

Strawberries may be key to developing an insulin pill

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More than 30 million Americans suffer from diabetes and must inject themselves with insulin two to four times daily. Researchers have been looking for ways to administer the drug orally, and researchers at Carnegie Mellon University have now shown such a feat is possible.

Chemical Engineering Associate Professor Kathryn Whitehead and her team said the secret lies in an unlikely place: strawberries.

"The problem with insulin," said research assistant Nicholas Lamson, "is that it's a protein. The human stomach is very adept at breaking down proteins—such as with food."

For insulin to be therapeutic, the protein needs to be absorbed intact by the small intestine. Researchers have developed many ways to encapsulate [insulin molecules](#) so that they can make it through the stomach to the small intestine. But what to do with them once the pill is there has been the biggest sticking point. Allowing the proteins to pass into the small intestine fully undigested means the insulin is too large to be absorbed through the intestine and into the [blood](#)

[stream](#). And while compounds already exist that can open the pores of the [small intestine](#), few can do it without lasting damage.

"We took around 110 fruits and vegetables and screened them for an ability to open up the gaps between the cells of the [intestine](#) wide enough to allow the insulin to pass through," Whitehead said.

That is where strawberries come in. The same chemical that makes strawberries red—pelargonidin—can dilate intestinal pores in a nontoxic way that later allows them to shrink back to normal.

Combine this molecule with an encapsulated insulin package and *voilà*—an insulin pill that can help diabetics manage their blood sugar with no negative side effects.

The research team has proven the pill's efficacy in mice, but there is still a long way to go before an insulin pill is made available to human diabetic patients.

"A number of challenges must still be addressed," Lamson said, "one of the biggest being the necessity of variable dosage. Diabetics must test their [blood](#) sugar throughout the day and administer an insulin dose appropriate for their [blood sugar](#) levels. This is easy to do with an injection, but much more difficult to do with a pill."

Whitehead's lab plans to extend their strawberry technology to proteins other than [insulin](#). That means this technology can potentially be used with other [protein](#) therapies, many of which are used to treat conditions like leukemia, osteoporosis and autoimmune disease. Such an advance would revolutionize healthcare as we know it, removing the pain of injections and improving the daily lives of millions of patients.

Provided by Carnegie Mellon University

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