



The Next Generation of Molecular Diagnostics

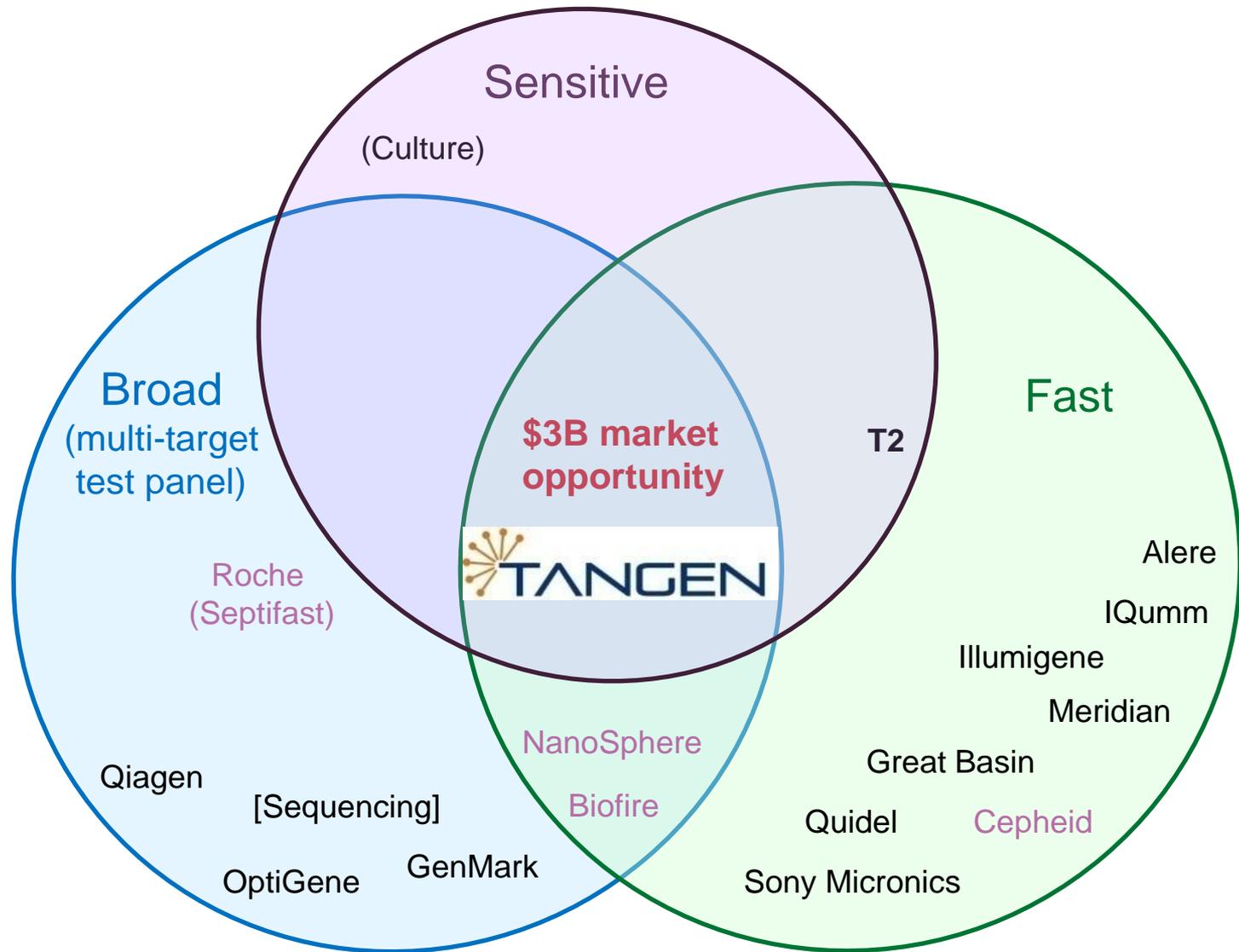
Company Overview

- Tangen Biosciences has developed the first molecular diagnostic platform uniquely capable of revolutionizing the \$3B sepsis market.
- Platform offers game-changing advantages over current diagnostic platforms as well as those in development
- Experienced team with a successful track record of developing revolutionary molecular tools and instruments
- Seeking an \$8 million Series A capital investment to obtain 510(k) clearance and domestic commercial launch
- Anticipate product launch in US markets in Q1 2019

