

BARDA DRIVE Portfolio Companies

February 2019

COMPILED BY
Susan Craft

NCBiotech Life Science Intelligence
research@ncbiotech.org
919-549-8880

COMPILED FOR
Emil Runge, First Flight Venture Center
Mary Beth Thomas, NCBiotech

The North Carolina Biotechnology Center

The North Carolina Biotechnology Center accelerates life science economic development through innovation, commercialization, education and business growth. Our vision is to transform North Carolina into a global life science leader. ncbiotech.org

Life Science Intelligence at NCBiotech

Life Science Intelligence at NCBiotech (LSI) specializes in the intersection of life science innovation and business. We inform business decisions by delivering targeted bioscience market and scientific insight. ncbiotech.org/library

About the Research Analyst



Susan Craft, MSLS, MMCi
Senior Research Analyst
919-549-8878

Susan obtained a Master's degree in Library Science (MLS) from UNC Chapel Hill in August 2012 and a Master's of Management in Clinical Informatics (MMCi) from Duke University in August 2018. While at UNC, she worked as a library intern with the Environmental Protection Agency Library in RTP. Prior to that, she graduated from the University of Mississippi with degrees in English and French and minors in mathematics and chemistry.

Note about authorship

All sources, such as Pitchbook Venture Capital database, are fully cited in the footnotes. Because of the nature and intended use of this report by the client and to save time, much of the text in this report was extracted directly, word-for-word, from the cited sources without the use of quotation marks. In other words, we are not claiming authorship of this information. Notes from the analyst are typically formatted in italics and/or highlighted. Anything summarized or re-written by the analyst is cited as such, to show that distinction.

Contents

Note about authorship 2

Executive Summary..... 1

Overview of Cost Sharing 2

Solving Sepsis Company Profiles 2

 Cytovale 2

 Emory University..... 3

 Immunexpress 4

 InnaMed..... 6

 Prenosis 7

 Qvella 8

 Sepsis Alliance..... 9

ENACT Company Profiles..... 10

 BioBeat..... 10

 Empatica..... 11

 EnLiSense..... 12

 Spire 13

Executive Summary

To date, BARDA DRIVe has provided funding to eleven entities. CytoVale, Emory University, Immunexpress, InnaMed, Prenosis, Qvella and Sepsis Alliance have received funding through the Solving Sepsis track, while Biobeat, Empatica, EnLiSense and Spire have received funding through the ENACT track.

The companies funded through the ENACT focus are developers of wearable sensors of biomarkers (cytokine levels) or bio-signals (heart rate, breathing variability, changes in body heat, etc.) through sweat or movement. Spire has raised money through multiple funding rounds and has products on the market. EnLiSense's products are still in development and they do not have a profile in Pitchbook venture capital database, but have received funding from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in 2017. The federal funding that EnLiSense and Spire have received have been from either NIAAA or the National Institute on Drug Abuse (NIDA). Biobeat has received funding from several venture investors and has a relationship with several accelerator or incubator groups such as Plug and Play Tech Center. Empatica is based on technology out of MIT and has received funding through venture groups as well as crowdfunding.

The companies funded through the Solving Sepsis focus have distinct products. InnaMed provides a rapid blood test for a sepsis-associated biomarker. Prenosis develops algorithms to help doctors predict the progression of sepsis in a patient. CytoVale develops low-cost diagnostics that use microfluidics, high-speed imaging, computer vision and machine learning to test blood samples for changes that occur when a person is getting sick. InnaMed has received funding from several incubator and VC groups, while Prenosis has raised money from incubator groups and venture competitions as well as the NSF and CDC. CytoVale has received funding from various sources including venture capital groups, agencies like NSF and companies like Becton Dickinson (BD). CytoVale has also been included in several notable incubator/accelerator programs, including Breakout Labs and Google Developers Launchpad. While InnaMed and Spire are in separate BARDA DRIVe focus areas, they have both received assistance through Y Combinator, an accelerator based in Cambridge, MA. Qvella has developed a rapid pathogen identification platform and leverages Predigen Inc.'s gene signature analytical power to help develop the intended assay for the early diagnosis of sepsis. Predigen is a spinout of Duke University. Qvella has received several rounds of VC funding, including funding from Hatteras Venture Partners. Immunexpress has developed a product that rapidly evaluates a set of patented gene-expression biomarkers from the patient's blood and has also received VC funding. Emory University is using machine learning to predict sepsis in patients. Shamim Nemati at Emory University has received funding in the past on this topic from NIEHS and state groups. Sepsis Alliance is a nonprofit that is launching a sepsis education and training initiative called the Sepsis Institute.

