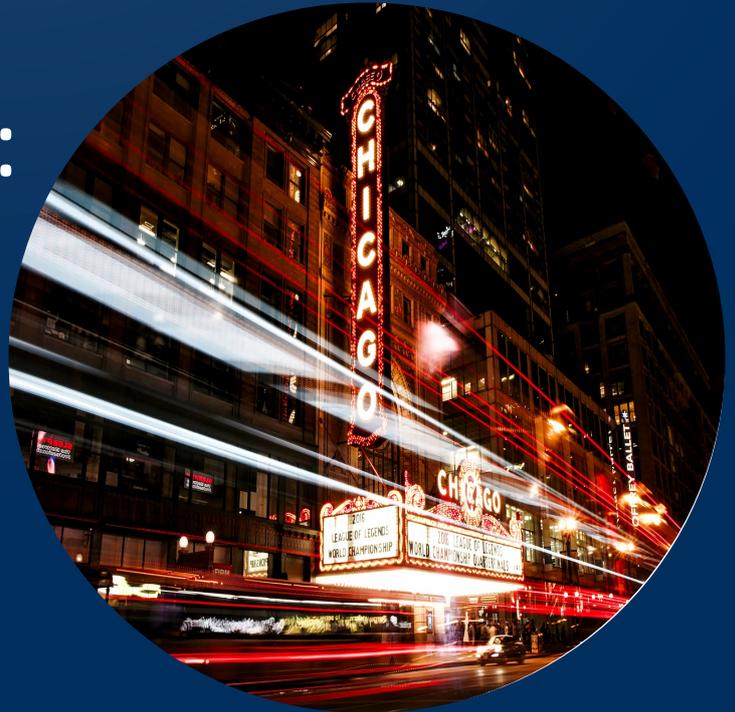




SILVERSKY
LIFESCIENCES

SilverSky Insights:

AACC 2018
Impressions



Building Trust. Building Business.



Meeting Report 70th AACC 2018, July 29th – August 2nd, Chicago IL, USA

Author: Dr. Anne Thews, MD, Principal Consultant at SilverSky LifeSciences GmbH

Venue: Fair Madrid / E

Dates: July 29th – August 2nd

Overall Impression

The world's largest clinical laboratory exposition with more than 850 exhibitors from A/C Diagnostics to Zybio and approximately 20,000 conference participants took place end of July/beginning of August in Chicago / US. All major players in the IVD market plus a plethora of start-up companies, including many Chinese vendors (> 80) were present. Compared to the high number of participants the exhibit was not well attended and very much US customers oriented. Topics of this year's scientific program were global health, clinical applications, mass spectrometry, molecular diagnostics and genomics, as well as emerging biomarkers and technologies.

Relevant Highlights

PoC ID Testing: Two Significant New Market Entries

Two large players introduced their universal PoC systems at ECCMID 2018:

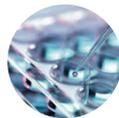
- 1) SHERLOCK Gene Editing: A gene editing system that differs from CRISPR as it is centered around the activity of Cas13a/C2c2. The Broad Institute and MIT originally developed this diagnostic tool not only to identify, but also quantify genetic signatures from Zika and Dengue viruses on a simple and inexpensive paper strip.
- 2) holoTC-based Anemia Diagnosis: holoTC is the only form of vitamin B12 that is taken up and used by cells of the body. Siemens Healthineers launched its ADVIA Centaur Active-B12 assay measuring holoTC.
- 3) New Alzheimer's Disease Assay: Roche Diagnostics announced that the FDA has granted Breakthrough Device Designation to Elecsys β -Amyloid (1-42) CSF and Elecsys Phospho-Tau (181P) CSF tests.
- 4) Chagas Test: Ortho Clinical Diagnostics demonstrated the effectiveness of its Anti-T. cruzi assay in a poster at the meeting.
- 5) Coagulation Self-Testing: Roche Diagnostics highlighted its CoagCheck Vantus system, which is designed for Warfarin patients to monitor their coagulation levels.
- 6) Improved HbA1c Testing: Abbott Diagnostics displayed the Afinion 2 analyzer for fast and easy quantitative determinations of HbA1c, Lipids, ACR, and CRP.
- 7) New MDx POC Platform: Sekisui Diagnostics is offering Silaristm, a platform cleared for the detection of the influenza A and B virus, showing a sensitivity of 97% for Flu A and 94% for Flu B.

