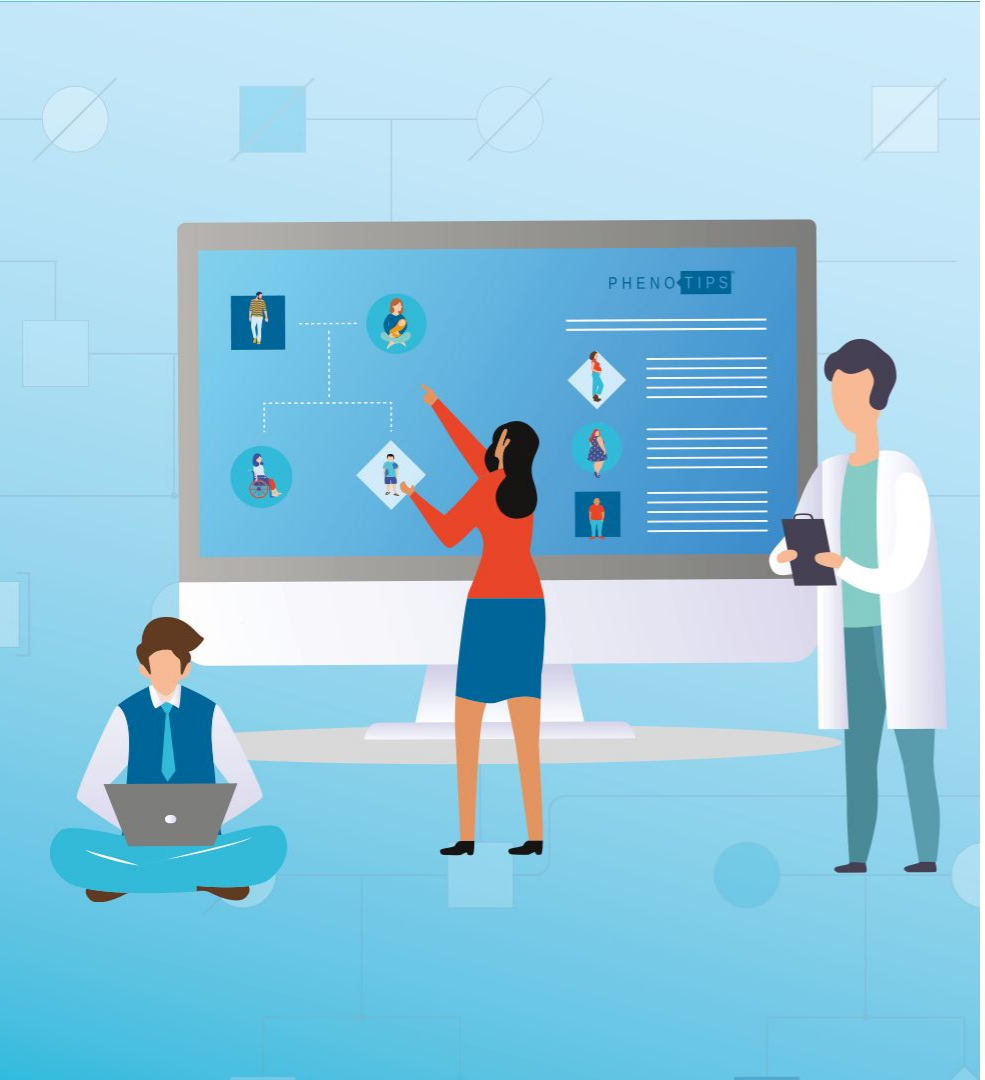


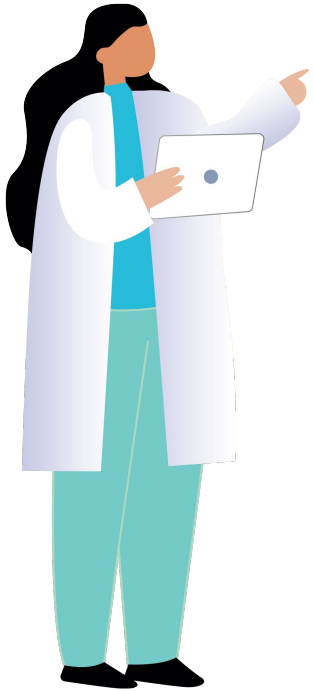
PHENOTIPS®

Integrating Phenotypic and Genomic Data

Orion Buske, PhD

CORD Conference
30 Apr 2025

Overview



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- What is PhenoTips, and how it's being used across Canada?
- How does matchmaking help find answers for those that are undiagnosed after initial testing?
