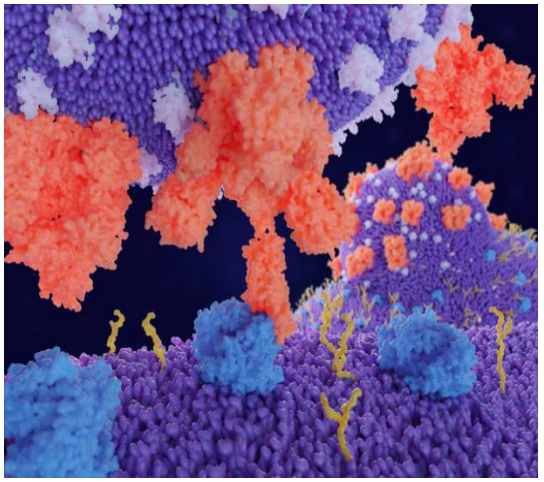
Targeted Fusion Protein Platform for Enhanced Bacterial Vaccines

Adjuvant-free CR2/TLR2-targeted antigens for stronger, safer immune responses

Background:

A major challenge in bacterial vaccine development is generating strong, lasting immunity without relying on added adjuvants, which can introduce side effects or complicate approval. Subunit vaccines, made from purified bacterial proteins, often lack sufficient immunogenicity on their own. One promising solution is to enhance how efficiently the immune system's antigen-presenting cells (APCs) detect, capture, and process the antigen. By directing antigens to immune receptors that naturally trigger strong immune responses, such as complement receptor 2 (CR2) and toll-like receptor 2 (TLR2), it is possible to boost vaccine potency and reduce the need for additional immune stimulants.



Source:https://www.istockphoto.com/search/2/image-film?phrase=fusion+protein

Technology:

Scientists at Albany Medical College have engineered fusion proteins that combine a whole-cell bacterial antigen with a receptor-targeting domain that binds CR2 and/or TLR2. The CR2-targeting component guides the antigen to B cells and follicular dendritic cells via the complement system, while the TLR2-targeting component activates innate immune signaling pathways that prime APCs for more effective antigen presentation. Together, these functions enhance both the magnitude and quality of the adaptive immune response. The design is modular, allowing substitution of different bacterial antigens, making it a flexible vaccine platform. It can be formulated for mucosal delivery, offers broad pathogen coverage potential, and eliminates the need for external adjuvants, simplifying manufacturing and improving safety profiles.

Intellectual Property:

US9475853

Technology Readiness:

Ready for licensing

Advantages:

- Enhances immunogenicity without external adjuvants
- Modular design adaptable to multiple bacterial antigens
- Suitable for mucosal and systemic delivery
- Simplifies vaccine manufacturing

Applications:

- Development of adjuvant-free bacterial vaccines
- Mucosal of adjuvant-free bacteria vaccines
- Broad platform for rapid adaptation to emerging bacterial threats

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