GMO tobacco ‘mystery serum’ rescues Ebola virus victims

Genetic modification—biotechnology vilified in some quarters as a violation of nature–has proved key in saving the lives of two Americans infected by the deadly Ebola virus.

When American Ebola patient Dr. Kent Brantly arrived in Atlanta, Georgia, Aug. 2, he had reportedly already had one course of treatment with an experimental drug called ZMAPP made with genetically engineered tobacco. Although it has only been tested previously in animals, the FDA is rumored to have authorized emergency approval for the drug for Brantly and another American who contracted the virus doing medical aid work in Liberia during the ongoing West African Ebola outbreak.

MAPP is produced by a small San Diego-based biotech company. The scientists use a common tobacco bacteria, genetically engineered with different components of the Ebola virus, to infect a large number of plants. The infection spurs the plants to make antibodies to the virus, including the pieces of viral Ebola DNA. The tobacco is then crushed up and the ebola serum is extracted. It contains antibodies that target several parts of the virus.

“What you want is a cocktail of antibodies that target different domains on the virus so escape is less likely in treatment,” said Heinz Feldmenn, chief of the National Institute of Allergy and Infectious Diseases’ Laboratory of Virology in Hamilton, Montana. Growing the genetically modified plants and refining the serum takes just five weeks, Lexington Herald-Leader reported. Kentucky company Kentucky BioProcessing contracts with MAPP to grow and refine the tobacco plants and is involved in studies targeting other infectious disease:

> KBP also has been selected for work on some of the biggest health threats on the planet, including H1N1 vaccine production, an anti-rabies antibody, norovirus or the “cruise ship virus,” HIV prevention, parvovirus, and HPV vaccine.

Tobacco is a good organism to produce genetically engineered drugs because its relatively easy to infect the plants with altered bacteria, the plants’ immune systems react well and the plants are easy to grow in a relatively short time frame. Neither MAPP founders nor the FDA have publicly commented on the release of ZMAPP to the two American Ebola patients, nor have they discussed accelerating testing of the drug to respond to the latest outbreak. Before its release in this case, the drug was undergoing testing on non-human primates.

Some have questioned the ethics of giving the serum to just the two Americans when more than a thousand Africans have contracted the virus:

> While potentially saving lives, the cases raise questions about who should have the right to receive experimental drugs years before they gain FDA approval. “There are a lot of Africans that are also dying,” Robert Garry, a virologist at Tulane University, said in a telephone interview. “If we are going to do it for the Americans then we should certainly step up our game

for the Africans.”

And as David Kroll pointed out Forbes, we don’t yet know if ZMAPP had any treatment affect for Brantly or if he was recovering from the infection on his own.

Additional Resources:

- Genetic modification may help tobacco find new life as a health savior and biofuels sources, Genetic Literacy Project
- Canadian research in experimental Ebola drug, Simcoe.com