



Semiconductor Sensors, Clinically Proven Diagnostics From Alzheimer's to Sepsis, From Chips to Clinics

Dr. Kuo, Chang-Fu
CSO, Board Director

Proprietary and Confidential





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Mission and Company Overview

Company Positioning

Next-generation IVD: fast, sensitive, scalable, powered by semiconductors.

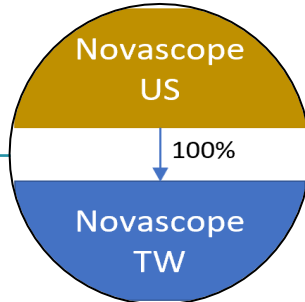
- ✓ **Mission :** Revolutionize IVD with semiconductor biochips for ultra-fast, sensitive results.
- ✓ **Vision :** Create a scalable ecosystem to speed treatment and improve outcomes worldwide.



2022
Incorporation (TW, US)



January 2023
Series A financing completed



March 2023
Corporate re-structuring



July 2023
ISO13485 compliance laboratory
(with clean room) constructed



April 2024
>50 employees



1H 2025
Sepsis and AD diagnostic pipelines
achieved the clinical proof milestone

World-Class Interdisciplinary Leadership Team



Dorothy Yen, MD PhD

Chairwoman/GM

- 40+ years in nuclear medicine with 500+ research publications
- Stanford-recognized "World Top 2% Scientist"
- Board member: Aprinoia, Jellow X Biotech, Research Foundation of Cardiovascular Medicine



Chang-Fu Kuo, MD PhD

Chief Strategy Officer

- Professor of Rheumatology and Clinical Immunology
- Former R&D Director of CGMH AI Center (2000+ annual publications)
- Stanford-recognized "World Top 2% Scientist"



Joyce Huang, PhD

Laboratory Director

- 25+ years in microbiology and diagnostics
- Director of Taiwan's largest clinical lab (\$100M+ annual revenue)
- Committee member: Laboratory Developed Test Certificate, National Quality Standards

Top-Notch Research Expertise, Clinical Experience, and Operational Excellence



James Wu, PhD
Vice President



Former ERSO/ITRI Deputy Director General, expertise in Micro Electronics , MEMS, Optoelectronics, Renewable Energy, Medical Devices, and IoT, etc.



Keith Chan, PhD
VP, Board Director



Former FDA Division Director at the Office of Generic Drugs; Co-Founder of GloboMax, a drug development organization; and IP Professor at National Chengchi University



Ming-Tang Chiou, Professor
Taiwan Advisory Board Member

NPUST | Veterinary Medicine Director, Research and Technical Center for Sustainable and Intelligent Swine Production



Wen-Yao Chung, Professor
Taiwan Advisory Board Member

CYCU | Electronic Engineering Expertise in microelectronics and biomedical engineering



US-Based Advisors: Biotech/Healthcare Expertise and Entrepreneurship

Wenn Sun, PhD

Founder and President, PREMIA

Founded PREMIA in 2018 in collaboration with LCSCRUM leadership, bringing entrepreneurial vision and scientific expertise

Haluk Tezcan, MD

Medical Oncologist and Hematologist

Over three decades of specialized experience in cancer management and clinical research, providing critical medical insights

Ayse Tezcan, PhD

Clinical Research Expert

Head of Data Quality at N-Power medicine who built innovative teams of field coordinators and data specialists

Stan Lapidus

Serial Entrepreneur

Board member at multiple biotech companies including Droplet, Lucid Diagnostics, Binx Health, and Mercy BioAnalytics

Michael McCurdy, MD

Critical Care Physician

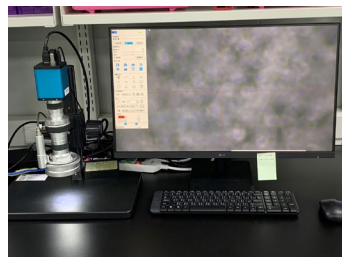
Clinical Professor of Pulmonary/Critical Care Medicine and Emergency Medicine at University of Maryland

Production and Technology Development

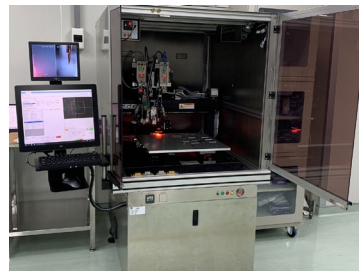
- PCB level process
- Wafer (shot) level process
- Low temperature process
- High uniformity process
- AI & Automation



Nov 2022
O2 plasma



Mar 2023
OM system



Jun 2023
Pilot line set up



Nov 2023
PE CVD



Nov 2023
Optical analyzer

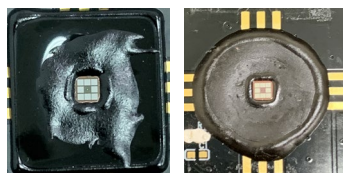


May 2024
Coating machine

Oct 2022
NS01A
Wafer out



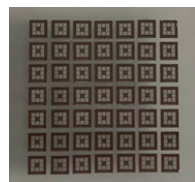
Nov 2022
Outsourcing package



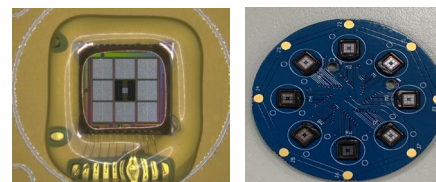
Feb 2023
Self development



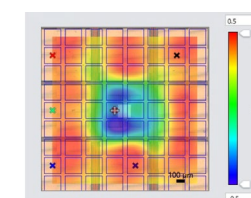
May 2023
Wafer level molding



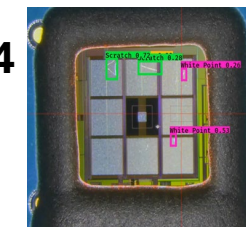
Oct 2023
Different process & chip



Nov 2023
Function group check

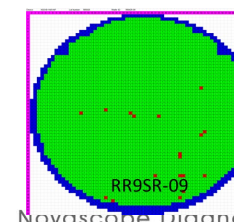
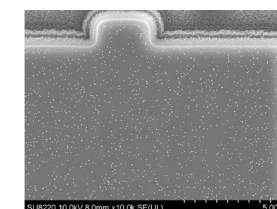


Apr 2024
AOI



Feb 2024
Cp test

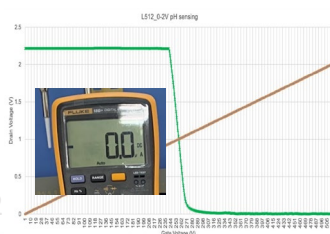
Jan 2024
SEM check



Jul 2023
Insert molding



Apr 2023
Electrical inspection





Heterogenous Integration of Biochemistry and Semiconductors

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NOVASCOPE Lab-on-a-Chip: Electric-Signal Speed and Accuracy to Create a New Market