Disruptive Opportunity

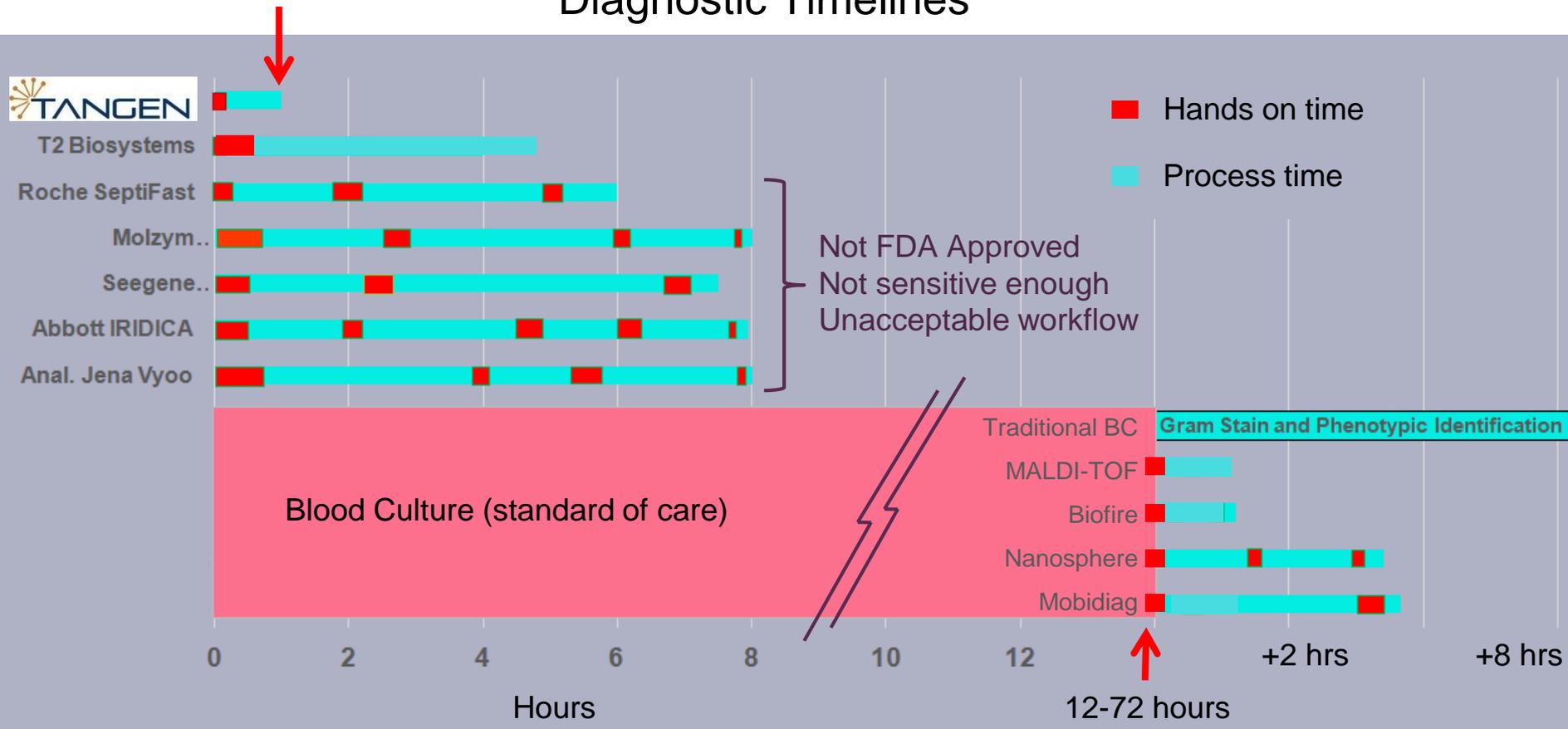
- Molecular technology, 15 years ago, completely displaced culture-based methods for diagnosing viral infections, transforming patient outcomes through improvements in speed (days to hours) and accuracy.
- Despite the potential 50x speed advantage, molecular technologies have failed to supplant blood culture in the \$3B Blood Stream Infection (BSI) diagnostic market.
- This is due to the poor sensitivity of existing diagnostic platforms
- ***Tangen has solved this by developing a platform that is extremely sensitive, rapid, economical, and also simple to use.***