- What are some current innovations?

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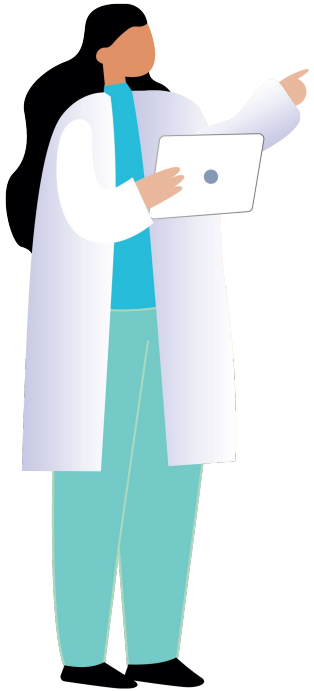

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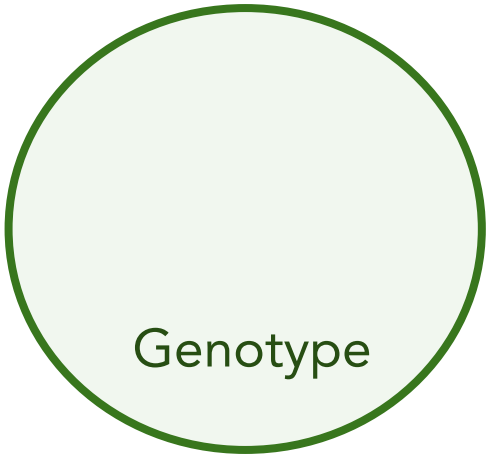
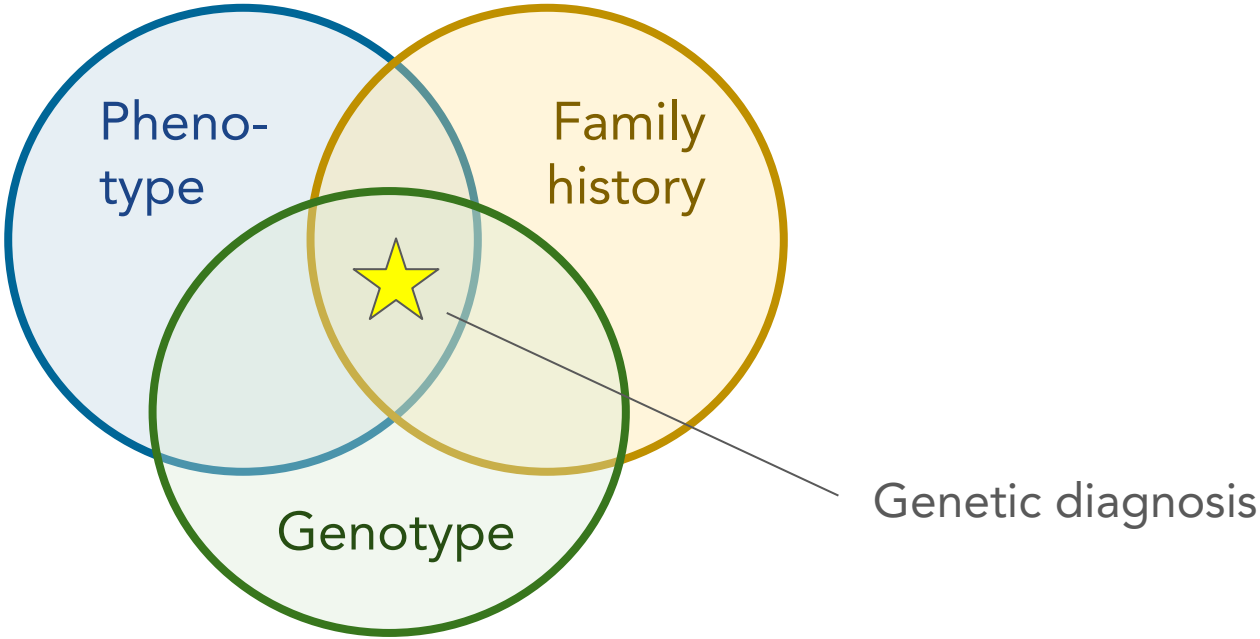
The Need for Integrated Data in Rare Disorders



