

Vitamins may hitch a protected ride on corn starch

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(Medical Xpress) -- Vitamins and medications may one day take rides on starch compounds creating stable vitamin-enriched ingredients and cheaper controlled-release drugs, according to Penn State food scientists.

The technique may offer drug and [food](#) companies a less expensive, more environmentally friendly alternative in creating, among other products, medications and [food supplements](#).

In a series of experiments, researchers formed pockets with corn starch and a fatty acid ester to carry oil soluble vitamins, such as [vitamin](#) A and vitamin C, into the body, according to Gregory Ziegler, professor, food sciences.

Heat and acids can harm or destroy vitamins. The starch molecule forms a protective pocket around the vitamins as they travel through the highly acidic stomach and into the small intestines, where they can be absorbed into the [blood stream](#).

To form the pocket, the researchers, who released their findings in a recent issue of *Carbohydrate Polymers*, used a type of corn starch called high amylose maize starch. When amylose comes into contact with fatty acids esters of vitamin A, for example, it creates a coil with an internal wall that repels water -- hydrophobic -- and an exterior wall that attracts water -- hydrophilic. The oil-soluble molecules automatically move into the coil that encapsulates the medication or vitamin.

"There's an ideal size and the real work is to get the right balance of the hydrophilic and hydrophobic properties," said Ziegler, who worked with Ursula V. Lay Ma, graduate student, and John D. Floros, professor, food sciences.

According to Ziegler, there are several benefits for using starches as hosts for delivering drugs and vitamins. Because starches are common, biodegradable and easily absorbed by the body, using corn starch could be inexpensive and better for the environment.

The [pharmaceutical industry](#) uses other ingredients and techniques to create inclusion complexes, said Ziegler. For example, cyclodextrin complexes -- donuts of sugar molecules -- form in a similar way to deliver controlled-release substances, such as Ibuprofen. Ziegler said that because the cavity in starch is a different size than that of cyclodextrin, it can increase the size range of molecules that can be encapsulated.

Corn starch could be used in a variety of other applications, including those outside the pharmaceutical and food industries, such as in make-up, containers and even optical and electronic devices, according to Ziegler.

"We have more work and research to do," Ziegler said. "The trick is how can we set this up so we can do it simply."

Provided by Pennsylvania State University

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