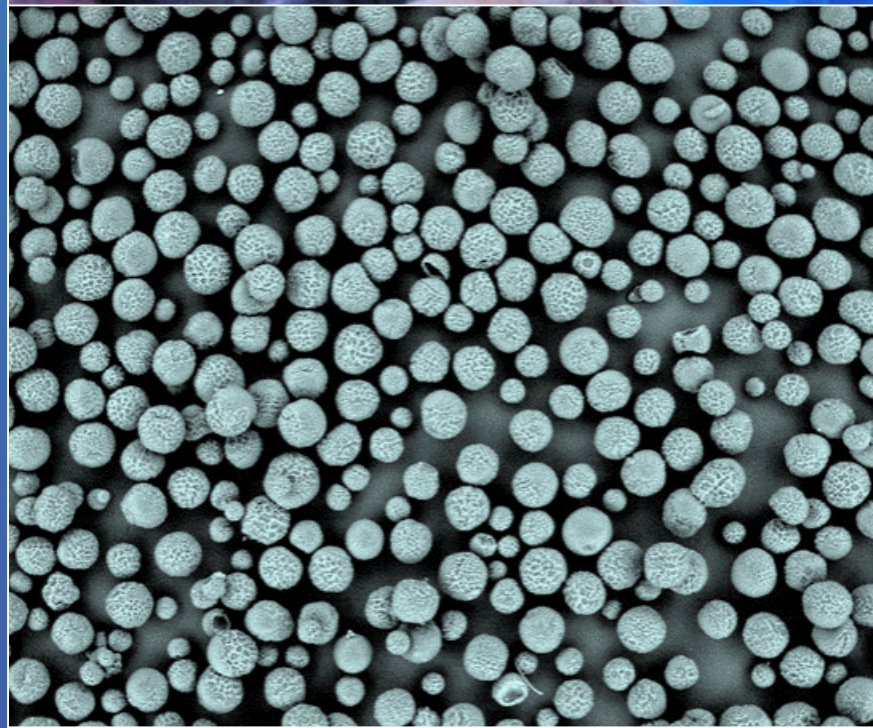
Particles for Humanity

Bridging the Gap Between
Academic Research and Developing World Needs

JP Morgan Conference

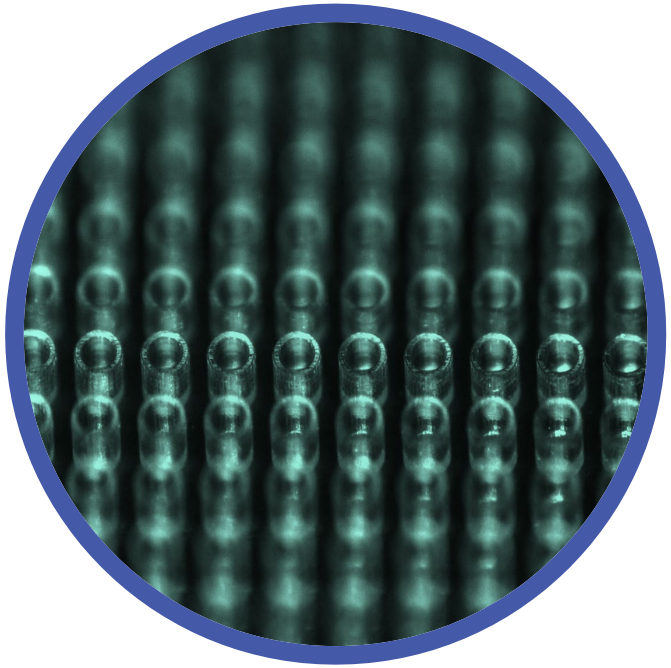
January 2019



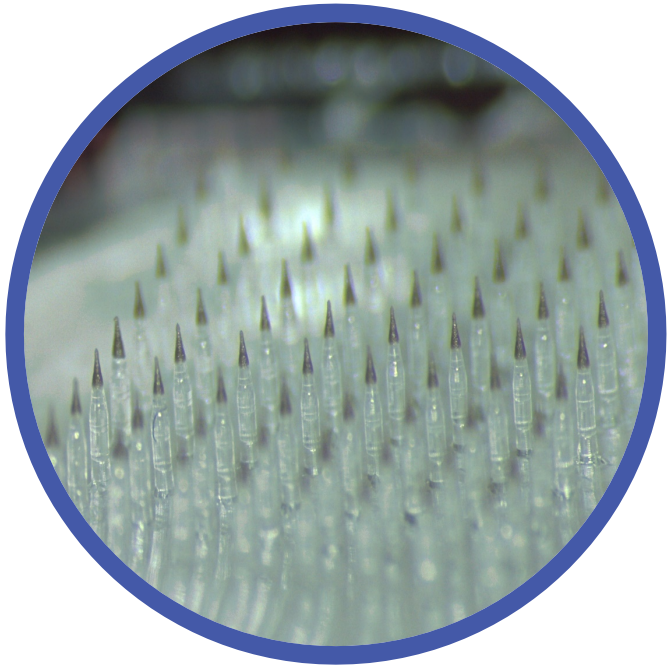
Applying Academic Research to Developing World Needs