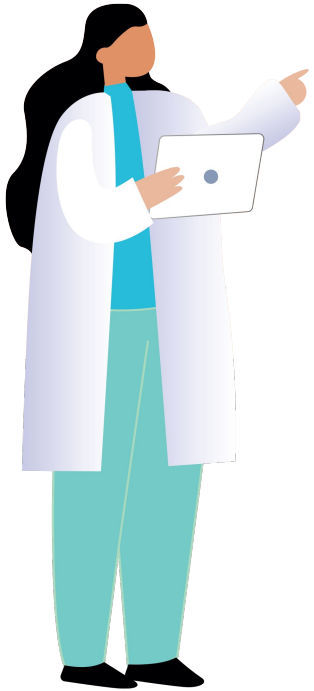
Finding a genetic diagnosis by sequencing alone is like
“finding a needle in a stack of needles”

The Need for Integrated Data in Rare Disorders



Integrated, high-quality data is essential for accurate and timely diagnosis

Overview



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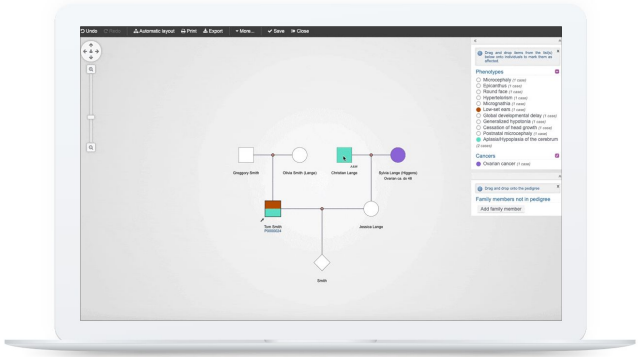
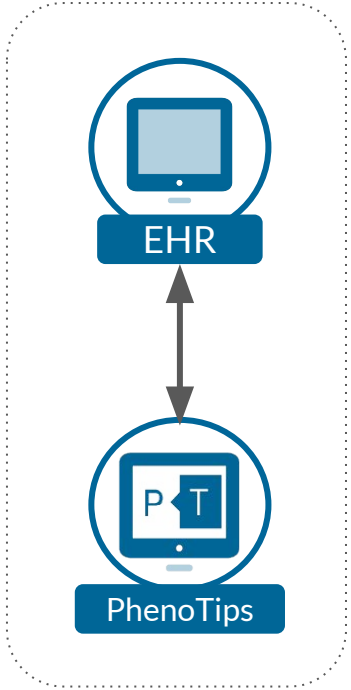
PhenoTips: the first Genomic Health Record

Spinout from
University of Toronto and
SickKids Hospital



Goal: Help healthcare providers deliver genomically-informed care at scale



1. **Structured** phenotype, diagnosis, genetics
2. **Pedigree** to visualize & manage families
3. **Workflow** support for intake, diagnosis, test orders, research

