The Precision Medicine Initiative®
Cohort Program:
An Update

Josie Briggs, NICHD Council
January 21, 2016
Follow PMI Cohort Program

www.nih.gov/precision-medicine-initiative-cohort-program

#PMINetwork

@NCCIH_Josie
To enable a new era of medicine through research, technology, and policies that empower patients, researchers, and providers to work together toward development of individualized treatments.
Precision Medicine Initiative®

- Precision medicine is much bigger than PMI

- PMI has many components
  - Cohort
  - Cancer
  - FDA
  - ONC
  - Etc.
Promise of PMI: New Treatments

- PMI will result in more therapies like Zelboraf™
  - Targeted to 60% of metastatic melanoma patients whose cancer contains a V600E mutation in the BRAF gene
  - Ddoubled the survival rates in this group
- Kalydeco™ treats cystic fibrosis (CF)
  - Targeted to mutations responsible for 5% of all CF cases
  - The first CF therapy to treat the underlying cause of CF rather than just treating its symptoms

- Benefits of precision medicine can be scaled up to help more people
Promise of PMI: Pharmacogenomics

- Combine EHR and genetic information to “crowdsource” what Rx works for which patient.
  - **DNA Chip** of all known variants of pharmacogenomic relevance
  - **Provide information** to both patients and clinicians
  - **LOINC** from EHR for Rx – what Rx is written
  - **Pharmacy records** – what Rx is filled
  - **Mine data** for common genetic variants
  - **Learn** what works & what doesn’t
  - **Mount an interventional trial** if no one knows if the gene/drug info is really linked
  - **Dramatically expand** existing knowledge
    - FDA counts over one hundred labels with genetic info
- **Apply to** widely used therapeutics
  - (e.g. aspirin resistance for heart attacks)
PARTICIPANTS AT THE CENTER

Long ago, U.S. business learned the benefits of constantly soliciting advice from workers on the shop floor by studying the startling success of the Japanese automobile industry.

• Bruce Albert
• Science lead editorial
• January 15, 2016
PARTICIPANTS AT THE CENTER

- Participants engaged in design and oversight
- Participant demands that data sharing include sharing data with THEM
- Participants pushing new consent models
- User centered approach that puts the participant first
- Partnership replacing paternalism
DNA SEQUENCING POWER

- Human genome can now be sequenced in less than a day for around $1000-5000
- Whole-exome or whole-genome sequencing of one million Americans or more is now feasible
mHEALTH ADVANCES

Mobile devices can track increasing amounts of health information

- Blood pressure, pulse rate, connect with devices such as inhalers and spirometers
- Mt. Sinai Asthma Mobile Health Study, together with Apple Healthkit measures:
  - Symptoms
  - Daily activities
  - Environmental triggers
  - Peak expiratory flow
  - Medications
  - Health events
ELECTRONIC HEALTH RECORDS (EHR)

- Now widely adopted
- Offers unique tools for researchers and data mining
- Research use requires agreements on data syntax, semantics, transmission methods, etc with multiple organizations who hold the EHRs
Can we put people, not institutions, in control of EHR data sharing?

Blue-button technology promises to allow patients to download information from their electronic health record

Promise not yet achieved but perhaps can be accelerated by leadership, resources, and patient demand

Data could be centralized – truly enabling data science
<table>
<thead>
<tr>
<th>Month</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2015</td>
<td>President launches Precision Medicine Initiative®</td>
</tr>
<tr>
<td>March 2015</td>
<td>NIH names ACD PMI Working Group</td>
</tr>
<tr>
<td>September 2015</td>
<td>ACD receives and approves Working Group Report</td>
</tr>
<tr>
<td>November 2015</td>
<td>First implementation steps</td>
</tr>
<tr>
<td>December 2015</td>
<td>Report to ACD on PMI progress</td>
</tr>
</tbody>
</table>
Assembling the PMI Cohort

- One million or more volunteers
  - Broadly reflect the diversity of the U.S., not statistically representative
  - Strong focus on underrepresented groups
- Longitudinal cohort, with continuing interactions, recontactable for secondary studies
- Two methods of recruitment
  - Direct volunteers - anyone can sign up
  - Healthcare provider organizations
- Estimated 3-4 years to reach one million
1. Participation is open to interested individuals
2. Representing the rich diversity of America is essential
3. Participants are partners in all phases of the cohort program
4. Participants have access to study information and data about themselves
5. Data can be accessed broadly for research purposes
6. Adherence to the PMI privacy principles and forthcoming security framework
7. PMI is a catalyst for progressive research programs and policies
Initial Core Data Set

- Centrally collected and stored in a Coordinating Center
- Align with other data sets when possible
- Leverage existing data standards and common data models when possible

