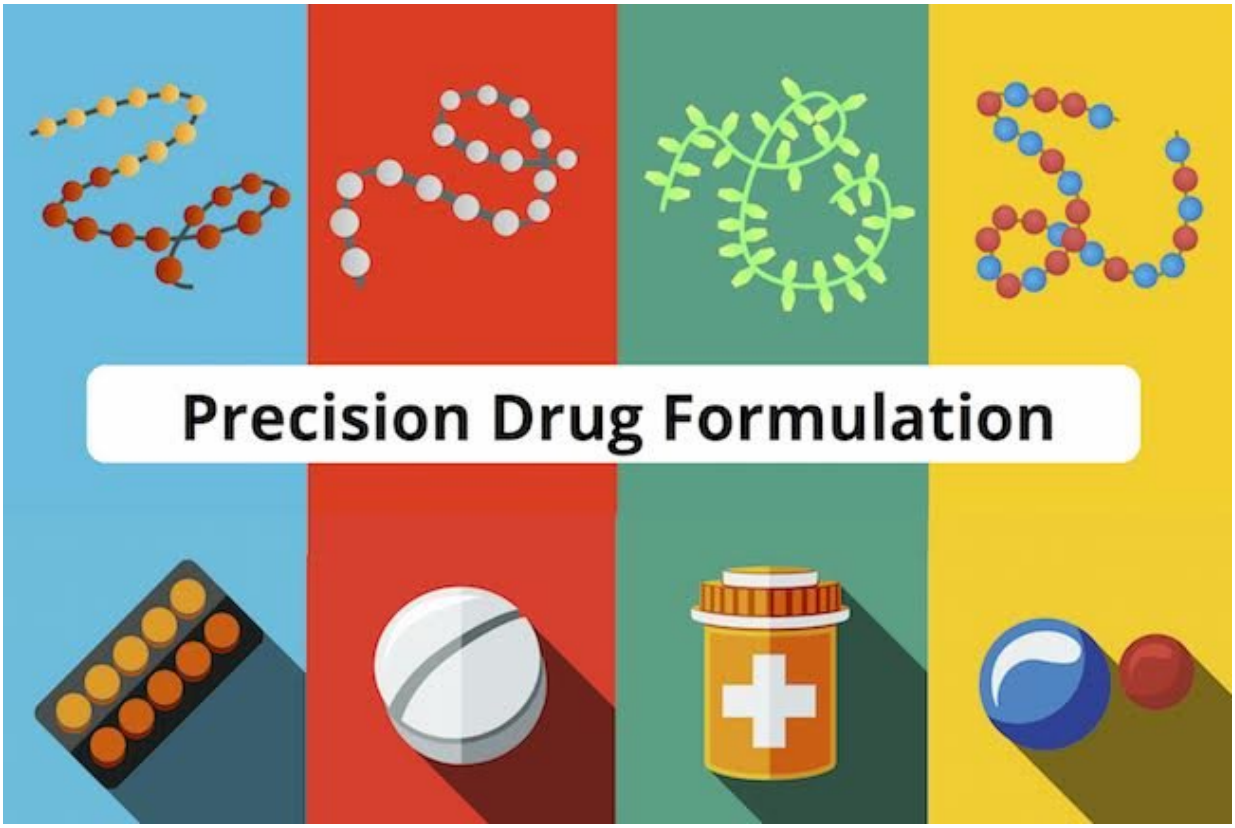
Developing oral medicines that work more efficiently

April 19 2018



Credit: University of Minnesota

Researchers at the University of Minnesota and The Dow Chemical Company have joined forces to tackle one of the biggest challenges in health care—how to get life-saving medicines to work faster and better

with fewer side effects.

In a new review article published today on the cover of the American Chemical Society's journal *Bioconjugate Chemistry*, the researchers examined dozens of publications on the topic and then outlined the future for improvements in developing oral medicines that work more efficiently.

One of the challenges for pharmaceutical companies when developing oral medications to treat a wide variety of diseases, from hepatitis C to HIV, is to ensure that the body will fully absorb the drug molecules. Many therapeutic structures do not easily dissolve on the molecular level in the patient's body, which means they are less effective. In those cases, the dose must be increased for patients, which may increase side effects.

Drug companies add substances, called excipients, to help the medicines dissolve in the stomach and intestinal fluid, but there have been few improvements implemented in recent years to this decades-old technology. The study examines the excipients used for several existing medicines and suggests improvements.

"In this article, we survey the latest techniques, materials, and formulations for developing molecularly customized excipients that could greatly improve the future of how oral medications are developed," said Theresa Reineke, a University of Minnesota chemistry professor and study co-author. "This information will be helpful in future research in both industry and academia that could help millions of people worldwide."

The researchers specifically focused on the well-established manufacturing pharmaceutical technique, called spray drying, which can be used in drug and tablet formulations as an effective strategy to improve effectiveness of medicines that usually don't dissolve well in

liquids. The control methods they examined could be easily scaled up from the milligram to the metric ton.

"Over the past decade, we have found that advancements in the spray-drying technique has helped researchers worldwide prepare heat-stable vaccines to combat measles, influenza, and a host of other diseases," said Jeff Ting, a former University of Minnesota chemical engineering Ph.D. student and first author of the study who is currently a postdoctoral researcher at the University of Chicago. "With more research we hope there will be more successes in the future."

The researchers say that the future will depend on the continuation of critical partnerships between industry and academia, like the one between Dow and the University of Minnesota.

"This study will be a strong resource for looking at what has already been done in this field, and, more importantly, what exciting things are coming on the horizon," said William "Trey" Porter III, an associate research scientist in The Dow Chemical Company's Larkin Laboratory and a co-author of the study. "We could have never done this study without the University, and the University could not have done the study without Dow. We need collaboration with academics to help us dive deeper into this research, but industry can help keep the team grounded in the real challenges facing developers of new medicines."

More information: Jeffrey M. Ting et al. Advances in Polymer Design for Enhancing Oral Drug Solubility and Delivery, *Bioconjugate Chemistry* (2018). DOI: 10.1021/acs.bioconjchem.7b00646

Provided by University of Minnesota