SEE STRUCTURAL VARIATION LIKE NEVER BEFORE WITH BIONANO OPTICAL GENOME MAPPING
De novo genome assembly across multiple species

Replacing traditional cytogenetics methods

Unbiased genome-wide structural variant detection

De novo genome assembly across multiple species

THE SAPHYR SYSTEM IS IDEAL FOR

WIDE RANGE OF APPLICATIONS

Undiagnosed Genetic Disorders
Complete the diagnostic odyssey by detecting large structural events missed by NGS and cytogenetic methods.

Hematologic Malignancies
Detect relevant mutations at >1,000x higher resolution over karyotyping with genome imaging.

Gene Discovery and Therapy
Identify genes of interest, their locations, and how SVs impact them, for effective therapy development.

Cell Line Stability
Detect genome instability caused by insertions/deletions introduced during DNA replication in cell lines.

Solid Tumor Research
Detect somatic rearrangements in heterogeneous tumors down to 1% allele fraction.

Genetic Engineering Studies
Identify areas of biological interest for achieving desirable traits in model systems or crops.

Evolutionary Biology
See the complete picture of how genomes have evolved and have been reorganized.

Reference Genome Assembly
Achieve highest quality, error-free de novo assemblies by correcting order and orientation of sequencing contigs.

The Saphyr® System by Bionano Genomics is a genome imaging tool for high-speed, high-throughput structural variant detection and analysis with exceptional sensitivity and specificity.

Picture Your Next Discovery with Bionano Optical Genome Mapping
WITH THE SAPHYR SYSTEM, YOU CAN DETECT STRUCTURAL VARIANTS OTHER TECHNOLOGIES MISS

<table>
<thead>
<tr>
<th>Structural Variants</th>
<th>Sensitivity</th>
<th>False Positives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insertions/deletions larger than 500 bp</td>
<td>99%</td>
<td>below 2%</td>
</tr>
<tr>
<td>Inversions larger than 30 kbp</td>
<td>99%</td>
<td>below 2%</td>
</tr>
<tr>
<td>Duplications larger than 30 kbp</td>
<td>97%</td>
<td>below 2%</td>
</tr>
<tr>
<td>Balanced and unbalanced translocations larger than 50 kbp</td>
<td>95%</td>
<td>below 2%</td>
</tr>
<tr>
<td>Fractional copy number variations larger than 500 kbp</td>
<td>97%</td>
<td>below 2%</td>
</tr>
</tbody>
</table>

The Saphyr System images ultra-long, linearized DNA molecules labeled at specific sequence motifs. Comparative analysis of the label patterns over long contiguous reads across the whole genome, reveals structural variants (>500 bp), at sensitivities as high as 99%, with false positive rates below 2%. All major types of large structural variants can be detected, even at allele fractions as low as 1%, which is not enabled by any other genomics technology.

Total processing time: as little as 4 days
The latest Bionano SP DNA prep kits are capable of purifying UHMW DNA in as little as 4 hours using a lyse, bind and wash process and novel paramagnetic disks. The resulting purified DNA is several megabases in length and is optimal for downstream use with Bionano systems.

Starting with UHMW DNA purified using the appropriate Bionano Prep Kit, fluorescent labels are attached to a 6 bp sequence motif, occurring 15 times per 100 kbp. Fluorescent labels are attached via the direct label and stain technology (DLS) which is nondestructive and leaves DNA samples intact. The result is uniquely identifiable genome-specific label patterns that enable de novo map assembly, anchoring sequencing contigs, and discovery of structural variations starting at 500 bp.

**Streamline Your Workflow with Optimized Sample Prep and Labeling Kits**

Bionano Prep Kits™ provide the critical reagents necessary to extract and label ultra-high molecular weight (UHMW) DNA that is compatible with Saphyr.

### OPTIMIZED KITS FOR EVERY NEED

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<table>
<thead>
<tr>
<th>Sample Types</th>
<th>Fresh/frozen Blood</th>
<th>Cell Culture</th>
<th>Bone Marrow Aspirates (BMA)</th>
<th>Tissue</th>
<th>Plant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bionano Prep Kit (plus lysis)</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Bionano Solution Phase (SP) Prep Kit</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Sample Input Range</td>
<td>400 - 650 μl</td>
<td>1 - 1.5 x 10^6 cells</td>
<td>1.5 x 10^6 cells</td>
<td>10 - 30 mg</td>
<td>2g young leaves</td>
</tr>
</tbody>
</table>

**SAMPLE TYPES**

- Tissue
- Plant Tissue
- Blood
- Cell Lines
Experience the Power of Saphyr Chips®

Bionano Saphyr chips utilize hundreds of thousands of massively parallel NanoChannels that linearize long, labeled DNA molecules allowing the Saphyr Instrument to directly image your samples.