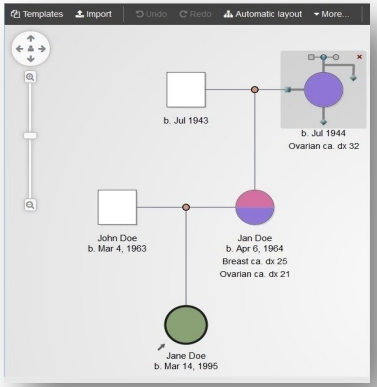
GDPR

CYBER ESSENTIALS CERTIFIED PLUS

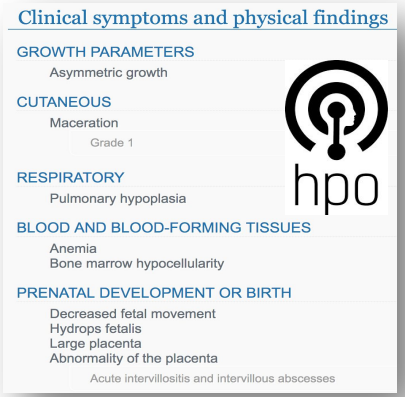
DSPT
Better security.
Better care.

Insights from Structured Data

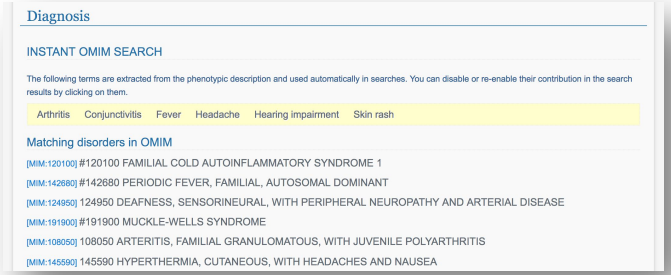
Family history



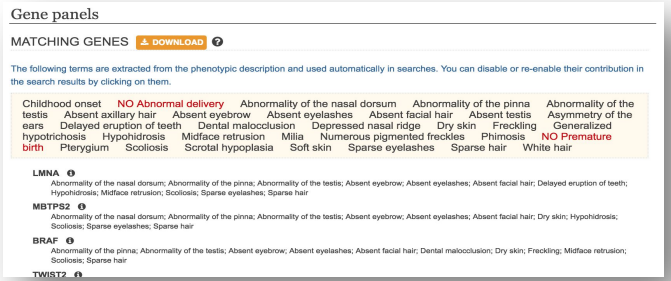
Phenotype



Suggest rare genetic conditions



Suggest related genes



Genotype

Call… count	RefG…	Chr	Pos	Ref	Alt	Variant class
1	GRCh37	1	109824680	C	T	SNP
1	GRCh37	1	111743036	G	A	SNP
1	GRCh37	1	1248329	G	A	SNP
1	GRCh37	1	145323656	A	T	SNP

PhenoTips Adoption Across Canada

634,300
patient records

398,700
family records

2,100
users

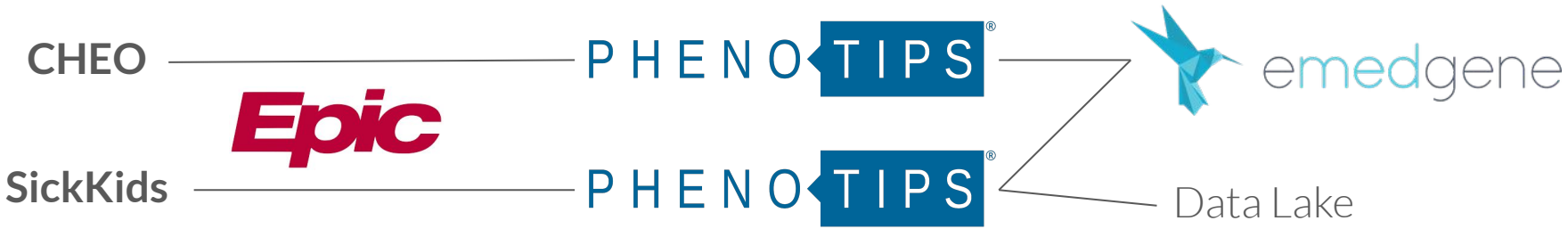
Examples:

