PMD-2100 Laboratory Device

By: Vanguard Biosystems, LLC
dba
Global Health Enterprises

About Vanguard Biosystems

Vanguard Biosystems, LLC (VBS), was formed in 2020 by three entrepreneurial professionals with significant experience in the areas of medical practice, medical & laboratory device engineering, manufacturing and marketing.

Mission Statement

Our primary goal is to bring together both existing and new medical device tools with a new ‘state of the art’ (Patent Pending) Artificial Intelligence Pattern Recognition System, “***Advanced AI/PRS,***” in order to help discover and verify effective therapeutics for problematic pathogens.

VBS Board of Directors

(Our three Founding Directors)

Chief Science Officer (CSO)
Romeo K. Fernandez
MD, PA; Pediatric Neurologist

Our Chief Science Officer, Dr. Fernandez is a board-certified neurologist with additional special qualifications in pediatric neurology. In short, he currently also holds an affiliate associate clinical professor rank at Florida Atlantic University, Department of Neurology, instructor at American Heritage High School-premed program, principal investigator for multiple clinical phase III studies with Eli Lilly. Expert Speaker Bureau for Neurelis. He has given numerous lectures to local hospitals in neurology. He's also the former Medical Director-Pediatric Neurology Joe DiMaggio Children's Hospital. After studying the concept of using bacteriophages in a unique manner against drug-resistant MRSA; then, devising new PRS research with Mr. Brian Smith and Mr. Bergman, he became the CSO of VBS.

Chief Technical Officer (CTO)
Anthony J. Bergman
Computer Engineer (AI Patents)

Our CTO has 41 years' experience as a consulting software engineer, and is the inventor of one of the foundational Artificial Intelligence-based Pattern Recognition Systems in use today: US Patent 5,838,820 (1998).
Mr. Bergman began a Space career for Honeywell Avionics, becoming quite probably the youngest professional programmer for NASA's fledgling Space Shuttle, and recently completed (2015) by writing software for "Orion & Special Projects," for both NASA and Lockheed Martin. He has worked on over seventeen different engineering teams in developing devices, and recently received US Patent 10,691,113 (2020) in the field of advanced robotic systems; and continues enhancing the original PRS, which has now morphed – along with Dr. Fernandez, into the Advanced AI/PRS.

Chief Executive Officer (CEO)
Brian Smith
Medical Device Manufacturer
(FDA certified)

Mr. Brian J. Smith, is our Chief Executive Officer.
In 2005, he started Refine USA, LLC, a Florida medical device manufacturing and distribution company focused in Aesthetic devices and biologics.
Mr. Smith is a Florida State University graduate with a B.S. in Economics (1993), and a J.D. from
Western Michigan (1998), with admission to the Florida Bar in April of 1999.
He has successfully brought Dr. Fernandez and Mr. Bergman together for the purpose of finding creative treatments for modern drug resistant infections, by combining modern medicine and AI engineering.

Saving Lives is our Priority

It is common for a patient to be admitted to the hospital with rare symptoms. The cause of an infection cannot be determined right away by medical professionals. The patient and their loved ones suffer while they wait for results.

This situation is all too familiar for families...

Our Device

PMD-2100

PMD-2100 laboratory device is designed to detect and classify microorganisms using optical microscopy with special sensors, observing real time growth, utilizing preparatory algorithms, leading to more efficient microorganism characterization. And simultaneously allowing for applied therapeutic interventions. All of which leads to early detection and earlier potential treatments.

How it Works

- Specimen is plated on an agar plate proprietary to VBS
- PMD-2100 goes to work
- Microorganism growth is monitored robotically
- Process can be stopped manually to be checked and verified
- Growth in the microbe is tracked
- Microbe is identified and therapeutic agent may be introduced
- The growth or lack of growth of the microbe is further characterized
- The end result is early identification and early sensitivities to various therapeutics, specific to the identified microbe

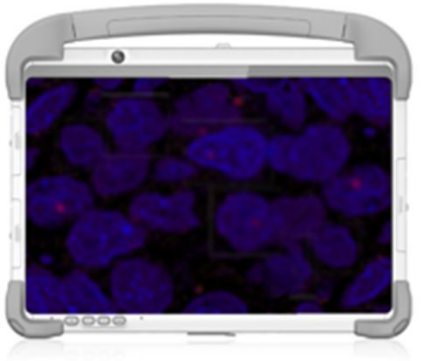
Microorganisms grow in favorable environments for which PMD-2100 is customizable

Steps

Technician prepares media for microorganisms in question.
PMD-2100 specific plates are used.

