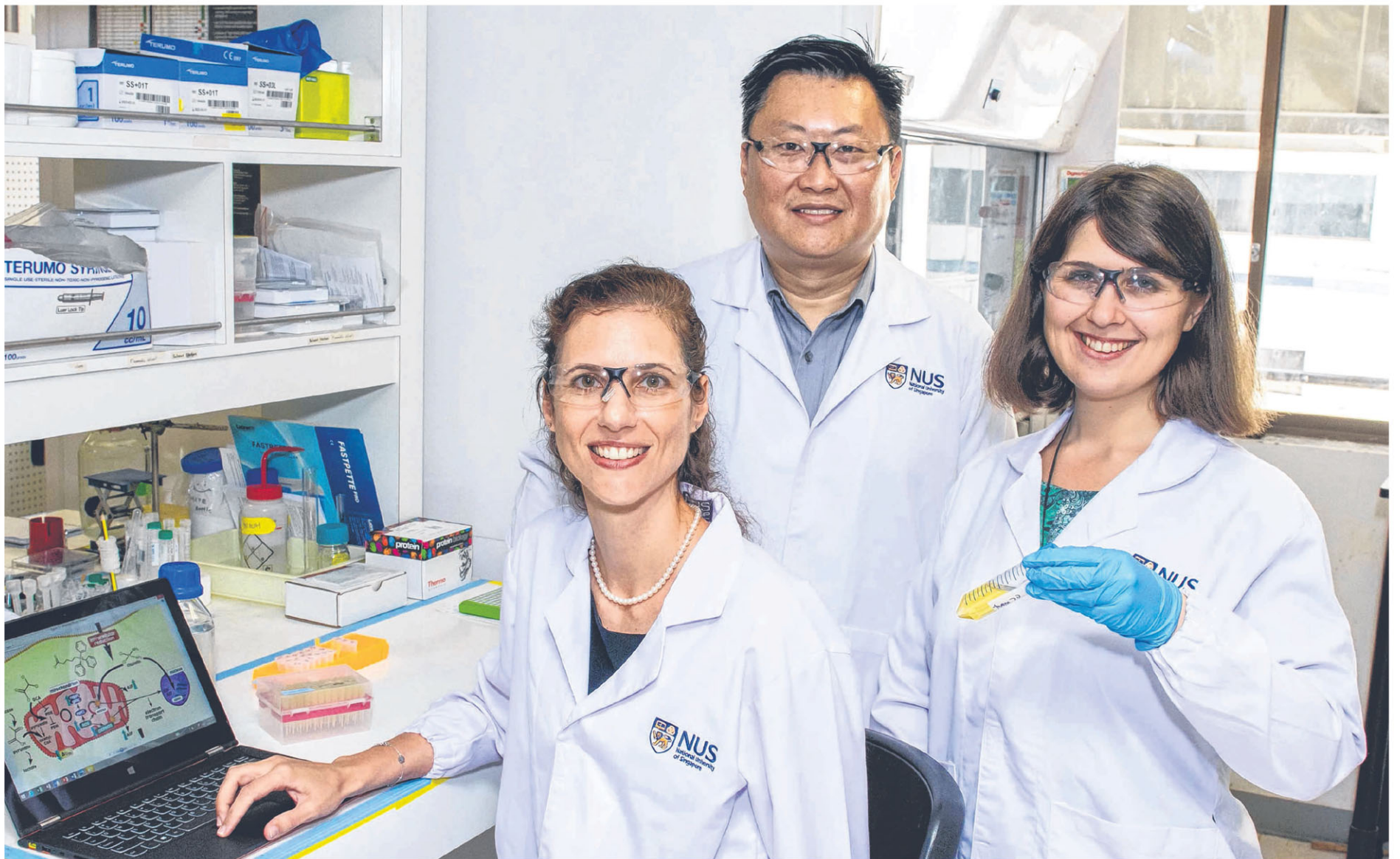


Associate Professor Ang Wee Han, Associate Professor Giorgia Pastorin and Dr Maria Babak (far right) with the new drug they are developing that can distinguish between cancer and healthy cells. PHOTO: NATIONAL UNIVERSITY OF SINGAPORE



# NUS team designing anti-cancer drug that has fewer toxic effects

## New drug can zero in on energy centres of cancer cells while avoiding healthy ones

Timothy Goh

Scientists here are developing an anti-cancer drug which, unlike its peers, can “home in” on the energy production centres of cancer cells and destroy them – leaving healthy cells and tissues untouched in the process.

Together with a counterpart from the Hebrew University of Jerusalem, the team of three researchers from the National University of Singapore (NUS) is developing an anti-cancer drug with better treatment outcomes to serve as an alternative to cisplatin, a platinum-based drug which has been used since 1965.

One of the researchers, Associate Professor Ang Wee Han from NUS’ Department of Chemistry, told *The Straits Times* that platinum drugs

are used as the first line of therapy for ovarian and testicular cancer, and widely used to treat colorectal, lung and stomach cancer.

But while cisplatin and other platinum drugs have improved the cure rates of cancer patients around the world, they have toxic side effects, causing severe kidney dysfunction in patients.

This is because these drugs cannot distinguish between normal, healthy tissue and cancer tissue, said Dr Maria Babak, one of the researchers.

Prof Ang added: “Cisplatin is known to kill cancer cells by damaging DNA. But cancer cells are smart, and they have ways to repair this damage and become resistant to drug treatment.”

The team came up with a two-pronged solution to address these problems.

First, they modified the existing molecular structure of cisplatin, attaching a “homing device” known as a mitochondrial sensitiser to it.

This sensitiser is attracted to the mitochondria, or energy production centres, of the cancer cell. It interferes with them, causing the cancer cell to produce energy at a much slower rate, which is insufficient to meet the high demand of cancer cells, as they replicate rapidly.

This enhances the anti-cancer effects of cisplatin.

Second, the team encased the entire structure of the drug in a nanoparticle, which is bigger than a molecule of cisplatin. Previously, cisplatin was so small that it would pass through the tiny gaps in healthy blood vessels, causing unwanted effects in healthy tissues.

The nanoparticle casing, however, is too large to penetrate these gaps – but the drug can still pass through the gaps in blood vessels of cancer tissues, which are larger.

This reduces the toxic side effects of the drug while allowing a

### SECRET WEAPON

**It’s something like a Trojan horse, with a hidden weapon inside.**



**DR MARIA BABAK**, a researcher on the project, on the nanoparticle used to encase cisplatin, which is used to kill cancer cells.

more targeted attack against cancer cells, said the researchers.

“It’s something like a Trojan horse, with a hidden weapon inside,” said Dr Babak.

The new drug, which is injected into patients, is in its pre-clinical phase of development but has already shown remarkable results at this stage. Tumours could no longer be detected after 20 days, and there were no signs of kidney toxicity.

Associate Professor Giorgia Pastorin, the team’s third member,

said: “While our results show great potential, we want to further challenge ourselves to improve our drug so we can achieve complete tumour remission and tackle drug resistance.

“Such a feat will open doors to improving cancer treatment and survival rates.”

According to the Singapore Cancer Registry Annual Registry Report 2015, colorectal cancer is the most common form of cancer among Singaporean men and the second-most common in Singaporean women, affecting about 10,000 people between 2011 and 2015.

Lung cancer is the second-most common form of cancer in Singaporean men and the third-most common among Singaporean women, with around 7,000 people affected in the same period.

Breast cancer was the most common cancer in Singaporean women in this period.

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