Chemist discovers shortcut for processing drugs

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A prolific University of Missouri chemist has discovered a quicker and easier method for pharmaceutical companies to make certain drugs.

Jerry Atwood, Curator's Professor and Chair of the Department of Chemistry in the MU College of Arts and Science, has recently published a paper – his 663rd in a refereed journal – that states that highly pressurized carbon dioxide at room temperature could replace the time consuming and expensive methods currently used to manufacture certain pharmaceutical drugs.

In the article, "A New Strategy of Transforming Pharmaceutical Crystal Forms," published in a recent edition of the Journal of the American Chemical Society (JACS), Atwood and a team of researchers explain how manufacturers of popular drugs such as clarithromycin (an antibiotic drug) and lansoprazole (an acid reflux drug) could benefit from this process.

To develop basic drugs that are safe for people to consume, manufacturers must utilize chemistry to make specific crystals that constitute the eventual compound. Depending on the drug, current methods may include high-temperature heating, raw material altering, washing, filtering, and intensive drying. Atwood's team found that pressurizing carbon dioxide can bring about the desired crystallization "with ease" and at normal room temperatures. Atwood said this discovery has the potential to streamline work flow and provide more safety for those who work with these chemicals.

"I believe this could have huge implications for the pharmaceutical industry," Atwood said. "In addition to streamlining processes, pressurizing gas could circumvent some of the more difficult techniques used on an industrial scale, leading to better pharmaceuticals, more effective treatments and ultimately a lower price."

Atwood points out that cost savings may be minimal to consumers, however, as drug companies set prices to recoup billion dollar investments in multiple-drug trials. Only one of every five clinically tested drugs makes it to market, Atwood said, and the companies must make a profit on the drug that becomes widely used.

The JACS paper was recognized by Chemical & Engineering News in its "News of the Week," an accomplishment Atwood has achieved nine times. Despite all of his success, Atwood remains focused on his ultimate goal: to develop a chemotherapy drug with a magnetic component that could bring targeted delivery of medication, rather than the bloodstream saturation process used now.

"When I lecture a group of world-class scientists, I tell them the good news and the bad news," Atwood said. "The bad news is that we must make a major breakthrough like curing a disease. If we can do that, then our field of chemistry will flourish, and we will pay society back for their investment. If we fail to make the breakthrough, society won't support what we are doing forever. The good news is that just one of our research groups has to do it, so the pressure is on all or us, not just on you or me."

Provided by University of Missouri-Columbia