Most of the companies are incurring around a 30% cost share, excluding Immunexpress at 77%, CytoVale at 46% and Empatica at 45%. There is not much information available around what the cost share is covering; for InnaMed, Prenosis and CytoVale, the cost share is going towards "development costs" according to the BARDA press releases.

Overview of Cost Sharing

Portfolio Company	DRIVe Investment	Cost Share	Total	% Cost Share
Spire	\$62,200	\$26,660	\$88,860	30%
InnaMed	\$200,000	\$85,750	\$285,750	30%
Prenosis	\$749,000	\$322,552	\$1,071,552	30%
EnLiSense	\$550,909	\$236,104	\$787,013	30%
CytoVale	\$749,000	\$648,200	\$1,397,200	46%
Biobeat	\$599,000	\$355,800	\$954,800	37%
Emory University	\$699,376	\$348,400	\$1,047,776	33%
Empatica	\$251,454	\$205,734.98	\$457,189	45%
Immunexpress	\$744,739	\$2,458,929	\$3,203,668	77%
Qvella	\$692,236	\$296,673	\$988,909	30%
Sepsis Alliance	\$427,248	\$195,000	\$622,248	31%
Total	\$5,725,162	\$5,179,802.98	\$10,904,964.98	47%

Solving Sepsis Company Profiles

Cytovale

<http://cytovale.com/>

San Francisco, CA

Number of employees: 5-15

Year founded: 2013

Products

Cytovale's low-cost diagnostic holds the potential to provide the quick information emergency room healthcare providers need in the critical first hours and days of this often-deadly disease.

The Cytovale technology takes advantage of advances in microfluidics, ultra-high speed imaging, computer vision, and machine learning to rapidly quantify immune cell dysregulation from a blood sample in minutes. It uses deformability cytometry to measure immune cell changes, like inflammation and other changes that occur when a person is getting sick.

Previous funding¹

- The company raised \$7.25 million of Series B venture funding from Baidu Ventures, Blackhorn Ventures and Breakout Ventures on July 1, 2018, putting the company's pre-money valuation at \$25 million. Pactolus Ventures also participated in the round.

¹ Retrieved from Pitchbook.

- The company joined Google Developers Launchpad in October, 2017. The startups “get what Google deftly described as ‘equity-free support,’ and access to Google mentors, community engagement as well as datasets and testing environments for prototyping, as examples.”²
- The company received \$2.97 million of grant funding from U.S. Department of Health and Human Services and National Science Foundation in September 2016.
- The company received \$25,000 of grant funding from Becton, Dickinson and Company (NYSE: BDX) on April 6, 2015. This was in partnership with Breakout Labs.³
- The company raised \$4.3 million of Series A venture funding from NetScientific, IT-Farm Corporation and undisclosed investors on June 10, 2014, putting the pre-money valuation at \$8.1 million.
- The company raised an undisclosed amount of venture funding from Breakout Labs and Dolby Family on November 15, 2013

Strategic partnerships

- Cytovale has partnered with various academic institutions and healthcare systems on their publications, including UCLA, California NanoSystems Institute, Louisiana State University, Baton Rouge General Medical Center

Cost share

DRIVE and Cytovale are committed to a public-private partnership, with DRIVE contributing \$749,000 of the total \$1.397 million project cost. Cytovale will cover the remaining development costs for this phase of development as a part of a cost share.

Emory University

<http://nematilab.info/>

Atlanta, GA

Products

The BARDA DRIVE Solving Sepsis initiative is partnering with Emory University to further validate an interoperable machine learning software for early prediction of sepsis in hospital intensive care units that will provide physicians with actionable information. The project will leverage a multicenter consortium (Emory University School of Medicine, Massachusetts General Hospital, University of California San Diego School of Medicine, and Atlanta’s Grady Health System) for retrospective validation utilizing a secure cloud architecture and will also execute a prospective deployment of the real-time predictive algorithm.

The deep learning algorithm currently in use in the Emory Healthcare system processes high-resolution vital signs and laboratory measurements in real time to produce prediction scores and has the potential to warn health professionals of the impending development of sepsis in patients 4 to 6 hours in advance.

