

Mice orally immunized with a transgenic plant expressing the glycoprotein of crimean-congo hemorrhagic fever virus

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While Crimean-Congo hemorrhagic fever (CCHF) has a high mortality rate in humans, the associated virus (CCHFV) does not induce clinical symptoms in animals, but animals play an important role in disease transmission to humans. Our aim in this study was to examine the immunogenicity of the CCHFV glycoprotein when expressed in the root and leaf of transgenic plants via hairy roots and stable transformation of tobacco plants, respectively. After confirmatory analyses of transgenic plant lines and quantification of the expressed glycoprotein, mice were either fed with the transgenic leaves or roots, fed the transgenic plant material and injected subcutaneously with the plant-made CCHFV glycoprotein (fed/boosted), vaccinated with an attenuated CCHF vaccine (positive control), or received no treatment (negative control). All immunized groups had a consistent rise in anti-glycoprotein IgG and IgA antibodies in their serum and feces, respectively. The mice in the fed/boosted group showed a significant rise in specific IgG antibodies after a single boost. Our results imply that oral immunization of animals with edible materials from transgenic plants is feasible, and further assessments are under way. In addition, while the study of CCHF is challenging, our protocol should be further used to study CCHFV infection in the knockout mouse model and virus neutralization assays in biosafety level 4 laboratories.

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