American Rescue Plan

IMPROVING ACCESS TO VACCINES AND OTHER BIOLOGICS

RAPID CONTINUOUS PRODUCTION OF mRNA VACCINES

NIIMBL® The National Institute for Innovation in Manufacturing Biopharmaceuticals

University of Massachusetts Lowell

Type:
Academic Research Organization

Project Partners:
Sepragen

» ***Carl Lawton,*** *University of Massachusetts Lowell*

INDUSTRY NEED

In vitro mRNA synthesis for vaccine development is a breakthrough platform technology brought to the forefront with the FDA's approval of mRNA COVID-19 vaccines. Unfortunately, more than 250,000 Americans died waiting for scale-up and approval of the vaccines. Rapid manufacture of future pandemic vaccines would reduce this number substantially.

SOLUTION

Carl Lawton of the University of Massachusetts Lowell worked with Drew Weissman of the University of Pennsylvania and Vinit Saxena at Sepragen to establish a prototype for automated and portable mRNA production. The team created an inline sensor technology for cGMP production to allow for continuous control of mRNA synthesis. They integrated an affinity matrix for mRNA separation to allow for continuous production. The technology, named CAMERNA (Continuous Advanced Manufacturing Equipment for mRNA), integrates into one machine, an mRNA purification device, an inline UV sensor, control strategies, and continuous polishing purification to successfully produce a continuous purification platform.

OUTCOME

Automated, continuous production of mRNA will enable improved access and more cost-effective, rapid, and flexible production of vaccines and other biologics. Compared to current systems that use roughly 200 liters, CAMERNA has the same productivity in a one-liter reactor. Due to their small foot-print and high productivity, the CAMERNA systems can eventually be pre-installed in mobile cleanrooms, and easily transported for set up at hot spots anywhere in the world to deal rapidly with local outbreaks of emerging viral diseases.

> *"Our technology drastically reduces costs in raw materials and labor for mRNA vaccine production."*

This work was performed under a Project Award Agreement from the National Institute for Innovation in Manufacturing Biopharmaceuticals (NIIMBL) and financial assistance award 70NANB21H085 from the U.S. Department of Commerce, National Institute of Standards and Technology.