² Google powers up AI, machine learning accelerator for healthcare. November 1, 2017.

<https://www.healthcareitnews.com/news/google-powers-ai-machine-learning-accelerator-healthcare>

³ Breakout Labs and Becton, Dickinson and Company Partner to Provide Capital and Expertise to Biomedical Startups. April 6, 2015. <https://www.businesswire.com/news/home/20150406005695/en/Breakout-Labs-Becton-Dickinson-Company-Partner-Provide>

Leveraging the Google Cloud Healthcare API and the Google Cloud Platform, the Emory team will optimize the software platform and undertake a prospective cloud-based implementation study, for a multi-site evaluation and validation, with an eventual goal of seeking FDA clearance as software as a medical device (SaMD) for early prediction of sepsis. The device, which would allow for detection of early signs of sepsis and the corresponding leading causes via a deep learning-based multi-dimensional time-series analysis approach, could improve clinicians' situational awareness and potentially save lives.

Previous Funding

- Dr. Shamim Nemati is listed as PI on an NIEHS grant titled “Deep Learning and Streaming Analytics for Prediction of Adverse Events in the ICU” from 2015-2019.
- Dr. Shamim Nemati is listed as Co-PI on a \$300,000 NSF grant titled “Leveraging Heterogeneous Data Across International Borders in a Privacy Preserving Manner for Clinical Deep Learning” from 2018.
- Dr. Shamim Nemati is PI on a \$39,982 Pilot Grant through Georgia Clinical & Translational Science Alliance titled “Real-Time Identification of ICU Patients at Risk for Sepsis Through Big Data.”
- May 1st, 2018 The Georgia Tech Pediatric Technology Center awarded funding to PIs Shamim Nemati (Emory), Gari Clifford (Emory), Kevin Maher (CHOA), and Wilcox, to pursue a new project focused on preventing bloodstream infections through interpretable machine learning: “A FHIR-Enabled Interpretable Deep Learning Platform for Timely Prediction of Central Line-associated Bloodstream Infections.”

Strategic Partnerships

The Nemati Lab at Emory often partners with researchers and clinicians at Emory Healthcare as well as The Clifford Lab at Emory University and Georgia Institute of Technology, led by Gari Clifford.

Cost Share

DRIVE and the research consortium will work in partnership, with DRIVE contributing \$699,376 of the total \$1.04 million estimated project cost. The consortium institutions will fund the remaining development costs.

Immunexpress

<http://www.immunexpress.com/>

Seattle, WA

Number of employees: 15

Year Founded: 2006

Products

Immunexpress is a Seattle-based molecular diagnostic company committed to improving outcomes for patients suspected of sepsis. Immunexpress' SeptiCyt[™] technology rapidly quantifies, directly from whole blood, specific molecular RNA biomarkers from the patient's own immune system – the ‘host response’. SeptiCyt[™] LAB, recently cleared by the FDA, is the first of its kind in using the host immune system to differentiate systemic inflammatory response syndrome (SIRS) and sepsis.

Immunexpress SeptiCyt[™] technology is a precision diagnostic tool that evaluates a set of patented gene-expression biomarkers from the patient's blood. The tool is being designed to use mathematical algorithms

to differentiate sepsis and infection negative systemic inflammation and identify whether the sepsis infection is viral or bacterial.

Previous Funding

- The company is in the process of raising \$20 million of Series C venture funding from undisclosed investors as of January 4, 2018. The round is expected to close August 31, 2018.
- The company raised \$27.23 million of venture funding from undisclosed investors. The date of this was not disclosed.
- The company raised \$12 million of venture funding in a deal led by Debiopharm Innovation Fund on March 5, 2014. The company intends to use the funds to advance development of the Immunexpress SeptiCyte® technology and bring one of its late-stage sepsis diagnostic products through to market.
- The company received AUD 982,707 of grant funding from Commercialisation Australia on February 18, 2014.