Is next year's ACCC 2019 in Anaheim, Ca, US too far for you?

Then meet international IVD & Lifesciences companies at DxPx - The 1st diagnostic partnering conference held in Düsseldorf / Germany at November 18th 2019.



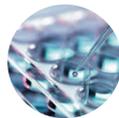
Do you want to learn more about DxPx?
www.djpx-conference.com



- New Opioid Tests: Roche will introduce soon the new Hydrocodone (HYD), Buprenorphine (BUP), and 6-Acetylmorphine (6-AM) assays, which expand its existing Drugs of Abuse Testing menu offering.
- Future POC HCV test: Chembio announced a collaboration with the Foundation for Innovative New Diagnostics (FIND) to expedite the feasibility testing of a rapid diagnostic test for hepatitis C virus (HCV).
- Fast Chikungunya Assay: J. Mitra is offering the Advantage Chikungunya IgM Card.
- New PCR Master Mix: Biofortuna announced the launch of ampDRY™, its patent pending stabilized master mix for PCR applications.
- Faster Microbiology Results: bioMérieux was displaying its BACT/ALERT VIRTUO blood culture detection system, a flexible platform fitting into nearly any size lab, even outside the routine microbiology lab.
- Smaller Automated Lab Solutions: Carolina Liquid Chemistries's EasyRA is a high-speed benchtop clinical chemistry analyzer that accommodates labs in small locations, physician offices or urgent care centers.
- Small-sized Immunoassay System: Mindray Medical has unveiled the world's smallest, fully automated chemiluminescence immunoassay analyzer.
- New Data Management Solution: Siemens Healthineers has previewed the soon-to-be-released Atellica® Data Manager1.
- Palm-sized Detector for ID Testing: Mesa Biotech, molecular diagnostic company has developed an affordable PCR testing platform designed specifically for point-of-care (POC) infectious disease diagnosis.

In addition, the Winners of the 2018 Scientists' Choice Awards for Clinical Lab Science were announced at AACC:

- Best New Clinical Laboratory Instrumentation of 2017 award was presented to Abbott for the Alinity ci-series immunoassay system. The Alinity-ci series is a compact and scalable clinical chemistry and immunoassay system which promises improved throughput and assay performance.
- The Best New Clinical Assay/Kit of 2017 was presented to Bruker Daltonics for the MBT STAR®-Carba IVD Kit. The MBT STAR-Carba IVD Kit allows for the rapid identification of antibiotic-



resistant microorganisms in a single workflow, through the fusion of mass spectrometry and clinical microbiology techniques.

- The Award for Clinical Company of the Year had gone to Siemens Healthineers.
- The Award for Clinical Product of the Year was picked up by Abbott for the Alere™ i, soon to be known as ID NOW. This instrument provides a rapid, simple alternative to PCR.
- The German start-up GNA is winner of the AACC Disruptive Technology Award competition.

INTERESTING LEARNINGS

Herpesviruses Linked to Alzheimer’s Disease: a consortium of research teams found two common Roseoloviruses—human herpesvirus 6A (HHV-6A) and human herpesvirus 7 (HHV-7)—were at levels up to twice as high in post-mortem brain tissue of individuals with Alzheimer’s disease than in those without.

Climate change Is shifting the course of infectious diseases: Lyme disease has spread into Canada to places where the summers used to be too short and cool for the disease to establish itself. Further south, the Aedes aegypti mosquito has expanded its range, carrying diseases such as Zika, dengue fever, and chikungunya to new locations in the United States. In fact, cases of disease from mosquito, tick, and flea bites have tripled in the U.S. since 2004, according to the CDC. In addition, warmer temperatures are known to speed the development of malaria parasites within mosquitos, while also increasing mosquito activity and biting patterns.

COMPANY DETAILS

This is randomly selected information / impressions gained by visiting a fraction of companie’s booths.

ABBOTT was launching of its’ Alinity and AliniQ products and focused on ‘Alere is now Abbott, biotin induced interference in immunoassays. Has showcased at their booth Alere and Afinion instruments.



The Alere™ i is a rapid, instrument-based, isothermal system for the qualitative detection of infectious diseases. Available CLIA Waived Alere™ i tests include Influenza A & B 2, RSV and Strep A.

