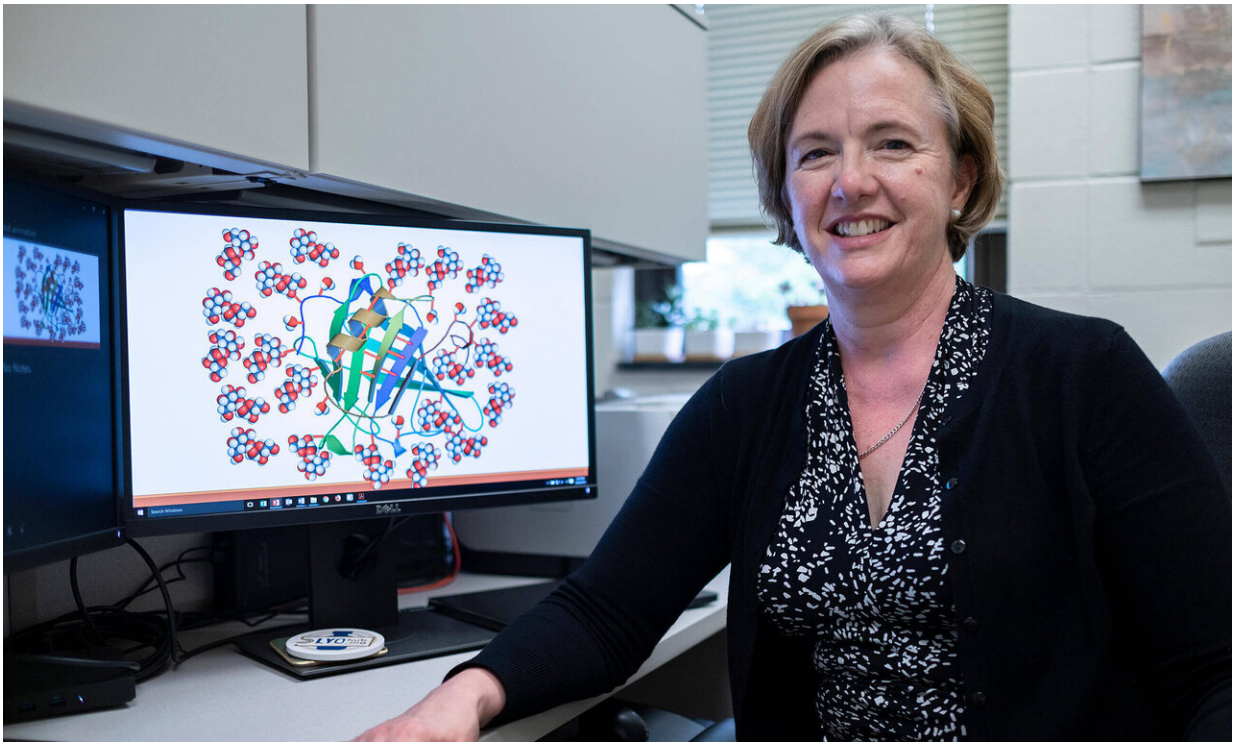
Medical Xpress

New drug form may help treat osteoporosis, calcium-related disorders

January 6 2021



Elizabeth Topp, a Purdue professor of physical and industrial pharmacy, helped develop a stabilized form of human calcitonin, which is a peptide drug already used for people with osteoporosis. Credit: Chris Adam/Purdue University

A novel form of a drug used to treat osteoporosis that comes with the potential for fewer side effects may provide a new option for patients.

The work is supported by the National Institutes of Health and is published in *Biophysical Journal*.

Purdue University innovators developed a stabilized form of human calcitonin, which is a peptide drug already used for people with osteoporosis. Researchers at Purdue created a prodrug form of the peptide hormone to increase its effectiveness as an osteoporosis treatment.

In humans, calcitonin is the hormone responsible for normal calcium homeostasis. When prescribed to osteoporosis patients, calcitonin inhibits bone resorption, resulting in increased bone mass.

Unfortunately, human calcitonin undergoes fibrillation in aqueous solution, leading to reduced efficacy when used as a therapeutic. As a substitute, osteoporosis patients are prescribed salmon calcitonin. It does not fibrillate as rapidly but suffers from low potency and the potential for several adverse side effects.

"The technology can help make these calcitonin drugs safer and more effective," said Elizabeth Topp, a Purdue professor of physical and industrial pharmacy. "Our approach will increase the therapeutic potential of human calcitonin, promising a more effective option to replace salmon calcitonin for osteoporosis and related disorders."

To decrease the fibrillation propensity and increase the therapeutic benefit of human calcitonin, Purdue researchers phosphorylated specific amino acid residues.

"Many promising new peptide drugs tend to form fibrils," Topp said. "This technology provides a way to stabilize them in a reversible way so that the stabilizing modification comes off when the drug is given to the patient."

More information: Harshil K. Renawala et al, Fibrillation of Human Calcitonin and Its Analogs: Effects of Phosphorylation and Disulfide Reduction, *Biophysical Journal* (2020). DOI: 10.1016/j.bpj.2020.11.009