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Data Provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self report measures</td>
<td>Diet, substance use, self-report of disease and symptoms (e.g., cognitive or mood assessment)</td>
</tr>
<tr>
<td>Baseline health exam</td>
<td>Vitals (e.g., pulse, blood pressure, height, weight), medical history, physical exam</td>
</tr>
<tr>
<td>Structured clinical data (EHR)</td>
<td>ICD and CPT codes, medication history, select laboratory results, vitals, encounter records</td>
</tr>
<tr>
<td>Biospecimens</td>
<td>Blood sample</td>
</tr>
<tr>
<td>mHealth data</td>
<td>Passively-collected data (e.g., location, movement, social connections) from smartphones, wearable sensor data (activity, hours and quality of sleep, time sedentary).</td>
</tr>
</tbody>
</table>
Information Flow In

Direct Volunteers

Self-report Measures
mHealth Data
Consent
EHR Data
Baseline Exam
Biospecimens

HPO Volunteers

18
Information Flow Out
## Projected Enrollments

### Estimated Cumulative Enrollments per Calendar Year

<table>
<thead>
<tr>
<th>Entry point to cohort</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPOs</td>
<td>28,000</td>
<td>196,000</td>
<td>448,000</td>
<td>595,000</td>
</tr>
<tr>
<td>Direct volunteers</td>
<td>50,000</td>
<td>150,000</td>
<td>252,000</td>
<td>352,000</td>
</tr>
<tr>
<td>FQHCs</td>
<td>&lt;1,000</td>
<td>51,000</td>
<td>101,000</td>
<td>151,000</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td>~79,000</td>
<td><strong>397,000</strong></td>
<td><strong>801,000</strong></td>
<td><strong>1,098,000</strong></td>
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</table>
# PMI Cohort Program Funding Opportunities

<table>
<thead>
<tr>
<th>Title / Type</th>
<th>Year 1 $</th>
<th>Number of awards</th>
<th>Project Period</th>
<th>Application</th>
<th>Award</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Volunteers Pilot Studies (OT)</td>
<td>TBD</td>
<td>1</td>
<td>1 yr</td>
<td>December 22, 2015</td>
<td>February 2016</td>
</tr>
<tr>
<td>Communication Support for the Precision Medicine Initiative Research Programs (OT)</td>
<td>TBD</td>
<td>1</td>
<td>2 yrs</td>
<td>December 22, 2015</td>
<td>February 2016</td>
</tr>
<tr>
<td>PMI Cohort Program Biobank (U24)</td>
<td>$15 M</td>
<td>1</td>
<td>5 yrs</td>
<td>February 4, 2016</td>
<td>June 2016</td>
</tr>
<tr>
<td>PMI Cohort Program Coordinating Center (U2C)</td>
<td>$21 M</td>
<td>1</td>
<td>5 yrs</td>
<td>February 17, 2016</td>
<td>July 2016</td>
</tr>
<tr>
<td>PMI Cohort Program Healthcare Provider Organization Enrollment Centers (UG3/UH3)</td>
<td>$28 M</td>
<td>≤7</td>
<td>5 yrs</td>
<td>February 17, 2016</td>
<td>July 2016</td>
</tr>
<tr>
<td>PMI Cohort Program Participant Technologies Center (U24)</td>
<td>$8 M</td>
<td>1</td>
<td>5 yrs</td>
<td>February 17, 2016</td>
<td>July 2016</td>
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</table>
PMI Cohort Program

Coordinating Center

- Large HPOs
- Direct Volunteers
- FQHCs

- Participant Technologies Center
- Biobank
- DV Health Exams & Specimens
- Laboratory Analyses

- FOAs Out
- Under development
**Timeline**

- **FOA**
- **Award**
- **Pilot testing**
- **Transition to CC**

**Direct Volunteer Pilot Phase**

- **FOAs**
- **Applications**
- **Awards Integrate DV Pilot**

**Coordinating Center**

**HPOs, Biobank, Participant Technologies**

- **Explore**
- **Pilot sites**
- **Expansion**

**FQHCs**

**2016**
# Proposed FY16 Budget for PMI

<table>
<thead>
<tr>
<th>Agency</th>
<th>$ Million</th>
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</thead>
<tbody>
<tr>
<td>National Institutes of Health</td>
<td></td>
</tr>
<tr>
<td>• <em>PMI for Oncology</em></td>
<td>$200</td>
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<tr>
<td>• <em>PMI Cohort Program</em></td>
<td>$70</td>
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<tr>
<td></td>
<td>$130</td>
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<tr>
<td>Food and Drug Administration</td>
<td>$10</td>
</tr>
<tr>
<td>Office of the National Coordinator for Health Information Technology</td>
<td>$5</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$215</strong></td>
</tr>
</tbody>
</table>
Thank you!