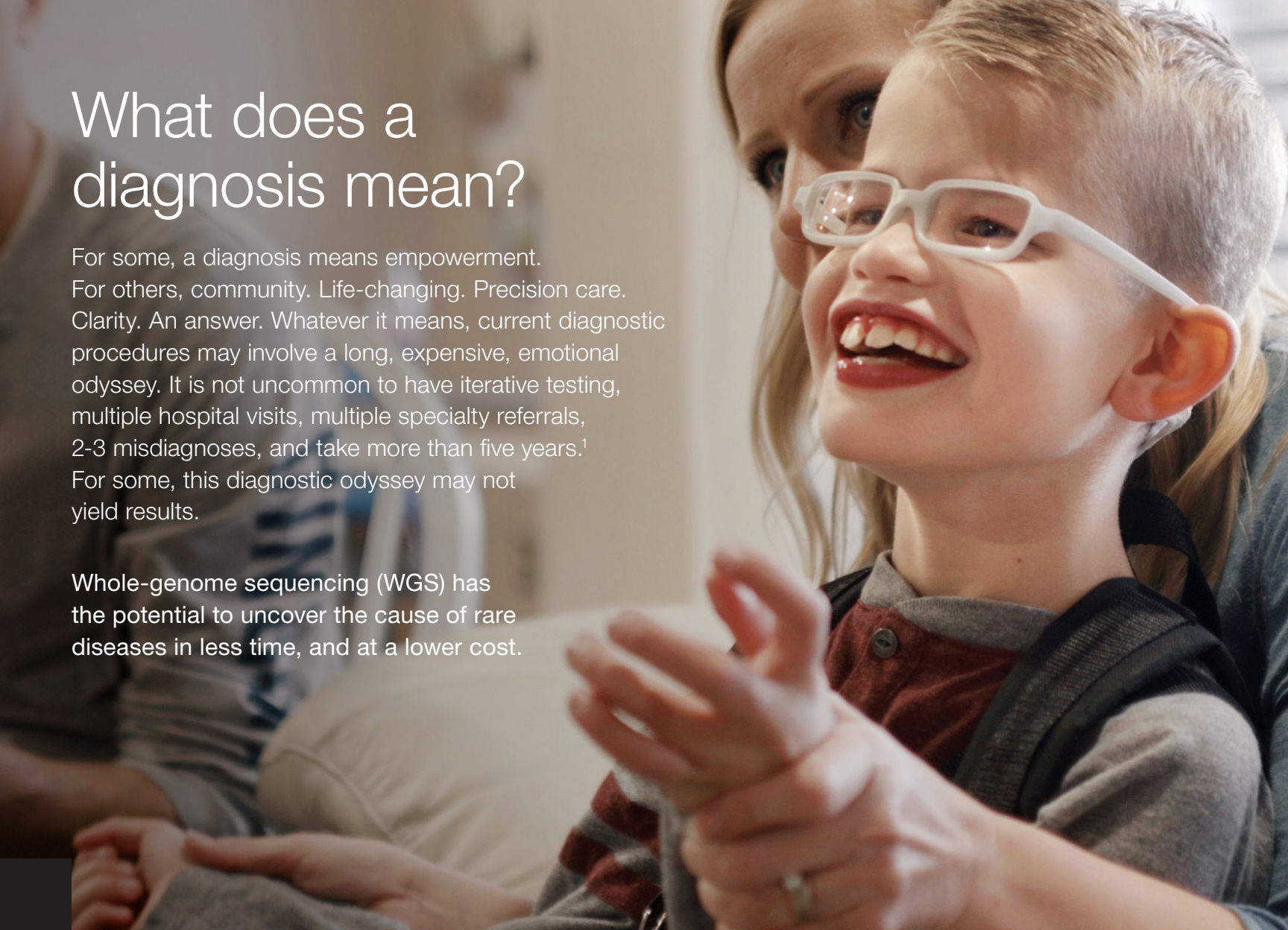

Begin the end of the diagnostic journey
Uncover rare disease variants with whole-genome sequencing
illumina®

What does a diagnosis mean?

