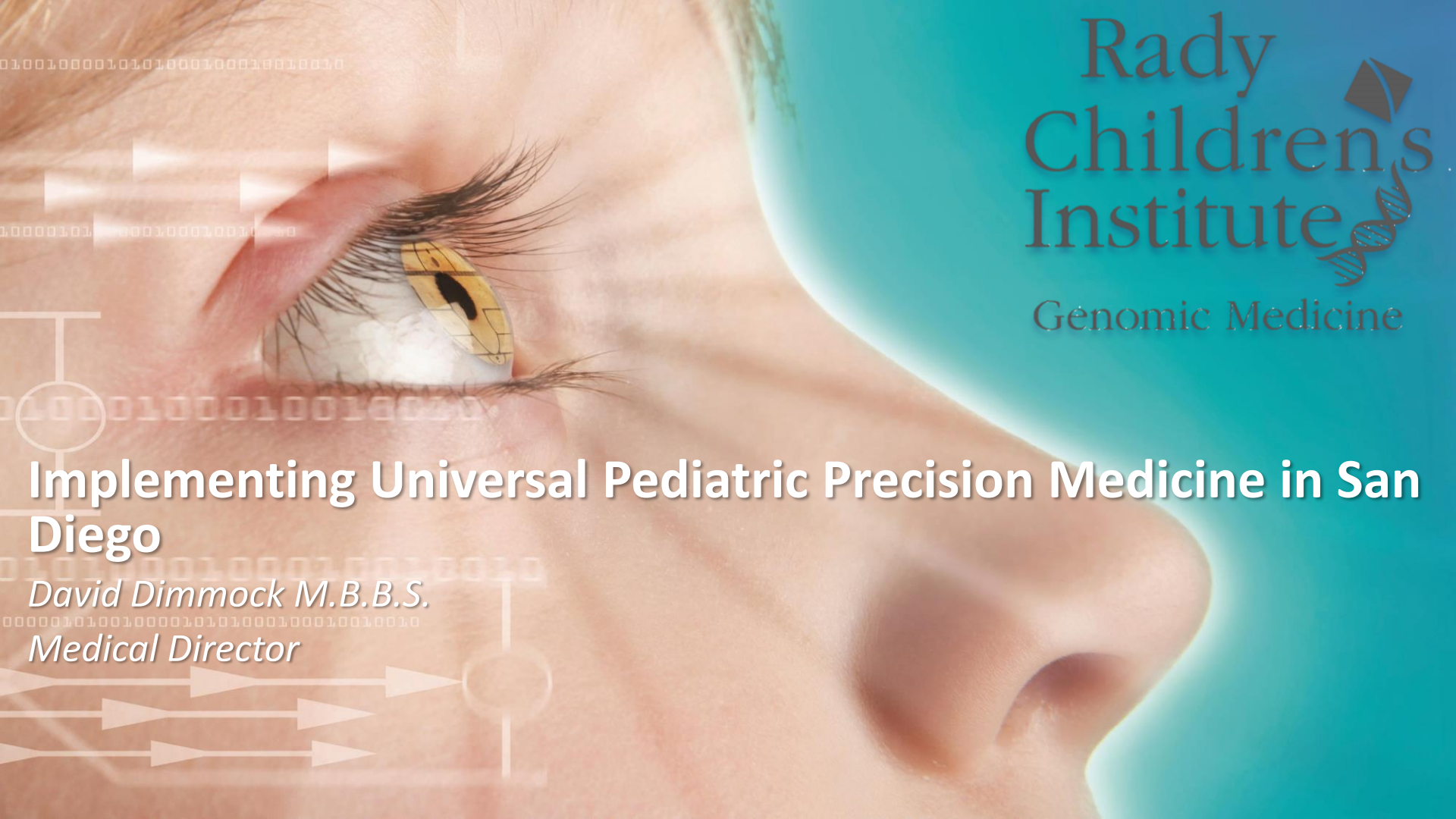
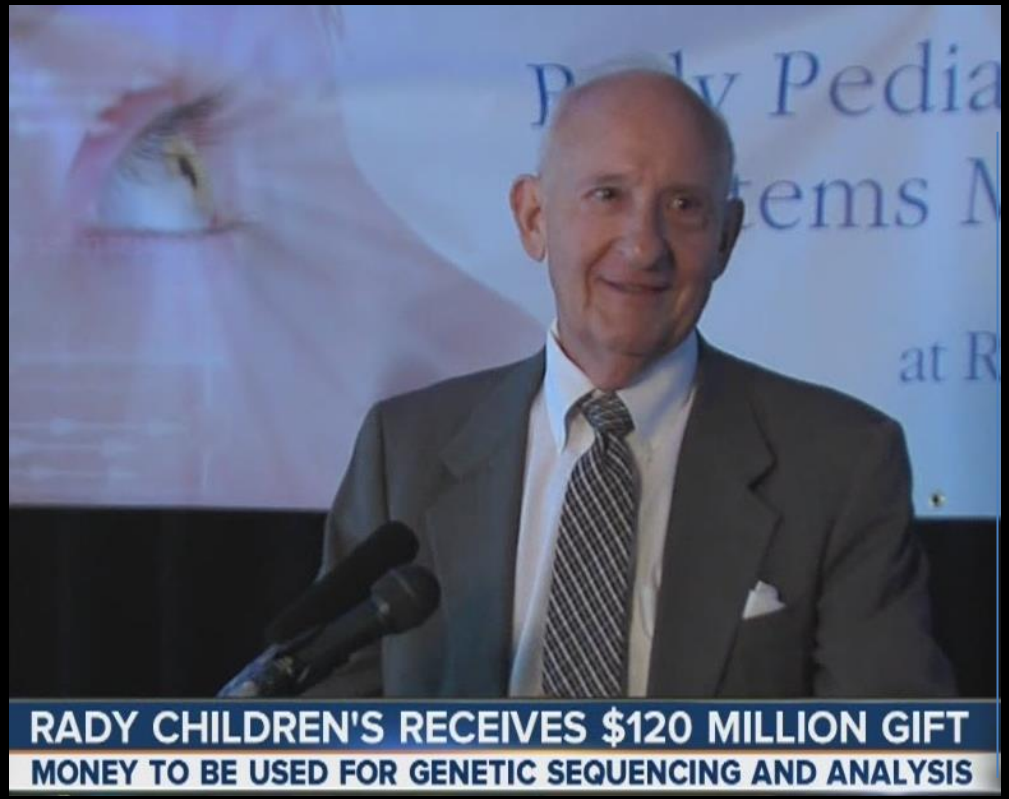