The **Afinion™ 2** analyzer is a compact, rapid, multi-assay platform point-of-care testing. Tests available are HbA1c, Lipid Panel, ACR, and CRP.



In addition, **Abbott** introduced their Alinity ci-series: clinical chemistry, immunoassay, and integrated systems part of the Alinity family of products, including point of care, hematology, blood and plasma screening as well as molecular diagnostics.

AESKU Diagnostic has acquired DST in 2017, a company specialized in allergy and food intolerance. and announced a new line of IFA quality controls that are designed to produce specific positive autoantibody patterns compatible with ICAP classification.



AGENA BIOSCIENCE, specialist in PGx testing using liquid biopsies to improve cancer management, has focused on their MassARRAY technology performing multiplexed somatic mutation detection of up to hundreds of mutations in a single work flow with sensitivity down to 0.1% allelic frequency.

ALCOR launched a fully automated erythrocyte sedimentation rate analyzer miniSED ESR Analyzer as newest addition to the iSED family of ESR analyzers. It is a single position, fully automated ESR analyzer that works directly from the primary EDTA tube and produces an ESR result in 20 seconds.

ALIFAX showed its new Alfred AST sepsis analyzer for rapid bacterial culture, AST and MDRO screening. It includes fastest and cost-effective RAP MIC solution, 1-minute reagent free bacteria identification by ATR-FTIR and RAP SEPSIS, a 5 hours phenotypic susceptibility testing by laser light scattering technology. In addition, it showcased ALIBOX certified quality and traceable bio-transportation. Alifax has closed a commercial partnership with Sysmex.



APPLIED BIOCODE presented the newly developed BioCode MDx 3000 platform for multiplex pathogen detection with results from 188 samples in eight hours shift. The System is based on Applied BioCode's Barcoded Magnetic Beads technology which offers up to 4,096 different barcoded patterns. Up to 100 different barcodes per assay can be run on the BioCode MDx 3000. Additional announced R&D for IVD test with first panel GTI.



ARKRAY was focusing on its ADAMS A1c HA-8180V the newest addition to the ARKRAY portfolio in the United States. The fully automated analyzer utilizes gold standard HPLC technology to perform HbA1C testing and claims to eliminate interference from most common hemoglobin variants. Arkray claims the lowest precision claims on the market (CVs $\leq 1\%$).

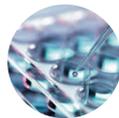
BECKMAN COULTER launched quite a few new instruments and reagents: Early Sepsis Indicator, DxH 900 and 520 Hematology Analyzer, Access hsTnI, Access AMH, Access Sensitive Estradiol immunoassay, REMISOL Advance 1.10 and DxONE data management software. Additional foci: High-sensitivity Troponin, risk assessment for Sepsis with Procalcitonin and the opiate crisis: 6-Acetylmorphine and Buprenorphin.



BIOFORTUNA launched the ampDRY hotstart master mix been developed to enable complete end-stage or real-time PCR assays to be stabilized in a dry format at ambient temperatures for at least 12 months, thus negating the requirement for cold chain shipping and storage.

BIT GROUP is teaming up with Qorvo Biotechnologies for point of care testing with their universal bio-sensor system / cartridge platform – the ALEX – allergy explorer: the first in vitro multiplex allergy test allowing simultaneous measurement of total IgE (tIgE) and specific IgE (sIgE) against a plethora of allergen extracts and molecular allergens.

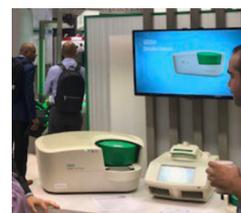
BIOFIRE has focused on its multiplexed meningitis test and rapid blood culture ID for antibiotic stewardship. A novel version of BioFire's multiplex assay for the diagnosis of Meningitis detects



from one sample six bacteria, seven viruses, and one yeast. Using multiplexed tests to analyze CSF resulted in a 44%-600% increase in specimens with an identified organism.

BIOMERIEUX showcased clinical microbiology and lab automation solutions: BACT/ALERT® VIRTUO®, VITEK® MS, VIDAS® 3, EMAG®, Data Analytics Center featuring MYLA®, VITEK® 2. An additional focus has been Procalcitonin (PCT) and NEPHROCHECK® to early identify chronic kidney disease. The BACT/ALERT VIRTUO blood culture detection system with motion activated loading system requires the operator to have minimal skill level to load the instrument. After bottles are loaded. "smart scanning" images the bottle to provide instant recognition of barcode labels and automated blood volume level detection. Bottles are loaded and unloaded into newly designed racks by a robotic arm. High fidelity optics and new algorithms are incorporated to increase performance and time to detection.

