SEQUENCING SOLUTIONS FOR BIOPHARMA

Accelerate your research and development with highly accurate and comprehensive sequencing data

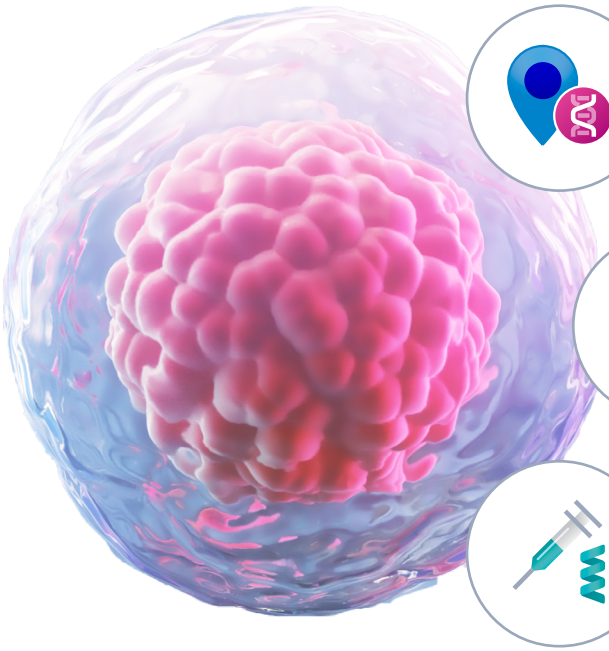
Supercharge your R&D

Sequencing has become an integral part of the biopharma research and development process and enhances our understanding of the molecular determinants of health and disease. Whether you are conducting research on novel potential drug targets, biomarkers, or therapeutics such as gene therapies, PacBio® offers highly accurate sequencing solutions across its portfolio that can improve your chances of success and may reduce your time to market.

PacBio

PacBio data in action

PacBio sequencing is uniquely suited to advance insights in these applications in biopharma research.



Target and biomarker identification

Understand drivers of disease and identify novel targets or biomarkers at the DNA or RNA level

Cell and gene therapy

Design, develop and evaluate AAV gene therapy and CRISPR-Cas9 gene editing approaches

Biologics development

Enhance your development of biologics such as mRNA vaccines or antibodies and optimize desired protein properties

PacBio offers highly accurate short- and long-read sequencing for your project's needs

We've got you covered—PacBio offers a portfolio of long- and short-read sequencing systems to power any biopharma application.

HiFi sequencing
Delivers long reads with the highest accuracy—even in hard-to-sequence regions

SBB™ sequencing
10-100x more accurate than conventional NGS approaches

Long-read ideal		Short-read ideal
SNV and SV discovery	Target ID	SNV discovery
RNA isoforms		Gene expression
Full-length mRNA sequencing		Whole exome sequencing
Viral integration		Off-the shelf panels
AAV genome sequencing	Gene editing assessment	
Full-length plasmid sequencing		
	Directed evolution / biologics development	Small amplicons <300 bp
Large amplicons		
Fresh or frozen samples		Fresh, frozen, FFPE, oligos, and degraded samples

Target and biomarker identification

Comprehensively analyze your samples to identify and validate novel targets and biomarkers

