Corporate Overview

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President & CEO
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This presentation contains forward-looking statements. Forward-looking statements describe future expectations, plans, results or strategies and are generally preceded by terms such as "may," "will," "should," "could," "would," "expects," "plans," "anticipates," "believes," "estimates," "projects," "predicts," "potential" and similar expressions (including the negative thereof). Forward-looking statements in this presentation include, but are not limited to, statements regarding: (i) growth drivers and expected levels of our organic growth; (ii) improvements to our manufacturing cost efficiency; (iii) the impact of our investment in R&D and commercial initiatives; (iv) our ability to stay in front of competitors’ improvements in technologies, (v) synergies created by our acquisition of Lineagen and (vi) other statements that are not historical facts.

Actual results or developments may differ materially from those projected or implied in these forward-looking statements. Forward-looking statements are based only on current information, assumptions and expectations, and involve a number of risks and uncertainties relating to (i) challenges inherent in developing, manufacturing and commercializing products; (ii) the timing and mix of customer orders among our products; (iii) our ability to further deploy new products and applications and expand the markets for our technology platforms; (iv) third parties’ abilities to manufacture our instruments and consumables; (v) the success of products competitive with our own; (vi) our expectations and beliefs regarding future growth of the business and the markets in which we operate; (vii) the accuracy of our estimates, (viii) our ability to fund our operations and (ix) the application of generally accepted accounting principles which are highly complex and involve many subjective assumptions. We are under no duty to update any of these forward-looking statements after the date of this presentation to confirm these statements to actual results or revised expectations, except as required by law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the date of this presentation. Moreover, except as required by law, neither we nor any other person assumes responsibility for the accuracy and completeness of the forward-looking statements contained in this presentation.

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Creating a market leader in digital cytogenetics

Fragile X Syndrome Testing (FRx)
Screening and diagnosis of Fragile X syndrome, the most common known genetic cause of ASD/ID that runs in families. Ordered with 75% of FirstStep™ PLUS CMA cases.

Pharmacogenetics Testing (PGx)
Next generation whole exome gene sequencing (WES) to detect single genome letter changes undetectable by CMA.

Chromosomal Microarray (CMA)
Designed to detect larger deletions and duplications in the genome.

Whole Genome Diagnostic (WGDx)
Most comprehensive genetic test that can detect majority of genome mutations (deletions/duplications/single base changes).

Product Solutions with the Saphyr System

CLIA Diagnostic Services via the Lineagen Business + Saphyr
The Diagnostic Journey in Genetic Diseases and Cancer Ends Too Often in Frustration, Disappointment and even Premature Death

Constitutional Genetic Diseases

• Neurodevelopmental disorders (NDDs), for example, including Autism Spectrum Disorder, Intellectual Disability and ADHD, occur at a rate of 1 in 6

• Yet, for 50 – 70% of patients tested, their results are negative, meaning their disease may not be properly diagnosed

• Without a definitive molecular diagnosis that explains the genetic condition underlying their disease, these patients may not obtain optimal treatment and their diagnostic odyssey could continue

Blood Cancers

• About 180,000 new cases of Leukemias, Lymphomas and Myelomas are diagnosed each year in the US

• Yet, again, for 50 – 70% of patients tested, their results are negative, meaning that they have the disease, yet no actionable genetic markers are detected. These patients may not obtain optimal treatment and their diagnostic odyssey could continue

• Even with a definitive diagnosis and good prognosis, Split survival, where average survival is split between long survival and short, is common in leukemia. Current technology doesn’t allow to predict which patients will respond to therapy and survive, and which will not
A Big Part of the Diagnostic Challenge is that the Genome Variations that Cause Disease Are Not All the Same!

Single Nucleotide Polymorphisms (SNPs)
- 1 base pair (bp)

Structural Variations (SVs)
- 100s bp to Millions bp
  - Deletion
  - Insertion
  - Repeat Expansion
  - Inversion
  - Translocation

Aneuploidy
- Full Chromosomes

Single Nucleotide Polymorphisms (SNPs)

A-G-C-T-A-C-T
   |   |
T-C-A-T-G-A

Structural Variations (SVs)

Aneuploidy

Full Chromosomes
Cytogenetics means the detection of chromosomal disorders in the laboratory by karyotyping (examining the chromosomes within a cell). Molecular cytogenetics involves testing of a specific disease locus by fluorescence-in-situ hybridization (FISH) assay.