Implementing Universal Pediatric Precision Medicine in San Diego

David Dimmock M.B.B.S.
Medical Director

“CHILDREN ARE AN UNDERSERVED COMMUNITY AS FAR AS RESEARCH GOES. THEY’RE A SMALLER MARKET SEGMENT. THEY’RE OVERLOOKED"



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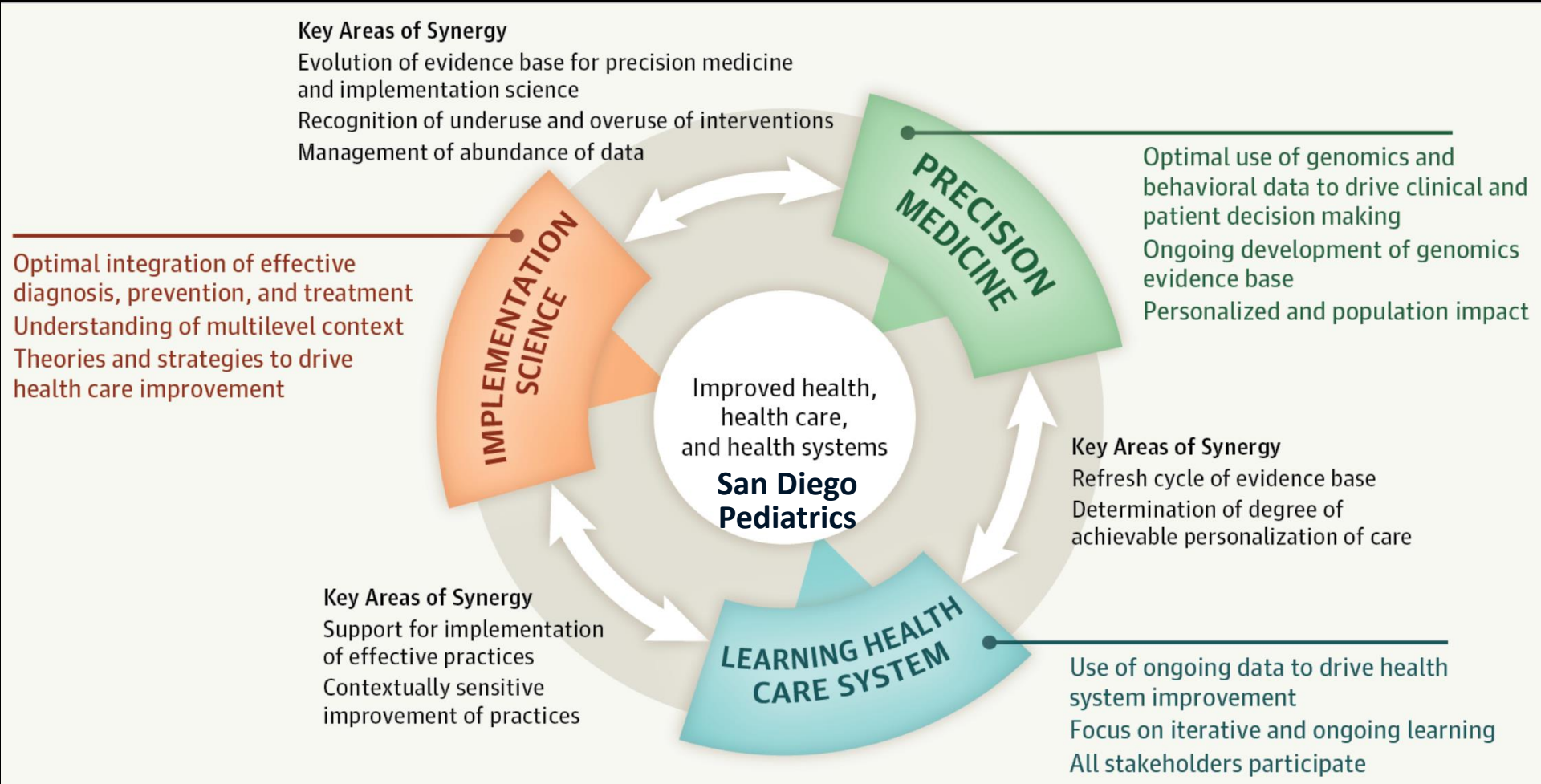
Genomic Medicine


