

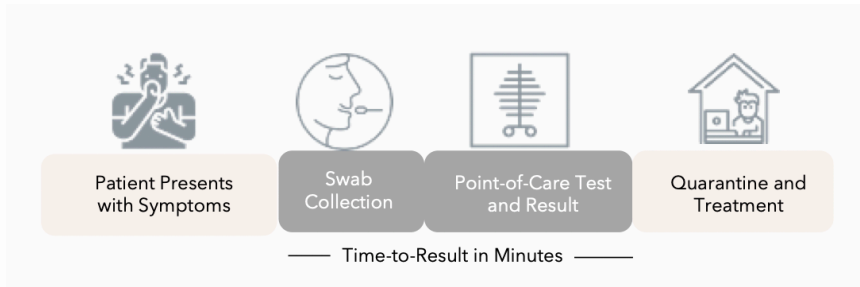


The COVID-19 pandemic has highlighted the need for a new approach to rapid diagnostic testing

Current diagnostics suffer from long time-to-result, low accuracy, and low throughput.

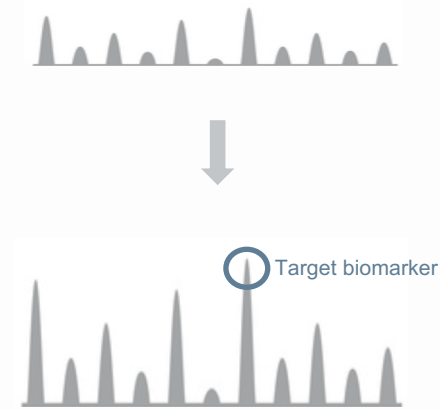


Our platform can identify biomarkers of interest within minutes (real-time) with high accuracy

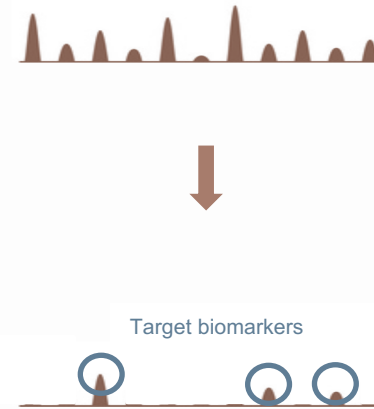


What if we could eliminate noise in a biological sample and directly detect rare biomarkers of interest?

Most diagnostic technologies require sample preparation followed by biomarker amplification



Our platform removes sample noise, enabling direct quantification of target biomarkers without amplification



Our team has pioneered the field of rare biomarker analysis



Alison Burklund

Co-founder/CTO

B.S. Johns Hopkins University 2015

M.Eng. UC Berkeley 2016

Ph.D. Dartmouth Engineering (2021)

Pathogen Purification

- **Burklund A, Tadimety A**, Zhang X.J. "Micro-scale Immunomagnetic Bacterial Enrichment Coupled to Nanoplasmonic Sensing for Rapid Detection of Pathogens in Whole Blood" *MicroTAS* 2019.
- **Burklund, A**, Saturley-Hall, H., Franchina F.A., Hill, J.E. Zhang, X.J. 2019. Printable QR code paper microfluidic colorimetric assay for screening volatile biomarkers. *Biosensors and Bioelectronics* 128, 97-103.
- **Burklund A**. Petryk, J, Hoopes, P.J., Zhang, X.J. Microfluidic enrichment of bacteria coupled to contact-free lysis on a magnetic polymer surface for downstream molecular detection. *Biomicrofluidics*.14, 034115 ***Editors Choice Paper.
- **Burklund A*, Tadimety A***, Nie Y, Hao N, Zhang X.J. "Advances in Diagnostic Microfluidics." *Advances in Clinical Chemistry*. <https://doi.org/10.1016/bs.acc.2019.08.001>
- **Burklund A.** and Zhang, X.J. 2019. Microfluidics-based organism isolation from whole blood - an emerging tool for bloodstream infection diagnosis. *Annals of BME*.
- **Burklund, A.** Rees, C.A., Stefanuto, P-H., Eckhardt, E.M., Schwartzman, J.D., Hill, J.E. Identification of pathogens from positive blood cultures using volatile metabolic profiles and machine learning. Ready to submit.



