

BIOTECHNOLOGY

Lettuce-manufactured pharmaceuticals

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Credit: Dušan Zidar / Alamy Stock Photo

By definition, food is nutritious substance that sustains life and growth, and medicine is therapeutic treatment used to heal disease. Many people believe in the homology of traditional medicine and food, especially people in East Asia. Nowadays, transgenic technologies have empowered plants to produce therapeutic molecules, which further blurs the boundary between food and drugs.

In a recent paper published in *Biomaterials*, Zhang et al. at Nanjing University, China, reported a transgenic lettuce producing therapeutics that are potentially useful in the treatment of hepatitis B virus (HBV) infection. They designed two artificial miRNAs (amiR471 and amiR519) against the surface antigen of HBV (HBsAg), and expressed them individually in stable transgenic lettuce cultivars. To test the pharmaceutical effects of the plant-derived miRNAs, they fed lettuce decoction (~2 kg leaves for 1 l decoction and ~4 ml per day per mouse) to p21-HBsAg knock-in transgenic mice. Low accumulation amounts of the plant-derived

amiRNAs were detected in mice livers after seven days of treatment. Simultaneously, they observed a significant reduction of HBsAg mRNA and protein levels. Long-term (1-month and 15-month) treatment of mice using amiR471 lettuce decoction also led to consistent, positive health effects. Liver injury caused by HBsAg expression was largely suppressed by the long-term lettuce feeding in mice. Moreover, the body weight of both control (mice fed with wild-type lettuce decoction) and experimental groups were comparable in these tests.

Plants are natural manufacturers of food and medicine. In this case, the small artificial RNA expressed by the lettuce may become a nutritious vegetable and an effective cure for human HBV infection in the future. Then, what is next? A modern industry of plant-manufactured pharmaceuticals?

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