Diseases caused by large genomic aberrations, also known as structural abnormalities (not sequence abnormalities). Structural abnormalities include translocations, insertions, deletions and other chromosomal rearrangement of genomic information.

ACMG/AMP/AAN/AAP recommend KT/FISH/CMA/Frag-X as the standard of care for constitutional disorders.


The human genome is highly repetitive and large structural abnormalities are often hidden among repeats. Reads from next-generation sequencing (NGS) and even long-read sequencing are too short to span the repetitive sections and thus are unable to reliably capture the large structural abnormalities/genomic aberrations.
One Problem with Traditional Cytogenetics is the inefficient Workflow

Based on the Cyto workflow at NHS Lothian, Edinburgh Scotland, per Dr. Eddy Maher
Digital Cytogenetics with Saphyr is a Single Workflow for Detecting all SVs Recommended by Medical Guidelines – Easy!
We Believe Sequencing is Not an Alternative to Saphyr – Even Long-Read Sequencing Misses the SVs that Saphyr Detects with Ease

**SNPs to Small Structural Variants**

Sequencers can detect these

| 1 to 100s base pairs (bp) |

A-G-C-T-A-C-T

T-C-A-A-T-G-A

**Large Structural Variations (SVs)**

Sequencers are **BLIND** to these

- Deletion
- Insertion
- Repeats
- Translocation
- Inversion

100s bp to Millions bp

ONLY Saphyr detects these large SVs that cause disease*

We believe that Saphyr is the only genome analysis platform capable of comprehensive, cost effective & efficient detection of large SVs (500 bp and larger)
Key Studies Have Shown 100% Concordance with the Standard of Care Methods

**New Results**

**Next generation cytogenetics: comprehensive assessment of 48 leukemia genomes by genome imaging**

Kornelia Neveling, Tuomo Mantere, Susan Vermeulen, Michiel Oorsprong, Ronald van Beek, Ellen Kater-Baats, Marc Pauper, Guillaume van der Zande, Dominique Smeets, Daniel Olde Weghuis, Marian J Stevens-Kroef, Alexander Hoischen

doi: https://doi.org/10.1101/2020.02.06.935742

**Next generation cytogenetics: genome-imaging enables comprehensive structural variant detection for 100 constitutional chromosomal aberrations in 85 samples**

Tuomo Mantere, Kornelia Neveling, Céline Pebrel-Richard, Marion Benoist, Guillaume van der Zande, Ellen Kater-Baats, Imane Baatout, Ronald van Beek, Tony Yammine, Michiel Oorsprong, Daniel Olde-Weghuis, Wed Majdali, Susan Vermeulen, Marc Pauper, Aziza Lebbar, Marian Stevens-Kroef, Damien Sanlaville, Dominique Smeets, Jean Michel Dupont, Alexander Hoischen, Caroline Schluth-Bolard, Laila El Khattabi

doi: https://doi.org/10.1101/2020.07.15.205245

**BIONANO FOUND ALL**

clinically reported variants detected by Karyotype, FISH and Chromosomal Microarray

**NO OTHER TECH**

has been shown, in a single assay, to deliver results of all 3 traditional technologies
Case Study: Saphyr Found the SV that Was Responsible, Helping Solve This Case in Pediatric Genetic Disease

Saphyr detected a 410kbp duplication & insertion in the DMD gene which provided a definitive molecular diagnosis of Duchenne’s Muscular Dystrophy

Juvenile male patient suffering from muscular weakness and developmental delay
Patient tested negative by standard and advanced molecular methods