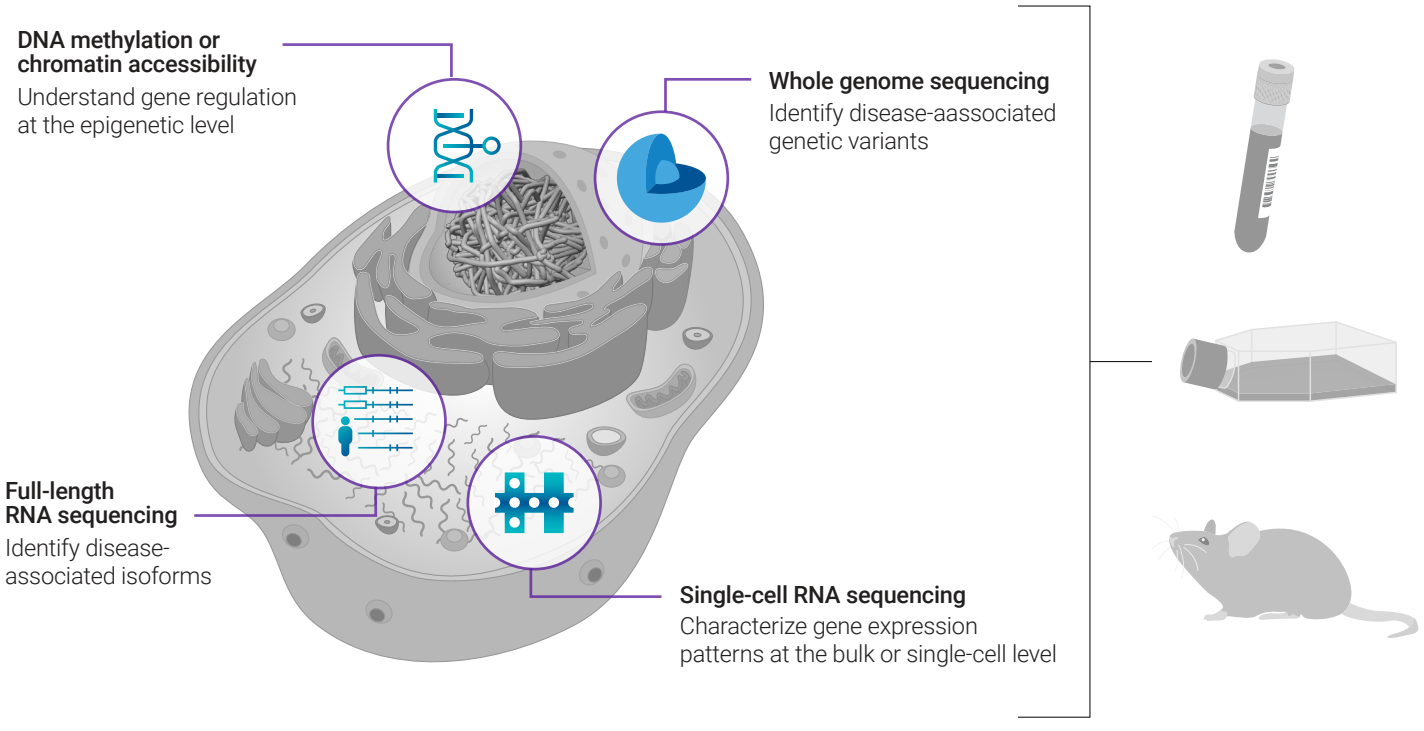
- **Capture** SNPs, indels, and larger structural variants to identify novel targets or biomarkers
- **Identify** novel RNA isoforms, fusion transcripts and gene expression patterns
- **Integrate** epigenetic information into your results with DNA methylation and chromatin accessibility data
- **Generate** more comprehensive multiomic datasets

The power of high-quality sequencing in target and biomarker ID

Most drug development projects begin with identifying novel biomarkers and druggable targets. However, many projects fail in later stages due to incomplete or inaccurate molecular information used for target selection. It is critical to take advantage of the most comprehensive and accurate data available early in the research process to characterize samples fully and correctly and to identify high quality potential targets.

What can you do with PacBio sequencing?

Highly accurate PacBio whole genome sequencing (WGS) allows you to comprehensively assess challenging regions with phased haplotypes and to identify more disease-associated variants than other methods ranging from single nucleotide variants (SNVs) to larger structural variants (SVs). RNA sequencing with Kinnex™ kits provides full-length RNA isoforms, fusion transcripts and gene expression levels as critical data points in understanding health and disease and identifying potential drug targets. Finally, the influence of the environment and incomplete penetrance of certain genetic variants emphasizes the importance of considering epigenetic information such as 5mC and 6mA methylation information included in every HiFi run.