No existing platform has all three of the required attributes to transform culture-based sepsis diagnostics to a rapid molecular solution



Tangen Speed Advantage

Diagnostic Timelines



Mortality rate increases by 7.6% for each hour correct treatment is delayed!

Core Technologies

➤ **LVC™** Sample processing system (IP pending)

- Enables instrument to analyze any sample type from nearly any volume
- Enables virtually any required sensitivity to be achieved
- Efficient pathogen capture & concentration in about a minute



➤ **RAMP** amplification and detection disk (IP pending)

- Sensitivity as low as one microbe
- Robust single-enzyme isothermal system
- 35-channels (controls + up to 33 targets)



➤ **TangenDx™** Instrument (IP pending)

- Pathogen DNA/RNA extraction
- 1-hour realtime amplification & detection
- Data analysis and reporting



BARDA Process

July 2015: Request Tech Watch

Nov 2015: Tech Watch review meeting at BARDA

Jan 2016: White paper and Quad chart submitted

Aug 2016: White paper reviewed and revision requested

Oct 2016: White paper and Quad chart resubmitted

April 2017: Full proposal submitted

Sept 2017: Enter negotiations and site visit

Oct 2017: Contract signed and commenced

Contract awarded to Tangen Biosciences for the development of mobile Biothreat assay on the TangeDx platform.

Key Initiative: Point of Care Molecular Diagnostics

Innovation to bring diagnostics into the Physicians Office and the home
Empower patients, reduce spread of disease, and reduce overall health care costs

Broad Applicability to DMD Portfolio

- Influenza
- Biothreats
- Antimicrobial Resistance
- Emerging Disease

Improved Sensitivity and Specificity

Utility

- Physician's Offices
- Emergency Departments
- Remote Settings
- Home Use

Current Projects

- Abbott (Alere) - NextGen Isothermal Influenza Diagnostic
- Roche LIAT - C. diff + MRSA assays
- Tangen - Anthrax