BIORAD focused on quality control concepts, fully automated HBcA1 testing, blood banking, immunohematology and displayed a droplet digital PCR system for liquid biopsy monitoring e.g. BCR-ABL, see image.



CHEMBIO announced a collaboration with the Foundation for Innovative New Diagnostics (FIND) to expedite the feasibility testing of a rapid diagnostic test for hepatitis C virus (HCV). Chembio uses its' patented DPP technology platform for the testing of a rapid HCV core antigen assay.

CURETIS launched their LRT Unyvero cartridge in the US detecting 19 microorganisms and 10 antibiotic resistance markers.

DENKA SEIKEN'S fully automated assay to quantify small dense LDL cholesterol has been cleared by US FDA and helps identifying patients at a higher risk for cardio-vascular diseases.

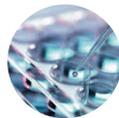
EPENDORF is now collaborating with Artel for NGS. Artel's Multichannel Verification System (MVS) technology works seamlessly with Eppendorf's epMotion® automated liquid handler to enhance critical low volume performance.

EUROIMMUN and PerkinElmer with a joint booth, focused on autoantibody detection in neurological disorders, myositis, Systemic Sclerosis and displayed EUROBlotOne and EUROPattern instruments. The FDA granted 510(k) clearance to PerkinElmer for its Euroimmun Crithidia luciliae immunofluorescence test (CLIFT) and CLIFT sensitive assays.



FUJIREBIO displayed its new LUMIPLUSE G1200, a midsized, fully automated immunoassay instrument. The LUMIPLUSE G1200 is based on CLEIA (chemiluminescent enzyme immunoassay) technology.

GE Healthcare launched the Whatman FF-HP-nitrocellulose backed membranes, a new version of the Whatman Fast Flow High Performance (FF HP) nitrocellulose backed membranes, which is used in many lateral flow devices. The new membranes are based on the current FF120HP product grade with an enhanced surfactant to ease assay optimization.



GENEALL showed its automatic nucleic acid extraction System GENTi 32 utilizing the proven magnetic-bead technology.

GENMARK – no news.

GNA The German start-up is winner of the AACC Disruptive Technology Award competition. Its Pulse Controlled Amplification (PCA) technology allows ultrafast (15 minutes or less), sample-to-result workflows even on challenging clinical matrices such as whole blood. After launching a first PCA instrument (Pharos V8) at the end of 2017, GNA now plans to launch a portable and low-cost sample-to-result platform for infectious disease molecular testing at the point of care. The planned assay pipeline for the CLIA-waivable platform focuses on antimicrobial-resistant pathogens that are highly relevant causes of hospital acquired infections, as well as multi-drug resistant tuberculosis.

HYCOR displayed their HYTEC 288 Plus Automated Immunoassay System, a fully automated immunoassay instrument for Allergy and Autoimmune antibody testing, and for user-defined ELISA commercial or developed assays. The HYTEC 288 Plus is compatible with many interface protocols and provides quality control management. It also complies with FDA Quality System Regulation, current International ISO Standards, NCCLS guidelines and CE-mark guidelines.

IMMUCOR announced its next-generation, fully automated Echo® instrument: Echo Lumena has received FDA clearance in the United States to match donor-patient blood.

INOVA presented new biomarkers closing the seronegative gap in autoimmune testing and was focusing on instruments including the new Aptiva system for particle based multi-analyte testing (PMAT, in R&D), BIO-FLASH rapid-response chemiluminescent analyzer, QUANTA-Lyser EIA/IFA processor (in R&D), NOVA View digital IFA microscope, and the NOVA Dot immunoblot testing systems.



INSTRUMENTATION LABORATORY displayed its hemostasis and acute care diagnostics portfolio with focus on the ROTEM blood management system and platelet functional assays. The ROTEM sigma instrument allows rapid, whole blood diagnosis of coagulopathies and viscoelastic testing, performed at the point of care.

J. MITRA is offering the Advantage Chikungunya IgM Card - a rapid, sensitive, qualitative immunoassay for the detection of Chikungunya specific IgM antibodies in human serum or plasma. The system is a one-step test procedure based on Sandwich Immunoassay principle, which offers results in 15 minutes.