Strategic Partnerships

- **Biocartis**
In January 2018, Immunexpress announced a partnership with Biocartis to develop and commercialize a fully automated SeptiCyte™ LAB test for use on the Biocartis' sample-to-answer real-time PCR Idylla™ platform.
- **MARS Sepsis Consortium**
2011 – present: The MARS Sepsis Consortium is a prospective observational cohort study designed to produce molecular information relevant to sepsis diagnosis and management. Immunexpress is a full partner in the collaborative Consortium. The Consortium recruited 8,603 critical care patients with signs of Systemic Inflammatory Response Syndrome (SIRS) across two tertiary hospitals in the Netherlands: the Academisch Medisch Centrum (AMC) in Amsterdam, and the University Medical Centre Utrecht (UMCU). Immunexpress is continuing collaborative sepsis clinical research at both study sites. (Clinicaltrials.gov identifier: NCT01905033)
- **Seattle Children's Hospital**
2013 – present: The Genotypes and Phenotypes in Pediatric SIRS and Sepsis (GAPPSS) study is a collaborative pilot study at the Seattle Children's Hospital between Professor Jerry Zimmerman and Immunexpress. Immunexpress and the Seattle Children's Research Institute are jointly funding this study. (Clinicaltrials.gov identifier: NCT02728401)
- **Intermountain Health Care**
2013- present: Intermountain Healthcare acted as the coordinating trial and data collection site for the FDA clearance studies of SeptiCyte™ technology, including the on-site real-time studies, and has a long history of interaction with Immunexpress. This collaboration has resulted in multiple papers and publications ranging from assay performance trials through to health econometric modeling.
- **University College London Hospital**
2011 – present: University College London and Immunexpress continue to collaborate in prospective observational cohort studies including in pneumonia, immunocompromised sepsis patients, UTIs, and on validation of gene expression biomarkers for bacterial and viral sepsis.

Cost Share

DRIVE and Immunexpress are committed to a public-private partnership, with DRIVE contributing \$744,739 of the total \$3.2 million estimated project cost, and Immunexpress funding the remaining

development costs. Immunexpress will leverage its prior experience of developing its FDA-cleared product (SeptiCyte™ LAB) to develop this new sepsis diagnostic on the Biocartis Idylla™ platform.

InnaMed

<https://www.innamed.com/>

Philadelphia, PA

Number of employees: 4

Year founded: 2016

Products

Developer of a smart, at-home blood testing device designed for the early detection of deterioration and automation of therapy in chronically ill patients. The company's device utilizes patented DNA-driven assay technology, aptamer reagents and signal processing hardware, enabling rapid, ultra sensitive blood testing at the home.

InnaMed will develop its proprietary electrochemical proximity assay (ECPA) technology to rapidly test blood for the sepsis-associated biomarker, a recently identified peptide that has shown increased sensitivity, specificity and prognostic ability compared to currently used sepsis indicators. The ECPA platform will be combined with analytics to determine a "sepsis score" to triage and monitor patients. InnaMed products are currently available for investigational use.

The company has [one publication](#) indexed in PubMed.

Previous funding⁴

- The company raised \$735,000 of venture funding from Arab Angel, Data Collective, and Matadero Ventures on March 20, 2017. GWC, Cheng Hu, Dong Hai, and Dorm Room Fund and other undisclosed investors also participated in the round.
- The company joined Y Combinator as part of the Winter 2017 class on March 20, 2017 and received \$120,000 in funding
- In January 2017, the company joined California Institute for Quantitative Biosciences
- In May 2016, the company joined Boomtown HealthTech Accelerator on May 23, 2016 and received \$20,000 in funding. Wharton Venture Initiation Program also participated in this round.
- The company received \$10,000 of grant funding from Publicis Groupe on an undisclosed date.

Strategic partnerships

- InnaMed co-authored a study in 2018 with NeoVentures Biotechnology of Ontario.
- Their website claims that they are partnering with "payers, health systems, skilled nursing facilities and pharmaceutical companies" but I haven't been able to find any news articles naming specific entities.
- InnaMed was a finalist in the 2016 Accenture HealthTech Innovation Challenge.

Cost share

DRIVE and InnaMed are committed to a true public private partnership, with DRIVE contributing \$200,000 of the \$285,750 estimated project costs. InnaMed will fund the remaining development costs.

⁴ Retrieved from Pitchbook.

Prenosis

<http://www.prenosis.com/>

Formerly known as ElectroCyt

Chicago, IL

Number of employees: 6-13

Year founded: 2014

Products

Prenosis' ImmunoMatch™ technology uses machine learning algorithms trained by its proprietary dataset (NOSIS) which combines critical biological information with existing electronic medical record data, to perform intelligent patient matching. With technology to predict how a sepsis patient's condition will progress, doctors can determine more quickly what is needed to improve outcomes over the continuum of sepsis care.