“We need research data on structural variants like Bionano provides, to ultimately help patients. It has the potential to change the way we diagnose diseases and eventually how we manage them.”

Dr. Rashmi Kanagal-Shamanna
The University of Texas, M.D. Anderson Cancer Center

Saphyr Chip’s NanoChannel Technology Keeps DNA Intact

Saphyr Chip’s NanoChannels allow only a single linearized DNA molecule to travel through while preventing the molecule from tangling or folding back on itself. This nanofluidic environment allows molecules to move swiftly through hundreds of thousands of parallel NanoChannels simultaneously, enabling high-throughput processing to build an accurate Bionano genome map.
Intelligent Data Solutions

Manage and monitor data generation on Saphyr and generate genome assemblies and variation reports in one place.

BIONANO ACCESS

Bionano Access® is a web-based hub for Saphyr® operations, provides all the software for experiment management and Bionano applications, including variant annotation and reporting. With Bionano Access, you can:
- Set up and monitor runs remotely to flag potential sample-quality issues
- Perform one-click structural variation calling and annotation
- Filter and generate variant reports
- Automate de novo and somatic variant detection by comparing multiple samples and export in a dbVar-compliant VCF file
- Generate de novo assemblies for population-specific reference genomes

ANALYSIS PIPELINES

Bionano Access has several analysis pipelines to get most out of your Bionano data.
- Rare Variant Pipeline has >90% sensitivity to detect SVs down to 1% variant allele fraction, completely unbiased and genome wide, allowing for the analysis of heterogeneous tumor/mosaic samples
- Copy Number Variation Pipeline detects copy number changes from 500 kbp up to aneuploidies, down to 10% variant allele fraction with high sensitivity
- Variant Annotation Pipeline filters all SV calls based on the frequency of variants in a built-in control database, and external databases. It annotates calls by providing overlapping gene info, performs trio-analysis and tumor-normal comparison
- De novo Assembly Pipeline builds consensus maps for genome assembly projects to scaffold sequence contigs into chromosome arm-length assemblies, or to call heterozygous structural variants with unmatched sensitivity and precision
- Bionano EnFocus™ FSHD Analysis Pipeline for targeted measurement of the D4Z4 repeat array on chromosome 4

BIONANO COMPUTE SERVERS

The Saphyr and Bionano Compute Servers offer cluster-like performance in an affordable, compact solution.
- Perform de novo assembly of a human genome in approximately 20 hours
- Simple web application interface enables integration into virtually any network setup

BIONANO COMPUTE ON DEMAND

Bionano Compute On Demand is a pay-per-use solution accessible through Bionano Access web application for your Bionano Solve operations. Compute On Demand simplifies the way you perform analyses, without the need of any additional infrastructure, giving you the flexibility and scalability, your experiment deserves.

Advantages include:
- Analyze large genomes and high number of samples simultaneously
- Perform pipeline analysis operations without worrying about server capacity
- Data encrypted for secure operations
- Data centers compliant with IPAA, CSA, SOC2, ITAR regulations
- Genomic data accessible only to end-users and deleted post-processing

COMPUTE OPTIONS

COMPUTE SERVER
- Expect to run servers for >25% of the time
- Execute consistent loads
- Ideal solution when internet access not permitted

COMPUTE ON DEMAND
- Execute variable workloads
- No upfront server costs required
- Receive data from service providers
- Work on large genomes
## Bionano Technical Support

The Bionano Support team is committed to your smooth onboarding and continued success.

### ONBOARDING

Be it reviewing your applications, identifying the right solution based on your experimental goals, or discussing your computational needs, our Field Applications and Field Service teams are with you, every step of the way.

### CONTINUED SUPPORT

The Bionano Customer Solutions team is available anytime to help with ongoing and future projects, troubleshooting and resolving issues, and ensuring you get the most value possible from your Saphyr System.

### TRAINING

Every Saphyr system is accompanied by exceptional training to get you started on the right foot. This onsite training of users covers the entire workflow, from sample preparation to data review and assessment using Bionano Access.

### SAPHYR ASSURE

Saphyr Assure is the optional automated system health monitoring service that continuously inspects data quality and instrument performance. Performance issues are diagnosed early and validated updates are automatically ready for installation.

