COMBATTING FUTURE BIOLOGICAL THREATS – HOST-DIRECTED INTERVENTIONS TO EMERGING THREATS FOR RAPID RESPONSE

Encapsulation For Supporting In Situ Cell-free Generation And Release Of Vaccine Antigens

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The ability to rapidly create treatments and therapeutics to emerging and novel diseases has remained a major public health and national security challenge for decades. Due to the vast and unpredictable threat space, potential countermeasures must be flexible and programmable. Cell-free protein synthesis (CFPS) uses the protein production machinery extracted from living cells in an in vitro system, only requiring a DNA template for activity and promising the ability to rapidly produce protein therapeutics to respond to emerging threats. CFPS lysates are also amenable to repackaging in novel formats while maintaining activity. We show that CFPS lysates can produce active fluorescent proteins in different capsule formulations, and in our proposed work, we aim to encapsulate CFPS lysates in polymer shells for oral delivery, protein antigen production, and vaccination to generate a protective immune response. We hope to lay the groundwork for generating a potential “just-add-water” oral delivery system that eliminates significant cold-chain storage bottlenecks for distributed manufacturing and field administration of recombinant protein vaccines.

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