Prenosis is developing analytic systems that may help doctors predict the progression of sepsis in a patient. With DRIVE funding, Prenosis will develop a precision-medicine technology that could transform the clinical management of sepsis.

The first product, planned for early 2019 release, is a platform agnostic software system for use in Emergency Departments, in-patient populations, and ICUs. The second product, a combined handheld device with accompanying analytics, will be released by early 2021.

The company has [one publication](#) indexed in PubMed and co-founder Rashid Bashir has a [few additional publications](#) that are not affiliated specifically with Prenosis.

Previous funding⁵

- The company received \$ 704,525 of grant funding from National Science Foundation in 2018: SBIR Phase II: Point of Care Device for High Frequency Stratification of Patient Populations at Risk of Sepsis.
- The company received \$150,000 of grant funding from CDC in 2017: Point of Care Device for Reducing Overuse of Antibiotics in Potentially Septic Hospital Populations.
- The company received \$150,000 of grant funding from National Science Foundation in 2017: SBIR Phase I: Point of Care Device for High Frequency Stratification of Patient Populations at Risk of Sepsis.
- The company raised \$1.5 million of angel funding from undisclosed investors on September 7, 2016.
- The company received \$5,000 of grant funding from VentureWell on July 13, 2016.
- The company received \$10,000 of prize money from Technology Entrepreneur Center as a part of 14th Annual Cozad New Venture Competition on June 14, 2016.
- The company raised \$65,000 of angel funding from undisclosed investors on March 18, 2016. The deal also includes an undisclosed amount of convertible debt financing.

⁵ Retrieved from Pitchbook.

Strategic partnerships

- Prenosis is a spinout of University of Illinois and Carle Foundation Hospital in Urbana, IL.

Cost share

DRIVE and Prenosis are committed to a true public-private partnership, with DRIVE contributing \$749,000 of the total \$1.07 million estimated project cost. Prenosis will fund the remaining development costs.

Qvella

<https://www.qvella.com/>

Carlsbad, CA

Number of employees: 30

Year Founded: 2009

Products

Qvella is a molecular diagnostics company founded in 2009 by a group of scientists and engineers with the goal of dramatically reducing time to results in bacteriology. The company aims to revolutionize how sepsis management is practiced by significantly cutting costs and saving lives. Qvella's Field Activated Sample Treatment (FAST) technology utilizes a novel sample prep technique that enables rapid detection of infectious agents and host response biomarkers from whole blood.

The BARDA DRIVE Solving Sepsis initiative is partnering with Qvella Corporation of Carlsbad, California, to develop ground-breaking technology to diagnose infection in patients suspected of sepsis with assay results in 60 minutes. The new host response diagnostic system leverages Qvella's FAST-ID™ pathogen identification platform based on revolutionary new approaches to rapid sample processing and nucleic acid isolation and amplification directly from whole blood. The Qvella project combines the company's diagnostics technology and expertise with Predigen Inc.'s gene signature analytical power to help develop the intended assay for the early diagnosis of sepsis.

Previous Funding

- The company raised \$20 million of Series B venture funding in a deal led by RA Capital Management, Sands Capital Ventures, Kensington Capital Partners, Whitecap Venture Partners on December 4, 2017. Hatteras Venture Partners and BioMérieux also led the round. The funds will be used to conduct clinical trials, to support on-going research and development and to facilitate team expansion and manufacturing scale-up.
- The company raised \$20 million of Series A venture funding in a deal led by RA Capital Management and Whitecap Venture Partners on October 14, 2015. Hatteras Venture Partners, Sands Capital Ventures and Sands Capital Management also participated in the round.
- The company raised an undisclosed amount of venture funding from Whitecap Venture Partners on June 23, 2015.
- The company received \$539,000 of grant funding from The Health Technology Exchange's Investing in Business Innovation Initiative on May 11, 2012. This funding will accelerate the commercialization of Qvella's bacteria testing platform, resulting in improved patient care and reduced healthcare costs.
- The company received \$2.5 million of financing in a deal led by The Health Technology Exchange on January 20, 2012. Other undisclosed investors also participated. The funding will support the development of the company's whole blood sample preparation and bacterial ID system.

Strategic Partnerships

Qvella leverages Predigen Inc.'s gene signature analytical power to help develop the intended assay for the early diagnosis of sepsis. Predigen is a spinout of Duke University, led by Ephraim Tsalik.