- ***Problem***: Technologies that could benefit billions often languish in academic research labs
- ***Solution***: Use successful biotech model to accelerate progress with:
  - People experienced in translating academic research into products
  - Innovative technologies created at top academic centers
  - Partnerships to provide infrastructure to jump-start development
  - Financial backing to be effective
- ***Initial focus***: Create strategic roadmap, select first product, write development plan
- ***Initial funding***: Bill & Melinda Gates Foundation (BMGF)

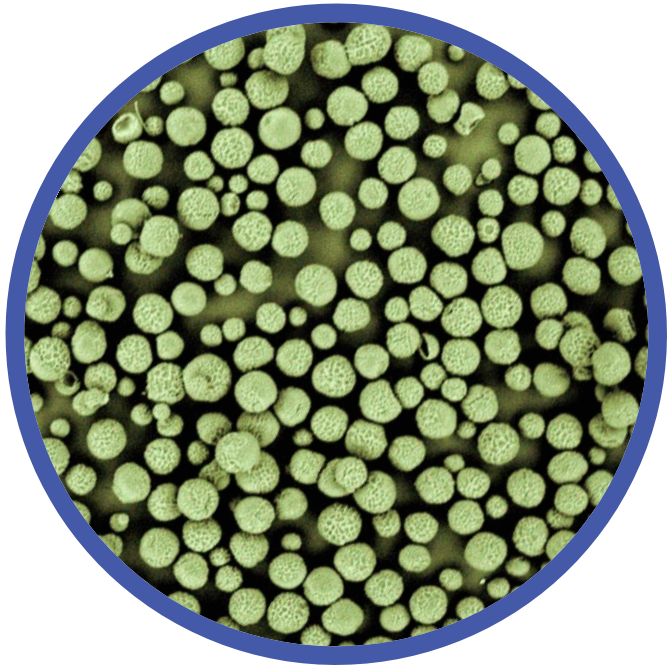
Pilot Phase: 3 Microencapsulation Technologies