- ➔ Alberta Health Services
- ➔ Genome Sequencing Ontario
- ➔ Genomics4RD

Example: Genome Sequencing Ontario

Genome-wide Sequencing Ontario

Supporting a coordinated multi-site clinical genome sequencing program



Sequencing 3,000+ people per year and growing rapidly

Example: Alberta Health Services

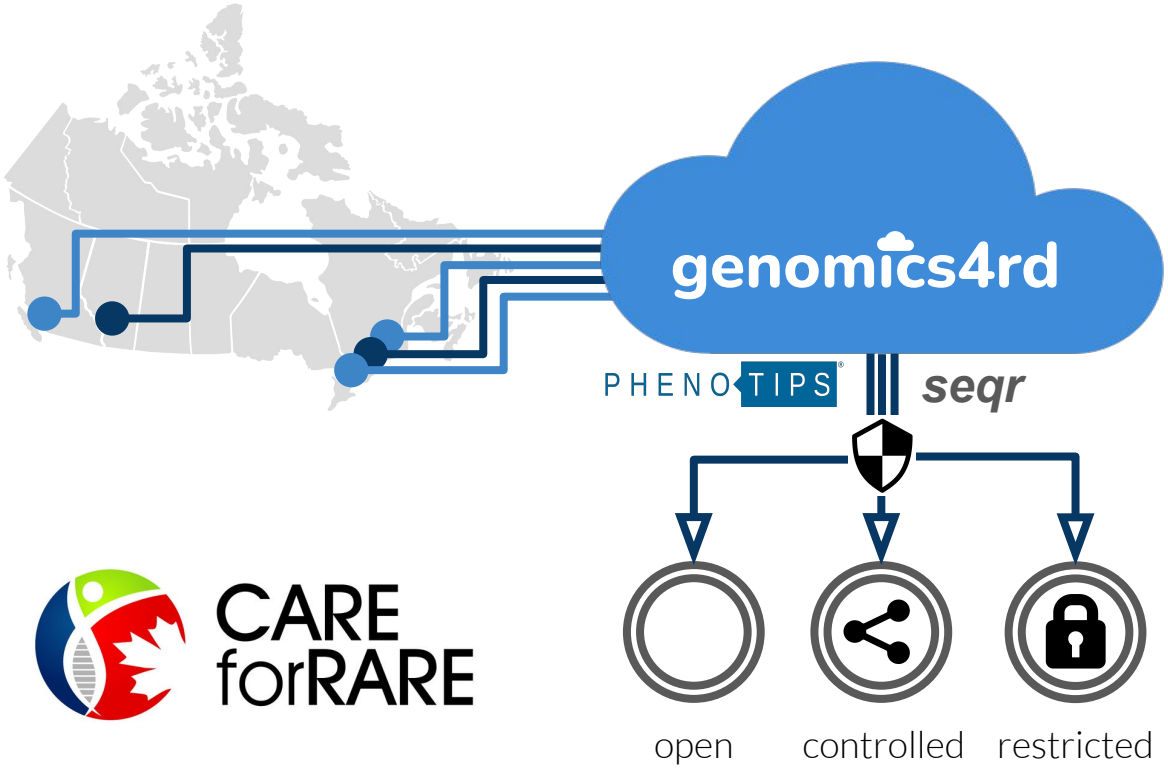
Alberta Health Services

Supporting structured data workflows across provincial health system

Currently project to improve the management of prenatal records, avoid data gap when transition from mother's record

