look away, but stem cell researcher Phan Toan Thang sees "magic" in them.

"I like wounds. I see the wound healing. It's something amazing," he said. The chief scientist's passion for healing wounds led him to discover a way to create skin cells quickly and in large quantities by using the lining from umbilical cords.

Rather than using the limited available amount of a patient's skin to help heal a burn, the cells from the umbilical cord lining can provide an unlimited reserve of unprogrammed cells to create new skin and bone, and even other body parts, such as the cornea in the eye.

Such methods could potentially heal wounds from burns or diseases such as diabetes.

Cellresearch Corp, a biotech company he founded with group chief executive Gavin Tan and fellow plastic surgeon and skin researcher Ivor Lim in 2002, now owns 39 patents worldwide. They include patents for extracting stem cells from umbilical cord lining, banking and cultivating them, and for therapeutic applications. The company is now worth $700 million.

Work is under way for the technology to be approved by the globally recognised the United States Federal Drug Administration (FDA), he told The Straits Times at his workplace, a 3,000 sq ft lab in Ayer Rajah Crescent. The cells are being manufactured in Denver and the first clinical trial on patients is expected to start early next year.

"Non-healing wounds are a big medical burden everywhere. They are associated with diabetes, stroke, heart problems and ageing," he said, explaining the importance of the technology, which can make it affordable for patients to get skin grafts.

Dr Por Yong Chen, vice-chairman of the board of the Chapter of Plastic, Reconstructive & Aesthetic Surgeons, said FDA approval will put Singapore on the map.

"Wound healing is a big market, especially because of diabetics," he said. "This is a significant breakthrough. I think a lot of people are going to try to do the same thing."

Dr Phan has come a long way since he started his career here as a scientist and researcher in the burns unit in Singapore General Hospital.

He came here from Vietnam in 1997 and is now a Singaporean.

In 2002, the same year Cellresearch Corp was founded, Dr Phan went to the Institute for Stem Cell Biology and Regenerative Medicine, at Stanford University in the US, which he was collaborating with.

In the two years there, he discovered that researchers were trying to separate stem cells from the placenta for liver repair.

When he returned to Singapore in 2004, he decided to experiment with the placenta and umbilical cord. At the time, stem cells found in umbilical cord blood were already being used to help cure patients of diseases such as leukaemia, and other blood cancers and disorders. He has CEO Mr Tan to thank for getting the ball rolling.

It was Mr Tan who gave him two bottles to experiment with, one holding a placenta and one with an

QUIET DETERMINATION

Back then, I lived in the lab. I turned off my phone and my wife used to go crazy. Back then, no one cared about skin. They were focusing on cancer and heart problems. We were just quietly doing it.

STEM CELL RESEARCHER PHAN TOAN THANG

HARD WORK

There were many challenges in moving forward to perfect a product, and to make it inexpensive enough for everyone to use. It's not easy. But luckily, we managed to do it.

DR PHAN

He failed several times to perfect the medium, a proprietary combination of sugars and proteins that keep the tissue in the umbilical cord alive, and decontaminating it at the right level.

"Back then, I lived in the lab. I turned off my phone and my wife used to go crazy," the father of three laughed. He would even rush to the lab if he had a sudden idea on how to make it work.

"Back then, no one cared about skin. They were focusing on cancer and heart problems. We were just quietly doing it," he said.

Dr Phan started his career as a plastic surgeon dealing with wounds in an army hospital in Vietnam in 1991 after graduating with a degree in medicine from the Military Medical University in Hanoi.

"I had no time, no money to fool around. So I just focused on studying. Worked very hard, learnt Russian, learnt English," he added.

In 1995, he went on a fellowship to Oxford University in Britain after a dermatology professor from there who was visiting the army hospital offered him the chance. It was a move that eventually led him to his life in Singapore.

While at Oxford, he met a Singaporean who put him in touch with the head of plastic surgery at the burns unit at Singapore General

very difficult to sustain," he said.

About a year later, he met co-founder Dr Lim, who joined him as a fellow registrar. Together, they focused on understanding scar formation.

In 2001 and 2002, Dr Phan won awards for identifying a function in surface skin that causes scarring.

At the time, research was being done using stem cells from embryos, which raised many red flags. By focusing on the umbilical cord, Dr Phan sidestepped the touchy topic.

Dr Phan, who is also an associate professor at the department of surgery at the National University of Singapore's Yong Loo Lin School of Medicine, achieved his goal using umbilical cord – something considered medical waste. But it can provide a whopping six billion stem cells to expand into skin, bone, the cornea and other parts.

Despite his achievements and a company worth $700 million, the devout Catholic is humble and puts some aspects of his discovery down to chance and luck.

He said: "There were many challenges in moving forward to perfect a product, and to make it inexpensive enough for everyone to use. It's not easy. But luckily, we managed to do it."

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