Abbott

Roche

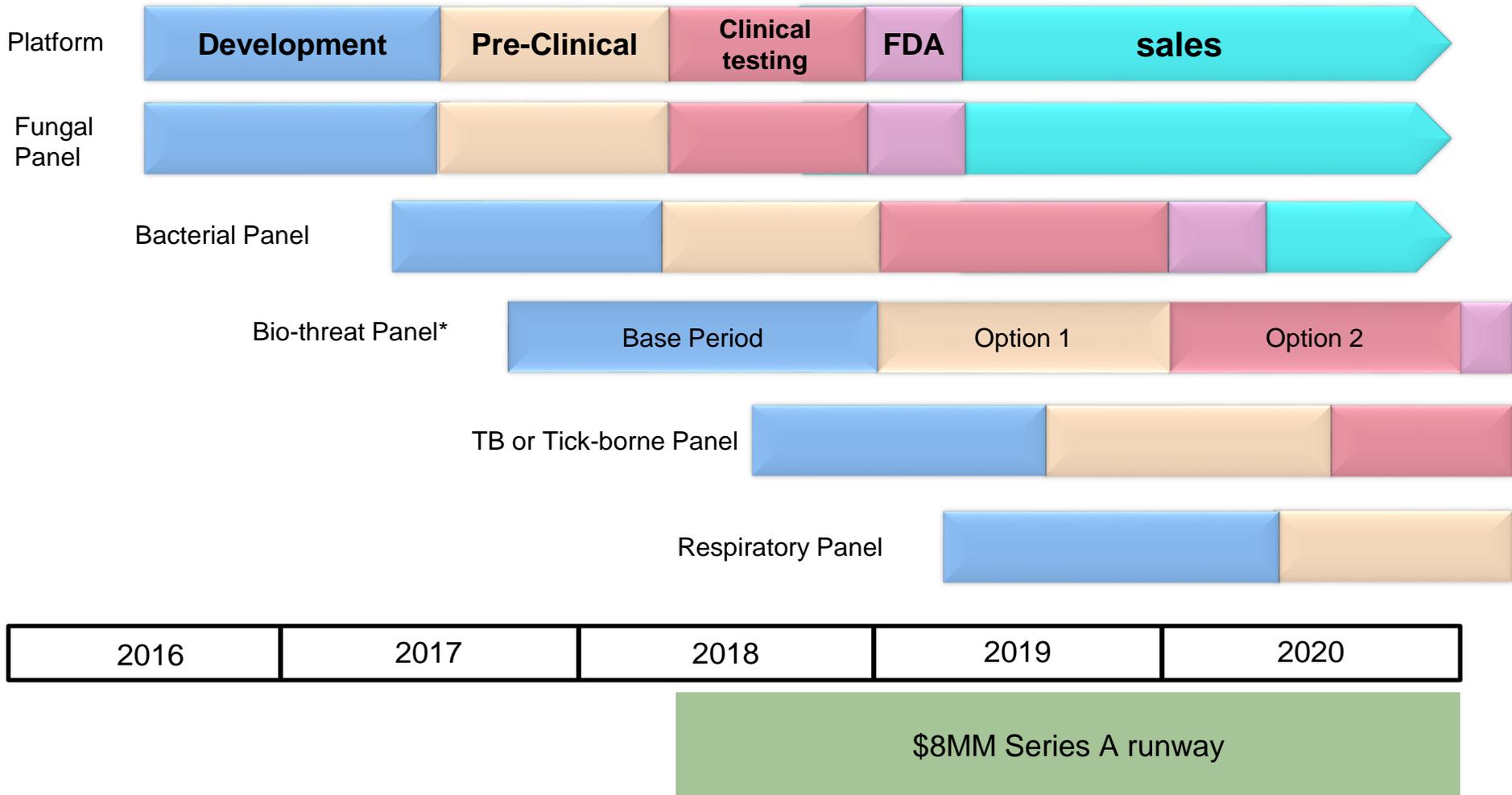
TANGEN

SPR

Traction

- Yale New Haven and Rhode Island Hospital have successfully run the TangenDx diagnostic system in their clinical labs
- Pilot study underway at RIH
- FDA Pre-submission meeting successfully completed (paving the way for the clinical studies)
- Multiple NIH grants awarded for development of various applications
- Bill and Melinda Gates Grant awarded for nucleic acid diagnostic platform evaluation

Product Pipeline



* BARDA funded

Management Team



John Nobile, Co-Founder, President & CEO

30 years of product development experience
12 years leading the design of Next Gen DNA sequencers for 454 Life Sciences (Roche) and Ion Torrent (Life Technologies).
Over 40 issued patents
BS, Mechanical & Materials Engineering, University of Connecticut



John Davidson, PhD, Co-Founder , Chief Science Officer

14 years developing DNA technologies: Mutation detection in cancer, Gene synthesis
Senior Director for Research and Development at Ion Torrent/Life Technologies
Commercialized multiple DNA sequencing platforms and a highly automated sample prep platform
Harvard biochemistry PhD 2000



Richard Carroll, PhD, VP Business Development & Clinical Affairs

40 years of FDA diagnostic product experience
7 FDA cleared diagnostic products
5 patents and numerous publications in HIV and blood cell separation
Cleared first ever FDA gene sequencing technology in 2002, TruGene, for Visible Genetics
VP for Clinical Research at HistoRx (2009), President ViveBio (2013)



Noemí Olivo, MSN/Epidemiology, CCRP, VP Regulatory Compliance

CRO Services, President/CCRP
Amida Care, Director Research and Grants Management
HistoRx, Senior Director Clinical Research, GCP
ViveBio, Senior Director of Quality Management