Example: Genomics4RD

Genomics4RD: the first centralized pan-Canadian rare disease research data lake



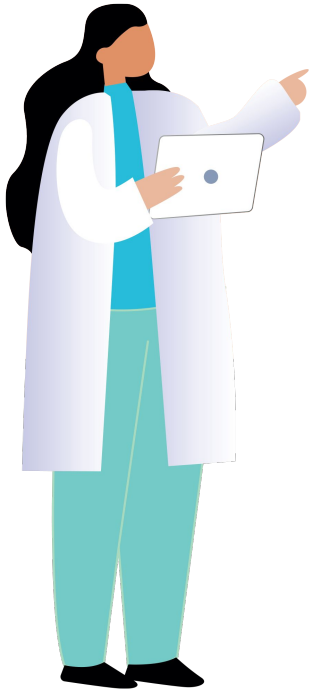
CARE forRARE

Harmonized, structured phenotype-genotype data for ~3,000 families

Most still unsolved

Supports collaboration, data sharing, and gene discovery

Overview



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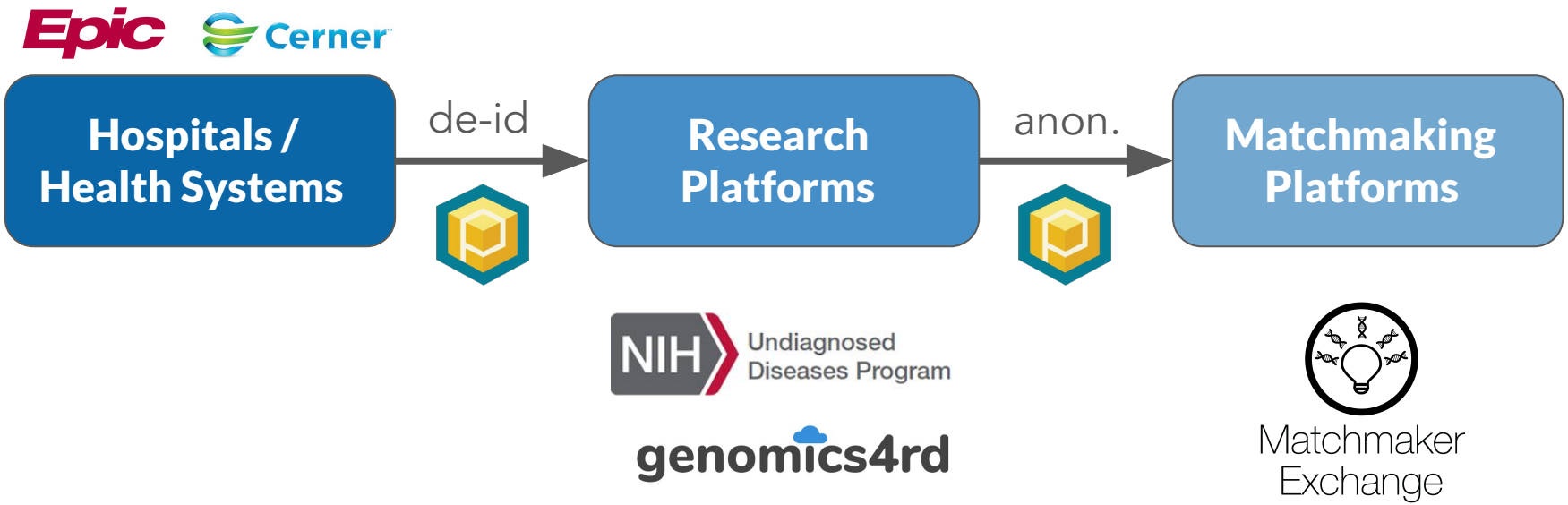
Matchmaking to Find Answers for Undiagnosed Patients



