

# Mushrooms may aid rapid vaccine response

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A rapid production of therapeutic human drugs using modified mushrooms may help mount a quicker response to various public health problems, according to plant pathologists who have received a federal grant to perfect their technique.

C. Peter Romaine, professor of plant pathology at Penn State and holder of the John B. Swayne Chair in Spawn Science, said, "We are looking to address several public health issues through our research."

Romaine and his colleague, Xi Chen, previously a post-doctoral scholar at Penn State, hold the patent to genetically modify *Agaricus bisporus* – the button variety of mushroom, which is the predominant edible species worldwide.

The Defense Advanced Research Projects Agency (DARPA) recently awarded Penn State and Agarigen Inc., Romaine's spin-off company based in Research Triangle Park in Raleigh, N.C., \$2.2 million in initial funding under the Accelerated Manufacture of Pharmaceuticals (AMP) program for the rapid production of vaccines and other therapeutic proteins in altered mushrooms. The total value of the effort, if both phases of the development program are completed, could be up to \$5.9 million.

"Our immediate research goals are to maximize the level of expression of various biopharmaceuticals and to devise efficient and economical methods for their extraction and purification from mushroom tissue," Romaine said.

At the end of the second year of the contract, Romaine and his colleagues, who include Agarigen cofounder and former Penn State graduate Dr. Donald S. Walters, Penn State post doctoral associate Dr. Carl Schlagnhauer and a team of nine Agarigen scientists, are expected to demonstrate an ability to produce vaccines or other biological drugs within 12 weeks.

"It will be a blind test," said Romaine. "We will be handed genes for vaccines, monoclonal antibodies or other therapeutic proteins, and asked to produce them in the mushroom."

The drugs will then be extracted from the mushroom into forms that could be administered to people. In a pending third year of the project, the researchers are expected to show they can execute a full-scale manufacturing effort and produce three million doses of a drug in 12 weeks.

Researchers at Penn State and Agarigen are currently focusing on assembling gene components for expression in the mushroom, and fine-tuning their techniques to ensure a consistently high level and quality of the drug.

"We are evaluating different gene sequences from a broad array of organisms to determine which provide us the highest level of drug expression in the mushroom," explained Romaine. "It is an empirical process, but we are leaving no stone unturned to achieve our end goal."

The Penn State Department of Plant Pathology is at [www.ppath.cas.psu.edu/default.html](http://www.ppath.cas.psu.edu/default.html)

Source: Penn State

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