NOVASCOPE

- Molecule agnostic detection
- Semiconductor FET sensor with femtogram/mL sensitivity
- Fast and simplified process enabled by heterogeneous integration

TAM: New Market Opportunity

PCR Systems

- Optical fluorescence detection, nucleic acids only
- Standard PCR is qualitative (positive/negative)
- Desktop systems with complex workflow

TAM: \$25B (2.4% CAGR)

ELISA/Rapid Tests

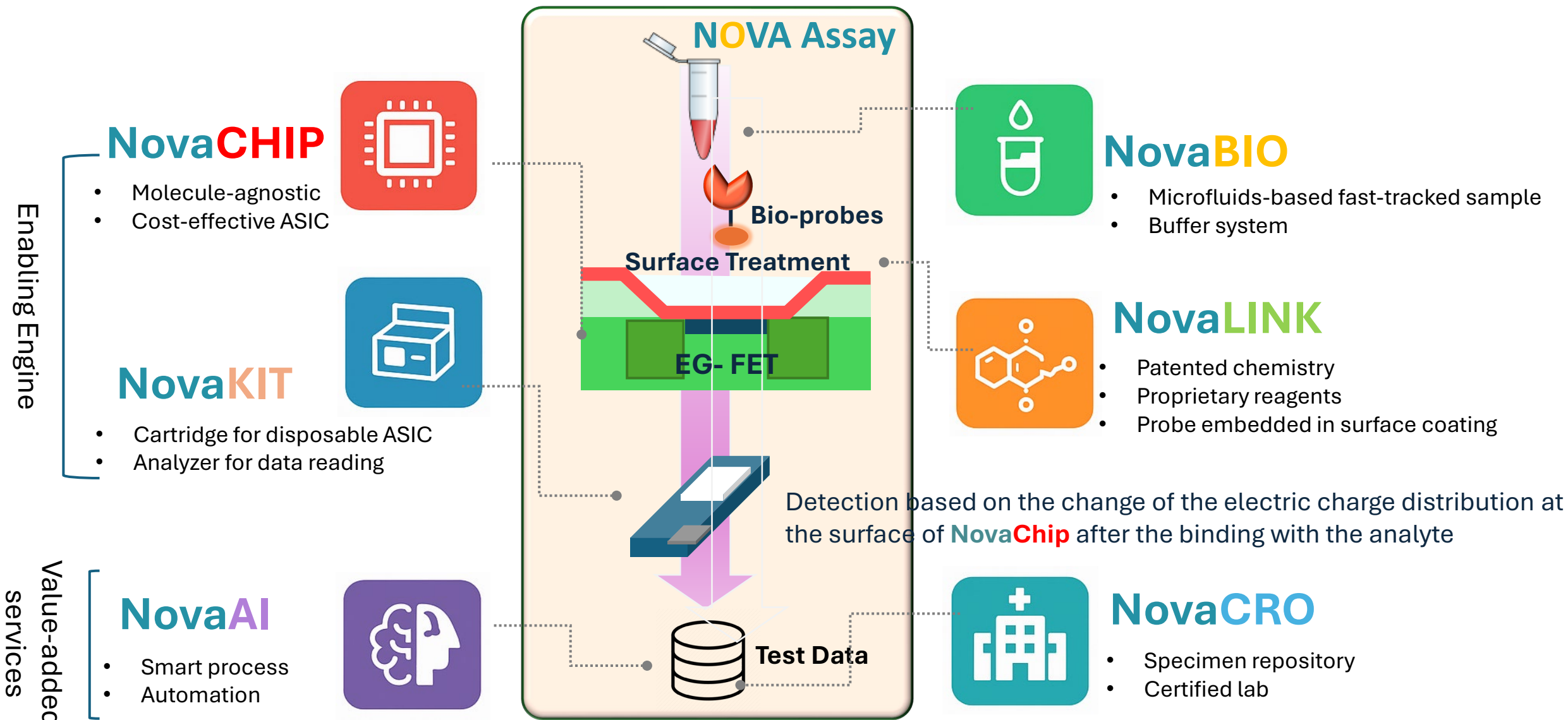
- Optical detection, primarily protein-based
- ELISA is slow, equipment-dependent and less field-friendly
- Rapid tests are fast but prone to sensitivity/specificity trade-offs

TAM: \$2B (5.6% CAGR)

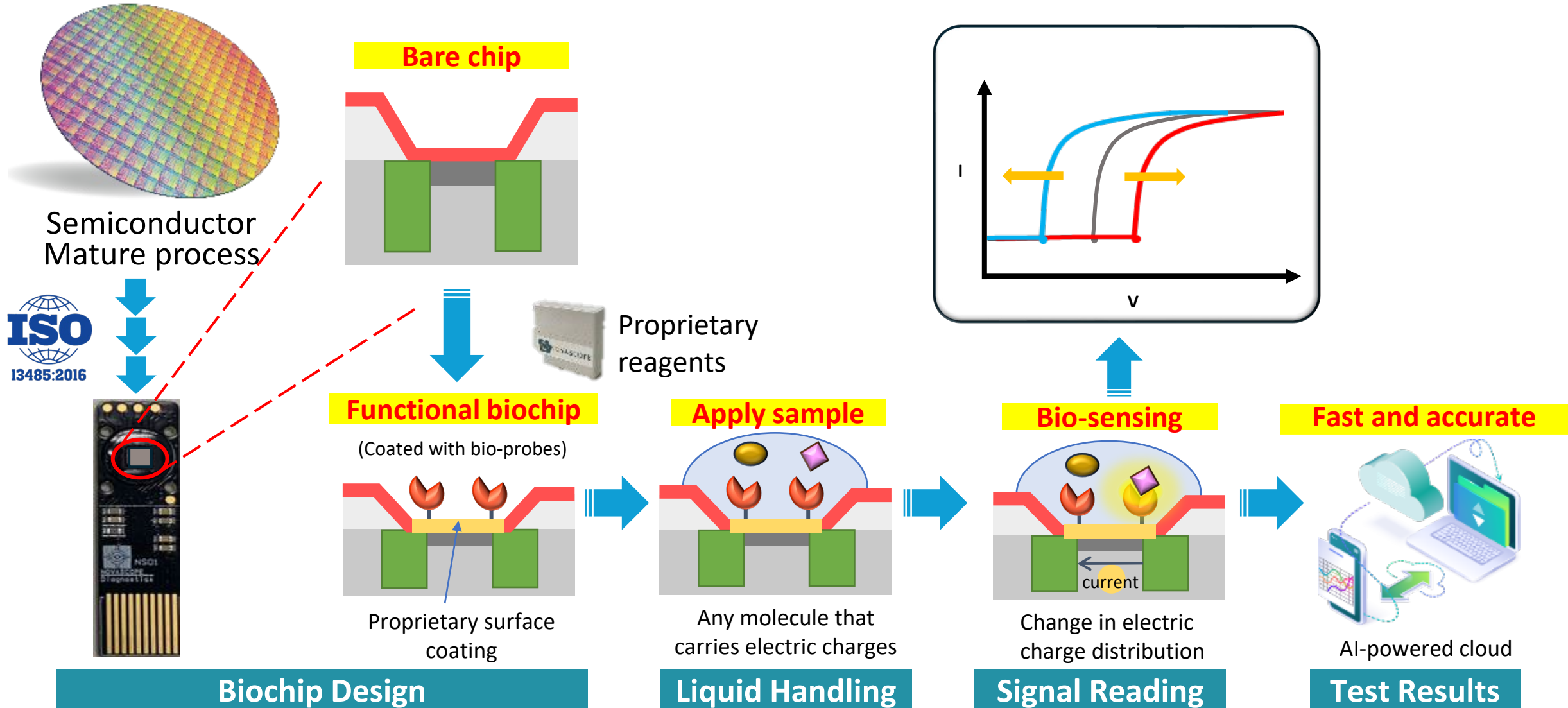
Inherent challenges of optical detection – penetration of sample layers and attenuation of signals: Other inherent disadvantages include sensitivity to Interference and instrumentation complexity