LUMINEX had its focus on the Verigene II combining the multiplexing, molecular diagnostic capabilities of Luminex's current VERIGENE® SP and Reader into one system.



MERIDIAN presented its comprehensive range of tropical and vector-borne antigens and antibodies tests, including the new ZERO X-REACT Zika Envelope Antigen. It also focused on its SensiFAST™ Probe No-ROX Kit and its immolase™ DNA Polymerase - a heat-activated, thermostable DNA polymerase for multiplex reactions.



MOLZYM was presenting its MoLYsis technology and focused on manual and automated human DNA removal and microbial DNA enrichment technology, as well as ultra-clean PCR assays suited for background-free Sanger and NGS sequencing-based identification of bacteria, fungi and microbiomes.

MESA BIOTECH provides a palm-sized, reusable dock with disposable test cassettes - their Accula System. It offers traditional POC rapid immunoassays, while claiming superior sensitivity, specificity.

MINDRAY, Shenzhen China-based, had unveiled claims for the world's smallest, fully automated chemiluminescence immunoassay analyzer. Their DiaSpect Hemoglobin Analyzer provides immediate hemoglobin results from a hand-held analyzer. Results are in less than two seconds and the system features reagent-free cuvettes, that are unaffected by humidity and temperature, as well as an internal battery provides 40 days or 10,000 tests continuous use.

MYCARTIS was focusing on its EVALUTION platform leveraging analytical performance from conventional immunodiagnostic approaches with the capability to quantify and monitor binding reactions in real-time.

ORTHO CLINICAL showed data of a comparison VITROS® Immunodiagnostic Products Anti-T. cruzi (Chagas) Assay* to the Ortho® T. cruzi ELISA Test System significantly improving performance.

PERKINELMER, s. Euroimmun.

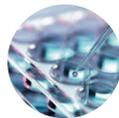
QIAGEN Lake Constance: its aLF - a lateral flow reader – is an open reader platform capable of accurately reading every lateral flow test format. This eliminates the need for multiple instruments aLF is CE-IVD registered and supports the aLF platform validated IVD assays

QUANTIMETRIX showcased its Dipper POCT urine analysis dipstick, and QC with MICROOPTICS. It claims improved performance, efficiency, & compliance with Dipper POCT single-use liquid urinalysis quality control. In addition, it launched the CHROMASCOPICS® Urinalysis Control with MICROSCOPICS specifically designed for Siemens Clinitek Novus, Atellica UAS 800 & Atellica 1500 AUS Microscopics sediment elements include: RBC, WBC, calcium oxalate dihydrate crystals and now introducing E. coli bacteria.

RANDOX LABORATORIES displayed their small dense LDL, biochip-array for early diagnosis of Chronic Kidney Disease and showcased the Acusera 24•7 interlaboratory data management software.

ROCHE elaborated on sepsis stewardship by using biomarkers and informed that its' Elecsys BRAHMS PCT is recommended in the new guidelines. In addition, it was promoting the Elecsys troponin Gen 5 STAT, VENTANA DP 200 slide scanner, cobas connection module, cobas e 801 module, cobas 6800/8800 system, Elecsys ToRCH, Liat PCR system, cobas m 511 hematology analyzer and Roche Digital Diagnostics as well on new opioid tests. Roche will introduce the new Hydrocodone (HYD), Buprenorphine (BUP), and 6-Acetylmorphine (6-AM) assays, which expand its existing Drugs of Abuse Testing menu offering. These screening assays are available on the cobas® c 501 & 502 analyzers, allowing for quick response to growing testing demands due to the opioid epidemic.

SALADEX: antipsychotic therapeutic drug management for personalized medicine in psychiatry. The MyCare Psychiatry line provides antipsychotic drug levels for greater insight into patient adherence and possible treatment failures. MyCare Psychiatry Assay Kits are available for risperidone, paliperidone, clozapine, aripiprazole, quetiapine and olanzapine. MyCare Psychiatry point-of-care



products for risperidone, paliperidone, clozapine, aripiprazole, quetiapine and olanzapine. MyCare Oncology assay kits for imatinib, paclitaxel, 5-FU, and docetaxel.

