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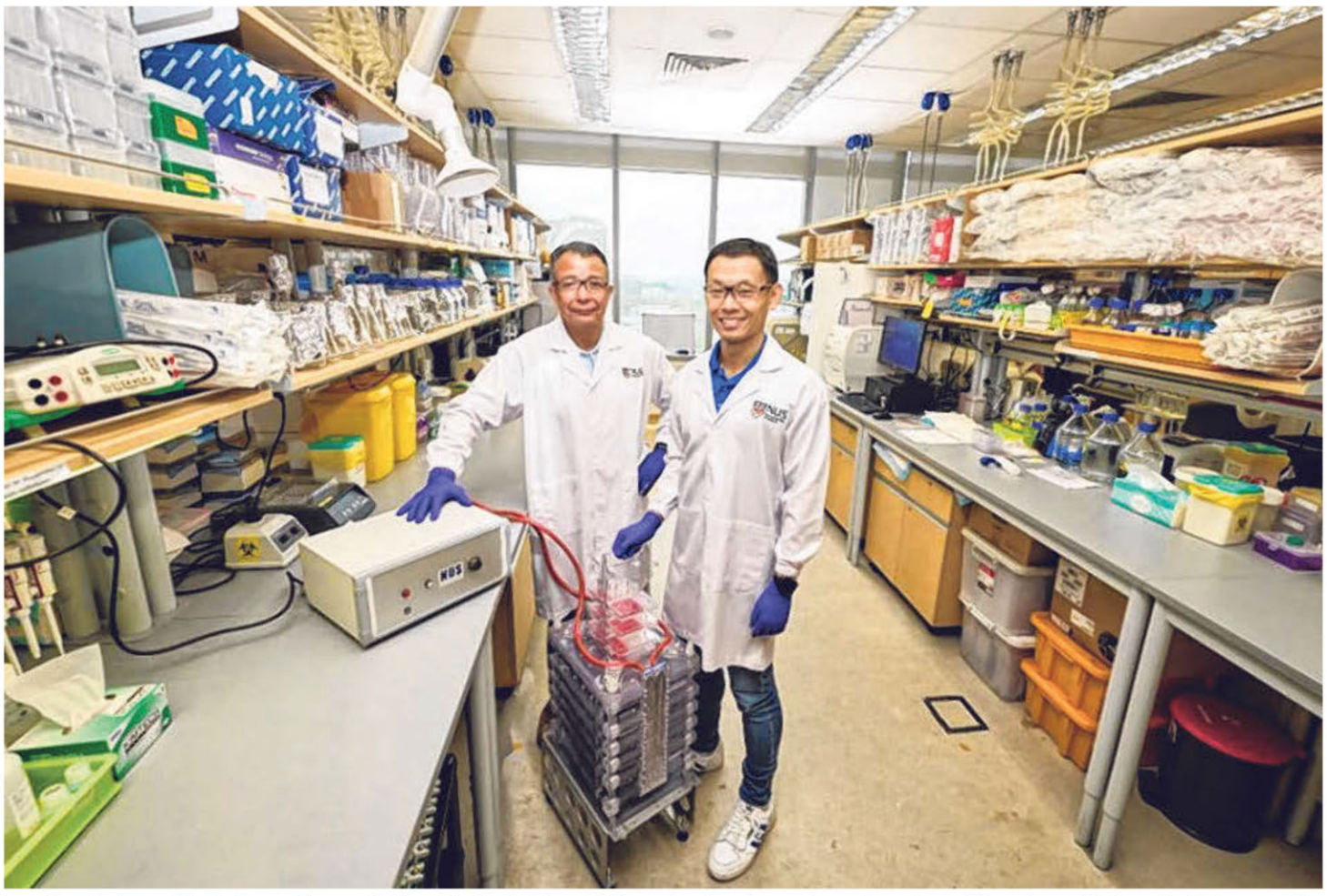

Associate Professor Alfredo Franco-Obregon (left) and Dr Alex Tai from NUS have developed a novel way of growing cell-based meat. Their method joins a growing global movement shifting from the traditional way of growing cell-cultured meat with animal serum. PHOTOS: NUS INSTITUTE FOR HEALTH INNOVATION & TECHNOLOGY

NUS scientists develop magnetic method to grow meat

Innovative approach involves pulsing magnetic field through animal cells

Ang Qing

Scientists from the National University of Singapore (NUS) have found a novel use for magnetic pulses to grow cell-cultured pork.

The inter-disciplinary team has so far successfully validated its approach with pork muscle cells, said Associate Professor Alfredo Franco-Obregon, who led the research.

Their method joins a growing global movement that is shifting from the traditional way of growing cell-cultured meat with animal serum, which is derived from the blood of unborn calves of slaughtered pregnant cows.

By pulsing a magnetic field through animal cells, researchers from NUS' Institute for Health Innovation and Technology and NUS Yong Loo Lin School of Medicine observed that the cells release a myriad of molecules that have regenerative, metabolic, anti-inflammatory and immunity-boosting properties.

"These substances are part of what is known as the muscle 'secretome' and are necessary for the growth, survival and development of cells into tissues," said Prof Franco-Obregon, who has been researching the use of magnets to enhance muscle growth and function for a decade.

A bioreactor (above) passes the magnetic fields through the cells. A 10-minute exposure can cause cells to multiply better and survive longer than the outcome of adding animal serum to cells, says Prof Franco-Obregon.

The NUS team's research was published in scientific journal Biomaterials in August.

A 10-minute exposure of these cells to pulsing magnetic fields can cause them to multiply better and survive longer than the outcome of adding animal serum to cells, he added.

Prof Franco-Obregon said the non-ionising magnetic fields used to culture meat are of a low-energy range and, like gravity, are ever present and necessary for survival.

GROWING TISSUE

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ASSOCIATE PROFESSOR ALFREDO FRANCO-OBREGON, on the myriad of molecules released by the cells.

Professor William Chen, director of Nanyang Technological University's (NTU) Food Science and Technology programme, said further investigation is needed before this technology can be used for cultivated meat.

Researchers would need to replicate magnetic-induced growth over a longer period as cultivated meat production takes more than a few hours to achieve sizeable muscle biomass.

They would also need to understand the long-term impact of applying a pulsed magnetic field, he added, noting that if the cells are used for meat production and need to be regularly stimulated, changes to cell DNA may need to be monitored.

So far, electromagnetic fields in the non-ionising part of the electromagnetic spectrum cannot damage DNA or cells directly and studies of animals have not provided any indication that these fields are associated with cancer, according to the United States' National Cancer Institute.

Said Prof Franco-Obregon: "Cost-wise, it's just building a bioreactor that requires an initial investment of between $20,000 and $30,000, unlike serum or other drugs for growth that need to be reproduced each time they are used up."

A patent has since been filed for the NUS team's technology, and the university is currently in discussion with potential industry partners to commercialise it.

Singapore became the first country to approve the sale of a cell-cultured meat product – chicken bites by start-up Eat Just – in December 2020, after the authorities determined that it was safe for consumption.

"Initially relying on animal serum, increasing global efforts in looking for alternative and cheaper replacement of animal serum have generated promising results," said Prof Chen, citing NTU's research in using fermented soya bean residue to replace animal serum at a fraction of the cost.

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