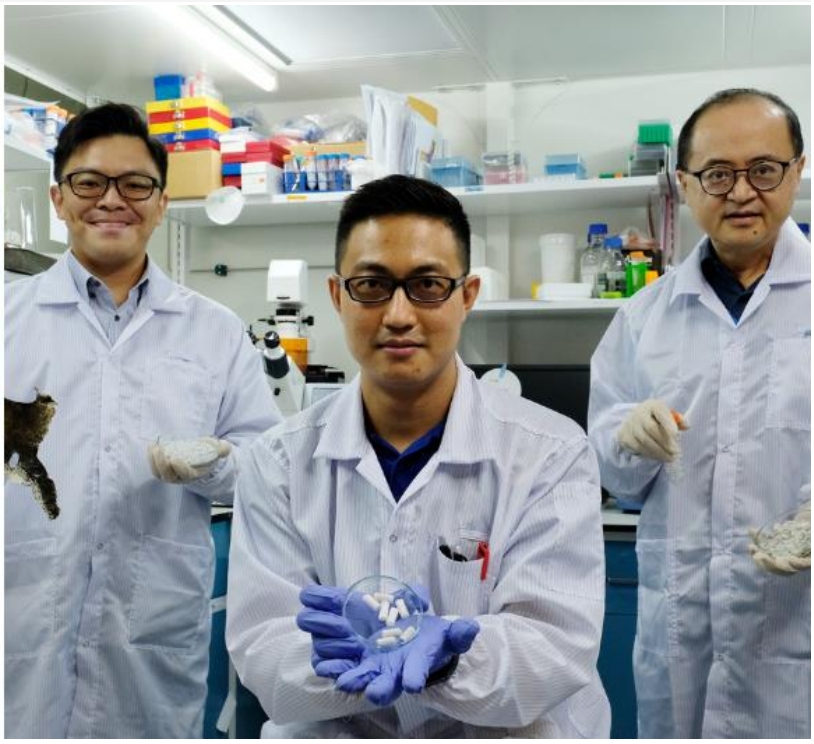
NTU scientists turn unwanted fish scales & bullfrog skin into new biomaterial that helps repair bone tissue

Good for both the environment and the field of medicine.

Ashley Tan | May 29, 2021, 10:00 AM



Scientists at the Nanyang Technological University (NTU) have discovered a method to convert aquaculture waste into a new sustainable biomaterial that could potentially benefit the field of medicine.

New biomaterial

You would be surprised at the amount of waste Singapore's aquaculture industry produces.

People here consume around 100 million kg of fish and frog flesh per year. As a result, fish scales and bullfrog skin are two of the largest aquaculture waste side streams at local fisheries and farms.

The NTU team, led by Dalton Tay, an assistant professor at NTU School of Materials Science and Engineering, was able to develop a new natural biomaterial from discarded fish scales and bullfrog skin.

The two waste products contain collagen and hydroxyapatite (HA). These two components are also typically found in bones.

The porous biomaterial developed from the process thus has a structure, composition, and ability to promote cell attachment similar to bones.

Photo from NTU

Alternative in bone repair

As such, the biomaterial can actually be used to help in bone repair.

Lab tests conducted showed that when scientists seeded bone-forming cells onto the biomaterial "scaffold", the number of cells increased significantly after a week.

The cells were also uniformly distributed across the scaffold; this indicates that the scaffold could promote proper cellular activities and eventually lead to the formation of tissues.

Additionally, the team found that the risk of the biomaterial triggering an inflammatory response in the body is low.

This biomaterial scaffold can be used to help regenerate bone tissue lost to disease or injury, such as jaw defects from trauma or cancer surgery.

It could also assist bone growth around surgical implants such as dental implants.

This poses a more convenient, and time- and cost-saving alternative to using a patient's own tissues — such processes usually require additional surgery to extract said tissues from the bone.

Waste-to-resource

Not only does this new method provide an additional source of high-value biomaterial for doctors and surgeons, it is also environmentally-friendly, and helps to close the waste loop in the aquaculture industry.

Director for Research at the National Dental Centre Singapore, Goh Bee Tin, who was not involved in the study, expressed her excitement at the endeavour, saying that the natural biomaterial has numerous potential dental applications.

Making the biomaterial only took less than two weeks, and the NTU team believes it can be further shortened and scaled up.