Processes implemented in PMD-2100 are robotics, optical microscopy and proprietary AI algorithms.

Once these colonies of growth are identified, the device itself robotically targets the colonies and introduces a possible cure, therapeutic agent.



PMD-2100 allows for efficient identification of the microorganism, real-time therapeutic sensitivities and specificity is determined, real-time analysis, expedited reporting, and scalability.

Algorithm Discussion

The Advanced AI/PRS has just received a US Patent Pending status, after many years of development from the original 1998 US Patent #5,838,820.

Portions have already been successfully tested in the Flowave 1000 Heart Monitor and Cell Body and Centrosome Tracker for Moffitt Cancer Center.

New VBS-proprietary time domain features have been added for the latest version.

We utilize the latest AI-based platform recognition software

Competition: Background

Traditional

Traditional pathogen detection and analysis includes:

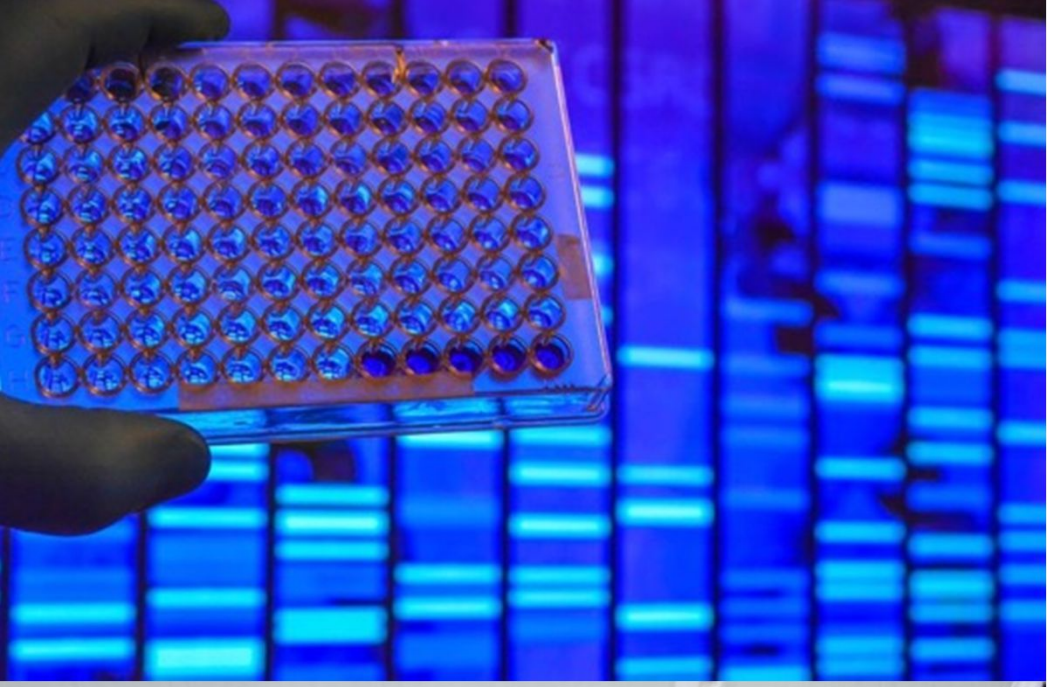
- Manual Agar plating
- Incubation & staining
- Optical microscopy and cell counting

Modern

- Traditional plus automated…
- Advanced microscopy
- PCR & cellular tagging
- Spectrographic analysis
- Laser augmentation
- Image matrix analysis
- Electroluminescence

Leading Edge

- Modern plus…
- Advanced biosensors
- Multidimensional imaging (both capture & analysis)
- Wide area data capture and systems analysis
- AI analysis of all data



Clinical Microbiology Detection Methods

- Conventional, culture of micro biological media and identification by biochemical tests
- Immunological-based methods
- Fluorescence in situ hybridization
- Molecular base methods (real-time PCR, multiplex PCR)
- DNA sequencing
- Micro arrays
- Loop mediated thermal application (LAMP) assay
- Meta-genomic assay
- MALDI-TOF MS

Our Competition (nearest)

Invitrogen™Celleste™ Image Analysis Software

Image Processing Tools with 3D visualization interface to EVOS microscopes.

