

# Newly discovered molecule could deliver drugs to treat diseases

September 24 2012

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(Medical Xpress)—Kansas State University researchers have discovered a molecule that may be capable of delivering drugs inside the body to treat diseases.

For the first time, researchers have designed and created a membrane-bounded vesicle formed entirely of peptides—molecules made up of amino acids, the building blocks of protein. The membrane could serve as a new [drug delivery system](#) to safely treat cancer and [neurodegenerative diseases](#).

A study led by John Tomich, professor of biochemistry at Kansas State University, has been published in the journal [PLOS ONE](#) in September, and a patent for the discovery is pending.

The peptides are a set of self-assembling branched molecules made up of naturally occurring [amino acids](#). The chemical properties of a peptide create a vesicle that Tomich describes as a bubble: It's made up of a [thin membrane](#) and is hollow inside. Created in a water solution, the bubble is filled with water rather than air.

The peptides—or bubbles—can be made in a solution containing a drug or other molecule that becomes encapsulated as the peptide assembles, yielding a trapped compound, much like a gelatin capsule holds over-the-counter oral remedies. The peptide [vesicles](#) could be delivered to appropriate cells in the body to treat diseases and minimize potential side effects.

"We see this as a new way to deliver any kind of molecule to cells," Tomich said. "We know that in certain diseases subpopulations of cells have gone awry, and we'd like to be able to specifically target them instead of attacking every cell, including healthy ones."

The finding could improve [gene therapy](#), which has the potential to cure diseases by replacing [diseased cells](#) with healthy ones. Gene therapy is being tested in clinical trials, but the biggest challenge is how best to deliver the genes.

Methods include cells with a virus being injected into the body, and liposomes—fatty compounds—carrying the genes. However, these methods may present some problems.

When a virus is used, the body's immune system can attack the virus or cause a tumor. Lipid-based systems may cause inflammation and may not properly bind to cells.

The peptides created by Kansas State University researchers have advantages over their lipid counterparts. The peptides have improved stability and durability, are easier and quicker to create, and they could be delivered to a specific area in the body.

The peptides can be designed to have the ability to target cells, tissues, tumors or organs, and to encapsulate chemical reagents, antibodies, toxins and inhibitors, Tomich said.

"We don't even begin to know all of the potential applications for this discovery," he said. "We envision that many products could be packaged and delivered using these peptides."

**More information:** [dx.plos.org/10.1371/journal.pone.0045374](https://dx.plos.org/10.1371/journal.pone.0045374)

Provided by Kansas State University

Citation: Newly discovered molecule could deliver drugs to treat diseases (2012, September 24)  
retrieved 3 May 2024 from

<https://medicalxpress.com/news/2012-09-newly-molecule-drugs-diseases.html>

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