

We use a new genetics platform to develop better vaccines for flu, COVID-19, etc



inv-vax.com Pasadena CA

LEAD INVESTOR



Priya Balachandran

InvVax is fundamentally changing the way in which antiviral vaccines are developed. Leveraging years of technical and commercial experience in the space, the invVax team has developed a breakthrough platform that significantly increases the vaccine hit rate against current, emerging and future variants of viruses such as Influenza, Hepatitis and SARS-COV-2. InvVax is collaborating with leading global researchers in the space to apply their best knowledge and move the technology to the next phase of commercialization & implementation. The platform can be extended to address rapid vaccine development for other viruses and future pathogens. Arthur Young, with his deep knowledge in viral genomics, Nima Shiva, with his proven track record in the biotechnology entrepreneurial space and Olga Petrauskene, with her extensive experience in viral diagnostics, create an outstanding team to bring forth a compelling platform to address the public health threat of viral infectious diseases globally.

Invested \$2,500 this round

Highlights

- 1 Huge global market for these vaccines: Universal flu - \$22B; COVID-19 - \$5B
- 2 Chance to make an enormous societal impact
- 3 Patented durable and universal flu vaccine
- 4 Major smashes: Moderna, BioNTech, Novavax: Invest in the next one!
- 5 Backed by Life Science Angels - #1 US angel group (CB Insights), Sand Hill Angels, Tech Coast Angels
- 6 Funded by the DoD and the NSF

Our Team



Arthur Young CEO

PhD from a top 5-medical school, postdocs at Harvard and UCLA, pioneered a powerful new viral genetics platform



Olga Petrauskene Director

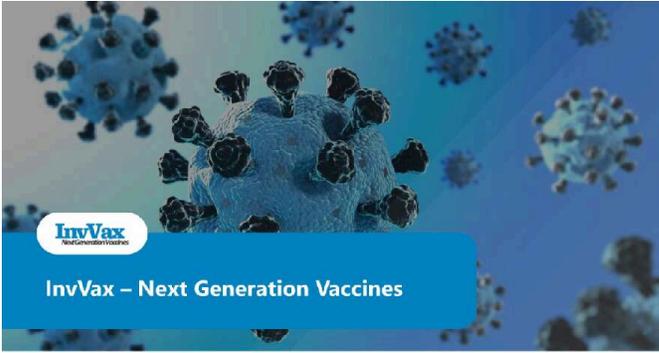
Produced an HIV and flu diagnostic with Applied Biosystems that is sold in 60 countries



Justin Kern Director

Wrote a freelance article for Newsweek on vaccines that reached millions





The Problem

<p>01.</p> <p>Pandemics:</p> <ul style="list-style-type: none"> • COVID-19 – 6.9M deaths • 1918 Flu – 50M deaths • 1957 Flu – 2M deaths • 1968 Flu – 2M deaths • 2009 Flu – “Swine” flu 	<p>02.</p> <p>Possible Emergence Of:</p> <ul style="list-style-type: none"> • Bird H5N1 – 60% fatality • Bird H7N9 – 30% fatality 	<p>03.</p> <p>Every year: Flu –</p> <ul style="list-style-type: none"> • 35M cases in U.S. alone • 300,000 – 650,000 deaths worldwide 	<p>04.</p> <p>The Challenge:</p> <ul style="list-style-type: none"> • Susceptible to variants that escape vaccine
---	--	--	---

[InvVax](#)

InvVax’s solution

- Find regions of the virus that cannot mutate – i.e., Any mutations in these regions result in the death of the virus
- Find these regions by a novel, sophisticated scientific platform pioneered by Dr. Arthur Young (InvVax founder) while at UCLA
- Target these regions in a next-generation vaccine
- Virus cannot Escape the vaccine by mutation
- Approach enables vaccines and therapies against all hypervariable viruses, flu and COVID-19 included

[InvVax](#)

How We’re Better Than What’s Out There

	Current Flu Shot	InvVax Universal Vaccine
Typical efficacy	40%	>90%
Works against	Limited number of strains	All strains
Flu pandemic protection?	No	Yes
Can virus escape vaccine?	Yes	No
Current stage	Commercial	Preclinical

[InvVax](#)



We have developed a unique platform for discovering the best vaccine and therapeutic targets for highly challenging viruses.