Dr. Amogha Tadimety

Co-founder/CEO

Thayer PhD Innovation Fellow

B.S. Princeton University 2014

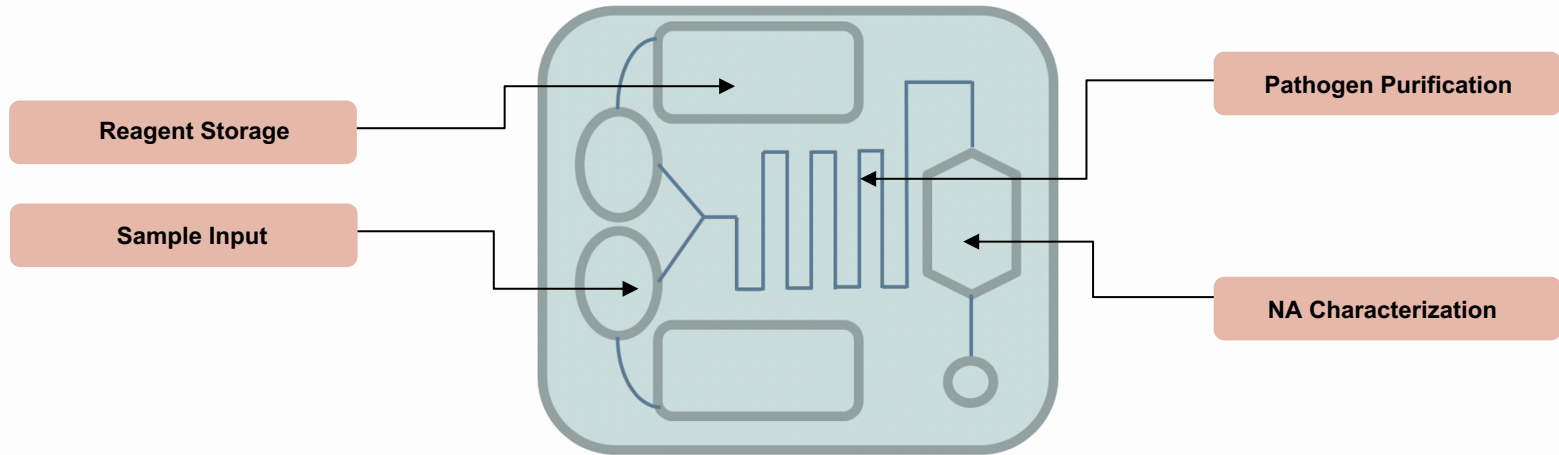
Ph.D. Dartmouth Engineering 2020

RNA/DNA Characterization

- **Tadimety A***, Wu Z*, Molinski JH, Beckerman R, Jin C, Zhang L, Palinski TJ, and Zhang XJ. "Rational Design of On-Chip Gold Plasmonic Nanoparticles for Liquid Biopsy." *Biosensors & Bioelectronics*. Under Review
- **Tadimety A**, Zhang Y, Kready KM, Palinski TJ, Tsongalis GJ, and Zhang XJ. "Design of peptide nucleic acid probes on plasmonic gold nanorods for detection of circulating tumor DNA point mutations." *Biosensors and Bioelectronics*. 130, 236-244, 2019.
- **Tadimety A**, Kready KM, Chorsi HT, Zhang L, Palinski TJ, and Zhang XJ. "Nanowrinkled Thin Films for Nanorod Assembly in Microfluidics." *Microfluidics and Nanofluidics*. 23(7), 2019.
- **Tadimety A**, Zhang Y, Palinski TJ, Cheng GC, Tsongalis GJ, and Zhang XJ. "Plasmonic Gold Nanorods with Sequence-Specific Conjugation for Circulating Tumor DNA Screening." *IEEE Optical MEMS and Nanophotonics*. 2018.
- **Tadimety A**, Zhang Y, Tsongalis GJ, and Zhang XJ. "Screening Circulating Nucleic Acids of Pancreatic Ductal Adenocarcinoma Using a Plasmonic Nanosensor." *Journal of Molecular Diagnostics*. 19(6) 1050, 2017.
- **Tadimety A**, Closson A, Li C, Yi S, Shen T, and Zhang XJ. "Advances in Liquid Biopsy On-Chip for Cancer Management: Technologies, Biomarkers, and Clinical Analysis". *Critical Reviews in Clinical Laboratory Sciences*. 1-23, 2018.

Our core technology is entirely unique – and will be developed as a platform

Our integrated, disposable cartridge 1) isolates target biomarkers from a biological sample and 2) localizes nucleic acids over our on-chip sensor



Our approach represents a complete paradigm shift in diagnostic testing, applicable to a range of clinical scenarios



INTEGRATED SINGLE CHIP & WORKFLOW

Our entire technology will be integrated onto a single chip and clinical workflow



ELIMINATE NUCLEIC ACID AMPLIFICATION

We use ultrasensitive optical detection that eliminates the need for PCR or sequencing



SIMULTANEOUS MULTIPLEXING

Our approach allows for multiplexed characterization of biomarker of interest and population-level disease surveillance.