Moving forward, the team hopes it can work with clinical and industrial partners to find out if tissues in the body would respond to the biomaterial in the long term.

They are also looking to bring this entire waste-to-resource pipeline closer to commercialisation after further evaluating the long-term safety and efficacy of the biomaterial as dental products.

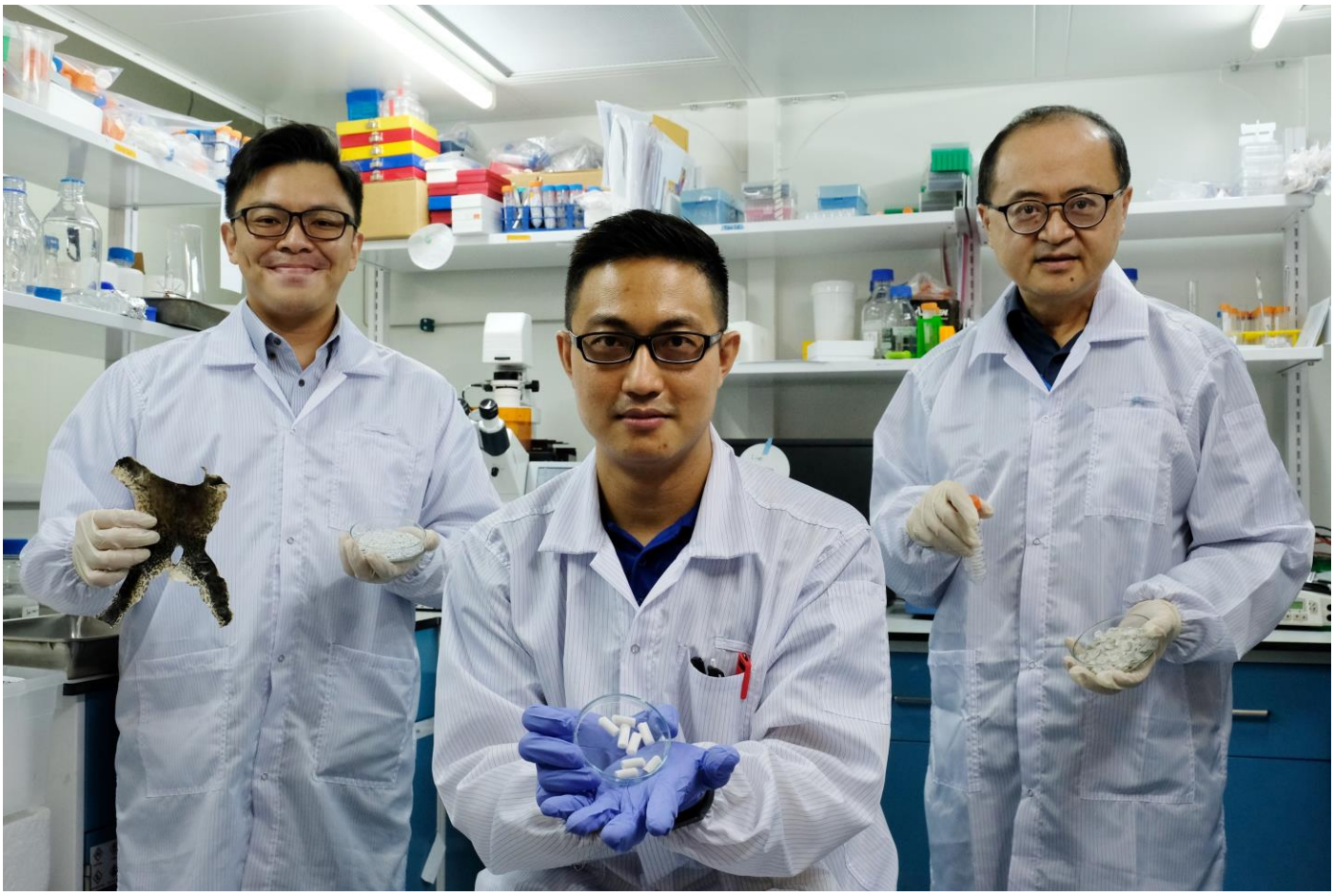


Photo from NTU
Top photo from NTU

https://mothership.sg/2021/05/ntu-fish-waste-bone-repair/