Key Areas of Synergy
Evolution of evidence base for precision medicine and implementation science
Recognition of underuse and overuse of interventions
Management of abundance of data
PRECISION MEDICINE
Optimal use of genomics and behavioral data to drive clinical and patient decision making
Ongoing development of genomics evidence base
Personalized and population impact
IMPLEMENTATION SCIENCE
Optimal integration of effective diagnosis, prevention, and treatment
Understanding of multilevel context
Theories and strategies to drive health care improvement
Improved health, health care, and health systems
San Diego Pediatrics
Key Areas of Synergy
Refresh cycle of evidence base
Determination of degree of achievable personalization of care
Key Areas of Synergy
Support for implementation of effective practices
Contextually sensitive improvement of practices
LEARNING HEALTH CARE SYSTEM
Use of ongoing data to drive health system improvement
Focus on iterative and ongoing learning
All stakeholders participate

Our Primary Focus

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14% of US newborns admitted to a NICU

Initial Focus For Precision Medicine- Infants

- 8,000 known genetic diseases
- These affect 3% of US children
  - Leading cause of death in infants,
  - Leading cause of death in PICUs and NICU
- Presentation less confounded by environment
- Biggest timespan for benefit

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San Diego Substrate: Illumina + Edico + Rady Children's

RECORD HOLDER

GUINNESS WORLD RECORDS

Newsweek

Europe Edition

HOME POLITICS BUSINESS CULTURE TECHNOLOGY SCIENCE HEALTH THIS WEEK'S EDITION

SCIENCE

Whole Genome Sequencing Time Cut to Just 26 Hours

By Conor Gaffey 10/1/15 at 9:31 PM

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00:00

Baby with acute liver failure

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00:00

Parents gave consent

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00:00

Blood sample from mum, dad and baby

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00:02

Transport to Institute

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01:00

Isolate DNA

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06:00

Prepare DNA for sequencing

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24:30

Rapid genome sequencing

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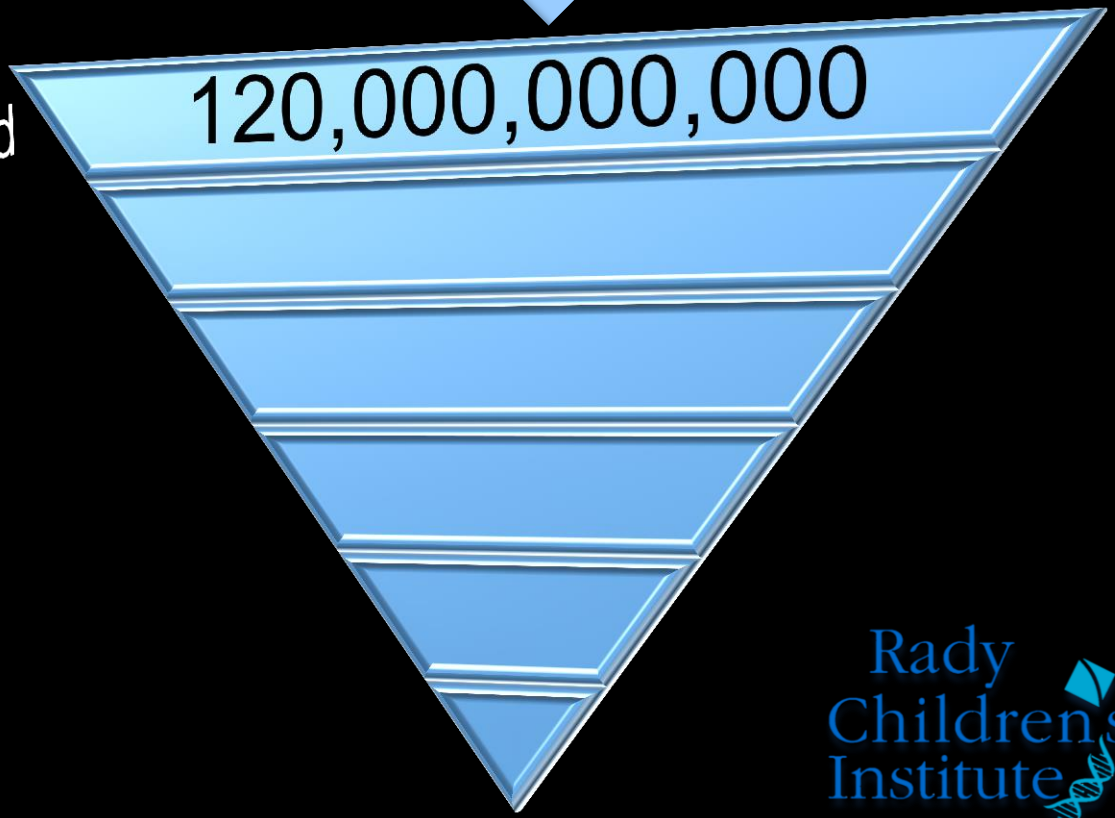
24:30