Cost Share

DRIVE and Qvella are committed to a public-private partnership, with DRIVE contributing \$692,236 of the total \$988,909 estimated project cost. Qvella will fund the remaining development costs.

Sepsis Alliance

<https://www.sepsis.org/>

San Diego, CA

Number of employees: 20

Year Founded: 2004

Products

Sepsis Alliance is the leading sepsis organization in the U.S., with expertise in developing educational materials for professionals and for the public, reaching more than 3 million patients and providers each year. Sepsis Alliance is working in all 50 states to save lives and reduce suffering by raising awareness of sepsis as a medical emergency. In 2018, Sepsis Alliance launched It's About TIME™, a national initiative to create broader awareness of sepsis and the need for urgency in seeking treatment when there are signs and symptoms present.

To educate healthcare providers on recognizing the signs of sepsis across the continuum of care, DRIVE and Sepsis Alliance, one of the nation's leading sepsis organizations, launched a sepsis education and training initiative called the Sepsis Institute.

The Sepsis Institute will provide high quality, evidence-based education and training on the recognition, treatment and management of sepsis to healthcare professionals. The Institute will develop and house new webinars and training modules created for a range of healthcare providers including primary care and urgent care practitioners, nursing staff and emergency medical services personnel.

Previous Funding

Sepsis Alliance receives funding from a variety of sources including private donations, grants, and sponsorships, for example, a \$30,000 grant in 2018 from the Del E. Webb Foundation to produce Sepsis: First Responders, a training video designed for 2.7 million first responders in the United States.

Strategic Partnerships

Sepsis Alliance lists National Sponsors on their website including:

- EKFMF
- ThermoFisher Scientific
- Biomerieux
- Edwards Life Sciences Foundation
- Merck
- Accelerate Diagnostics
- La Jolla Pharmaceuticals

- Beckman Coulter

Cost Share

DRIVE and Sepsis Alliance are committed to establishing a public-non-profit organization partnership, with DRIVE contributing \$427,248 of the total \$622,248 estimated project cost to establish the Sepsis Institute and develop educational content. Sepsis Alliance will fund the remaining development costs.

ENACT Company Profiles

BioBeat

<https://www.biobeat.cloud/>

Petach Tikva, Mehoz HaMerkaz, Israel

Number of employees: 10-20

Year founded: 2012

Products

Biobeat's Wrist Watch is an FDA-cleared monitoring device that continuously measures blood pressure, heart rate, heart rate variability, oxygen saturation, respiratory rate, stroke volume, cardiac output and index, systemic vascular resistance, sweat, skin temperature, and more. With funding from DRIVE, Biobeat will further develop the technology to track bodily changes that signal the user has potentially been exposed to an influenza virus or other pathogen.

Biobeat's technology is based on reflective photoplethysmography, a low-cost technique to detect blood volume changes in the smallest blood vessels of human tissue and often used non-invasively to make measurements at the skin surface. The data is recorded and analyzed to produce alerts and recommendations of clinical significance. This also potentially allows prediction and early warning before severe physiological emergencies occur. Information can be transmitted via the cloud to a cell phone application or database

Previous funding⁶

- The company raised \$3 million of venture funding in a deal led by Oxford Sciences Innovation on August 14, 2018. White Cloud Capital, IQ Capital Partners, Future Positive Capital, and inovia Capital also participated in the round. The new investment will support the company as they focus on delivering their cutting-edge wellness solutions to a global audience.
- The company joined Plug and Play Tech Center as a part of its Batch 4 of Health & Wellness Accelerator on March 21, 2017.
- The company raised \$2.28 million of venture funding in a deal led by White Cloud Capital Advisors and Oxford Sciences Innovation on April 22, 2016. Samsung NEXT Ventures, AXA Strategic Ventures and IQ Capital Partners also participated in this round.
- The company raised \$299,000 of Seed funding from Raptor Group, Slow Ventures, Italian Angels for Growth and other undisclosed investors on November 1, 2014, putting the company's pre-money valuation at \$2.25 million.

⁶ Retrieved from Pitchbook.

