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Meet the Inventors

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Department

Biomedical Engineering (BME)

Publication(s)

External Link(s)

- From the lab of Dr. Joel Collier

An adjuvant-free vaccine platform using self-assembling nanofibers

Value Proposition

Vaccines have application for a wide range of human health conditions, including the treatment of pathogenic diseases, cancer immunotherapy, and the suppression of autoimmune disorders. In order to stimulate the immune system to react towards an immunogen, vaccines are often administered with an adjuvant, which includes an extensive list of compounds. Unfortunately, adjuvants have the potential to unfavorably polarize the immune response in a manner that is detrimental to the intended effect. Furthermore, adjuvants add complexity to the chemical definition of a vaccine, which can make regulatory approval a challenge. Consequently, vaccines that do not require the use of adjuvants would have a clear clinical benefit.

Technology

Dr. Joel Collier and colleagues have developed a novel, nanofiber vaccine platform that is composed of self-assembling, concatemerized antigens and does not require the use of an adjuvant to stimulate potent immune responses. Their studies show that, compared to conventional monomeric peptide vaccines, nanofiber vaccines are more readily taken up by dendritic cells – a major immune cell subset required for potentiating robust vaccine responses. Additionally, immunization with a nanofiber vaccine targeting the glioblastoma-specific mutation EGFRvIII was able to induce a protracted immune response that was greater than that which was engendered by a monomeric peptide vaccine administered with one of the most potent adjuvants, CFA.

Advantages

A major benefit of this self-adjuvanting vaccine platform is that it simplifies the immunological monitoring of the resulting immune response, given oft-used standard adjuvants have relatively indiscriminate immune-stimulatory activity. As an example, adjuvants alone can stimulate the secretion of cytokines that have little bearing on the antigen-specific vaccine response, which would confound the interpretation of the immune response. Additionally, a chemically-defined vaccine platform would simplify regulatory approval, considering that additional elements are not required.