MIMIX COVID-19: The Only Single-Dose, Shelf-Stable, Self-Applied SARS-CoV-2 Vaccine

The Challenge

Need to **rapidly scale** SARS-CoV-2 vaccine globally

- Over 41 SARS-CoV-2 Vaccines are Under Development
- Best case scenario, **18 months to launch**
- Moderna vaccine requires **two injections 28 days apart**
- Traditional vaccine delivery risks cross-infection as hospitals are a primary source of COVID-19. Example, in Spain 14% of all cases are healthcare workers. (NUGENT, 2 APRIL 2020)

The Solution: MIMIX™

- **Compatible** with any SARS-CoV-2 antigen; proteins, killed viruses, mRNA, and VLP
- **Single Dose** – Enhanced immune response comes from sustained release and intradermal delivery.
- **Dose-Sparing** – Less is needed to trigger immune response due to sustained release and intradermal delivery.
- **Shelf-Stable** – Advanced silk biomaterial enables storage at room temperature for years.
- **Self-Applied** – No sharps, easy to self-apply at home
  - Reduces patient and healthcare worker cross-infection
  - Conserve protective equipment

*No other known platform can deliver all of these benefits.*
DEVELOPING A SARS-COV-2 VACCINE:
By March 23rd, 2020, forty-one organizations had announced efforts to develop vaccines aimed at COVID-19 (WHO, 2020). As of March 18th, one candidate had advanced to the clinic, mRNA-1273, developed by Moderna and the US NIH, which provided patients with two separate injections 28 days apart (US NIH, 2020). Best-case estimates place the leading candidates 18+ months from launch.

THE NEXT CHALLENGE: We need a way to rapidly scale a SARS-CoV-2 vaccine globally while minimizing interaction with healthcare workers. In Italy, hospitals have become a primary source of SARS-CoV-2 transmission; roughly 9% of all COVID-19 patients are healthcare workers. Doctors in Italy advocate an approach focused on remote healthcare administered in patients’ homes (Begley, 2020). A United Health group study demonstrated the ability for users to effectively collect their own SARS-CoV-2 samples at home. The study’s lead remarked, “Making simple, patient-administered testing widely available will substantially improve testing efficiency, while protecting health care workers and preserving urgently needed personal protective equipment, such as face masks, gowns, and gloves.” (Reuter 2020). The same sentiments apply to vaccines; new technologies are needed to enable large-scale, remote delivery.

MIMIX: THE SOLUTION TO GLOBAL DISTRIBUTION AND DELIVERY. Vaxess has an antigen-agnostic technology that could enable a single-dose, shelf-stable, self-applied vaccine to simplify global distribution. The MIMIX platform, developed at Tufts, MIT, and Vaxess, offers a compact single-use applicator to deploy a microarray patch (Boopathy, 2019). With only five minutes of wear-time, the MIMIX patch embeds vaccine-polymer depots in the skin that release over 2-3 weeks. Studies in Cell and PNAS have shown that slowly delivering antigen to mimic an infection drives more potent immune responses, supporting dose-sparing and potential single-dose protection (Cirelli, 2019) (Tam, 2016).

With generous support from the NIH, the NSF, BMGF, and others, Vaxess has performed extensive MIMIX platform development and has validated performance and compatibility with a range of vaccine classes including proteins, killed viruses, mRNA, and VLP’s. In all cases, MIMIX showed dramatic enhancements in immune response. Regardless of which vaccine candidate emerges, the MIMIX platform can play a key role in enabling home delivery and ensuring global access.

Seeking partners for joint development on MIMIX.
While Vaxess aggressively pushes forward an mRNA-based COVID vaccine with an initial partner, the company is actively seeking other collaborators.