Cell and gene therapy

Design and evaluate the most promising cell and gene therapies for the next generation of novel disease treatments

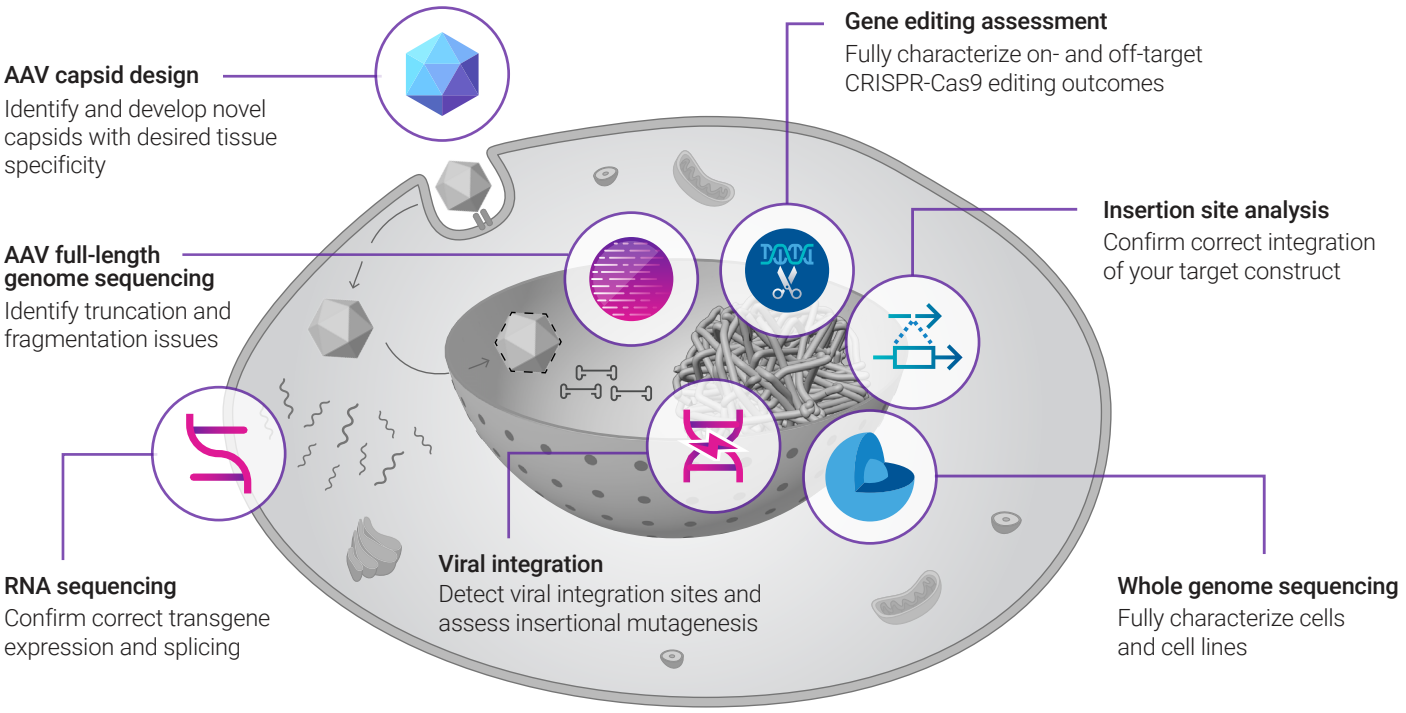
- **Discover, design, and evaluate** novel AAV vectors
- **Comprehensively analyze** virus and construct integration sites
- **Confirm** plasmid and cell line identity and integrity
- **Fully characterize** CRISPR-Cas9 gene editing outcomes

Highly accurate sequencing as a key tool for cell and gene therapy research

Cell and gene therapies have emerged as promising tactics to combat disease and require equally innovative methods to facilitate their development. Highly accurate sequencing provides comprehensive and unbiased information crucial for cell and gene therapy development, ensuring the confidence you need to advance your projects and ensure the safety and efficacy of potential therapeutics.

What can you do with PacBio sequencing?

The exceptional accuracy of PacBio sequencing solutions provide you with the tools needed for cell and gene therapy development. This accuracy empowers you to rapidly accelerate the engineering and discovery of novel Adeno-associated virus (AAV) capsids, monitor and evaluate impurities and assess viral integration. Comprehensive variant detection across PacBio platforms affords the full characterization of CRISPR-Cas9 gene editing outcomes, including small and large insertions or deletions, as well as target construct integration sites. Finally, the precision of PacBio sequencing technology allows you to confirm the correct expression and splicing of transgenes and the identity and genomic integrity of cell lines used in your cell and gene therapy development.