## YOUR BIONANO SUPPORT TEAM

<table>
<thead>
<tr>
<th>Field Application Scientists</th>
<th>Technical Support</th>
<th>Field Service Engineers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular calls to provide product and administrative updates and review project status and pipeline</td>
<td>Available via e-mail and phone</td>
<td>Performance of annual preventive maintenance and onsite and remote system troubleshooting</td>
</tr>
</tbody>
</table>

Contact Bionano Customer Solutions team

- bionanogenomics.com/support
- support@bionanogenomics.com

## 3 Ways to Get Bionano Data

<table>
<thead>
<tr>
<th>GET THE SERVICE</th>
<th>GET THE CONSUMABLES</th>
<th>GET THE SAPHYR SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIONANO DATA SERVICES</td>
<td>REAGENT RENTAL AGREEMENT</td>
<td>SYSTEM AND CONSUMABLES PURCHASE</td>
</tr>
</tbody>
</table>
| Submit your samples to Bionano or a certified service provider  
- Fresh/frozen human samples accepted: Tissue, Blood, Cultured Cells, Bone Marrow Aspirates  
- Non-human samples accepted only through service providers | Run samples in-house with a free Bionano Saphyr instrument  
- Flexible reagent commitment terms  
- Installation, Compute On Demand analysis, and training included | Purchase a Saphyr System for your institution  
- Installation and training included |
# Bionano Genomics Ordering Guide

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>Part No.</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>KITS</td>
<td>80042</td>
<td>Bionano Prep SP Blood and Cell DNA Isolation Kit v2 (10 Reactions)</td>
</tr>
<tr>
<td></td>
<td>90103</td>
<td>Bionano Prep SP Bone Marrow Aspirate (BMA) DNA Isolation Kit v2 (10 reactions)</td>
</tr>
<tr>
<td></td>
<td>80005</td>
<td>Bionano Prep DLS Labeling Kit (10 Reactions)</td>
</tr>
<tr>
<td></td>
<td>80003</td>
<td>Bionano Prep Plant Tissue DNA Isolation Kit (5 Reactions)</td>
</tr>
<tr>
<td></td>
<td>80002</td>
<td>Bionano Prep Animal Tissue DNA Isolation Kit (10 Reactions)</td>
</tr>
<tr>
<td></td>
<td>90106</td>
<td>Bionano Prep SP Blood and Cell v2 30 Genome Bundle G2.3*</td>
</tr>
<tr>
<td></td>
<td>90107</td>
<td>Bionano Prep SP BMA DNA Isolation Kit, DLS Labeling Kit v2 and Saphyr G2.3 Chips – 30 Genome Bundle G2.3*</td>
</tr>
<tr>
<td>CHIP</td>
<td>20366</td>
<td>Saphyr Chip® G2.3 (formerly 3x1300*)</td>
</tr>
<tr>
<td></td>
<td>20319</td>
<td>Saphyr Chip® G1.2 (formerly 2x320)</td>
</tr>
<tr>
<td>INSTRUMENT</td>
<td>90067</td>
<td>Saphyr® System with Bionano Access Server, 1 color</td>
</tr>
<tr>
<td></td>
<td>90023</td>
<td>Saphyr® System with Bionano Access Server, 2 color</td>
</tr>
<tr>
<td>COMPUTING</td>
<td>80013</td>
<td>Saphyr Compute Server</td>
</tr>
<tr>
<td></td>
<td>80014</td>
<td>Bionano Compute Server</td>
</tr>
<tr>
<td></td>
<td>90047</td>
<td>Bionano Compute On Demand, US</td>
</tr>
<tr>
<td></td>
<td>90052</td>
<td>Bionano Compute On Demand, Germany</td>
</tr>
<tr>
<td></td>
<td>90060</td>
<td>Bionano Compute On Demand, Europe</td>
</tr>
<tr>
<td>SERVICES</td>
<td>90045</td>
<td>Saphyr® Instrument Extended Warranty Service Contract (1 year)</td>
</tr>
<tr>
<td></td>
<td>90072</td>
<td>100x Human Genome Sample Analysis</td>
</tr>
<tr>
<td></td>
<td>90073</td>
<td>400x Human Genome Sample Analysis</td>
</tr>
<tr>
<td></td>
<td>90074</td>
<td>Advanced Genome Sample Analysis</td>
</tr>
</tbody>
</table>

*Compatible only with Saphyr® System #90023 and #90067 (Saphyr® Instrument #60325 and #60396)

To order, please contact orders@bionanogenomics.com, call 1.858.888.7600 or contact your sales person directly.

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