- Chromosomal Microarray
- PCR and Sanger Sequencing
- Multiplexed Ligation Polymorphism Assay (MLPA)
- Whole Exon & Whole Genome Sequencing
<table>
<thead>
<tr>
<th>Condition</th>
<th>Diagnosis</th>
<th>Institution</th>
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<tr>
<td>ALS</td>
<td>Resolved mosaic repeat expansions</td>
<td>Mayo Clinic</td>
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<tr>
<td>Alzheimer’s Disease</td>
<td>Identified deletions in CR1</td>
<td>Mayo Clinic</td>
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<tr>
<td>Hepatocellular Carcinoma</td>
<td>Identified Hep B Virus insertion that caused tumor and replication stress</td>
<td>Centre de Recherche des Cordeliers</td>
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<tr>
<td>Disorder of Sex Development</td>
<td>Identified 6 kbp insertion in WDR11</td>
<td>UCLA</td>
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<tr>
<td>Leukemia</td>
<td>In 12 patients, found dozens of novel genes with recurring structural variants</td>
<td>Penn State College of Medicine</td>
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<tr>
<td>Epilepsy and Developmental Delay</td>
<td>Detected 90 kbp mosaic deletion in CDKL5</td>
<td>Duke</td>
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<tr>
<td>Congenital Diaphragmatic Hernia</td>
<td>Revealed complex genome structures and new candidate genes</td>
<td>Massachusetts General Hospital</td>
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<tr>
<td>3q29 Microdeletion Syndrome</td>
<td>Characterized large, complex repeats and rearrangements in parents of 3q29 patients</td>
<td>Emory University</td>
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In results expected to be published, based on comparative studies against one or more of NGS, CMA, FISH & Karyotyping.
Bionano Saphyr is Prominently Involved in the Search for Genomic Variants that Stratify COVID-19 Patients by Risk and May Help Towards Vaccine and Rx Development

- Saphyr is being used to identify variants in host genomes that influence COVID-19 response, severity, progression and drug response

**China**

GrandOmics 希望組

First study in Wuhan with Bionano service provider GrandOmics is underway

**Europe**

European study involving University of Hannover genomic epidemiologists launched in March 2020

**US-Based Consortium**

COVID19HostGenomeSV.com

Consortium co-founded by Dr. Ravindra Kolhe at Augusta is analyzing hundreds to thousands of patients in a study that has shown preliminary promise

**Compute Partners**

Rescale, together with Amazon, Google and Microsoft, are donating compute capacity

**Boston Children’s Hospital**

Study analyzing children with MIS-C, a severe form of COVID-19 causing deadly inflammation in children
We Estimate the Market for Digital Cytogenetics to be $2.6B – $3.8B

**CYTOGENETICS**  
(Digital Cytogenetics)  
2,500+  
cytogenetics labs worldwide  

- $0.5B-$0.6B  
  Estimated revenues  
- $0.2B-$0.4B  
  Estimated annual recurring revenues

**DISCOVERY RESEARCH**  
(Complement Sequencing)  
7,000+  
(and quickly growing)  
high-throughput sequencers worldwide  

- $1.4B-$1.8B  
  Estimated revenues  
- $0.5B-$1.1B  
  Estimated annual recurring revenues
We Believe Bionano is Alone in Addressing SVs and Digital Cytogenetics
On August 21st, We Acquired the Diagnostics Service Provider, Lineagen

REVENUE: IMMEDIATE IMPACT

Lineagen adds new revenue streams to help support growth of the combined business

COMBINING PRODUCT- AND SERVICE-BASED BUSINESSES

Provides centralized and decentralized offerings to support the broader market

ESSENTIAL COMPONENTS FOR BUILDING REIMBURSED DX MENU ON SAPHYR

Accelerates Saphyr entry into the clinic by adding content, skills, expertise and sample archives

- CLIA Certification
  - Development of proprietary LDTs helps drive Saphyr adoption
  - Enhances Bionano offering to pharma customers seeking new therapeutic targets

- Proprietary Content in Pediatric Neuro Developmental Disorders
  - Proprietary database from Toronto Sick Kids Hospital provides basis for differentiated tests, current and future
  +60,000 tests performed on +30,000 patients, and counting

- Patient Samples & Database
- Clinical Cytogeneticists & Custom Interpretation Software
- Genetic Counseling
- Certified Coders
- 3rd Party Payor Contracts

- Provides expertise for improved Saphyr Dx and workflow integration
- Differentiated service and critical link between physicians, patients and families
- Trained billing specialists lay groundwork for reimbursement of Saphyr LDTs
- Leverage existing relationships and contracts with payors
Lineagen is a Complementary Business that Provides Actionable Information through Diagnostic Services to Patients with Developmental Disorders

FROM ONE BUCCAL SWAB . . .

- **Five tests** providing multiple revenue streams
- **CLIA-certified LDTs** and services
- **Personalized**, easy-to-understand results
- **Genetic counseling** and clinical education
- **End-to-end support** with reimbursement

**1. FirstStep® PLUS (FSDx)**
Chromosomal Microarray (CMA) designed to detect larger deletions and duplications in the genome

**2. Fragile X Syndrome Testing (FRx)**
Screening and diagnosis of Fragile X syndrome, the most common known genetic cause of ASD/ID that runs in families. Ordered with 75% of FirstStep® PLUS CMA cases.