Infant with liver disease

Total DNA letters detected



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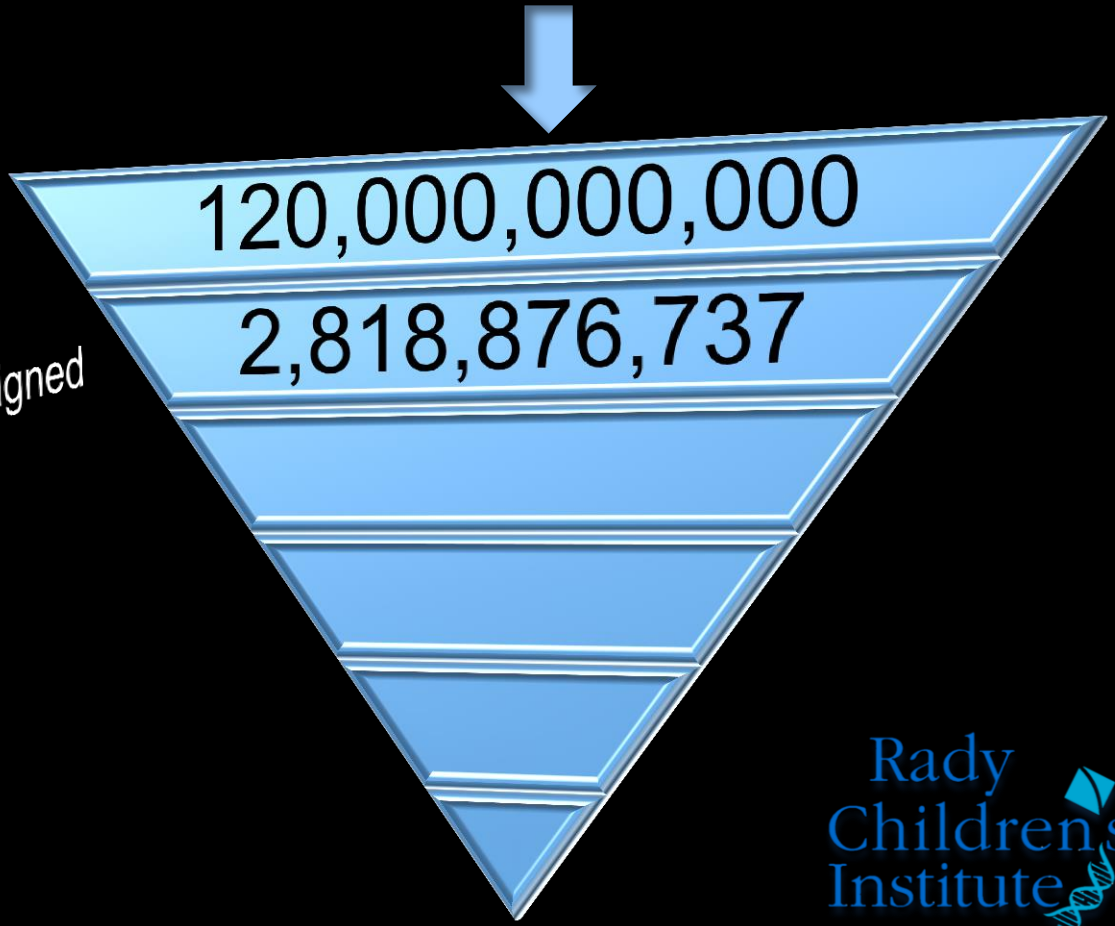
24:45