For some, a diagnosis means empowerment. For others, community. Life-changing. Precision care. Clarity. An answer. Whatever it means, current diagnostic procedures may involve a long, expensive, emotional odyssey. It is not uncommon to have iterative testing, multiple hospital visits, multiple specialty referrals, 2-3 misdiagnoses, and take more than five years.[1] For some, this diagnostic odyssey may not yield results.

Whole-genome sequencing (WGS) has the potential to uncover the cause of rare diseases in less time, and at a lower cost.



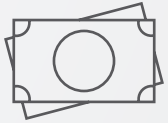
By the numbers

Individually, rare disease may seem uncommon. Taken in aggregate, rare diseases affect more people than cancer and AIDS combined,[2] making uncovering the causes imperative.

1 WGS test replaces 3 genomics tests[3]

Up to 80% of rare diseases are genetic or have a genetic etiology[*4-6]

Over 7,000 rare diseases have been identified[2,7,8]



Demonstrated $800K-$2M of savings in a study of critically ill infants[†9]

*Refers to condition and not aggregate of patients

†Based on a single study in critically ill infants

Why adopt WGS for rare genetic disease?

Performing WGS with next-generation sequencing (NGS) provides a comprehensive view of the genome, enabling simultaneous assessment of many genes. This information can help identify diverse variants of genetic disorders.

Superior diagnostic potential

WGS demonstrates the highest diagnostic yield, compared to standard of care,* in multiple patient groups[3,10-12]

Decreased time to diagnosis and decreased costs

WGS has been shown to decrease time to answer and cost of care compared to iterative testing[3,9-13]

Comprehensive variant detection

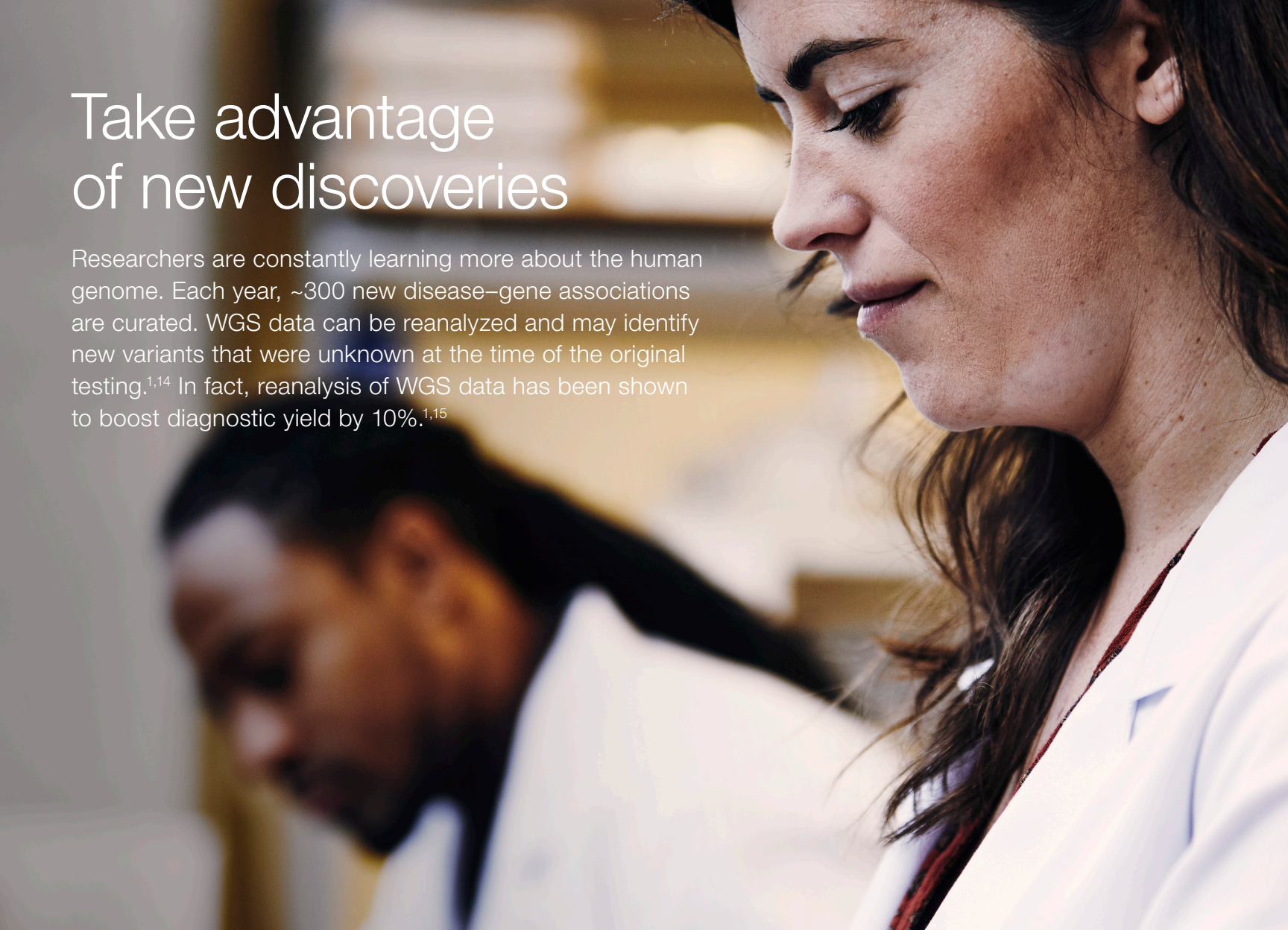
A single WGS test can detect small variants (SNVs, indels), CNVs, mitochondrial variants, structural variants, repeat expansions, and paralogs†