Our advantage based on electric signals – higher precision and sensitivity: No need for bulky instruments. Potential to detect down to single-molecule levels in optimized conditions. Sample color or turbidity doesn't affect signals.

NOVASCOPE End-To-End Solutions: Where Biochemistry Meets Semiconductors



NOVASCOPE Biochip: Extended-Gate FET (Field Effect Transistor)



Prototype Products Ready for Clinical Validations

1

Sample Preparation

Any molecule that carries electric charges in any sample types

- Microfluids for sample fast-tracking
- Built-in buffer system



2

Detection

Ultra-high sensitivity

- Disposal chip cartridge in the reader
- Cost competitive thanks to in-house capabilities and the Taiwan semiconductor and PCB ecosystem

NS01 chip



3

Reading and Report

Fast and accurate results
Connected to AI-empowered cloud

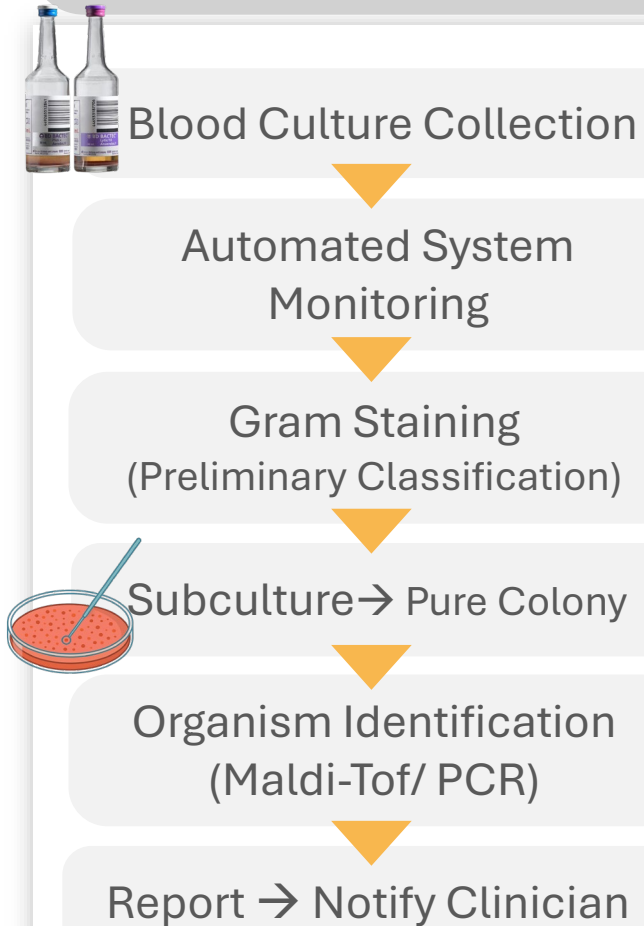
- Portable Reader
- Desktop Analyzer



Cassia
Production automation (lab use)

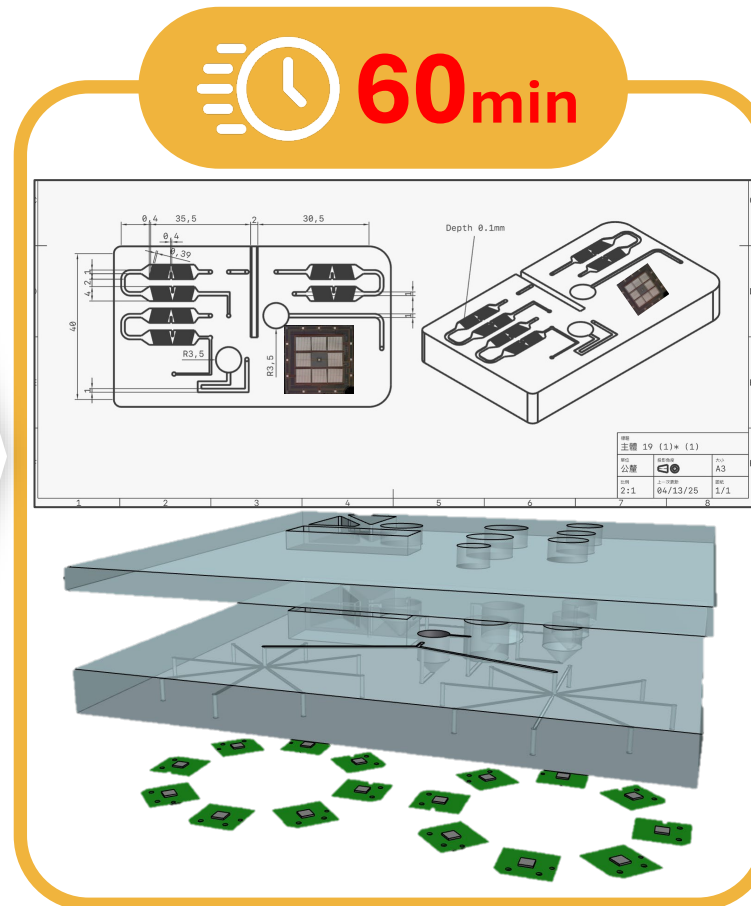
NOVASCOPE's End-to-End Lab-on-a-Chip: Workflow for Rapid Sepsis Diagnosis