Infant with liver disease



DNA letters of genome code assigned

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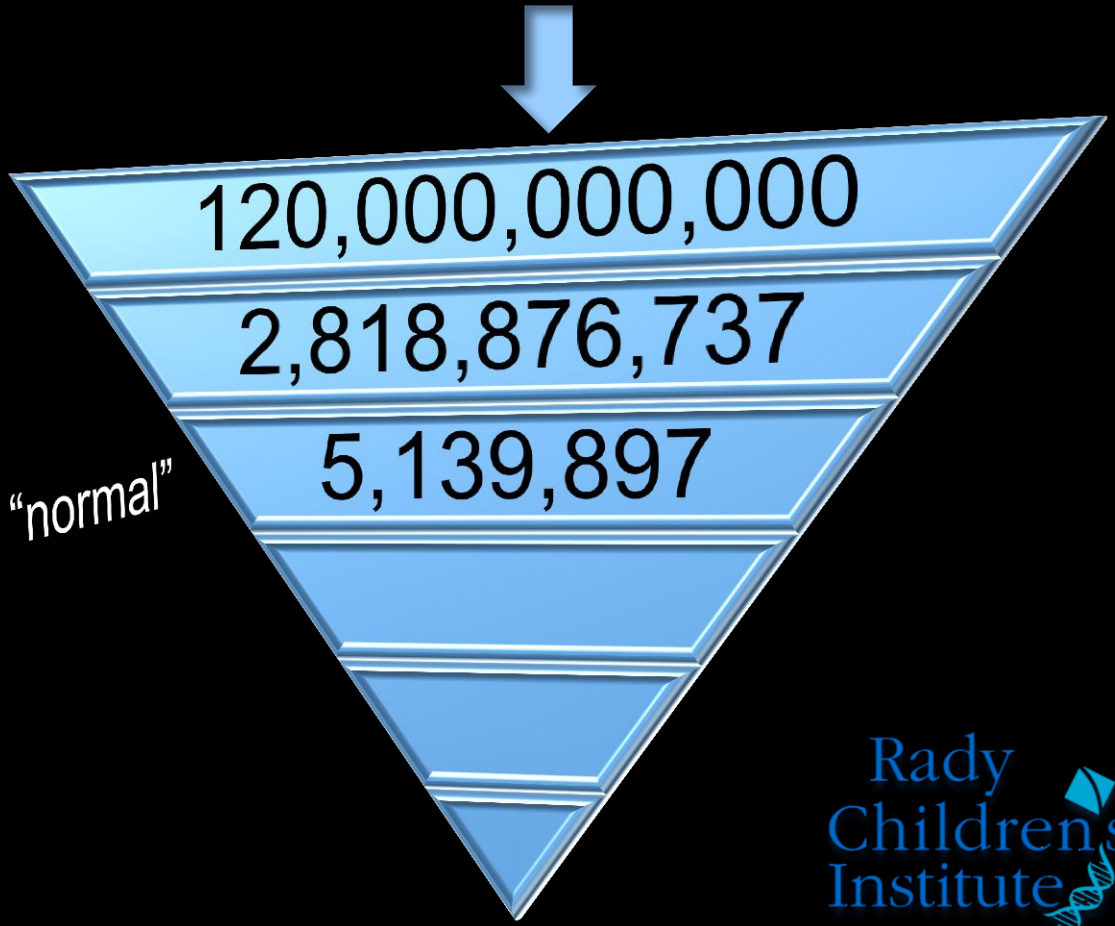
25:00

Infant with liver disease



DNA letter changes from “normal”

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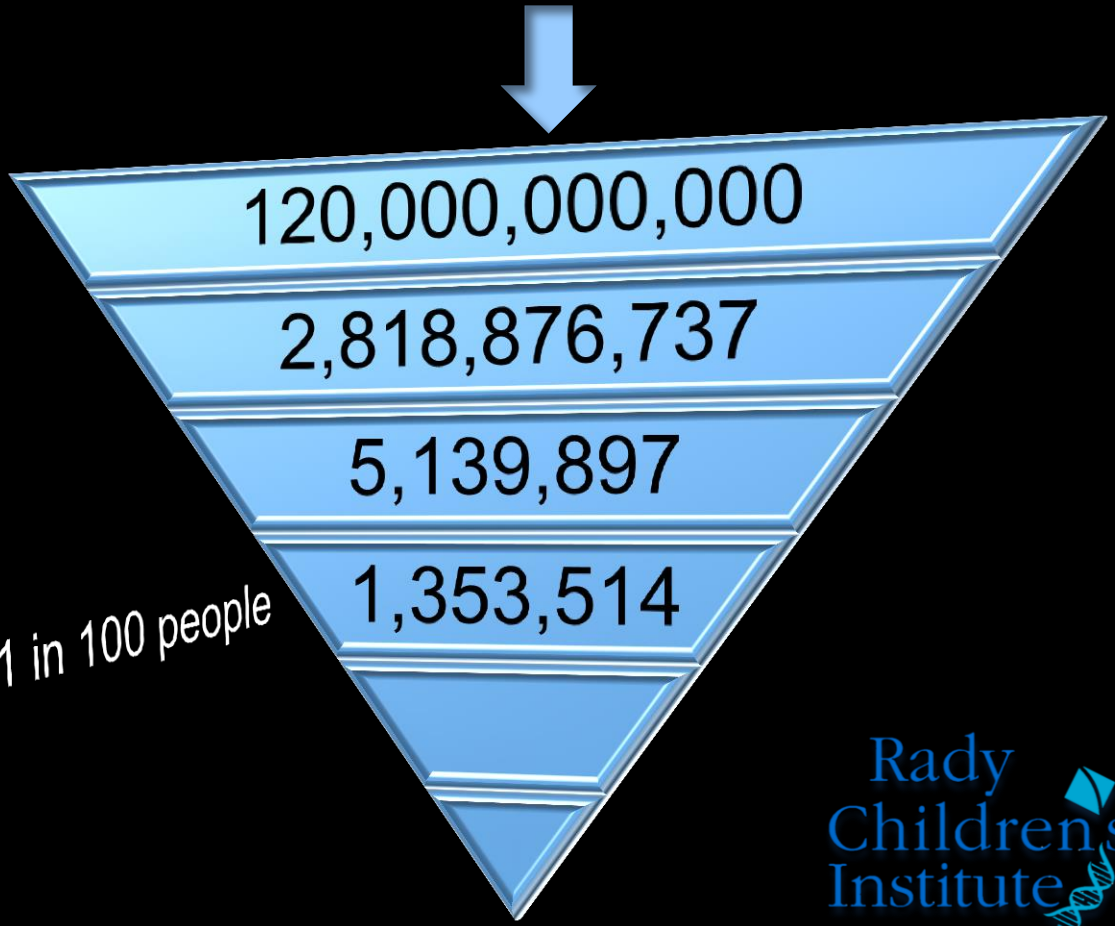
25:01

