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Dr. Hein received his Ph.D. in Plant Physiology from the University of Minnesota and has 17 years of professional experience in biotechnology, including 8 years in research and development at Monsanto and PPG Industries. At The Scripps Research Institute, he served on the faculty in the Departments of Molecular Biology and Cell Biology and is a co-founder of the Center for Immunoactive Plant Proteins. He is an inventor with Dr. Hiatt of EPlcyte's Plantibodies technology, as well as its transport technology for delivering therapeutic agents to epithelial tissues.

Immunoglobulins from Plants: Breaking the Barriers to Antibody Production

Antibodies applied to humans and animals from exogenous sources are a supplement to the immune system that can provide effective treatment for many diseases including infections, cancer, and inflammatory conditions. Antibodies can function by virtue of binding to antigens, and can recruit components of the host immune system to fight disease. Only recently has the ability to produce transgenic proteins in plants been exploited to produce pharmaceutical protein molecules for commercial purposes. For complex proteins like immunoglobulins, plant production systems provide breakthroughs in the cost, the scale of production, and the scope of molecules that can be efficiently manufactured. In choosing production methods for antibodies, it is often overlooked that plants are higher eukaryotes and, like mammals, have the capacity to produce and secrete complex multimeric proteins such as antibodies. Plants have well developed endomembrane systems capable of recognizing the protein processing, post-translational modification, and assembly signals encoded in peptide sequences. These cognate mechanisms for protein processing provide important advantages for plants as bioreactors for antibody production. In addition, plants are the most efficient producers of protein on the planet. Producing antibodies in large quantities using professional agronomic corps should dramatically increase the use of antibody therapeutics and facilitate new uses for antibodies.