Using this, we have created the only universal flu vaccine targeting invariant* sequences of influenza.

Invariant* - adj: Any part of a virus that cannot be mutated without the virus self-destructing

InvVax
Next Generation Vaccines

*To our knowledge, this is the only universal flu vaccine targeting invariant sequence of influenza, but there could be, in theory, others that we do not know about.

InvVax's First Product Is A Universal Influenza Vaccine

Influenza A virus Subtypes

H1N1
H2N2
H3N2
H5N1
H7N9
H7N7
H1N2
H5N2
H7N2
H7N3
H5N2
H10N7

InvVax
Next Generation Vaccines

Dr. Young's (Founder of InvVax) work uncovered 11 invariant sequences in the influenza A genome which are superior vaccine targets in that:

- The virus cannot mutate away from them
- They induce a strong immune response
- They account for all strains of flu

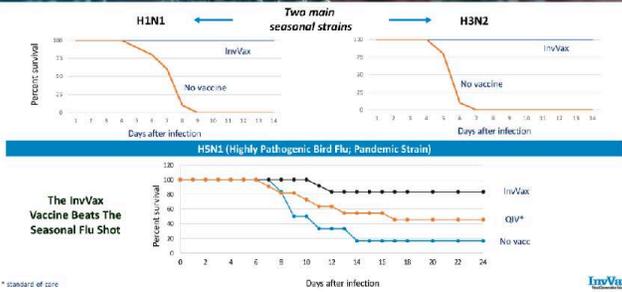
We should be able to give the vaccine only once every 5-10 years.

Patent for influenza vaccine targets granted April 2021: 11 invariant stretches comprised by 48 peptide variants.
Arthur Young co-inventor; exclusive license from UCLA.

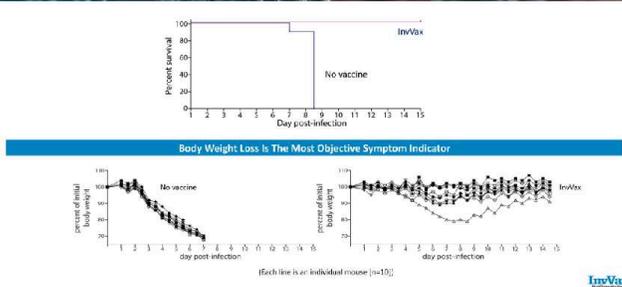
InvVax
Next Generation Vaccines

Proof-of-concept: Our vaccine works against a lethal challenge of flu virus

Mouse studies



Reduces Key Symptoms Of Morbidity



Ferret study: "Gold standard" flu model

20 ferrets were vaccinated with the InvVax vaccine and 4 ferrets were unvaccinated, and then 6 weeks later animals were all infected with flu virus.

Ferrets are better than mice because they have the same symptom profile from flu as humans.

T cell immunity measured.

Body weight loss monitored as response to flu virus.

Statistically significant correlation (95% confidence) between T cell immunity and less body weight loss.

InvVax
Next Generation Vaccines

Our Scientific Platform Can Be Applied To Other Hypervariable Viruses – Generating Additional Intellectual Property And Multiple Revenue Streams

Viruses	Current Solutions	# of Deaths/Year	# Infected	Time to Invariance Map
COVID-19	Four vaccines in market with varying efficacy against variants	11k	11k	1.25 years
Hepatitis B	No therapy available	900k	260M	1 year
Hepatitis C	No vaccine available	350k	175M	1 year

(Have received federal funding to work on Hepatitis B virus (\$1.9M) in collaboration with Princeton University)

InVax

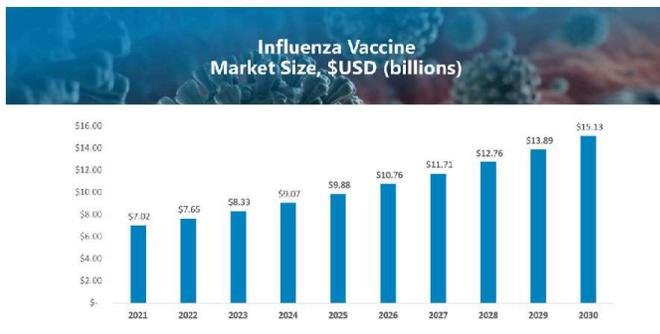
COVID-19 opportunity

The constant emergence of new variants has wreaked havoc on our COVID-19 vaccine efforts.