Blood Culture Testing Process



**2~5
Days**

Microfluidic system integration



**Design Concept:
Sample-in / Result-out**

Global Footprint accelerates a cost-efficient path to commercialization

1

R&D and Validation Network

- US: Lab in San Diego lab to connect with University California San Diego (UCSD), academia and the industry
- Taiwan: Clinical trials with Chang Guang Memorial Hospital (CGMH), National Taiwan University Hospital (NTUH) and Veterans General Hospital (VGH)
- China: Validation partnerships with premier hospitals such as Shanghai Chang Hai Hospital

2

Business Development

- Early OEM discussions with Delta, ILMN, TauRx and Blot
- RUO and LDT revenue → validation → regulatory submissions
- Leverage TFDA approval for FDA/CE submissions
- Distribution partnerships in the US and Asia Pacific
- Initial system deployments in hospital central labs

3

Product Portfolio Roadmap

- Cross-border development platform
- Expansion of indications (e.g., Sepsis and Alzheimer)
- Increase of automation for end-to-end lab-on-a-chip solutions
- Development of multiplexing chips and microfluid cartridges
- Extension of value chain activities (e.g., AI analytics)

Razor and Razorblade Business Model
High-margin recurring revenue from single-use of biochip cartridges

Flexible business models to maximize revenues (initially from Sepsis and AD)

Business model	Market	Product	Indication
Licensing and royalty	Initially US and China with exclusivity for specific indications	Biochips (cartridges), devices	Upon request
Contracted design and manufacturing (OEM/ODM)	Any market	Bare chips, biochips (cartridges), devices	Upon request
B2B channel sales	Initially in Taiwan	biochips (cartridges), devices	Depending on TFDA's approval

- These three business models are *not* mutually exclusive for any markets because our technology platform can detect different biomolecules for different indications.
- Taiwan: We believe TFDA approval will accelerate regulatory pathways in other markets given Taiwan's global leadership in the semis value chain and Novascope's time-to-market of revolutionary offerings.
- Financial forecasts are based on sale of biochips (cartridges) given our proprietary knowhow in surface treatment, linking and bio-design. That said, we are open to sale of bare chips.
- Sale of devices is not factored in the forecasts as we anticipate low or zero gross profit in the razor and blades business model for ourselves and our strategic partners.

Our Unfair Advantage: Semiconductor strengths and multi-disciplinary integration



Semiconductor Scale

- We are the only platform using standard CMOS process for cost effectiveness. Our chips are manufactured by UMC.
- **Exponential cost/performance curve** far ahead of optical/chemical competitors.



IP Fortress

- **24 patents** filed across chip design, chemistry, systems
- **10+ additional patents** in preparation
- **Trade secrets and knowhow** in IC design, mechanical design, and recipe design for surface treatments



Technical Expertise

- Analogue IC design
- FET reader design



Chemistry Platform

- Surface chemistry
- in-house biomaterials



Production Ready



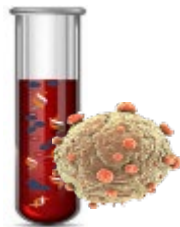

- Pilot line with clean rooms
- ISO13485 quality systems

Competitive landscape by technology and cost structure

Company	NanoDx	Paragraf	NOVASCOPE
Inception / Country	2010 / United States	2017 / United Kingdom	2022 / Taiwan
Device	Silicon nanowire FET	Monolayer graphene FET	Extended-gate FET
Technical Challenges	<ul style="list-style-type: none"> • Sensor reproducibility • Manufacturing 	<ul style="list-style-type: none"> • Scalability • Electrical uniformity of large-area graphene 	N/A because chips are fabricated with standard CMOS process
Integrated circuit	Unknown	Unknown	Standard IC
Production readiness	In development	Pilot production	Pilot production
Analyzer	Handheld / Desktop	Desktop	Handheld / Desktop
Cost / Price	Product not yet available	\$143 per test	COGS: \$10 per test
Capital Raised	\$30m (including \$18m in Series C in 2020)	\$85m (including \$60m in Series C in 2025)	\$13.5m in Series A in 2023 \$9m for Series B in 2025

Source: Company data

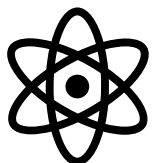
Biomarker Portfolio Under Development

Field	 <p>Infection</p>	 <p>Dementia</p>	 <p>Liquid Biopsy</p>	 <p>Animals & Food Safety</p>
Probe sorts	NA	Ab & NA	NA	Ab & NA
Biomarker Probes (Ab/NA)	<ul style="list-style-type: none"> <i>E. faecium</i> <i>A. baumannii</i> <i>K. pneumoniae</i> <i>E. coli</i> <i>E. faecalis</i> <i>P. aeruginosa</i> <i>S. aureus</i> 	<ul style="list-style-type: none"> pTau 181/217/231 NfL GFAP S100B TDP-43 α-synuclein Amyloid beta 40/42 APOE4 (NA) 	<ul style="list-style-type: none"> EGFR ALK ROS1 BRAF NTRK RET K-RAS METex14 	<ul style="list-style-type: none"> PRRSV PEDV PCV1/2/3/4 CSFV PRV SB