Broadest analysis of the genome available

WGS enables the most extensive analysis of the genome in patients suspected of rare disease, including coding or noncoding regions or coupling with epigenetic or transcriptomic evaluations

*Standard of care testing defined as karyotype, microarray, gene panels, whole exome sequencing

†SNVs = single nucleotide variants, CNVs = copy number variations

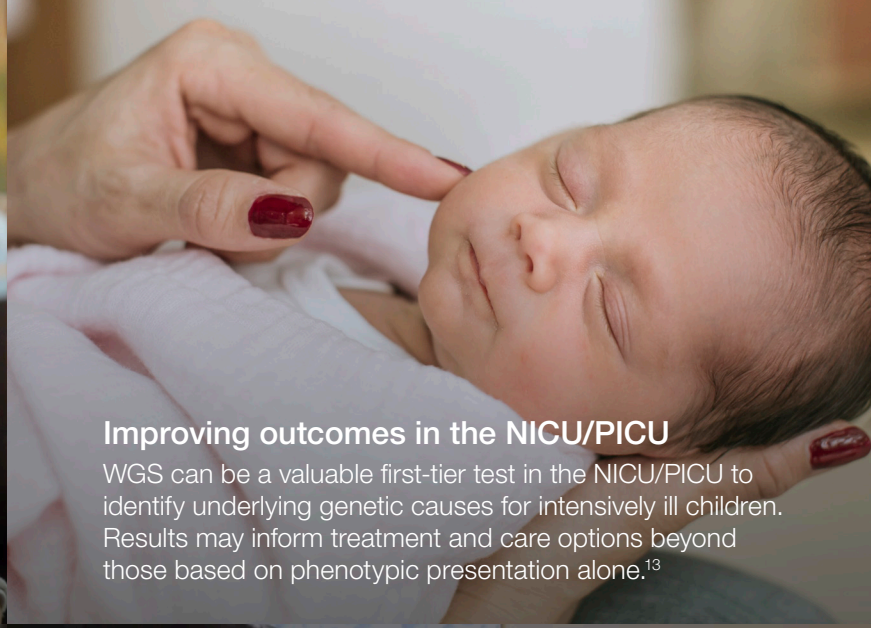


Take advantage of new discoveries

Researchers are constantly learning more about the human genome. Each year, ~300 new disease–gene associations are curated. WGS data can be reanalyzed and may identify new variants that were unknown at the time of the original testing.[1,14] In fact, reanalysis of WGS data has been shown to boost diagnostic yield by 10%.[1,15]

Helping children with rare undiagnosed disease

After a 7-year diagnostic odyssey, Shubao's family was able to get WGS and found that a mutation in his *PDHX* gene was the cause of his hypertonia.[16]