Omicron has upended the dogma that COVID-19 will not vary as widely or mutate as quickly as influenza.

We are a proactive solution to all the future variants that COVID can and will evolve, rather than a reactive one (scrambling to make new boosters after the next serious variant arises).

InVax



InVax

Source: Vision Research Reports.

We Are The Only Company Focused On Invariance

Company	Features	Progress	Outcome
InVax	T cell, conserved, INVARIANT	Preclinical	Validation in animal models
FluGen	Live attenuated, nonconserved & conserved	Phase 2a (challenged)	Only 1/2 of subjects showed Ab response; of these only 1/3 reduction in viral load
Alphaviva	Ab and T cell, conserved	Phase 3	Failed Phase 3
Altimmune	Ab and T cell, nonconserved	Phase 1	Safe & Immunogenic, but HA very mutable
vaccitech	T cell, conserved	Phase 2a & 2b (natural world infec.)	Failed both
UNITIX	Ab and T cell, nonconserved & conserved	Phase 2b	Reduced severe disease, but even these epitopes are mutable
NOVAVAX	Ab, nonconserved, novel Adjuvant	Phase 3	Improved immunogenicity over seasonal vaccine, nothing said about efficacy

InVax

To our knowledge, we are the only company focused on invariance. There could be others we do not know about.

Funding Raised To-date

Dilutive: ~1.5M

- Life Science Angels: \$305K
- Sand Hill Angels: \$222K
- Tech Coast Angels

Non-dilutive

- DoD CDMPR (Congressional Directed Medical Research Program): Invariance mapping of complete HIV genome and testing of Mre11 repair nuclease toward the improvement of CRISPR/Cas therapy for Hepatitis B & C

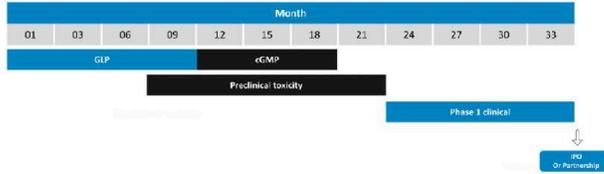
- Individual angels
- Friends & Family

repeatedly in 19 years, 2020/21

- NSF (National Science Foundation) Phase 1 SBIR: Stable prophylactic antibodies: 1 year, \$250K

InviVax

ROAD MAP: Influenza: Next 2.5 years



InviVax

Forward-looking projections are not guaranteed.

Our Team

Significant vaccine, genomic, and flu expertise; successful bringing products to market.



Arthur Young
Ph.D. Founder & CEO

- PhD from Yale (genetics)
- Harvard & MIT Postdoc
- 13 yrs flu research experience
- Co-developed and marketed the first flu vaccine



Nima Shiva
MBA, Head of Business Development

- Entrepreneur in Residence, University of Southern California - ANU
- Managing Director, Convergent Ventures, Life Science VC firm
- Founding CEO & Chairman, ProteoBio, Inc.
- Co-founder, VP Strategic & Real-time Development, Novartis Pharmaceuticals
- Research Scientist, UCSD Scripps Oceanographic Institute & Research Therapeutics
- MBA, Wharton School, USC's Neuroscience & Physiology, UCSD



Olga Potrauskene
PhD, MBA, Business Advisor & Director

- Director R&D, Applied Biology: developed MicroVax, HIV detection test, and flu & swine diagnostic
- COO of Business Development, Diagnostic Industries
- Former CEO of Molecular Diagnostics
- Faculty, Michigan State Univ.