NOVASCOPE's Biochip NS01E redefines bloodstream infection detection



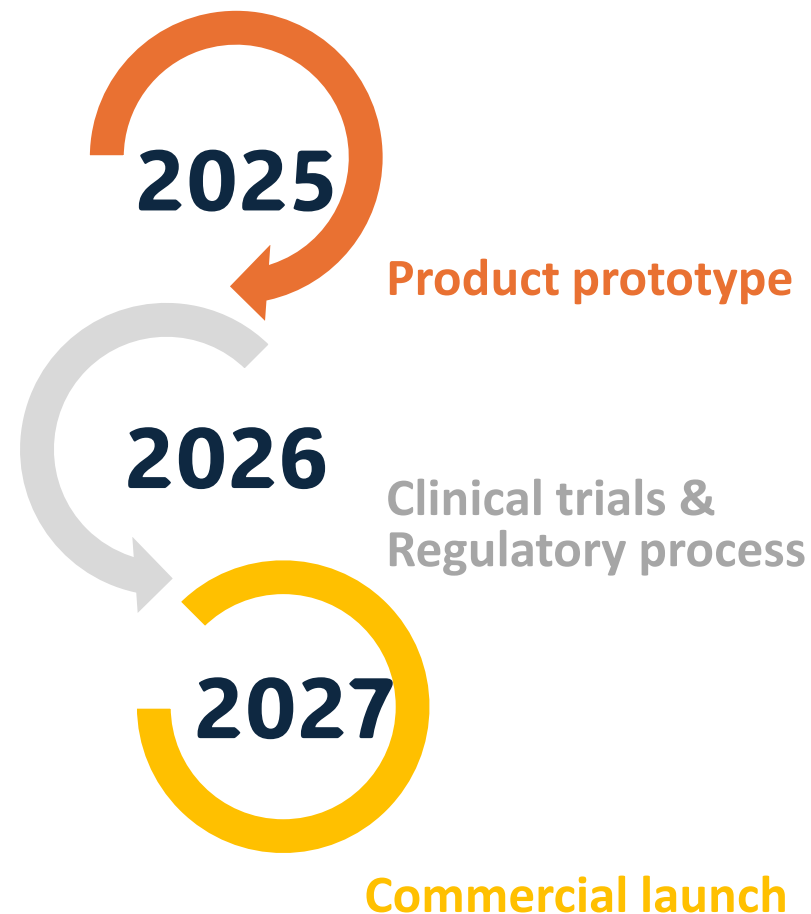
Integration of both direct-from-blood and post-culture detection approaches achieves **high sensitivity and results within one hour.**

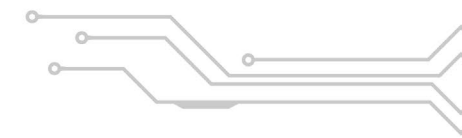
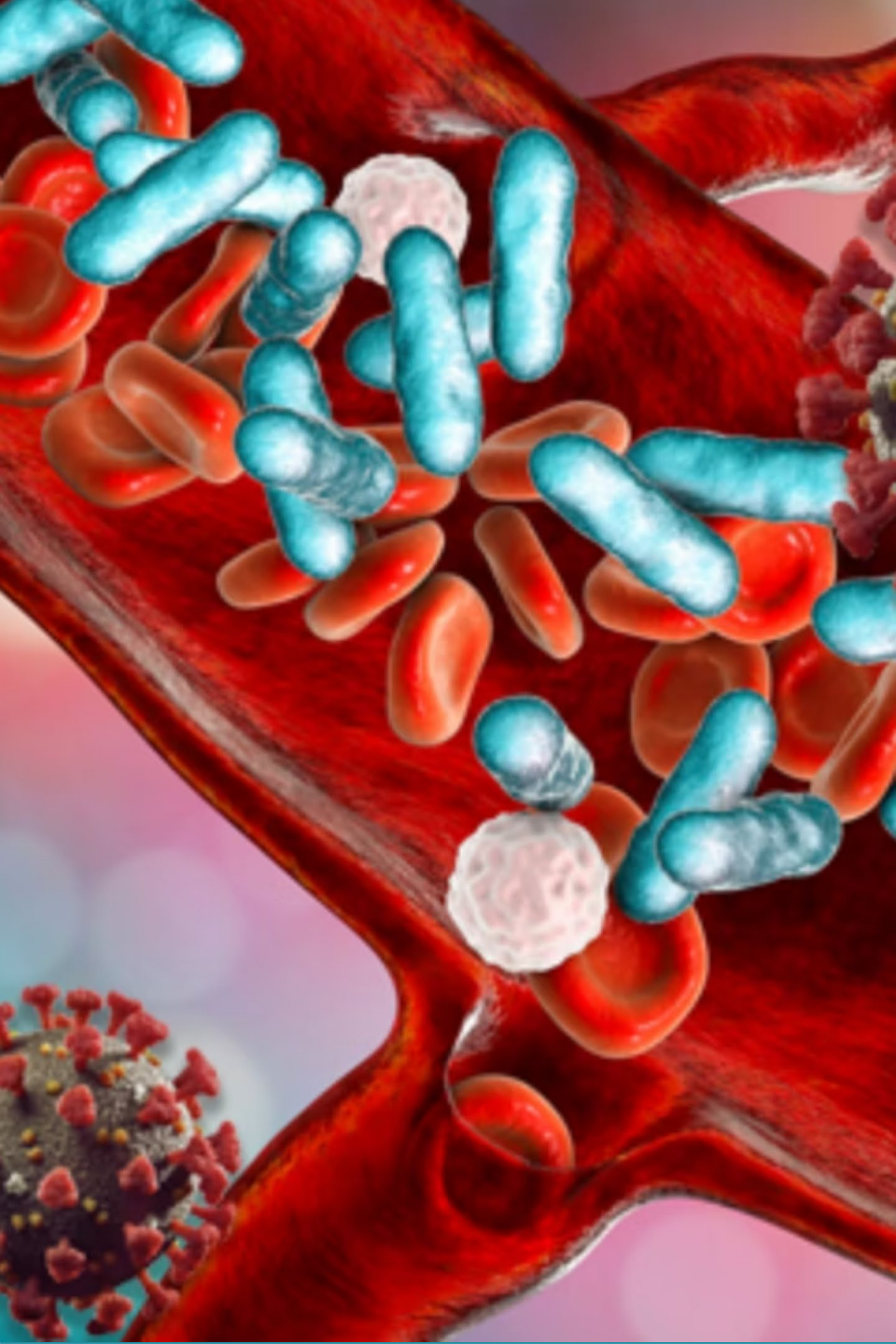


Preliminary CBC-based testing indicates strong potential for direct detection, with **good performance even in low-concentration samples.**



Ongoing efforts focus on enhancing **specificity and signal stability** to improve clinical feasibility.





Accelerating Pathogen (Sepsis) Detection & Antimicrobial Stewardship

Current pathogen-sepsis detection workflows are too slow for optimal patient outcomes. **NovaScope aims to dramatically reduce detection time from days to under an hour,** transforming antimicrobial stewardship and patient care.

Unmet Needs for SEPSIS Diagnostics

Technology	Sensitivity	Turnaround time	Accessibility	Price
Conventional culture	N/A	2-7 days	Central lab	US\$20
MALDI-TOF MS	10^7 cfu/mL	1 day	Central lab	US\$50
BioFire FilmArray	$1-10^5$ TCID ₅₀ /mL	1 day	Central lab	US\$150-180
NOVASCOPE	10^3 cfu/mL	60 mins	POCT or central lab	Competitive

IT CAUSES A LOT OF DEATHS

3rd Leading Cause of Death

1. Heart disease 2. Cancer 3. Sepsis

Sources: Elixhauser et al.; CDC.