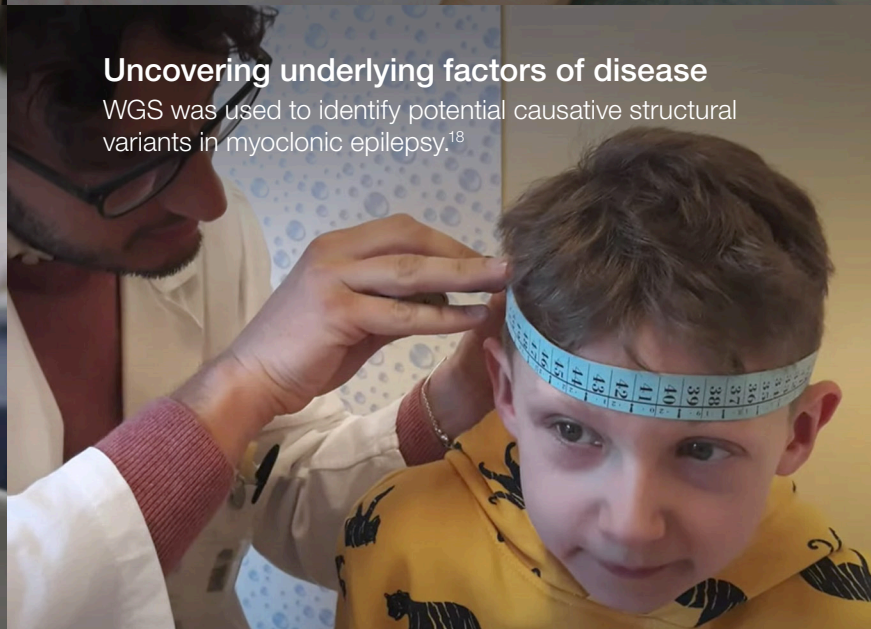


Improving outcomes in the NICU/PICU

WGS can be a valuable first-tier test in the NICU/PICU to identify underlying genetic causes for intensively ill children. Results may inform treatment and care options beyond those based on phenotypic presentation alone.[13]

Changing health management

The use of WGS as a first-tier test at a dysmorphology clinic in Mexico yielded genomic findings in 68.3% of children with suspected genetic disease, resulting in a change in clinical management in nearly half of those diagnosed.[17]



Uncovering underlying factors of disease

WGS was used to identify potential causative structural variants in myoclonic epilepsy.[18]

WGS is already making a difference

Performing WGS with next-generation sequencing (NGS) provides a comprehensive view of the genome, enabling simultaneous assessment of many genes. This information can help identify diverse variants of genetic disorders.

> “WGS has the potential to be a single test for the detection of many different genetic variation types underlying rare disease.”
>
> — Lindstrand A, et al[10]

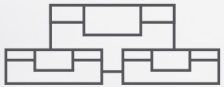
One sample. One application. A multitude of tools to uncover an answer.

Illumina offers multiple tools to support a sample-to-report WGS workflow.

Sequence

NovaSeq™ 6000 System

- Simplified workflow reduces hands-on time
- Scalable platform to meet demand
- Proven Illumina SBS* chemistry drives genome and exome analyses worldwide



Prepare library

Illumina DNA PCR-Free Prep

- Fast workflow takes ~90 min
- PCR-free chemistry minimizes coverage bias
- Broad DNA input range: 25-300 ng

*SBS = sequencing by synthesis

For Research Use Only. Not for use in diagnostic procedures.

Analyze, interpret, and report

TruSight™ Software Suite

- Comprehensive rare variant calling powered by the DRAGEN™ Bio-IT Platform
- Intuitive variant annotation and filtering with genome-wide visualization
- Simplified interpretation, curation, and report generation capabilities

WGS is providing a future

Community. Personalized care. Empowerment. These can become realities with a diagnosis. WGS can help. Through use as a first-tier test, WGS can provide accurate and comprehensive results with the potential to uncover life-changing genomic revelations.

WGS use is becoming more prominent in clinics worldwide as evidenced by Rady's Children's Hospital, National Health Services (NHS) in the United Kingdom, and the Karolinska Institute in Sweden. It is being used to make strides in population genomics through initiatives like All of Us and the Million European Genome Alliance. All to improve health care today and tomorrow.

> "These are promising times for the RGD [rare genetic disease] community; never before has the prospect of identifying a molecular diagnosis for all RGD patients been so attainable."
>
> – Hartley T, et al[1]

Learn more at **illumina.com/raredisease**

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