Infant with liver disease



DNA changes present in less 1 in 100 people

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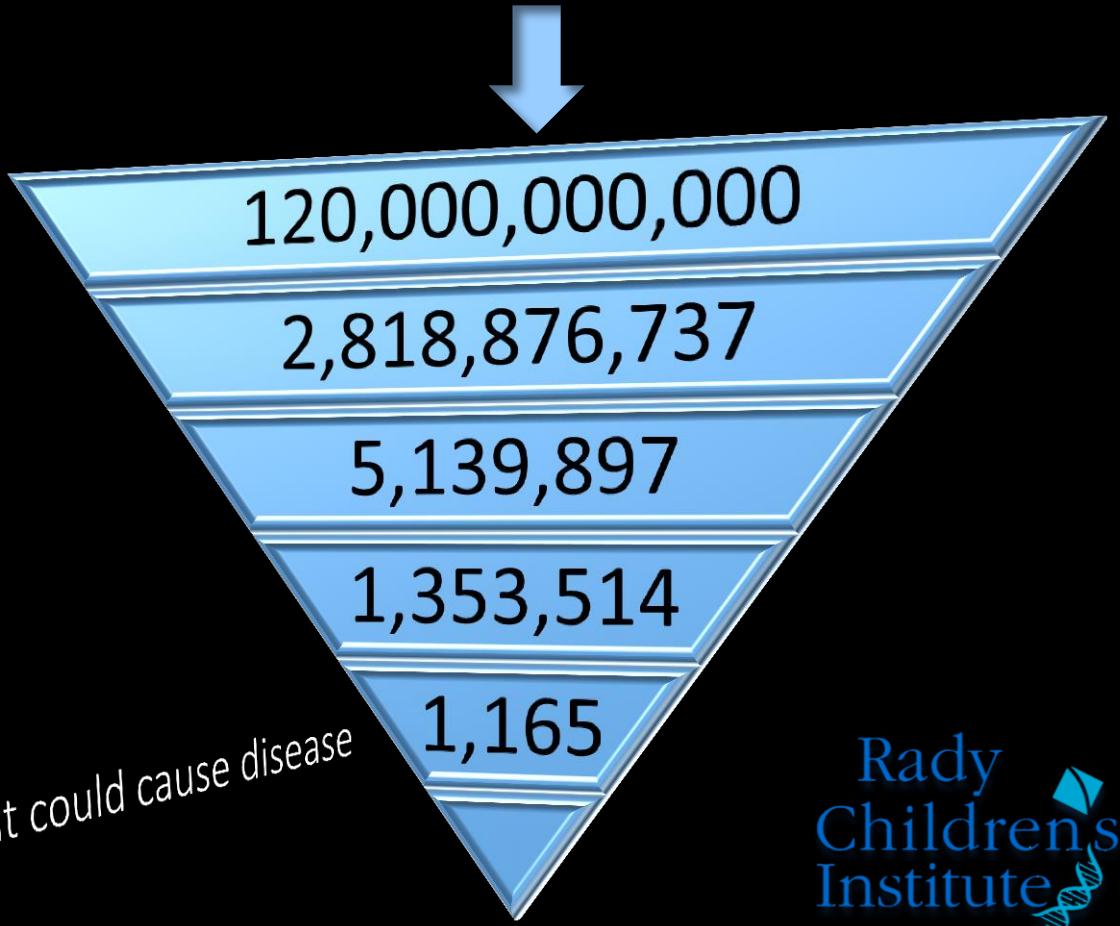
25:41