Contributes to **1** in every
2 to 3 hospital deaths

Source: Liu et al.



IT COSTS A LOT

Most Expensive Condition Treated in U.S. Hospitals

1. Sepsis

2. Osteoarthritis
3. Liveborn infants
4. Complication of device, implant, or graft
5. Heart attack

Source: Torio and Moore.

Accounts for
6.2% of hospital
costs, or

\$24 billion
\$\$\$\$

IT CAN PROGRESS QUICKLY



Septic shock:

7.6% drop in chance
of survival each hour
until antimicrobials
are begun

Source: Kumar et al.

IT IS UNDERRECOGNIZED



44%

U.S. adults who have
heard of sepsis

Source: Harris Interactive.

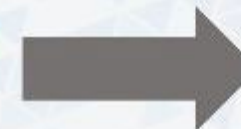
Death usually attributed
to underlying infection
Often not on
death certificates

Certificate of Death

Sepsis
Cause: *Pneumonia*

Antibiotics in Sepsis

Every
60 min
DELAY

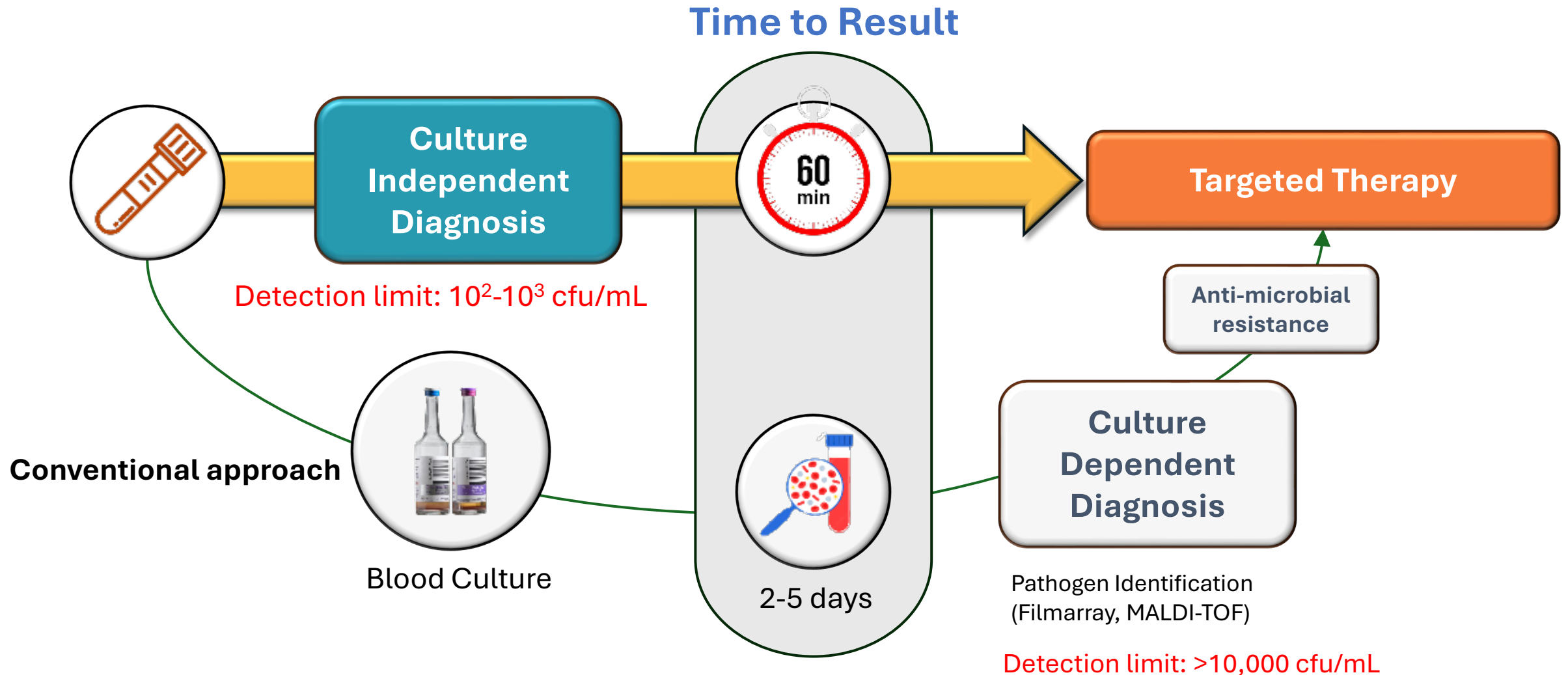


7.6%
increase in
MORTALITY

SIDP SEPSIS INTERVENTION DELAY PROGRAM

Kumar A, et al. Crit Care Med 2006; 34(5):589-95.

NOVASCOPE's Fast and Accurate Test Result Enables Timely Treatment of Sepsis



Clinical Validation Breakthrough: 98% Accuracy in Sepsis Detection

Our platform demonstrates a Limit of Detection (10^2 cfu/mL) that is **orders of magnitude more sensitive** than competing technologies.

Direct-from-Whole-Blood Detection Results

98%

Overall Accuracy

Detecting pathogens from non-cultured
clinical samples

97%

Sensitivity

True positive rate in clinical testing

100%

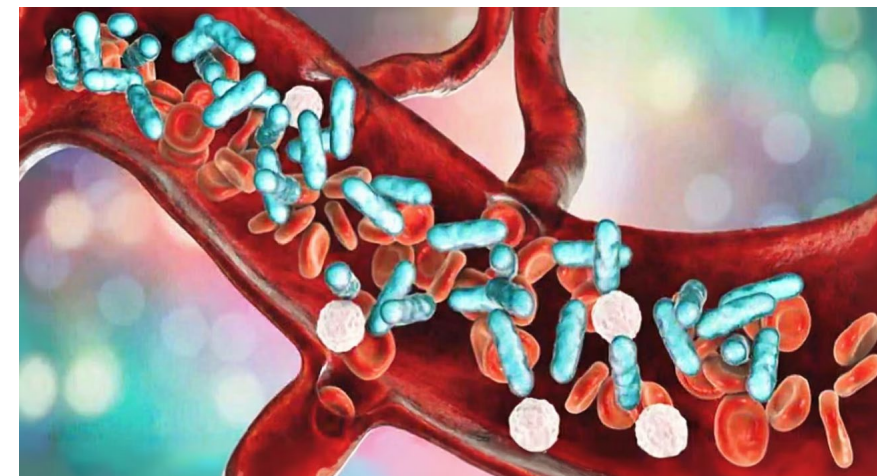
Specificity

Zero false positives in validation study

<1hr

Time to Result

Enabling rapid clinical decision-making



Source: Chang Gung Memorial Hospital

Competitive IVD Landscape (Nucleic Acid)