- The company received an undisclosed amount of grant funding from the UK's Innovation Agency on June 27, 2013.
- The company raised \$750,000 of seed funding from ENIAC Ventures, Zhen Fund and K5 Ventures on May 1, 2013. 11 individual investors also participated in this round.
- The company raised seed funding from BE Great Partners, Zynik Capital and individual investor: Nadeem Kassam, Cantora and other undisclosed investors on May 15, 2012.

Strategic partnerships

Biobeat lists their clients on their website, including

- Ministry of Health (Israel)
- Tel-Aviv Sourasky Medical Center
- Tri-logical Technologies Ltd.
- Rambam Health Care Campus
- Medison
- Amgen
- Magen David Adom
- Femi Premium
- Israel Defense Forces
- GE Healthcare
- Elbit Systems
- D-MARS (Desert Mars Analog Ramon Station, Israel)
- U.S. Department of the Air Force
- The Chaim Sheba Medical Center at Tel Hasomer

Cost share

DRIVE and Biobeat are committed to a public-private partnership, with DRI contributing \$599,000 of the total \$954,800 project cost. Biobeat will provide the remaining development costs.

Empatica

<https://www.empatica.com/>

Cambridge, MA

Number of employees: 65

Year Founded: 2011

Products

Empatica Inc. is an MIT Media Lab Spin off that develops wearable smartbands that utilize machine learning and an intricate combination of biosensors to unlock the physiology of your health. Their Embrace smartband is the first FDA-cleared, wrist-worn wearable to be cleared in the field of epilepsy for its seizure monitoring and alerting capabilities. Embrace detects patterns in motion and physiological signals that may be associated with generalized tonic-clonic seizures, and immediately alerts caregivers; these signals include electrodermal activity, rotational speed, skin temperature, and high sensitivity motion detection.

The project builds on Empatica's Embrace2, a battery-powered wristband FDA-cleared as a medical device for use by people suffering from epilepsy. Embrace2 technology measures multiple indicators related to physiological parameters. Embrace has also been approved in Europe as a medical device to monitor seizures and alert since April 2017. Currently Embrace2 uses advanced machine learning to monitor

physiological parameters, detect unusual patterns that may be associated with convulsive seizures, and immediately notify users and caregivers.

The Empatica device will be among those tested in the upcoming DARPA/BARDA Prometheus Influenza In-the-Home Clinical Studies to evaluate health signatures that can predict pathogen exposures prior to symptoms.

Previous Funding

- The company raised EUR 5 million of Series A venture funding in a deal led by Innogest on April 1, 2017. Endeavor Global and Invitalia Ventures also participated in this round.
- The company raised \$500,000 of angel funding via crowdfunding platform Indiegogo on January 21, 2015.
- The company joined Polihub on an undisclosed date.

Strategic Partnerships

Clients listed on the company's website include

- Danny Did Foundation
- Epilepsy Foundation
- Massachusetts Institute of Technology
- Boston Children's Hospital
- NASA
- Sunovion

Cost Share

DRIVE and Empatica are committed to a public-private partnership, with DRIVE contributing \$251,454 of the total \$457,189 project cost. Empatica will provide the remaining development costs.

EnLiSense

<https://enlisen.com/>

Allen, TX

Number of employees: 2-10

Year founded: 2014

Products

EnLiSense's Wearable Point-of-Need SWEATSENSOR Dx Platform is an easy-to-use, cost-effective sensor technology (i.e. No needles, No punctures) offering real-time, continuous reporting from passively expressed sweat with no external stimulation and works with varying skin types and varying environments for early warning of changes to body's physiological state.

EnLiSense's non-invasive SWEATSENSOR diagnostics (Dx) Platform could become an easy-to-use wearable sensor to quickly detect or rule out infections. The sensor, which may resemble a wrist-watch, works by detecting and tracking multiple biomarkers, including cytokine levels in sweat; these levels may be an early warning of changes in the body.

The SWEATSENSOR could be used in a hospital setting or in the community to identify an influenza infection or other illness related to chemical, biological, radiological, or nuclear disasters.

Currently, EnLiSense does not sell their product and it is still in development.

EnLiSense has authored or co-authored [16 publications](#) in PubMed since September 2015.

Previous funding

- None listed in Pitchbook
- Received \$242,389 from National Institute on Alcohol Abuse and Alcoholism (NIAAA) in 2017 for project, "AWARE (A wearable awareness with real-time exposure): rapid wearable alcohol diagnostics"

Strategic partnerships

- UT Dallas (technology spun out of UT Dallas through Dr. Shalini Prasad).