Infant with liver disease



DNA changes that could cause disease

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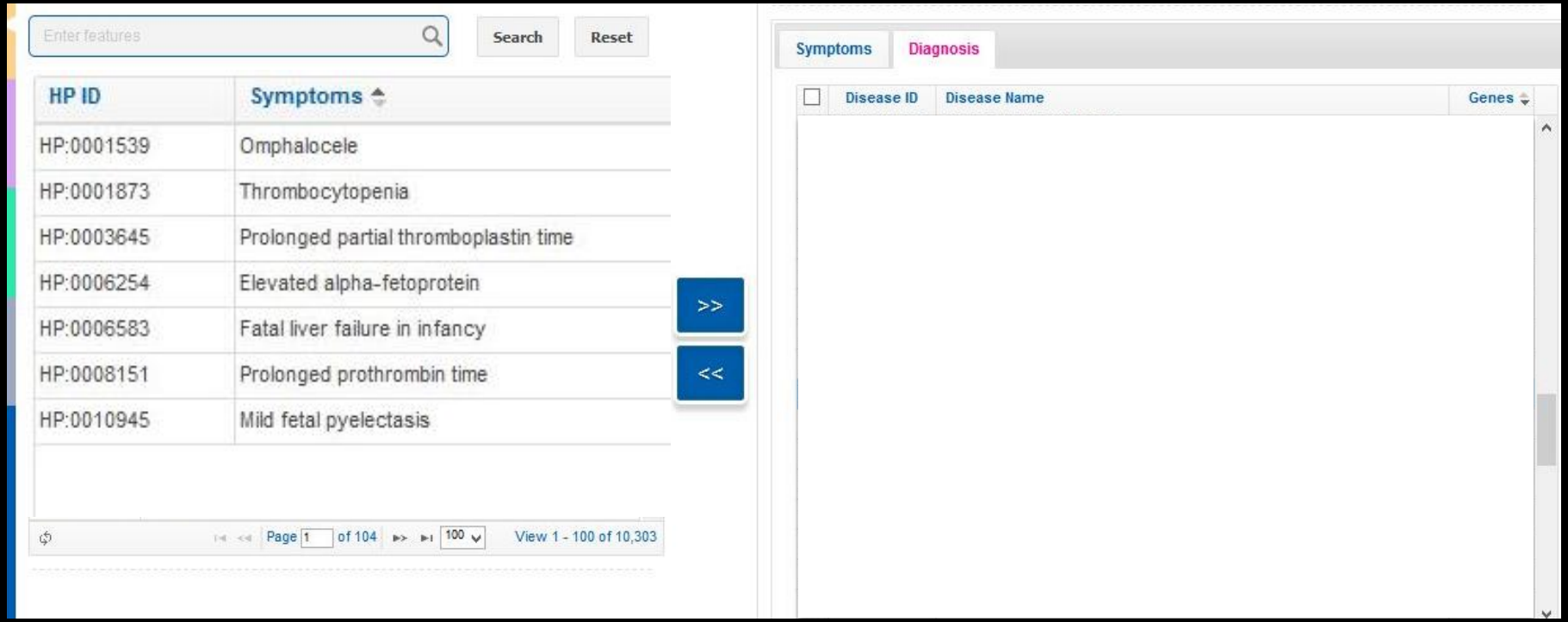
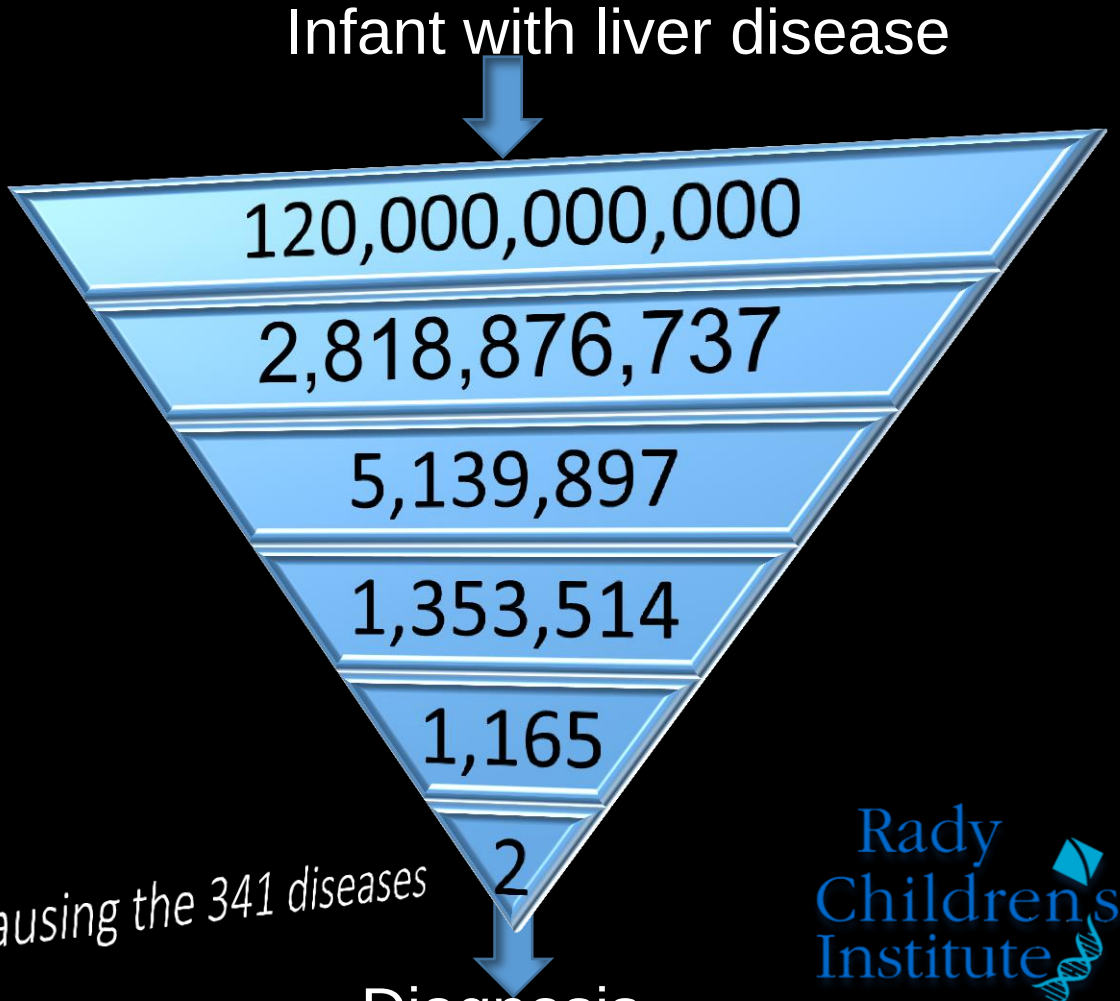
25:42

