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### Meet the Inventors

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Biomedical Engineering (BME)

### Publication(s)

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### External Link(s)

• [From the lab of Dr. Joel Collier](#)

## Sublingual immunization using supramolecular peptide-polymer conjugate tablets

### Value proposition

Immunization with vaccines prevent illness, disability, and currently avert an estimated 2 to 3 million deaths every year. However, commonly-used vaccine technology platforms can be unpredictable, require a high manufacturing cost, and often need cold-chain storage. While these factors result in raised costs and less effective vaccinations, they also contribute to difficulties in access for developing nations. Peptide vaccines can answer many of these problems, but traditionally elicit a weak immune response. Additionally, common needle-based injections are costly, require skillful administration and waste management, and pose significant safety risks to both health workers and patients. The World Health Organization has estimated that over a million deaths occur each year due to needle cross-contamination. Needles are also a major psychological deterrent for many, with up to ten percent of patients admitting skipping flu shots due to fear of pain and injury during injection. There is a need for cheaper, more accessible vaccines that can be administered without needles.

### Technology

The Collier lab at Duke has discovered that self-assembling peptide nanofibers can be rendered highly immunogenic by conjugating the assemblies to low molecular weight polyethylene glycol (PEG). These peptide-polymer assemblies can raise robust, antigen-specific responses against peptide epitopes that persist for at least a year when delivered sublingually. Additionally, they have demonstrated a dissolvable tablet capable of acting as a sublingual vaccine. This tablet is able to raise responses against the *M. tuberculosis* epitope ESAT6<sub>51-70</sub> and is additionally stable to heating for at least 1 week at 45 °C. A heat-stable, sublingually delivered peptide vaccine holds significant promise for lowering cost, controlling intervaccine variability, and improving vaccine accessibility.

### Advantages

- Robust immune response in animal model demonstrated with peptide nanofibers
- Preparation is simple and cheap
- Needle-free vaccination will improve patient compliance and avoid the cost of needle disposal