SARSTEDT with focus on S-Monovettes, its POC Collect Kit, AL-Flex and metal free tubes. The S-Monovette® blood collection system provides the option of gentle syringe-style collection directly into treated, analyzer-ready tubes. The S-Monovette® eliminates sample transfers from untreated syringes and reduces hemolysis and clotting rates. The ultra-low volume draw allows for precise, controlled dispensing to point of care devices, helping to promote blood conservation.

SEBIA showcased CAPOLLARYS 3 MC, HbA1c, HYDRASHIFT: the HYDRASHIFT immunoassay is a proprietary analytical shifting process developed used in conjunction with HYDRAGEL IF assay on its HYDRASYS 2 platform. The HYDRASHIFT test is used to mitigate interference caused by the drug DARZALEX (daratumumab) in patients with IgG kappa multiple myeloma. The CAPILLARYS 3 MC2, combines two CAPILLARYS 3 instruments with a sample tube loader for maximum walk away time. Diagnostic HbA1c is utilizing capillary separation provides high resolution with precise and accurate measurement of HbA1c while being free from interferences.

SEKISUI Diagnostics is offering Silaristm, a platform cleared for the detection of the influenza A and B virus, showing a sensitivity of 97% for Flu A and 94% for Flu B. The system utilizes proprietary OscARtm technology within a state-of-the-art microfluidic cassette.

SIEMENS Healthineers were focusing at their booth on POC, highly sensitive troponin, infectious disease testing in pregnancy and showcased the Atellica Diagnostics IT, a new Zika test, the epc Blood Analyzer, new testosterone-, oxycodone-, active B12-, Hb A1c-assays. Their new Atellica Data Manager is built on the powerful Centralink.



TECAN showcased its Resolvex A200 automated ppSPE workstation, which offers automated positive pressure solid phase extraction (ppSPE) for 1 ml columns and 96-well plates. It can precisely and accurately deliver up to 11 protocol solvents using proven Cavro syringe pump technology, allowing walkaway processing for a wide range of SPE workflows.

THERMO FISHER focused on NGS in cancer and their Oncomine product line including the analysis of tumor mutation load assay and its pan-cancer cell-free-, myeloid research assays. Showcased the Cascadion SM clinical analyzer and the TSQ Altis Triple stage Quadrupole.



VELA DIAGNOSTICS featured its Sensotasa PCR and NGS workflow, which offers both real-time PCR and Next-Generation Sequencing (NGS) applications on one integrated platform.

ZEPTO: Its modular bioassay platform utilizes giant magnetoresistance (GMR) technology as a detection system for measuring concentrations of biomarkers and nucleic acids. Current applications in development include; heart attack, inflammation, influenza, liquid biopsy and heavy metals.



About SilverSky and our Diagnostics Practice

More than 100 years expertise in diagnostics:

SilverSky is a small and highly specialized consultancy focused on diagnostics, medtech and biotech. It purposefully restricts its services to corporate financing, business building and innovation funding. Founder Dr. Mirko Stange has put together an energetic, experienced, international and interdisciplinary team to efficiently cover a wide range of skills decisive in the successful founding, expansion and motivation of life science organizations.



Dr. Ron Opstelten, Ph.D.

Our trained Ph.D. with his in-depth experience in global sales, marketing and business development will support you on business aspects such as developing and executing business plans, setting up sales strategies and organizing sales channels, and launching and managing your innovative product. He will use his experience of 30 years in exploiting new market opportunities, as well as the challenging phases of startups, to surpass the “Valley of Death” phenomenon. Ron’s support is not restricted to developing plans; plan execution is also well within his offering.



Dr. med. Anne Thews, M.D.

Our trained medical doctor will use her significant experience in international marketing and global medical affairs to assist you with launching and managing your challenging product. She will use her deep understanding, gained from over two decades building new international business units and startups, to fine-tune your go-to-market strategy and, if needed, could support you hands-on with implementation.



Dr. Mirko Stange, Ph.D.

Dr. Stange is founder and CEO of the SilverSky Group. His expertise in corporate finance is derived from his longstanding position as a consultant at Mc Kinsey and Droege Comp. As interim managing director of numerous medtech and diagnostics companies, he also has proven track record in successfully securing risk capital and business building. He gained a PhD in Biochemistry and Biophysics with a focus on cardiovascular diseases from the University of North Carolina at Chapel Hill and a diploma in chemistry from the Heinrich Heine University Duesseldorf.

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