InviVax

Advisory Board

Academic leaders in the field; life science commercialization track records; regulatory expertise



Ian Wilson
PhD

- Professor & Chair, Integrative Genomics & Complex Bio, Scripps Institution
- Former researcher in flu, HIV, & COVID virus (SARS-CoV-2)
- World leader in massive recognition of pathogens



Han van den Bosch
PhD

- founder, Nabibio, development of nanovaccines for influenza, RSV, and vaccine adjuvants
- founder, Vision, cost library for vaccine R&D
- CEO, Utevac, development of novel adjuvants for vaccines



Jon Lasch
PhD

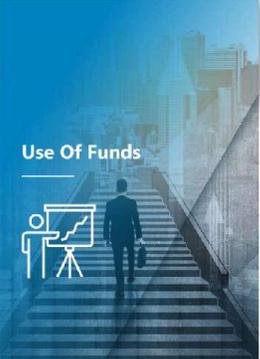
- Former Director, Alred Mann Institute, Baylor University, California
- 15 yrs. in science and technology development
- Former Vice President, Technology Development, Scripps Research Inst.
- Former Faculty, UCLA Anderson School of Management



Lou Fries, MD
Consultant

- Johns Hopkins faculty
- Vaccines for flu, RSV, hepatitis, Zika, and bacterial pathogens
- Senior management at Intellivax, ID Biomed, GSK, CHD at Novartis

InviVax



Use of Funds

- Precursor studies on influenza virus (e.g. comparison of mRNA with viral vector)
- Regulated manufacturing of influenza vaccine for clinical trials
- Development of a first-ever hepatitis C vaccine
- Development of a next-generation, mutation-proof COVID-19 vaccine
- Supplementation of grant income: Hepatitis B virus therapy, Prophylactic antibody work
- Ongoing company expenses, e.g. staff salaries, facility rent, IP and other legal fees

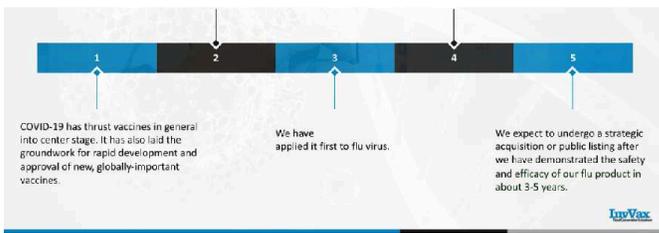
InviVax

We Have A Unique Opportunity

InviVax has pioneered a new viral genetics platform which can be used to discover new vaccine targets that hypervariable viruses cannot escape by mutation.

This platform is readily adaptable to other hypervariable viruses, such as COVID-19. This will generate new IP and additional revenue streams.

InviVax

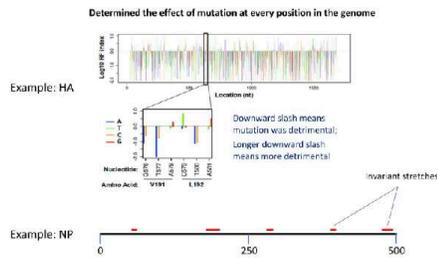


Forward-looking projections are not guaranteed.



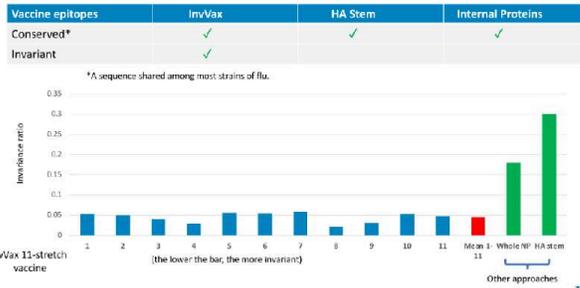
Mutational Profiling – Influenza A Virus

First-ever next-generation sequencing and bioinformatics-driven functional mapping of a viral genome.



Competitive Landscape: InvVax's Superior Approach

InvVax is the only universal flu vaccine in development that targets both conserved and invariant.



Ferrets - Statistically Significant Correlation Was Observed

Some vaccinated animals responded and some did not; those that did tolerated virus better.

N = 20 vaccinated with InvVax vaccine

	Vaccine responders	Vaccine nonresponders
Least body weight loss at endpoint (7)	6	1
Most maximum body weight loss at endpoint (13)	5	8

One-sided Fisher's Exact Test $p = 0.0158$

N = 21 (20 InvVax + 4 mock vaccinated)

	Vaccine responders	Vaccine nonresponders
Least maximum body weight loss (6)	5	1
Most maximum body weight loss (15)	6	12

One-sided Fisher's Exact Test $p = 0.0088$

