NIH Common Fund Metabolomics Program

Keren Witkin, PhD

Program Director, CF Metabolomics Program
Division of Cancer Biology, NCI, NIH

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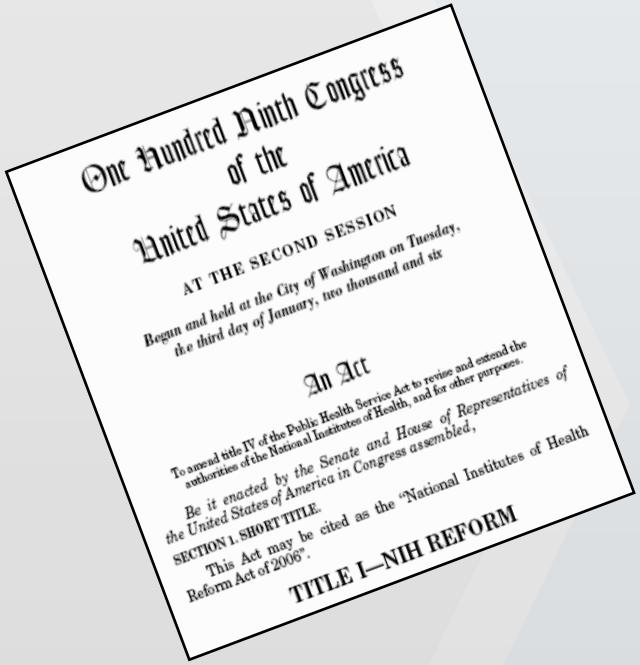
NIH National Institutes of Health
Office of Strategic Coordination - The Common Fund

The NIH Common Fund: A Different Approach to Science Management



One Hundred Ninth Congress
of the
United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Tuesday, the third day of January, two thousand and six

An Act

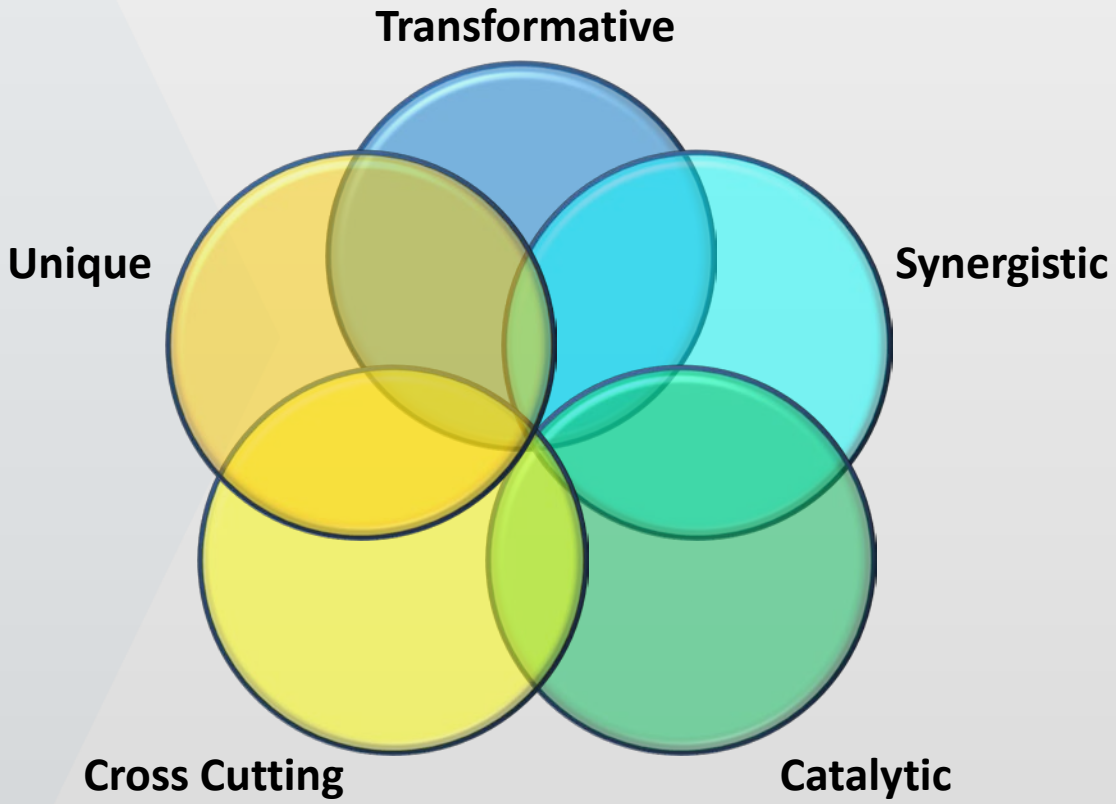
To amend title IV of the Public Health Service Act to revise and extend the authorities of the National Institutes of Health, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "National Institutes of Health Reform Act of 2006".