Cost share

This EnLiSense and DRIVE announcement is a true public private partnership with DRIVE providing just over \$550,900 and EnLiSense picking up a share of the cost.

Spire

<https://spire.io/>

San Francisco, CA

Size: 25 employees

Year founded: 2013

Products

Developer of a fitness sensor designed to monitor sleep, stress, and activity. The company's sensor is wearable that tracks both physical and psychological fitness to lower stress and increase productivity, enabling users to lead a healthy life and improve their performance.

The Spire Health Tag is a small washable device that attaches to clothing to monitor and report activity and detect changes in the body. The device can send messages to the user's cell phone to report findings and alert the wearer to real-time bio-signals, like heart-rate and breathing variability, changes in body heat, stress levels, and other changes in the unique health signature of the user. It is designed to be easy to use, can be worn while the person sleeps, and does not need to be recharged.

Currently the Spire Health Tag is available for consumer health and wellness use, including to help monitor sleep, stress and activity. Now with funding for DRIVE, Spire will further develop the product, aiming for U.S. Food and Drug Administration (FDA) 510K clearance. FDA clearance is required to ensure medical devices are safe and effective before they can be marketed for clinical applications.

Spire is backed by 7 years of research from Stanford's Calming Technology Lab, their consumer products are sold globally in Apple Stores, and their Spire Health Platform is in use by Fortune 100 medical device companies, large apparel retailers, and health professionals worldwide.

Previous funding⁷

- In 2018, Spire received \$209,276 from the National Institute on Drug Abuse (NIDA) for the project, “A clothing-adhered wearable to monitor biomarkers of cognitive/emotional state and deliver just-in-time behavioral interventions.”
- The company graduated from Y Combinator as a part of the Winter 2015 class and received \$120,000 in funding on March 24, 2015.
- The company raised funding from Tigerlabs Health, StartX and Dan Sutera on an undisclosed date.
- The company raised an undisclosed amount of convertible debt financing from Scrum Ventures on October 28, 2014.
- The company raised \$100,000 of seed funding from Scrum Ventures, Lee Linden and Rock Health on August 21, 2013. Mayo Clinic, University of California, DN Capital, San Francisco, Bert Navarrete also participated in the round.

Strategic partnerships

In 2018, Spire partnered with Swim.com to design a smart swimsuit.⁸

Cost share

Spire and DRIVe, as a true public private partnership, are sharing costs to increase the chances of success. The total project cost is \$88,860, with the DRIVe contributing approximately \$62,200 and Spire funding the remaining costs.

⁷ Retrieved from Pitchbook.

⁸ <https://www.wearable.com/sport/spire-smart-swimsuit-release-date-price-specs-5577>

Thank you for relying on Life Science Intelligence

We're dedicated to connecting entrepreneurs and companies with the insight, analysis and resources needed to make smart business decisions. How else can our experts support your growth?

Assess the Market

With research analysts on staff to answer your competitive intelligence questions and a market report collection that anyone can use for free, we're here to connect you with targeted business insight.

Get Good Data

We're proud data gurus. Need industry trends or labor market stats? No problem. Want industry data visualized or mapped? We've got that covered too.

Find Financing

When you're looking for funding, we can help you research and identify relevant investors, benchmark valuations, and explore deal terms. We're able to find grant opportunities too.

Identify Partners, Expertise and Leads

We can identify the people and companies you need to get work done. If you're looking for experts in your field, local contractors to help with critical work, or potential targets for out-licensing your product, we can find them. We're also able to develop targeted, current lists of companies and people who may benefit from your services or products.

Get Literature While we can run a literature search, we also work with literature providers like Elsevier, Springer Nature, and ACS to negotiate rates down on content for small- to mid-size companies. Contact us for a consultation about options that can work for your researchers.

Network and Learn

We host regular events to share research strategies, search tips, and resources to help you work more efficiently. Contact us to stay in the loop about these events.

Promote Your Company

Wondering how to reach North Carolina companies? We can show you how to promote your company in the heavily used NCBiotech Company Directory, and we're happy to talk about other sponsorship opportunities available through the Center.

Plug In or Tune Out

Need a place to work in RTP? Our library space has options for private and collaborative work, a small private conference room, Wi-Fi – and coffee. Lots of coffee.

Contact LSI

research@ncbiotech.org | 919-549-8880 | ncbiotech.org/library

