Scientists add 'invisible fiber' to foods for a healthier diet

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Scientists have converted native starches such as wheat, corn and cassava to dietary fiber that can be added to food to make it healthier without changing its texture, color or taste.

Researchers at RMIT University worked with Microtec Engineering Group, a technology-based engineering company that supplies starch processing equipment, to develop the starch-based product, called FiberX, which resists digestion in the human gut, just like fiber.

Not only is FiberX smooth and tasteless, but it's also suitable for fortifying low-calorie and low-GI foods and can be gluten free. Additionally, it's suitable for adding to low-fiber foods such as white bread, cakes, pasta, pizza and sauces to make them healthier.

Project lead from RMIT's Food Research and Innovation Centre, Associate Professor Asgar Farahnaky, and his team used advanced starch modification technology with approved food grade materials to create what they describe as "invisible fiber."

"We can now add extra fiber to foods like white bread and other staples without changing the taste or texture, which has been one of the main issues with many commercially-available fiber supplements to date," he said. "Our product is not even noticeable once added. It's just like a parent hiding vegetables in a child's meal to make it more nutritious."

The importance of fiber

Fiber is a type of carbohydrate that is not digested in the human gut, and it can help improve the health and function of our digestive system. It can also help prevent obesity and type 2 diabetes, and reduces the risk factors of some cardiovascular diseases.

Increasing the fiber content of food products by 10 to 20% while also maintaining pleasant taste and texture is a challenge across the food industry. Current foods with added fiber can have a tough texture or different flavor to the original product.

As part of the research, Farahnaky's team conducted taste tests and texture analysis on bread and cakes with varying amounts of added FiberX. They found they were able to add up to 20% fiber to food while maintaining the original taste and texture of the product.

"This new technology means we can increase the amount of fiber that goes into the food so we can receive our recommended daily intake, even while consuming less foods, which has potential to help with weight management and diabetes," he said.

How does it work?

RMIT University co-researcher and Vice-Chancellor's Senior Research Fellow, Dr. Mahsa Majzoobi, said the structure of starch was modified on a molecular level and tested to see how it reacted with digestive enzymes.

"Once the resistant starch goes through this process, it needs to have high levels of resistance to be counted as a successful conversion to dietary fiber," she said.

Using this new technology, the team can convert more than 80% of starch into dietary fiber, Majzoobi said.

FiberX was tested using internationally approved methods at RMIT and the accredited Australian Export Grains Innovation Centre. Farahnaky said his team are now looking at the next phase of FiberX technology, which will use green alternatives to convert starch to fiber.

Reducing food waste

Farahnaky explained that beyond the health benefits, FiberX technology

also has the potential to improve supply-chain challenges, reduce food waste and increase local jobs.

"Australia currently exports large amounts of grain for creating value-added products, such as plant-based meat. We then have to import these products back to Australia and wait for them if there are delays in the supply chain, as we saw with COVID," Farahnaky said. "Instead of growing and exporting more grains, we should be using existing grains to create value-added products here in Australia."

To do this, Microtec and RMIT's Food Research and Innovation Centre have also partnered with Fight Food Waste Cooperative Research Centre to stop starch and fiber-rich by-products of plant protein production from going to waste.

Australia currently produces 5,000 tons of pulse protein a year, which generates 30,000 tons of waste. Farahnaky explained that by processing this waste into dry pulse starch, FiberX technology can convert the starch to fiber on a large scale.

"Not only will this partnership help reduce food waste on a massive scale , but it will lead to creating new premium food products that are high in dietary fiber," he said.

Ready for expansion

With the help of Microtec, FiberX technology is now ready for the food industry to take up and use for large-scale production of dietary fiber.

"This new technology will enable the production of dietary fiber using a cost- and energy-effective process at a large scale," Farahnaky said. "Scaling this technology will mean the food industry will have access to large quantities of invisible dietary fiber at an affordable price to

provide high-fiber foods to consumers."

Provided by RMIT University