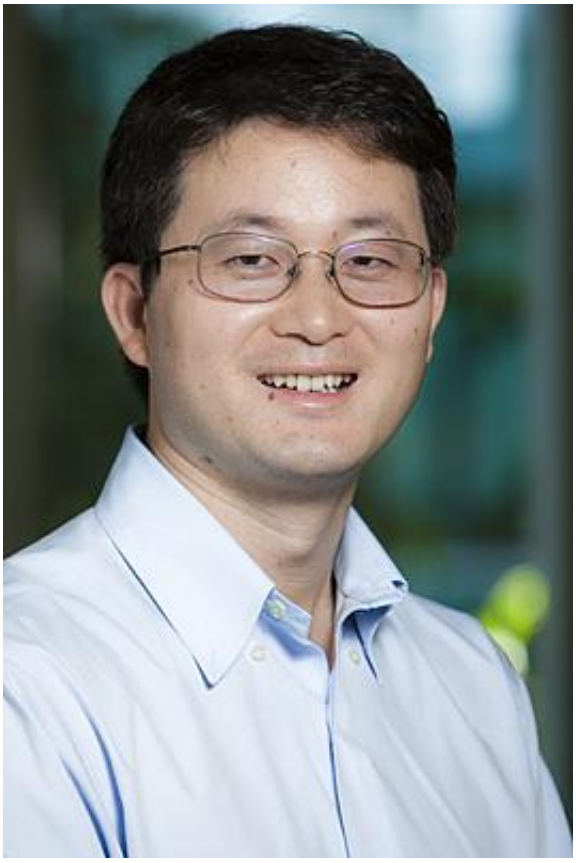
Vegetable oil ingredient key to destroying gastric disease bacteria

November 25 2014



Liangfang Zhang, Ph.D. Credit: UC San Diego School of Medicine

The bacterium Helicobacter pylori is strongly associated with gastric ulcers and cancer. To combat the infection, researchers at University of California, San Diego School of Medicine and Jacobs School of Engineering developed LipoLLA, a therapeutic nanoparticle that

contains linolenic acid, a component in vegetable oils. In mice, LipoLLA was safe and more effective against *H. pylori* infection than standard antibiotic treatments.

The results are published online Nov. 24 in the *Proceedings of the National Academy of Sciences.*

"Current *H. pylori* treatments are facing a major challenge—antibiotic resistance," said Liangfang Zhang, PhD, professor in the UC San Diego Moores Cancer Center and Department of Nanoengineering. "Our goal was to develop a nanotherapeutic that can tolerate the harsh gastric environment, kill *H. pylori* and avoid resistance." Zhang and Marygorret Obonyo, PhD, assistant professor in the Moores Cancer Center and Department of Medicine, are co-senior authors of the study.

LipoLLA is a lipid (fat) particle that contains linolenic acid. When LipoLLA encounters *H. pylori*, it fuses with the bacterial membrane. Then the particle's linolenic acid payload spills out, disrupting the membrane and killing the bacteria.

Zhang, Obonyo and their team labeled LipoLLA particles with fluorescent markers, fed them to mice and watched as the particles distributed themselves in the stomach lining—and stayed there. After treatment, they measured bacterial load in the stomach and markers of inflammation. Compared to standard antibiotic therapies, LipoLLA was more effective at getting rid of *H. pylori*. What's more, LipoLLA was not toxic to the mice and the bacteria did not develop resistance to the therapy.

"This is the first step to verify that we can make this therapeutic nanoparticle and demonstrate that it works to reduce *H. pylori* colonization. We're now working to further enhance the particle, making it more stable and more effective," Zhang said.

More information: In vivo treatment of Helicobacter pylori infection with liposomal linolenic acid reduces colonization and ameliorates inflammation, *PNAS*, Soracha Thamphiwatana, DOI: 10.1073/pnas.1418230111

Provided by University of California - San Diego