Single injection vaccines for full immunization (published in *Science)*



Vaccination tracking system for high coverage

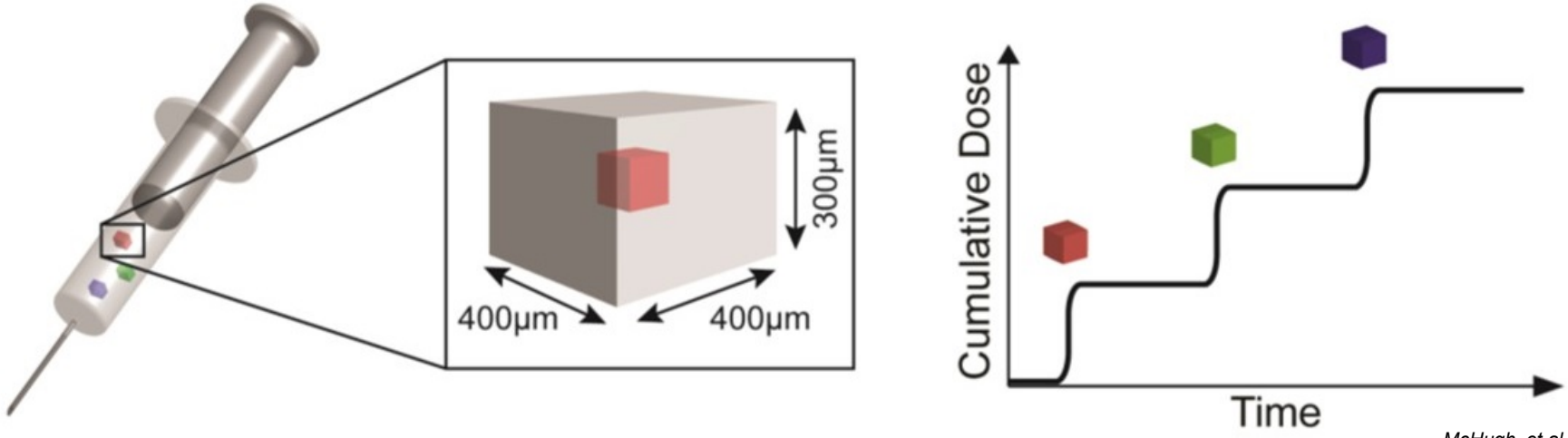


Food fortification technology to stabilize essential nutrients

Single Injection Vaccine for Full Immunization

*3 million people die annually from vaccine-preventable diseases**

Single Injection Timed-Release Particles Boosters Automatically Delivered



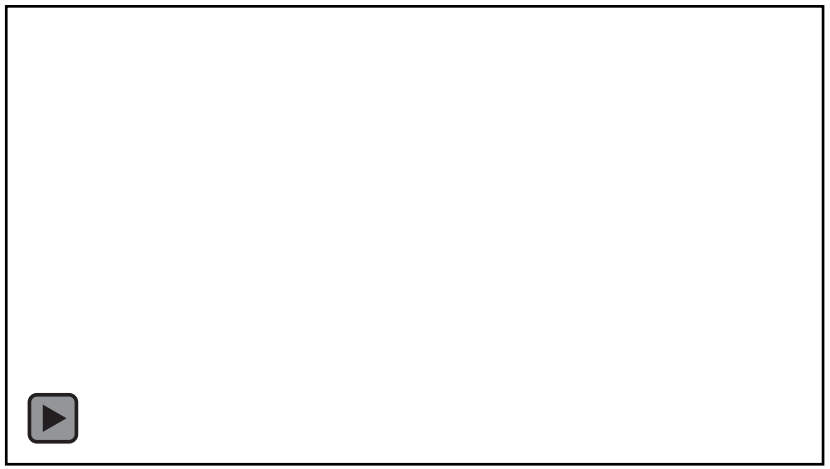
McHugh, et al., Science, 15 Sep 2017

- ***Problem***: Most vaccines require multiple booster shots for full efficacy, which is challenging for people without ready access to healthcare
- ***Solution:*** single injection vaccine utilizing encapsulation technology to release each booster in a pulse at the right time
- ***Progress:*** identified vaccines for development

* Centers for Disease Control and Prevention. 2006. Vaccine Prevent-able Deaths and the Global Immunization Vision and Strategy, 2006–2015. Retrieved September 3, 2008, from http://www.cdc.gov/mmwr.

Vaccination Tracking System for Campaigns

*19 million children worldwide are under-vaccinated**



https://www.nytimes.com/2018/11/10/world/asia/afghanistan-polio-vaccines-kandahar.html, video by Fahim Abed

GAVI Expert on Vaccination Tracking value:

"This is something lacking with our immunization programs. We need accurate post-campaign surveys to plan next campaigns and resource allocation."

- ***Problem***: challenging to reliably determine who has been vaccinated as patient medical records are spotty, especially during vaccine campaigns
- ***Solution:*** on-patient medical record embedding vaccination information into skin
  - Invisible data only readable by custom, low-cost, mobile technology
  - Enables valuable auditing of vaccine campaign to ensure high coverage
- ***Progress:*** accelerated development timeline by separating tracker from vaccine