**3. Pharmacogenetics Testing (PGx)**
Testing of genes that can impact dosage and choice of drug types, including Anti-Epilepsy and ADHD drugs

**4. NextStep® PLUS (NSDx)**
Next generation whole exome gene sequencing (WES) to detect single genome letter changes undetectable by CMA

**5. Whole Genome Diagnostic (WGDx)**
Most comprehensive genetic test that can detect majority of genome mutations (deletions/duplications/single base changes)

Lineagen launched EpiPanelDx™ for Epilepsy last week, giving it a 6th assay.
Bionano + Lineagen Side-by-Side:
Critical Mass to Support Global Adoption of Saphyr and Address Significant Clinical Unmet Needs

**Bionano Genomics**

**Products:** Systems, consumables and software for highly accurate structural variation analysis

- A leader in digital cytogenetics providing researchers and clinicians with the tools to detect structural variations
- Saphyr genome imaging system and consumables sold to leading scientists and clinicians for digital cytogenetics
- Addresses a $2.6-3.8B market opportunity with system placement opportunity of ~10,000 systems
- Adoption by leading cytogenetics labs in US and Europe
- Growing bibliography of publications validate Saphyr as replacement for traditional cytogenetic methods including karyotyping, FISH and CMA, plus outdated molecular methods such as Southern Blot. They underscore Saphyr’s ability to find SVs other methods fail to detect
- 101 employees
- LTM Revenues (June 30, 2020) $8.5 million

**Lineagen**

**Services:** Laboratory Developed Tests through CLIA-certified services for pediatric genetic disorders

- A leader in neurodevelopmental disorder testing with CLIA-certified LDTs for both pediatric specialists and generalists alike
- Portfolio of CLIA-certified Laboratory Developed Tests to assist physicians in diagnosing genetic conditions sooner to develop personalized healthcare management for patients and families
- Addresses a $1B market for pediatric development disorders
- Proprietary content and powerful reports supported by robust team of clinical genetic specialists, including genetic counselors and cytogeneticists
- Strong commercial organization with extensive capabilities in the US
- Multi-year history of contracted, reliable & stable reimbursement from prominent public and private payors
- 35 employees
- LTM Revenues (June 30, 2020) $6.0 million
Bionano + Lineagen As One:
Topline Expansion, Bigger Addressable Market, Deeper Market Penetration & New Products as Bionano Expands Clinical Applications

MULTIPLE WAYS TO ACCELERATE CLINICAL ADOPTION

- Potential FDA-cleared tests
- Novel Laboratory developed tests (LDTs)
- Leverage Lineagen’s reimbursement expertise to sell more Saphyrs
- Expand to more services, including pharma services with Partner Labs

Existing Lineagen Business
First-Line CMA tests + WES

Existing Bionano Business
# 2019 Pro Forma Financial Snapshot
($ in millions)

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<th>BNGO Standalone</th>
<th>Lineagen Standalone</th>
<th>BNGO+Lineagen Pro forma</th>
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<tr>
<td><strong>Revenue</strong></td>
<td>$10.1M</td>
<td>$7.5M</td>
<td>$17.6M</td>
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<tr>
<td><strong>Cost of Revenue</strong></td>
<td>$6.8M</td>
<td>$3.4M</td>
<td>$10.2M</td>
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Experienced Management Team and Board

**Executive Management Team**

- **Erik Holmlin, PhD**
  President, CEO & Board Member

- **Mark Oldakowski**
  Chief Operating Officer

- **Christopher Stewart**
  Chief Financial Officer

- **Alka Chaubey, PhD**
  Chief Medical Officer

**Board of Directors (Non-Executive)**

- **David Barker, PhD**
  Chairman of Bionano; former CSO of Illumina

- **Christopher Twomey**
  Former CFO of Biosite; Ernst & Young

- **Albert Luderer, PhD**
  CEO – Integrated Dx

- **Kristiina Vuori, MD, PhD**
  President – Sanford Burnham Prebys MDI

- **Hannah Mamuszka**
  CEO – Alva10

- **Yvonne Linney, PhD**
  Founder – Linney BioConsulting
Thank You

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