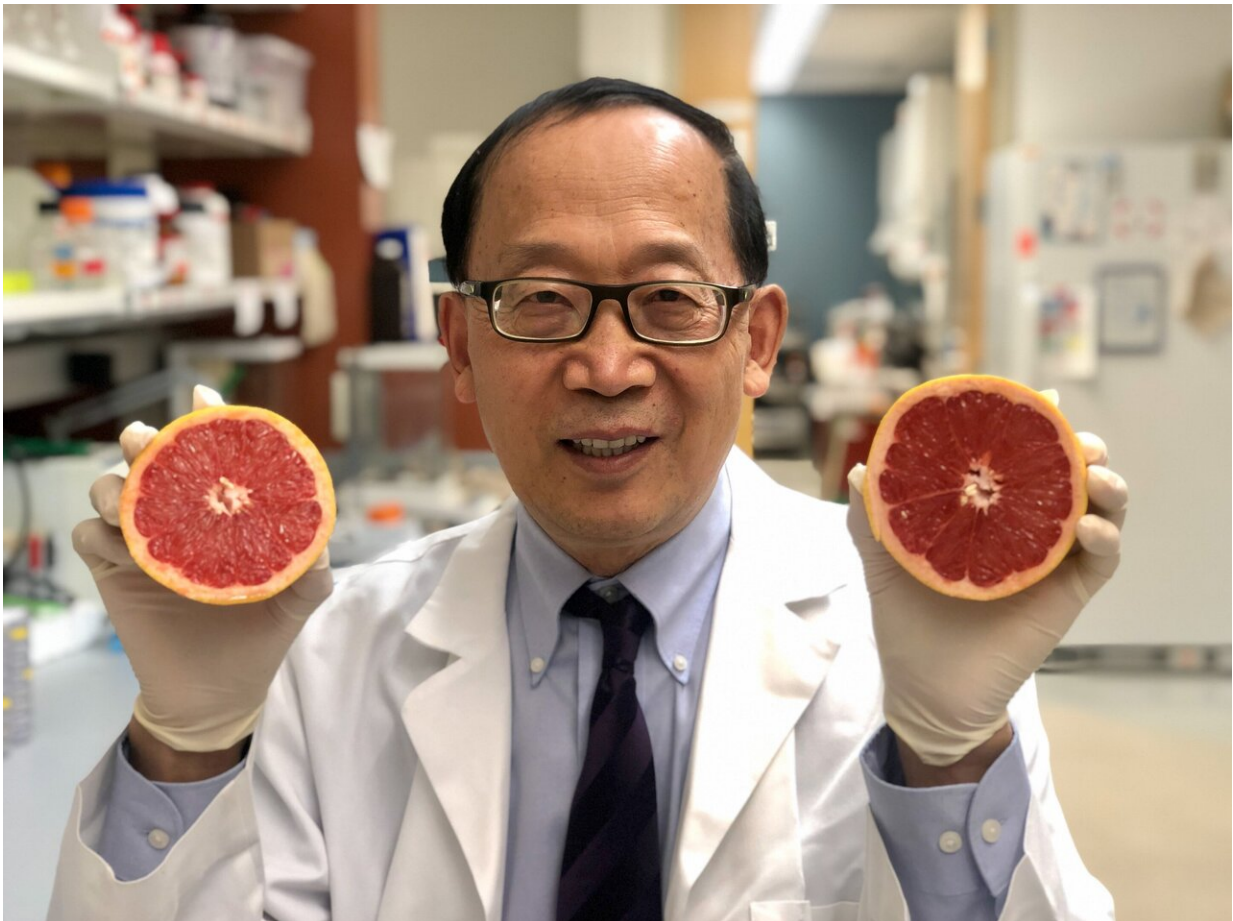


Researcher uses fruit for less toxic drug delivery

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therapeutics across biological barriers and throughout the body. Credit: University of Louisville

University of Louisville researchers have found a less toxic way to deliver medicines by using the natural lipids in plants, particularly grapefruit and ginger.

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The UofL technologies use exosomes, which are very small fragments of living, edible plant cells, to transport various therapeutic agents, including [anti-cancer drugs](#), DNA/RNA and proteins such as antibodies. These exosomes help ensure the drug is properly absorbed by the body.

Current practice is to use nanoparticles or liposomes made from [synthetic materials](#) to deliver these medicines. However, these materials are more expensive to produce in large quantities and can cause [adverse health effects](#), such as cell toxicity and chronic inflammation. The UofL edible-plant-derived exosomes don't have these problems, Zhang said, since they come from natural, readily available sources. More importantly, these exosomes have anti-inflammatory effects.

"Our exosomes come from fruit or other edible plants—something good for you, that you buy in the grocery store and that humans have eaten

forever," said Zhang, an endowed professor of microbiology and immunology who holds the Founders Chair in Cancer Research. "And, they don't require synthetic formulation."

The exosomes made from fruit lipids also can be modified to target and deliver medications to specific cell types within the body—like homing missiles, Zhang said. For example, the exosomes could be engineered to deliver a cancer therapeutic directly to cancer cells.

Zhang originally experimented with other fruits, including tomatoes and grapes. His epiphany came while eating a grapefruit—he realized his breakfast was chock-full of natural lipids that could be harvested to make exosomes at a larger scale. The results of that work later were published in multiple scientific journals, including *Nature Communications*, and *Cell Host & Microbe*, and now are exclusively licensed to Sen-da Biosciences.

"These technologies could make a real difference in drug delivery, improving access and costs while reducing side effects," said Guillaume Pfefer, CEO of Senda Biosciences. "We look forward to working with UofL to further develop these innovations and get them to market."

Senda Biosciences holds an exclusive license to several UofL fruit-based [drug delivery](#) technologies, including technologies focused on the regulation of gut microbiota, through the UofL Commercialization EPI-Center, which works with industry and startups to commercialize university technologies. The EPI-Center team worked closely with Zhang and Senda to develop and grow the partnership.

"This is the kind of outcome we want for all our technologies," said Holly Clark, Ph.D., deputy director of the Commercialization EPI-Center, who manages Zhang's intellectual property portfolio. "We've built a great working relationship between our innovator and our

commercialization partner, Senda, and together, they will advance this suite of technologies for market."

Provided by University of Louisville

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