Computer-Generated List of 341 Possible Diagnoses



25:43



DNA changes in genes causing the 341 diseases

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26:00

- *Perforin 1* heterozygous c.1310C>T [p.Ala437Val] LP, supported by case-control studies
- *Perforin 1* heterozygous c.272C>T [p.Ala91Val] P, supported by functional studies
- Diagnosis: Hemophagocytic lymphohistiocytosis type 2
- Treatment: IVIG & Steroids

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Outcome

- Coagulopathy resolved on d. 7
- He is now 36 months old, normal liver function
- 79 quality adjusted life years saved

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DOES IT
MAKE A DIFFERENCE?

2.9 QALYs per newborn genome

	Kansas City	Melbourne
Change in care	13 (37%)	21 (26%)
Palliative Care Guidance	6 (17%)	0 (0%)
Medication Change	4 (11%)	8 (10%)
Life-saving treatment	1 (3%)	0 (0%)
NICU stay decreased by >1 month	1 (3%)	0 (0%)
Major morbidity avoided	3 (9%)	1 (1%)
Parent or sibling diagnosed	1 (3%)	10 (13%)
Procedure Change	3 (9%)	4 (5%)
Diet Change	2 (6%)	2 (2%)
Complication monitoring	1 (3%)	11 (14%)

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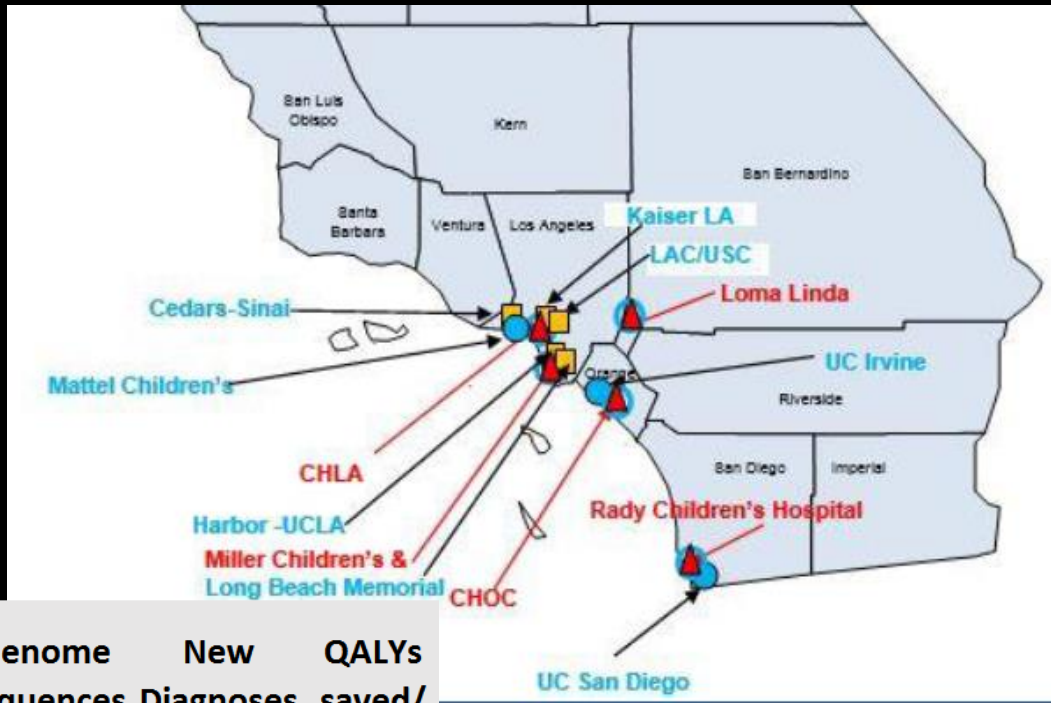
10 year vision for Pediatric Precision Medicine



County	Population 2014	Children with Genetic Diseases	Genome sequences / year	New Diagnoses / year	QALYs saved/ year
San Diego	3,263,431	22,126	8,284	1,327	5,773
SD,Imperial, Riverside, Orange	8,917,308	64,458	24,134	3,866	16,818

The children are waiting….