Particles for Humanity

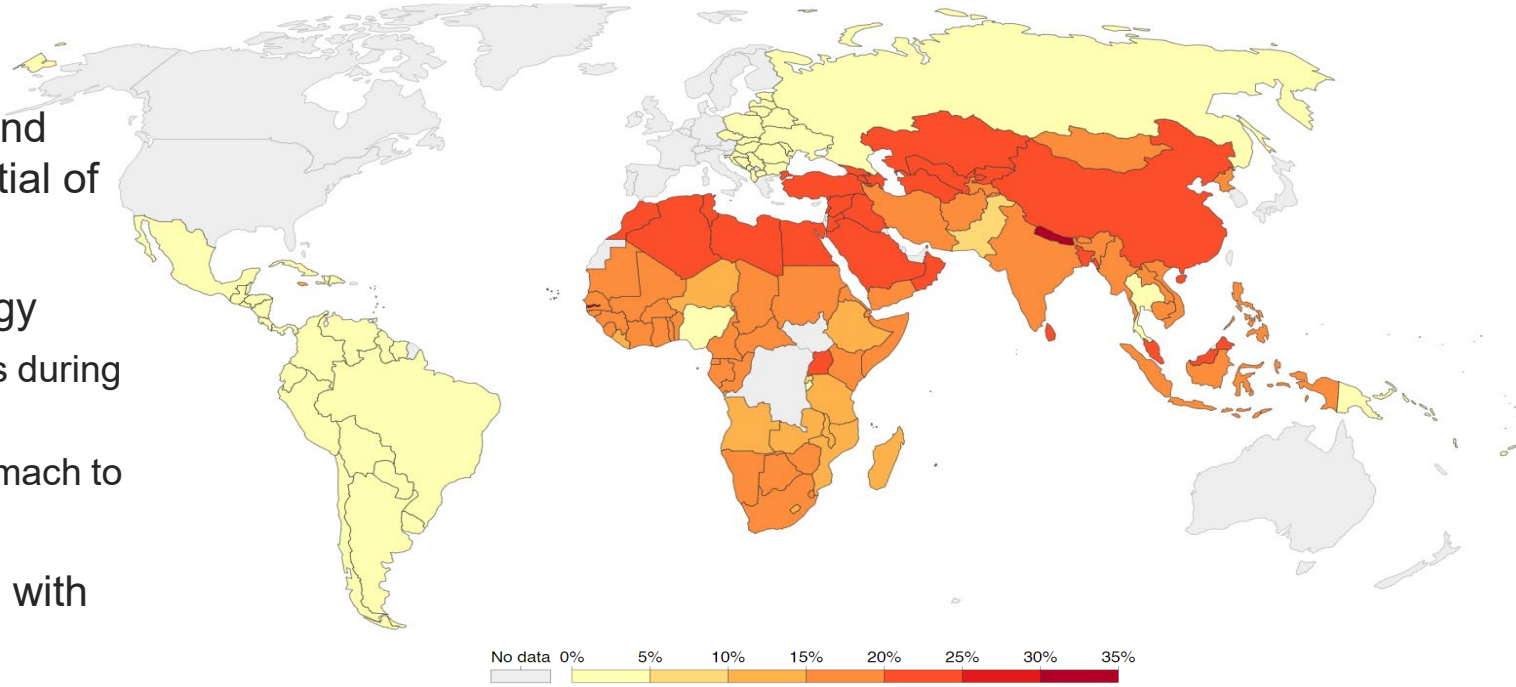
* UNICEF: *https://www.unicef.org/press-releases/unicef-reaches-almost-half-worlds-children-life-saving-vaccines

Food Fortification to Decrease Malnutrition

Two billion people worldwide suffer vitamin or mineral deficiencies leading to early mortality or a diminished life*

- Food fortification is one of top ways to combat malnutrition
- ***Problem***: many nutrients are unstable in heat and light or cause sensory issues, limiting the potential of food fortification
- ***Solution***: micronutrient encapsulation technology
  - Overcome lack of stability, by protecting nutrients during cooking and storage
  - Rapidly dissolve in the acidic environment in stomach to release nutrients for absorption
- ***Progress:*** collaborating with large multinational with manufacturing infrastructure

Prevalence of Vitamin A Deficiency in Pregnant Women
(1995-2005)



Source: WHO. Global prevalence of vitamin A deficiency in populations at risk 1995–2005. WHO Global Database on Vitamin A Deficiency. Geneva, World Health Organization, 2009.

* http://www.fao.org/docrep/x0245e/x0245e01.htm#P38_2721

Experienced Management Team and Board

Sherri Oberg
President and CEO
25 years' experience as CEO of public/private biopharma companies, drug development experience from concept through NDA submission, raised +$400 million across multiple market cycles

Don Chickering, PhD
Chief Technical Officer
20 years' development experience in early stage drug delivery, medical devices and pharmaceuticals

Robert S. Langer, ScD
Board Member
Institute Professor at MIT
National Medal of Science winner and holder of +1,300 patents licensed by +350 companies worldwide

Boris Nikolic, MD
Board Member
Managing Director of Biomatics Capital
Former chief advisor on science and technology to Bill Gates

Ana Jaklenec, PhD
Board Member
Research Scientist at MIT
Co-inventor of encapsulation technology

Particles for Humanity: “Fierce Urgency of Now!”

- Applying academic research to developing world needs
- Utilizing successful biotech industry model
  - Innovative microencapsulation technology
  - Experienced translators of research into products
- Focused on three initial areas
  - Food fortification
  - Vaccine delivery
  - Vaccination tracking
- Progress
  - Partnerships to access necessary infrastructure
  - Financial backing from the Bill & Melinda Gates Foundation

Photo by Seth Doyle on Unsplash