

Amgen Seminar Series in Chemical Engineering
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Biopharmaceutical Development of Vaccines for Prophylactic and Therapeutic Applications

By

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Advances in biotechnology and immunology in the last two decades have paved the way for novel biologics treatments for cancer such as monoclonal antibodies as well as cancer vaccines in clinical trials. Cell-culture based production (as opposed to egg-based fermentation) has enabled production of vaccines comprised of either purified protein antigens or virus-like particles (VLPs) using recombination of viral genes, at rates capable of meeting surge demands due to a pandemic. This approach also provides a better controlled process and a more purified product which minimizes potential allergies and side effects. Another recent development, the discovery of small molecule immune response modifier (IRM) molecules that act on Toll-like receptors (TLRs) that recognize pathogen associated molecular patterns, has enabled an even greater degree of control over the type and quality of an immune response. In particular, in combination with a protein antigen, certain IRMs can not only enhance the humoral response or antibody production for prophylaxis, but also provide a strong cell-mediated immune response that can treat and potentially cure a disease induced by a pathogen or virus. This talk will provide an introduction to the biopharmaceutical production processes involved in making protein and vaccine products, formulation and encapsulation technologies, product stability considerations, and typical biochemical characterization. The latter part of the talk will focus on IRM therapeutics including topical/intradermal technologies and injectables involving novel polymer and prodrug conjugation strategies for delivering vaccines that hold promise for a powerful new way of treating cancer patients.

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