We remove unwanted sample components and localize the virus over our sensor to lower time and enhance sensitivity

Our COVID-19 platform is rapid, portable, and can detect other key viruses, like the flu.

Technology	Nucleic Acid Amplification?	Portable?	Cost	Total Time
nanopathdx	no	yes	\$\$	min
RT-PCR (gold standard)	yes	no	\$	hr/days
Isothermal NAAT (Abbott ID Now™)	yes	yes	\$\$	min/hr
Nucleic Acid Microarrays	yes	no	\$\$\$	hr/days
Metagenomic Sequencing	yes	no	\$\$\$	days

*Our technology platform circumvents nucleic acid amplification and dramatically reduces total analytical time. Advantages are darkened. (RT-PCR = Reverse Transcription-Polymerase Chain Reaction; NAAT = Nucleic Acid Amplification Test)

We have developed a strong IP portfolio in collaboration with Dartmouth College

1. Two PCT Patents Filed
(nanoparticle array formation, plasmonic sensing, and volatile biomarker detection)

2. 3 New Provisional Filings
(integrated microfluidic device, new configuration, capture & lysis)

3. Capitalize on Dartmouth's founder friendly licensing policy
(4% equity stake for exclusive license)

4. Continue strong relationship with Dartmouth
(Incubator and Technology Transfer Office)

"As every investor knows, just as much as one invests in a particular entrepreneurial idea, one invests in the leadership of the startup. This one is a good bet in my mind"

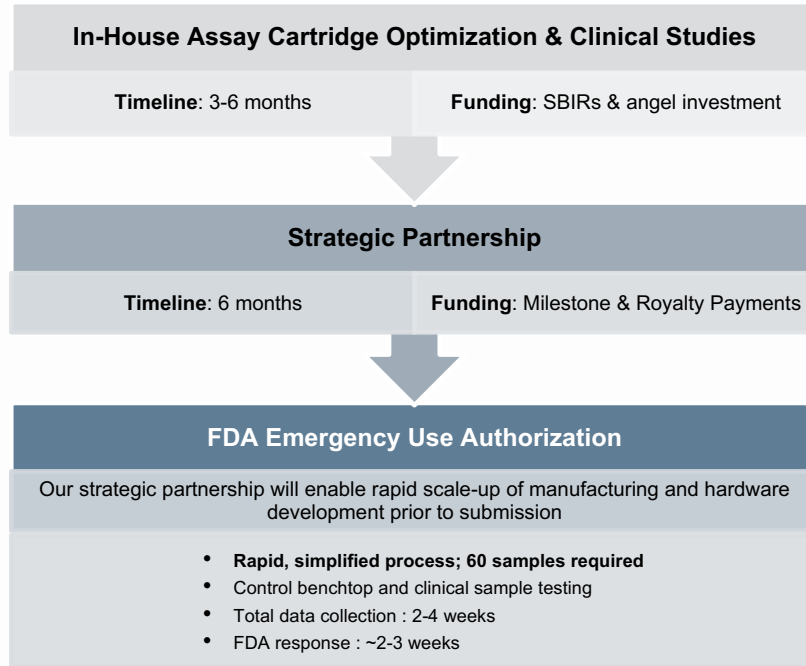


Dr. Eric Fossum

Business Mentor

Vice Provost, Office of Entrepreneurship and Technology Transfer
John H. Krehbiel Sr. Professor for Emerging Technologies
PhD Innovation Program Director
QE Prize Laureate

COVID presents a unique opportunity to rapidly de-risk our platform, and later apply it to other clinical scenarios



"I have met with the team to discuss their proposed technology and I am enthusiastic about its ability to aid in the rapid detection of SARS-CoV-2 "



