SUCCESS STORY

CC FLOW
Center for Continuous Flow Synthesis and Processing

Programme: COMET – Competence Centers for Excellent Technologies

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COVID-19: GRAZ CHEMISTS WANT TO ELIMINATE DRUG SHORTAGES USING STATE-OF-THE-ART TECHNOLOGY

ONE OF THE MOST PROMISING DRUGS AGAINST COVID-19, THE DISEASE THAT CAUSES CORONAVIRUS, IS REMDESIVIR. RESEARCHERS IN GRAZ ARE CURRENTLY TESTING A MORE EFFICIENT PRODUCTION METHOD USING FLOW CHEMISTRY.

The search for and production of medicines against coronavirus are proceeding quickly around the world. Graz chemists are therefore currently evaluating more efficient manufacturing methods for Remdesivir, a highly promising active pharmaceutical ingredient against COVID-19. Their research is based on continuous flow processes, with promising initial success. “We have identified a number of important steps in the synthesis process which run much more efficiently with our methods, than with traditional batch methods,” explains Prof. Oliver Kappe, from the Institute of Chemistry at the University of Graz and Scientific Director of the CCFLOW division at the Research Center Pharmaceutical Engineering (RCPE). Comprehensive results should be available in one to two months.

The flow method: fast, cheap, safe

In flow chemistry, the substances required for synthesis are pumped in the millilitres range through reaction chambers, where the individual processes take place one after the other. The need for individual preparation of the reaction mixture after every single step is eliminated. This saves time and minimises potential risk in the handling of hazardous substances. A further critical factor for the efficiency of the process is the high speed at which the synthesis is carried out. Kappe explained, “We use small reactors that enable better temperature and process control. This can significantly accelerate the reaction time. There are also fewer side reactions, which means less waste.”

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Graz know-how for US pharmaceutical production

The US pharmaceutical company Gilead holds the patents for Remdesivir, but is currently barely able to keep up with production demands. “The active pharmaceutical ingredient is complicated to manufacture. The current patient demand for it and also for research purposes is enormous,” added Kappe. In a recent interview, the former Gilead director of research, Norbert Bischhofberger, confirmed that one gram of Remdesivir is required for the treatment of one person. “If several hundred tonnes are to be manufactured, efficient processes based on continuous production technology are the best solution,” Kappe summarised.

The US is therefore currently working on converting its national production of pharmaceuticals to flow processes. This will also reduce its dependency on China and India, which together account for 80 percent of global demand for the manufacture of active pharmaceutical ingredients. The newly founded US company, Phlow, recently received a ten-year funding grant of 812 million US dollars from the American Department of Health, to produce essential drugs using precisely this methodology. The Graz expertise in this process is highly sought after, says Kappe. “We have already been working for several years on a similar project funded by the Bill & Melinda Gates Foundation with American colleagues, who would now like us on board for this project as well.” Similar initiatives intended to ensure access to important medicines for the population, independently of international supply chains, are also envisaged for Austria and at the European level.

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