Brian Chirico, VP Operations

30 years of experience in Operations, Service, Customer Support, Quality, and Project Management for analytical and diagnostic instrumentation
Roche, 454 Life Sciences, Perkin Elmer

Scientific Advisers



Michael Kinch, PhD

Dr. Kinch is Associate Vice Chancellor & Director for the Center for Research Innovation in Business, and Professor of Radiation Oncology at Washington University in St Louis, St. Louis, MO. Michael was formerly the Managing Director of the Yale Center for Molecular Discovery, and he is an advisor to Lewis and Clark Venture Fund. Michael was previously Chief Scientific Officer & Vice President, Research and Development at Functional Genetics, and before that was the Head of the Departments of Cancer Biology and Translational Research for MedImmune, Inc.



Sarah Fortune, MD, Harvard School of Public Health

Dr. Fortune's research focus has been on the molecular basis of population heterogeneity in *Mycobacterium tuberculosis* (*Mtb*). Her work combines bacterial genetic approaches with high throughput methodologies. Her work engages a broad network of collaborators including experts in sequencing methodologies at the Broad Institute and experts in human immunology at the Ragon Institute, where Dr. Fortune is Director of the TB Program.



Leonard A. Mermel, MD

Sepsis and Infectious disease expert

Professor of Medicine, Warren Alpert Medical School of Brown University, Adjunct Clinical Professor, University of Rhode Island College of Pharmacy and Medical Director, Dept. of Epidemiology & Infection Control, Rhode Island Hospital.

Dr. Mermel was a Technical Expert Panel Member of the Medicare Patient Safety Monitoring System, US Dept. of Health and Human Services. He was the 2005 President of the Society for Healthcare Epidemiology of America (SHEA)



David Ryan Peaper, MD, PhD

Director, Clinical Microbiology Laboratory, Yale New Haven Hospital;

Director, Virology Reference Laboratory, Veteran Administration CT

Assistant Professor of Laboratory Medicine;

MD Yale School of Medicine (2008); PhD Yale University School of Medicine (2007)

Fellowship Yale-New Haven Hospital Residency; Chief Yale-New Haven Hospital Residency

Yale-New Haven Hospital Board Certification; AB of Pathology, Clinical Pathology (2012)

Products Previously Developed by Tangen Team



454 GS20 & GS Flex

First Next Generation DNA sequencer, commercially launched in 2005 after 4 years of development. 20 - 140 million DNA bases per run (~1,000x more powerful than competition), \$500k instrument system. Company acquired by Roche. Mr. Nobile, Principal Engineer, responsible for instrument & kit design, manufacturing process development.



Ion Personal Genome Machine

First ever CMOS chip based DNA sequencer, commercially launched in 2011 after 3 years of development, became #1 sequencing platform in less than 2 years. 10 billion bases per run, \$49K system, acquired by Life Technologies for \$725MM. Mr. Nobile lead engineer, Dr. Davidson head of R&D.



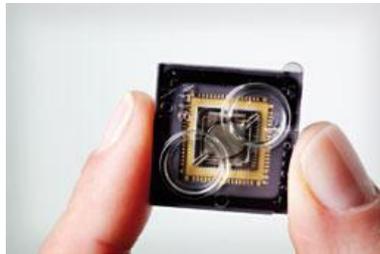
Ion Proton

Increased capacity DNA Sequencer, commercially launched in 2012 after 3 years of development, Mr. Nobile lead mechanical/fluidic/systems engineer.



454 GS Junior

Mini, low cost 454 sequencer. Mr. Nobile Principal Engineer and architect responsible for instrument design, kit design, and manufacturing process development (2007).



Ion ISFET Sequencing Chip

First ever CMOS based direct-detection DNA sequencing array. Mr. Nobile key member of the team that developed chip, flowcell, packaging, fluidics, and other groundbreaking technologies.



Ion OneTouch

First ever automated emulsion PCR platform. Dr. Davidson & and Mr. Nobile led the project from conception through commercial launch. 100 million separate PCR assays in 4 hours with under 5 minutes hands-on time 