Dr. Gregory J. Tsongalis

Clinical Advisor & Mentor

Director, Laboratory for Clinical Genomics

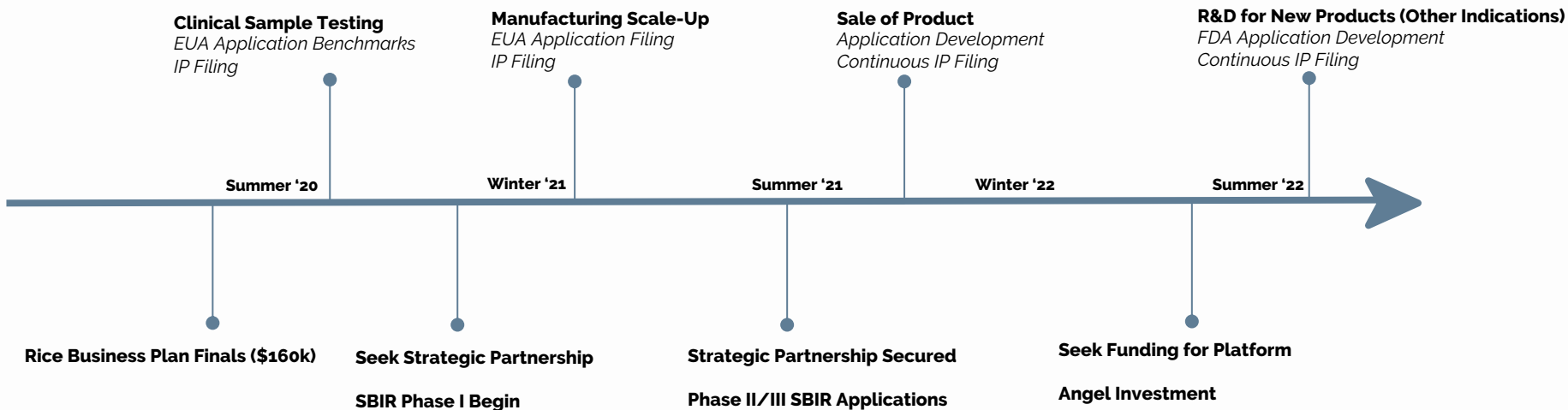
50+ stakeholder interviews (Spring 2018-present)



We plan to grow our technology portfolio to other applications & clinical settings before acquisition after Y5



Research & Development



Key Resources

Funding Sources

- 1. Rice Business Plan Competition:** 2nd overall (400+ teams), nCourage Women Prize, Pearland Prize, SheSpace Prize, LivePlan Pitch Prize
- 2. NIH SBIR Phase I Waiver:** "Integrated System for Rapid Pathogen Purification and Identification in Bloodstream Infections". Submitted 04/2020 (**\$600,000**)
- 3. NIH SBIR Phase I Waiver:** "Rapid point-of-care platform for molecular HPV screening from urine in low resource settings" Submitted 04/2020 (**\$400,000**)
- 4. NSF SBIR Phase I:** "Rapid, Portable RNA Quantification for COVID-19 Diagnosis." Submitted 06/2020 (**\$256,000**)

Our diagnostic platform has applications to many clinical indications, and we are actively developing it for infection and cancer



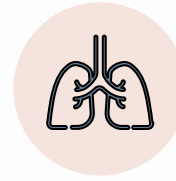
BLOODSTREAM INFECTIONS

Identification of pathogens in a blood sample



URINARY TRACT INFECTIONS

Characterization of pathogens in a urine sample



RESPIRATORY INFECTIONS

Detection of pathogens in sputum and saliva



ENVIRONMENTAL MONITORING

Food & water and environmental quality



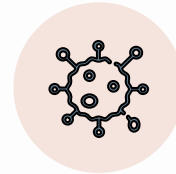
COVID-19

Rapid viral capture and RNA Identification



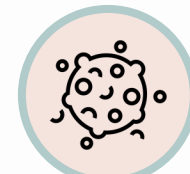
WOUND INFECTIONS

Antibiotic determination in the field (DOD SBIR)



BIOSECURITY

Capture of rare bioterrorism threats



CANCER LIQUID BIOPSY

Monitoring in low-volume samples



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Ph.D. Dartmouth Engineering (2021)



Dr. John X.J. Zhang

Co-founder

Thayer (Dartmouth) Professor
Dartmouth Hitchcock Medical Center PI
Lab-on-Chip Diagnostics Expert



Dr. Eric Fossum

Business Mentor

Vice Provost, Entrepreneurship & Tech Transfer
PhD Innovation Program Director
QE Prize Laureate



Dr. Gregory J. Tsongalis

Clinical Advisor & Mentor

Director, Laboratory for Clinical Genomics
Lab has processed 20,000+ COVID-19 Samples

At nanopathdx, we're passionate about improving human health worldwide. We founded our company because we believe that the technologies we've been developing in the lab can save lives. We believe our unique technology is the next frontier for large-scale diagnostics.

Amogha Tadimety

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Alison Burklund

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