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Plant expression platforms for human therapeutic proteins: A new era for biopharmaceuticals

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Abstract

Plants present a novel means by which large quantities of vaccine and therapeutic proteins can be produced in a safe and cost-effective manner. Biopharmaceuticals produced in plants are easy to store, require fewer timely and expensive purification steps, and lack the containment risks associated with proteins produced in animal or bacterial expression systems. Over the past decade, much progress has been made with respect to the development of vaccines, antibodies and other therapeutic proteins. This presentation outlines the steps involved in the engineering of a plant virus expression vector for transient expression of vaccine proteins and other therapeutics in plant tissue, and the advantages of this technology over the use of conventional transgenic plants. Expression of a vaccine protein using this expression vector system is described. An investigation into the basis of mucosal immunity using plant-based oral vaccines in preliminary clinical trials is also addressed. Expression levels and biological activity of a vaccine protein produced via a plant virus expression vector are described. The efficacy of this plant-based vaccine protein is compared to conventional vaccines. The presentation will conclude with a discussion of the future of plant-based vaccines and other therapeutic proteins in human and veterinary medicine with respect to commercial viability and as a tool to improve global public health.