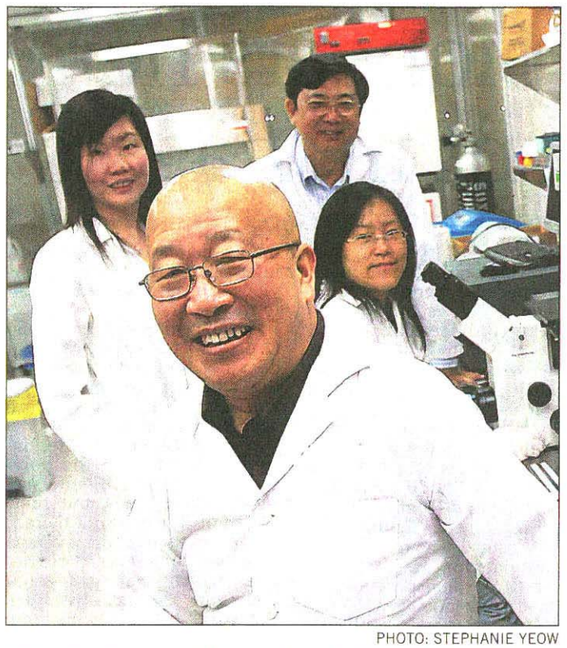

PHOTO: STEPHANIE YEOW

HEALTHY CELLS SPARED: Prof Feng (foreground), 60, with team members Dinah Tan (left), 27, and Sun Bingfeng, 27; and Professor Teoh Swee Hin, 51, director of the Centre for Biomedical Materials Applications and Technology at NUS.

Fighting cancer the 'nano' way

NUS researchers develop better drug delivery method, with fewer side effects

By Michelle Neo

NANOPARTICLES – which are so small that they cannot be detected under a standard microscope – may provide the key to battling breast, ovarian and lung cancers, research by the department of chemical and biomolecular engineering at the National University of Singapore (NUS) shows.

A team from NUS has developed a new method of delivering existing drugs that it believes will be less physically traumatic to patients and hence improve the drugs' effectiveness.

The team, led by Professor Feng Si-Shen, used anti-cancer drug Pacitaxel.

Normally, Pacitaxel is dissolved into an agent called Cremphor EL, which often triggers severe reactions in patients, including weakened immune systems and complete hair loss.

Steroids are administered to suppress these side effects, but this can produce a whole new set of problems, including weight gain and high blood pressure, according to Dr Wong Nan Soon, 37, a consultant oncologist at the National Cancer Centre, Singapore.

By dressing Pacitaxel in the ultrafine nanoparticles, which are derived from vitamin E, the problems commonly associated with chemotherapy can be significantly reduced, says Prof Feng.

Nanoparticles transporting the anti-cancer drug are equipped with "homing" devices in the form of antibodies, which are attracted only to antigens on the surface of cancer cells.

Healthy cells are spared.

The tiny size of these particles – less than one-thousandth the diameter of a human hair – allows them to pass more effectively through the blood vessels that supply tumours.

They are also biodegradable, which in theory means they are non-toxic.

Although Prof Feng and his team have yet to conduct clinical trials, laboratory tests on rats injected with colon cancer cells have yielded impressive results.

The new drug formulation was able to remain active for 168-336 hours after each dose of 10mg/kg, more than seven times longer than the current formulation for Pacitaxel.

But tests conducted in the human body may have varying results, said Dr Wong.

Prof Feng admitted the road to clinical trials is not easy, with more than $10 million in funding needed to take the technology from bench to bedside within the next three years.

Nonetheless, the technology is very significant, said Dr Wong.

"Such local research could provide opportunities for tie-ups with local institutions and boost the availability of such medicines here," he said.

If successful in clinical trials, both Prof Feng and Dr Wong agree that the technology's applications could expand to other anti-cancer drugs.

Currently, the only nanoparticle cancer treatment available is Abraxine, which is confined largely to the US market.

It costs more than $6,000 for a single dose – more than three times that of the current Pacitaxel formulation.

The technology has also gained recognition in international research journals like Nanomedicine and Biomaterials.

Cancer is Singapore's No. 1 killer, accounting for more than one in four deaths.

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