Specification	BioFire BCID2	T2 Bacteria Panel	Roche Eplex BCID	Vivalytic (BOSCH)	NOVASCOPE
Technology	Multiplex PCR	(T2MR)	AC Voltammetry	Multiplex PCR	FET / GFET
Specimen	Positive blood culture	Whole blood	Blood culture	Nasal or throat swab	Whole blood
Types of pathogen to be detected	43 pathogens (incl. resistance genes)	6 common bacteria	56 pathogens (incl. resistance & fungi)	Single pathogen (S. aureus)	7 common sepsis pathogens (e.g., <i>E. coli</i> , <i>S. aureus</i>)
Reaction time	~1 hr	~3–5 hrs	~90 min	~1 hr	<1 hr
Incubation time	Yes (12–24 hrs)	No	Yes (~12 hrs)	No	Current: <6 hrs; Goal: No incubation
Total testing	>1 day	<5 hrs	<15 hrs	<1 hr	Current: <8 hrs; Goal: <1 hr
Detection limit	E.f=1*10 ⁵ cfu/ml E.c=5*10 ⁵ cfu/ml K.p=5*10 ⁴ cfu/ml P.a= 1*10 ⁴ cfu/ml S.a=1*10 ⁴ cfu/ml	E.f=5 cfu/ml; E.c=11 cfu/ml; K.p=2 cfu/ml; P.a= 5 cfu/ml; S.a= 2 cfu/ml A.b=3 cfu/ml	NA	NA	1*10 ³ cfu/ml
Resistance Gene	CTX-M, IMP, KPC, <i>mcr-1a</i> , <i>mecA/C</i> <i>mecA/C</i> and MREJ(MRSA), NDM, OXA-48-like, <i>vanA/B</i> , VIM	NA	CTX-M (<i>bla</i> CTX-M), NDM (<i>bla</i> NDM), IMP (<i>bla</i> IMP), OXA (<i>bla</i> OXA), KPC, (<i>bla</i> KPC), VIM (<i>bla</i> VIM)	NA	CTX-M, IMP, KPC, <i>mcr-1a</i> , <i>mecA/C</i> <i>mecA/C</i> and MREJ (MRSA), NDM, OXA-48-like, <i>vanA/B</i> , VIM
Specimen Pre-processing	Manual	Integrated (✓)	Integrated (✓)	Integrated (✓)	Integrated (✓)
Sensitivity	>90%	~91–96%	>90%	NA (in development)	>90% (target)
Specificity	97–100%	99%	97–100%	NA (in development)	>90% (target)
Global price (US\$)	\$150–180 / test	\$300–450 / test	\$180–220 / test	\$100–150 / test	Target: <\$100 / test