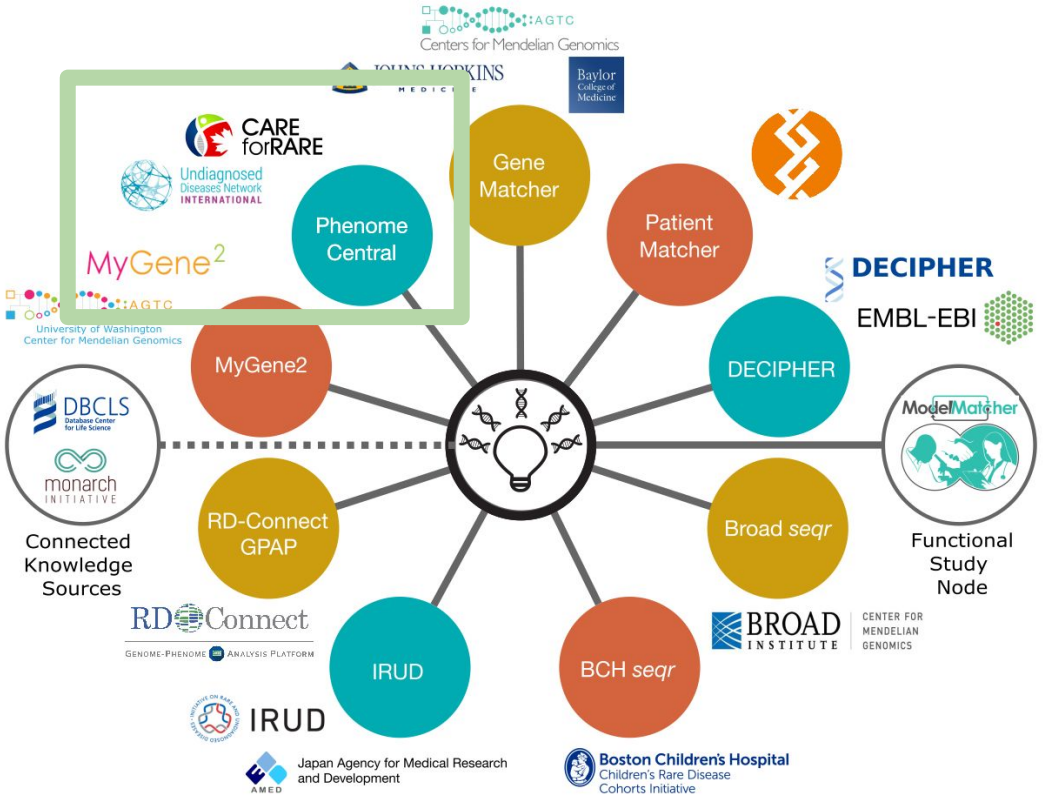
Matchmaker Exchange Helps Find Additional Families

Matchmaker Exchange

16 countries

170k patients

500+ cases shared / week



Global Alliance for Genomics & Health

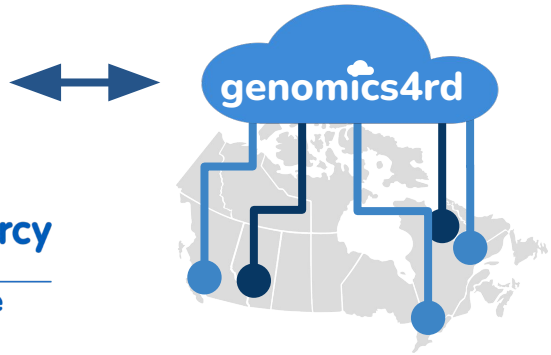
New Matchmaking Initiatives to Help Provide Answers

One-Sided Matching Platform (OSMP)

Goal: explore candidate genes by matching across internationally federated variant databases