Biologics development

Highly accurate sequencing can elevate some of the most commonly used approaches in biologics research and development

- **Confirm** complete plasmid sequences including its backbone
- **Characterize** mRNA vaccines including polyA-tail length
- **Develop** novel proteins with desired characteristics
- **Confirm** cell line identity and genomic integrity

Highly accurate sequencing to advance your biologics research and development

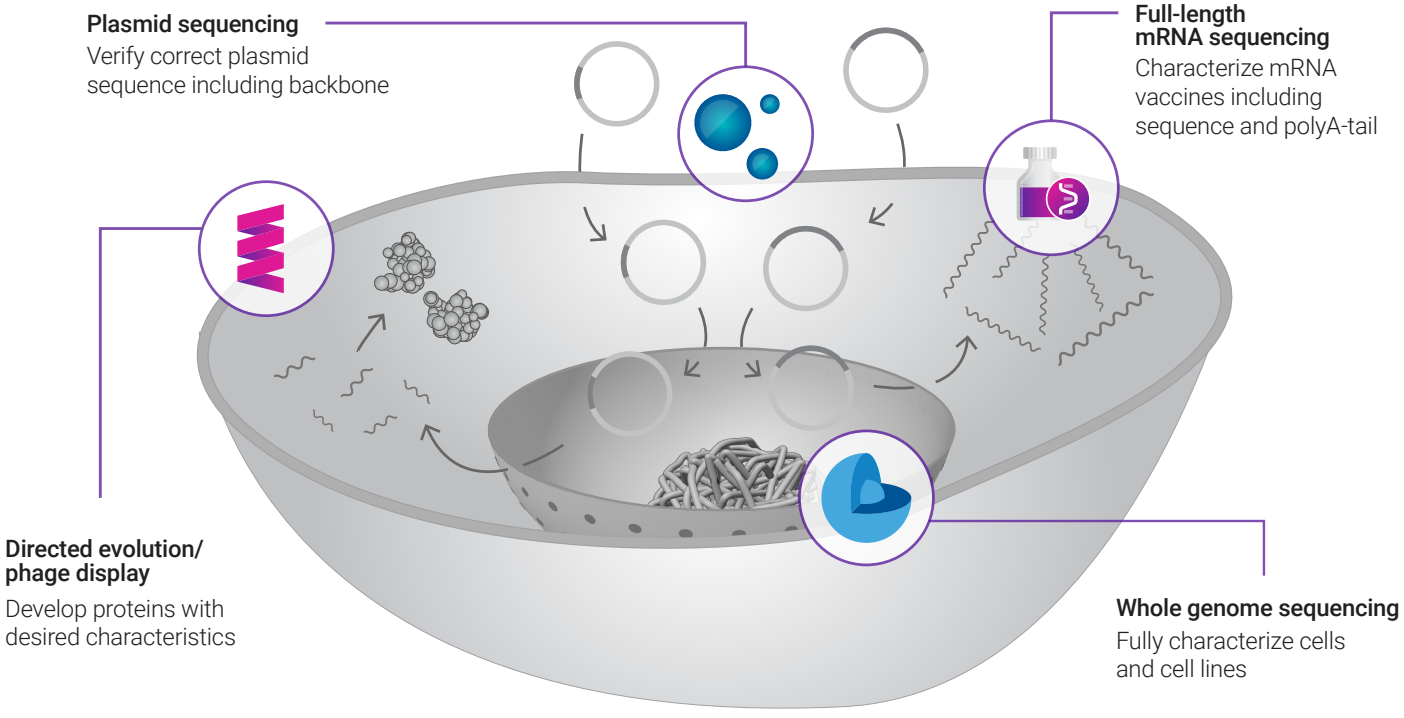
Sequencing has emerged as an invaluable tool across biologics research and development and represents a critical step in the development of RNA or protein-based potential therapeutics like mRNA vaccines or antibodies. Highly accurate sequencing provides you with confidence in your results, may help you speed up your development process and can enable you to create novel biologics.

What can you do with PacBio sequencing?

PacBio technology provides complete sequencing solutions for addressing the critical concerns of biologics development today. For biologics requiring the use of plasmids and cell lines, complete sequence characterization is critical for the safety and efficiency of the resulting products.

mRNA vaccines are a promising new therapeutic modality, and sequence identity, as well as polyA-tail length, are important measures for their safety and efficacy.