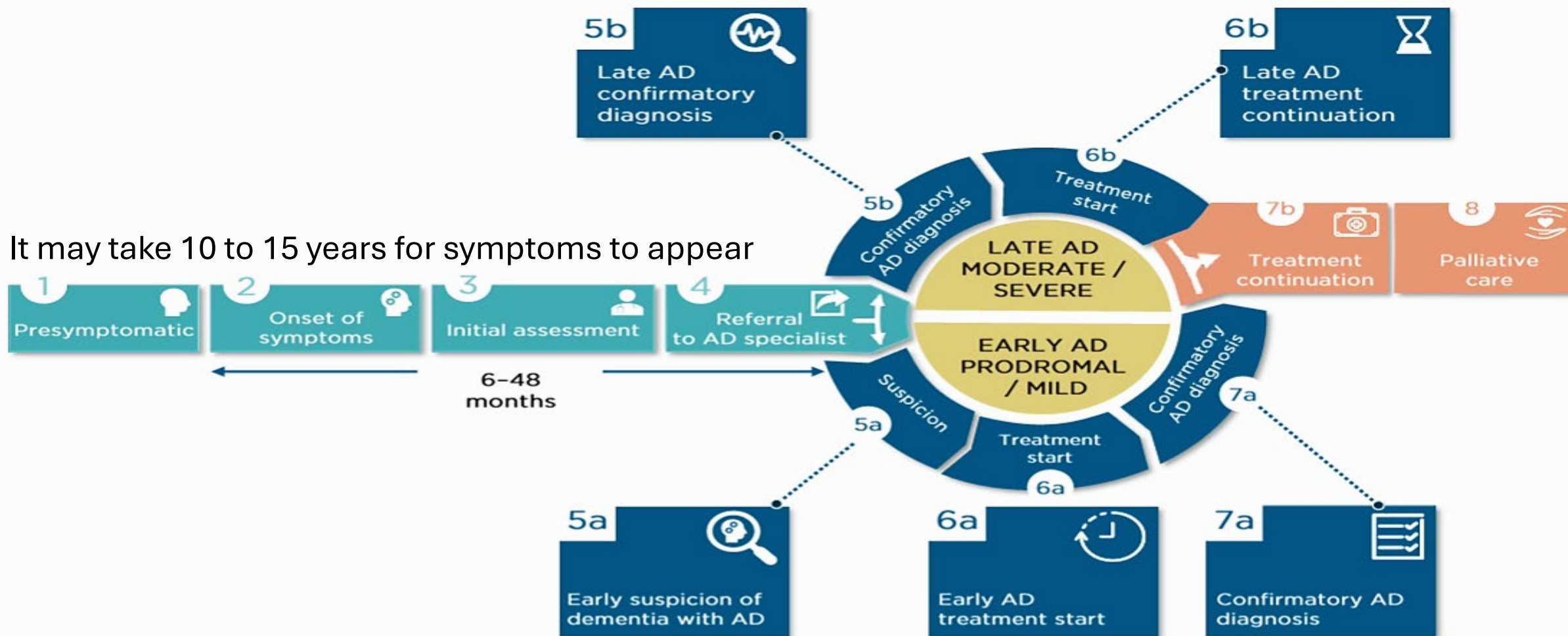


Early Alzheimer's Detection Using Biochip-NfL Platform

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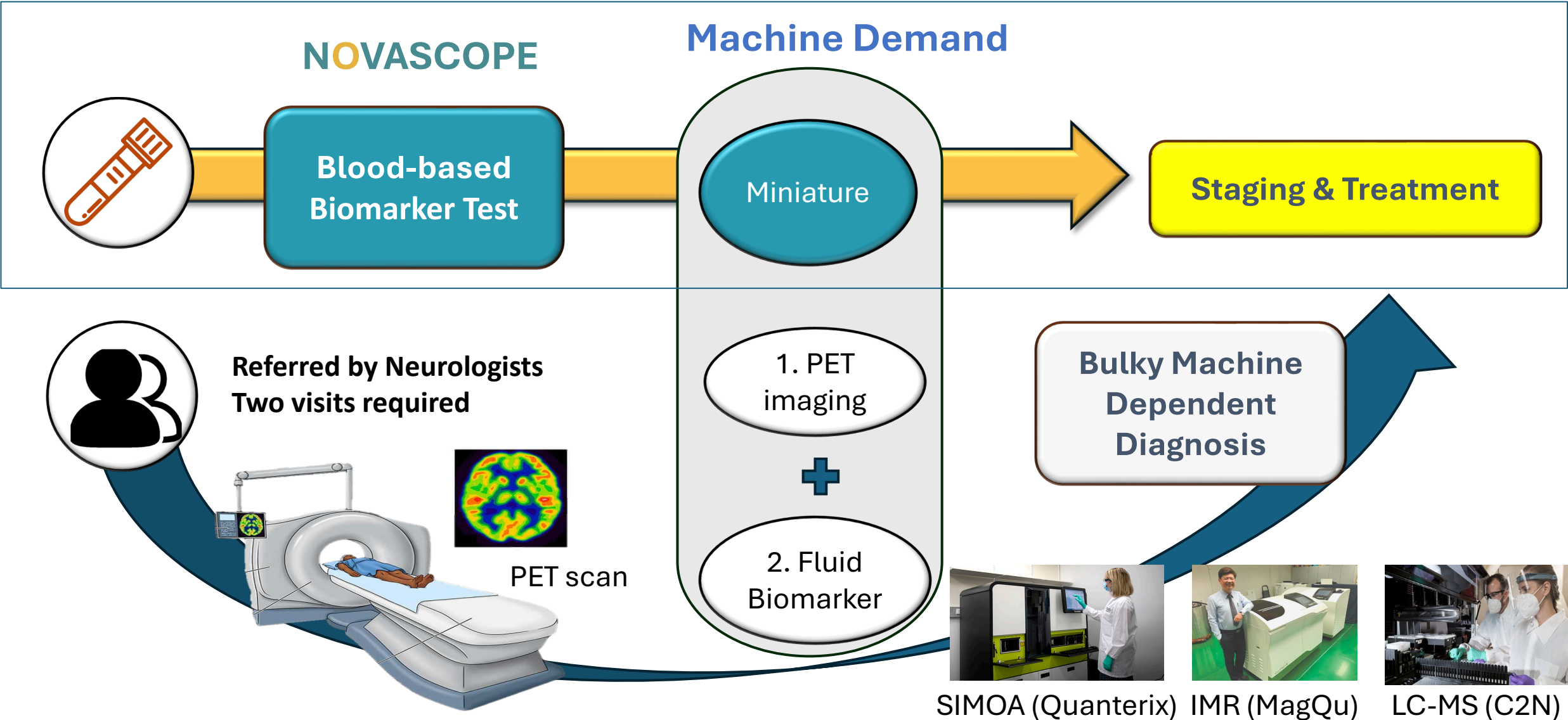


Early Detection of Alzheimer's Disease is Critical



Source: Satellite Symposium, "Empowering Physicians to Advance the Future of Alzheimer's Disease Management and Care," AAIC 2020, July 28 (Online)

Detection of Alzheimer's Disease: Mainstream Method vs. Novascope's Solution



Clinical Validation: Breakthrough in Alzheimer's Disease Biomarker Detection

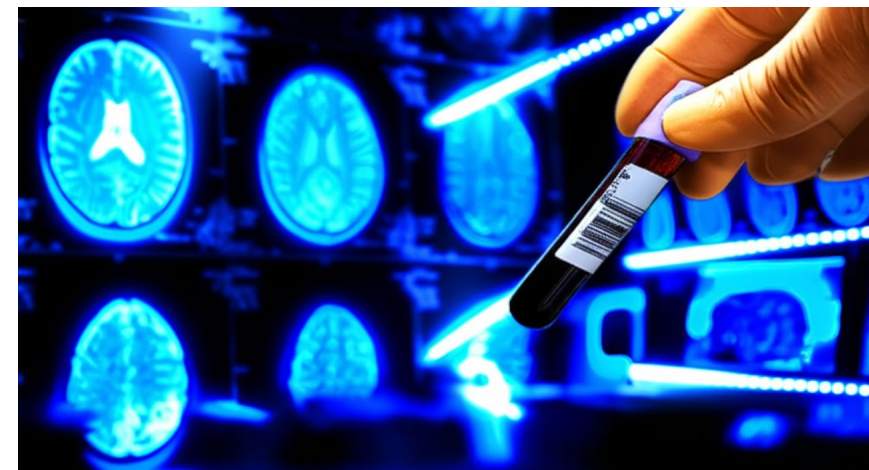
Head-to-Head Performance vs. Industry Gold Standard

Our biochip platform has demonstrated **exceptional performance** in detecting neurofilament light chain (NfL) protein—a critical biomarker for neurodegeneration in Alzheimer's Disease.

0.97-0.99

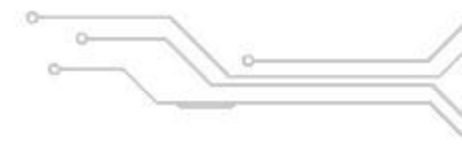
Correlation Coefficient (R^2)







Near-perfect correlation with Quanterix SIMOA, the current gold standard platform



Our biochip platform vs. traditional SIMOA assay results for NfL protein detection

IVD Competitive Landscape (Protein)



	Fujirebio	Roche	C2N	Quanterix	MSD	NOVASCOPE
Status	FDA approval in 2022 (CSF) and 2025 (blood)	FDA 510(k) clearance in 2022 (CSF)	LDT service in 2021	LDT service in 2022	RUO, GLP/GCLP-compliant testing	Under development
Core tech	CLEIA	CLEIA	LC-MS	Digital ELISA	Enhanced ECL (Electrochemiluminescence)	FET / GFET
System	Lumipulse G®	Elecsys®	PrecivityAD®	SIMOA™	MSD S-Plex ECL	Novascope kits
Price per test	\$600 (Labcorp)	\$600 (Labcorp)	\$400 (Quest)	\$500 (LucentAD)	Unclear	Very competitive
Machine cost	\$200K	\$200K	\$300-400K	\$300-400K	Unclear	Very competitive
Turnaround time	Days / batch	Days / batch	Days / batch	Days / batch	Days / batch	Minutes
						



THANK YOU

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Head of Capital Markets
emily.liu@Novascopedx.com

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