Genomic ANSWERS for KIDS

Children's Mercy KANSAS CITY Research Institute



Matt Osmond
GC, Research Coordinator
CHEO, Care4Rare

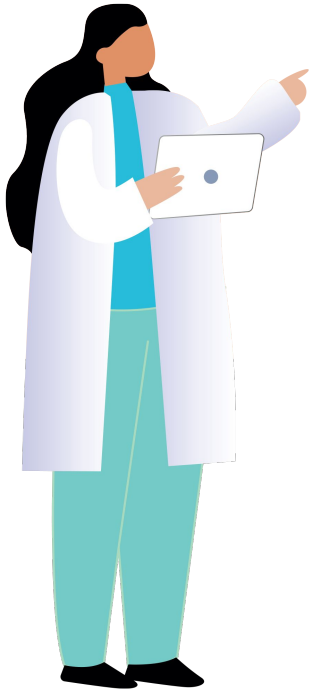
GA4GH Variant-Level Matching

Explore variants of unknown significant by matching across variant databases:

VariantMatcher
Franklin
MyGene2
Geno2MP
…

Nara Sobreira, MD, PhD
Clinical Geneticist
Johns Hopkins

Overview



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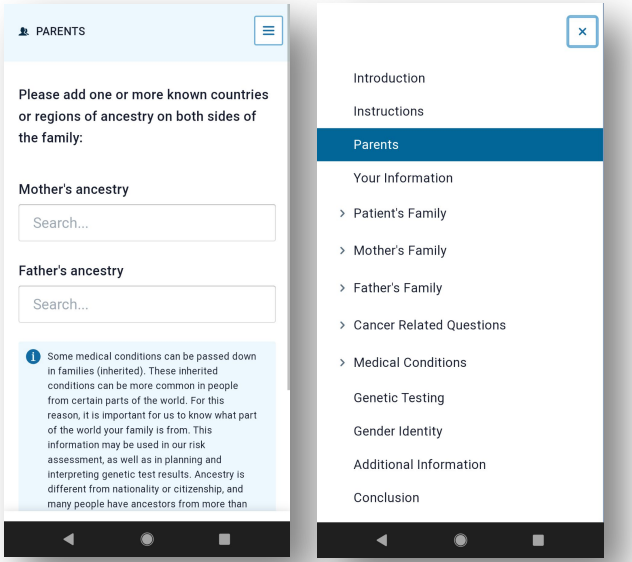
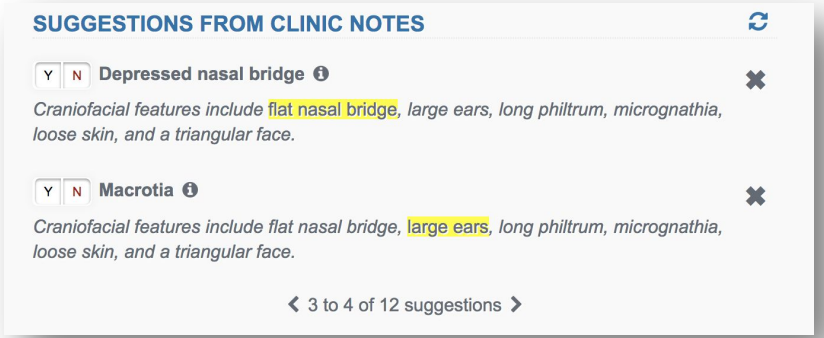
Streamlining Collection of Critical Data

Family can complete from home,
feeds directly into clinical system





Using AI to help document the phenotype

Piloting New Methods at the Undiagnosed Hackathon

2023: 11 patients → 4 diagnosed

- PhenoTips was founding member

2024: 21 families → 10 diagnosed

- Last year brought 116 clinicians and bioinformaticians together from 28 countries
- Patients nominated by clinicians from UDNI, remained undiagnosed
- Data: Both short and long-read of WGS and RNA-seq, OGM

2025:

Mayo Clinic, USA
September 22-24
undiagnosedhackathon.org

WILHELM FOUNDATION

UDNI
Undiagnosed Diseases Network INTERNATIONAL

Chan Zuckerberg Initiative

PHENOTIPS

Summary

- ➔ Standardized and integrated phenotype-genotype data is critical
- ➔ PhenoTips is a Canadian solution to help hospitals and health systems provide genetics services
- ➔ New efforts are improving data collection, sharing, and analysis