- Process & Analyze
- Measure & Quantify
- Count & Classify
- Report & Share
- Time-lapse Cell Tracking
- Incubation Module

Thermo Scientific™ CellInsight™ CX7 LZR High Content Analysis Platform and Store

Image Processing Platform with lab equipment interface.

- LZR Reader
- Fluorescent and Laser Illumination
- Cell Analysis Software
- Image Database Store
- Automated Assay R&D
- Plate Handler Modules
- Autofocus (laser/software)

CytoSolve Platform

Uses mathematical cell modelling to integrate multiple molecular pathway models into a unified system to help diagnose signaling problems resulting in biological failures.

- By Dr. VA Shiva Ayyadurai
- Scalable Architecture
- Large Scale Collaboration

Competition: Summary

The PMD-2100 attacks the actual analysis of images over time compared with each other, in real-time; presently - to our knowledge, nobody else does this. So, regardless how sensitive their sensors are, or even what sensors they use, the PMD-2100 can actually integrate all biosensor data (even non-optical) as input to our Advanced AI/PRS!

Bottom line: VBS brings a brand new, state-of-the-art AI-based cellular image processing system to the table.

PMD-2100

New Tool that helps give an advantage to patients, physicians and bio scientists.

Healthcare solutions

Because Life matters

Our Device Foundation

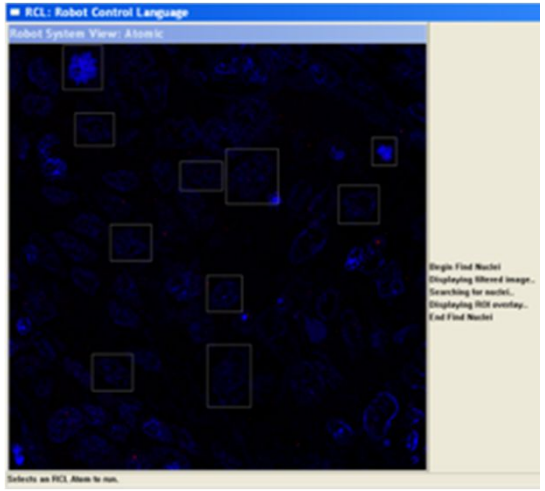
Our laboratory device hardware (ARM7 based) and software (WEC7 plus RCL) is derived from the third-party tested and verified (V&V) electronics modules used by Refine USA's medical devices.

These are enhanced and customized for the unique operations required by the PMD-2100, yet provide a great foundation to build upon – saving many hundreds of R&D engineering hours.

History of our Device

Flowave 1000

PMACS 1000



Cell Nuclei ROI Tracker

RejuvaMatrix

Flowave 1000
(2002-2007)

Real-time Cardiac Output (CI/CO) Monitor for Woolsthorpe Technologies.

PMACS 1000
(2007-2013)

Water Particulate Concentrator for LOD Testing for The Advanced Biosensors Laboratory.

Cell Tracker
(2009-2010)

Cell Nuclei Region of Interest (ROI) Tracker for the H. Lee Moffitt Cancer Center & Research Institute.

RejuvaMatrix
(2015-2018)

Radio Frequency (RF) based esthetic skin repair and rejuvenation system for Refine USA.

PMD-2100 Highlights

Flexible: Able to observe, track and analyze many kinds of microscopic interaction.

Fast: Uses ***Advanced AI/PRS*** time-domain tracking to speed up searches for potential cure matches from databases.

Portable: Allows off-line end-point AI analysis.

Easy to learn & use: Proprietary media plates allow for “test and forget” media tracking.

Limitless possibilities: Brings the futuristic ***Advanced AI/PRS*** to the real-world of actual laboratory testing and analysis.