Directed evolution approaches such as phage display are commonly used to create proteins with desired properties such as antibodies. Highly accurate sequencing powers up these approaches, increasing the number of variants that can be evaluated and therefore the chances of success.



HiFi long reads for biopharma

Whether you need the power and scalability of the Revio® system or the simplicity and accessibility of the space-saving Vega™ benchtop system, PacBio has you covered with the same HiFi long-read sequencing at exceptional 99.9% accuracy.

- Highly accurate long reads of 20+ kb
- Comprehensive variant calling with phasing and on-board 5mC & 6mA methylation detection without the need for bisulfite conversion
- RNA sequencing at the isoform level and at scale with Kinnex kits
- Uniform coverage through challenging regions such as homopolymers and GC-rich regions

Samples per SMRT® Cell for biopharma applications

	Vega system HiFi within reach	Revio system with SPRQ™ chemistry HiFi at scale	
	1 SMRT® Cell	1 SMRT Cell	4 SMRT Cells
Application	Samples per run		
Whole genome sequencing			
Human genome (20×)*	1	2	8
Human methylation profiling (5×)	4	8	32
RNA sequencing			
Kinnex single-cell RNA	1 (3,000–6,000 cells)	1 (6,000–10,000 cells)	4 (6,000–10,000 cells)
Kinnex full-length RNA			
5M reads	6	12	48
10M reads	3	6	24
Targeted sequencing			
Amplicon sequencing	≥1,000	>1,000	>4,000
Target enrichment			
20 Mb panel	12	16	64
2 Mb panel	72	96	384
100 kb panel	288	384	1,536
PureTarget™ repeat expansion panel	48	48	192

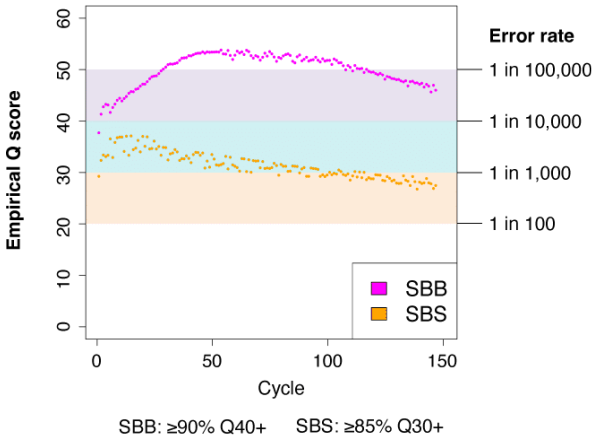
* 40× human genome can be achieved through 1 SMRT Cell on the Revio system with SPRQ chemistry. 2 SMRT Cells are recommended to achieve at least 30× on the Vega system.

Learn more about how HiFi technology works: **pacb.com/hifi**

SBB short reads for biopharma

Accuracy that allows you to see more with less

The introduction of PacBio sequencing by binding (SBB) technology on the **Onso™** short-read sequencing system allows you to generate extraordinarily accurate reads with an error rate of only 1 in 10,000 bases or less (**Q40+**).



SBB consistently achieves Q40+ quality scores, and the quality reaches Q50+ for much of the read, compared to the lower Q scores of SBS.

- The 15x higher accuracy of Onso compared with other short-read benchtop sequencers allows for the confident detection of rare variants
- Exceptional accuracy results in lower coverage depth requirements needed to achieve the same results as other short-read methods, lowering cost and increasing throughput
- Compatible with all your current SBS short-read sequencing applications
- SBB chemistry can resolve homopolymers and other difficult-to-sequence regions

SBB sample applications

Cancer research

Enable development of screening, monitoring, and therapy selection

Gene editing research

Confirmation of potential editing outcomes at extraordinary sensitivity

Exome/panels

Validated whole exome sequencing (WES) using third-party hybrid capture protocols

Single-cell

3’ single-cell RNA-Seq libraries supported and validated on the Onso system

Learn more about how SBB technology works: **pacb.com/sequencing-by-binding**

We have offices in countries around the world.
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Ready to get started with PacBio sequencing?

Learn more about HiFi sequencing:
pacb.com/sequencing-systems/

Learn more about biopharma applications:
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Connect with a PacBio scientist to get started:
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