Outline

- Project Overview
- Preliminary Data & Lessons Learned
- Timeline & Next Steps
High-Throughput Metabolomic Biomarker Measures in Diverse Ancestries

**Principal Investigators**
- Adam Butterworth, University of Cambridge & South Asian Cohorts
- Andre Brunoni, Universidade de São Paulo & ELSA-Brasil
- Arash Etemadi, National Cancer Institute, NIH & Golestan Cohort Study
- Hakon Hakonarson, Children’s Hospital of Philadelphia

**Team Members**
- John Connolly, Patrick Sleiman (CHOP)
- Praveen Surendran (South Asian Cohorts)
- Alexandre Pereira (ELSA)
Background

- Chronic diseases impose a high burden on the health system.
- Health outcomes can be significantly improved through early diagnosis and intervention.
- Early diagnosis often unavailable particularly for individuals in low and middle income countries and minority populations in high income countries.
- Metabolic profiling represents a highly-scalable model for risk prediction and prevention.
  - Because of its relatively low cost, it offers a route to individualized medicine for these populations.
Aims

- Generate Metabolic Profiles on 5,000 Individuals with Genetic and/or Health Outcome Data.
- Analyses of associations with phenotypes of interest
- Analyses of association between metabolic metabolite levels (such as lipid profiles) and genetic data
## Participating Cohorts

<table>
<thead>
<tr>
<th>Cohort Name</th>
<th>Study samples</th>
<th>Principal Investigator/Lead(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>South Asian Cohorts (BELIEVE)</td>
<td>1,500 samples of South Asian ancestry from Dhaka, Bangladesh</td>
<td>Adam Butterworth</td>
</tr>
<tr>
<td>ELSA-Brasil</td>
<td>1,000 samples from Brazilian civil servants</td>
<td>Andre Brunoni</td>
</tr>
<tr>
<td>Golestan Cohort Study</td>
<td>1,000 samples from Northeast Iranian general population</td>
<td>Arash Etemadi</td>
</tr>
<tr>
<td>Children’s Hospital of Philadelphia (CHOP)</td>
<td>1,500 samples of African American children</td>
<td>Hakon Hakonarson</td>
</tr>
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## Target Phenotypes

<table>
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<tr>
<th>Cohort Name</th>
<th>Study samples</th>
<th>Phenotypes</th>
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</thead>
<tbody>
<tr>
<td>South Asian Cohorts (BELIEVE)</td>
<td>1,500 samples of South Asian ancestry from Dhaka, Bangladesh</td>
<td>Diabetes</td>
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<tr>
<td>ELSA-Brasil</td>
<td>1,000 samples from Brazilian civil servants</td>
<td>Broad-based</td>
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<tr>
<td>Golestan Cohort Study</td>
<td>1,000 samples from Northeast Iranian general population</td>
<td>Ischemic heart disease</td>
</tr>
<tr>
<td>Children’s Hospital of Philadelphia (CHOP)</td>
<td>1,500 samples of African American children</td>
<td>22q11.2 deletion Autoimmune and autoinflammatory</td>
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</tbody>
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Nightingale Platform

- NMR-based (Nuclear Magnetic Resonance spectroscopy) platform
- 228 biomarkers
- 100µl of plasma or serum
Progress & Timeline Overview

- **Sep 2020**: Collective Bargaining
  - 1 Rate, 4 site

- **Jan. 2021**: 5,000 Diverse Samples Shared
  - 228 Marker

- **Aug 2021**: 5000 Metabolomic Profiles returned

- **Oct. 2021**: Preliminary Analyses

- **Jan. 2022**: Collective Manucripts
  - Program Expansion
Preliminary Data

- Significant signals for
  - Obesity
  - Asthma
  - Sickle cell disease
  - Type 1 diabetes
  - 22q11.2 deletion syndrome
- Hypothesis driven in analytical approach
Preliminary Data

Metabolomics Recovers Known Elevations in Triglyceride Concentrations Among Individuals with 22q11.2 Deletion Syndrome
Lessons Learned

- Collective bargaining works
- Nightingale platform is efficient with little requirement in terms of overheads
- IHCC publication policy works
- Template for expansion
Next Steps

- **Publication**
  - IHCC Guidance and policy

- **Data-Sharing**
  - IHCC Data Atlas
  - Metabolights - EMBL-EBI

- **Study Expansion**
  - Several cohort members with existing data
  - Prospectively expand to more sites
Thank You

Funding & Support
Wellcome Trust
National Institutes of Health
IHCC

Principal Investigators
Adam Butterworth: South Asian Cohorts
Andre Brunoni: ELSA-Brasil
Arash Etemadi: Golestan Cohort Study
Hakon Hakonarson, Children’s Hospital of Philadelphia

Study Team
Ian Campbell (CHOP)
Patrick Sleiman (CHOP)
Praveen Surendran (South Asian Cohorts)
Alexandre Pereira (ELSA)
Huiqi Qu (CHOP)
Questions/Comments ...