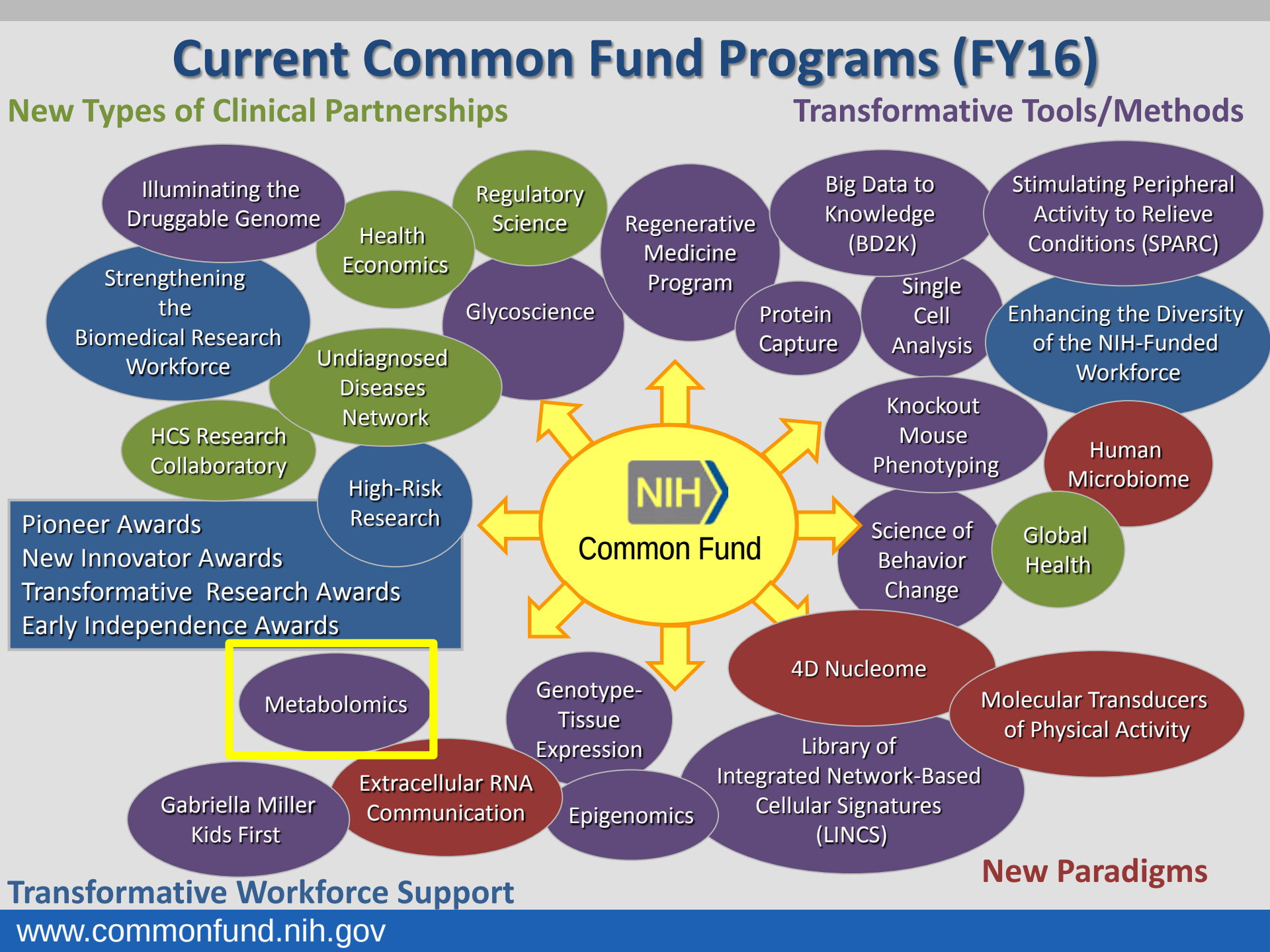
TITLE I—NIH REFORM



- **Exceptionally high impact**
- **Broadly applicable**
- **Benefit from strategic planning and coordination**

Managed by the Office of Strategic Coordination in the Office of the Director, NIH

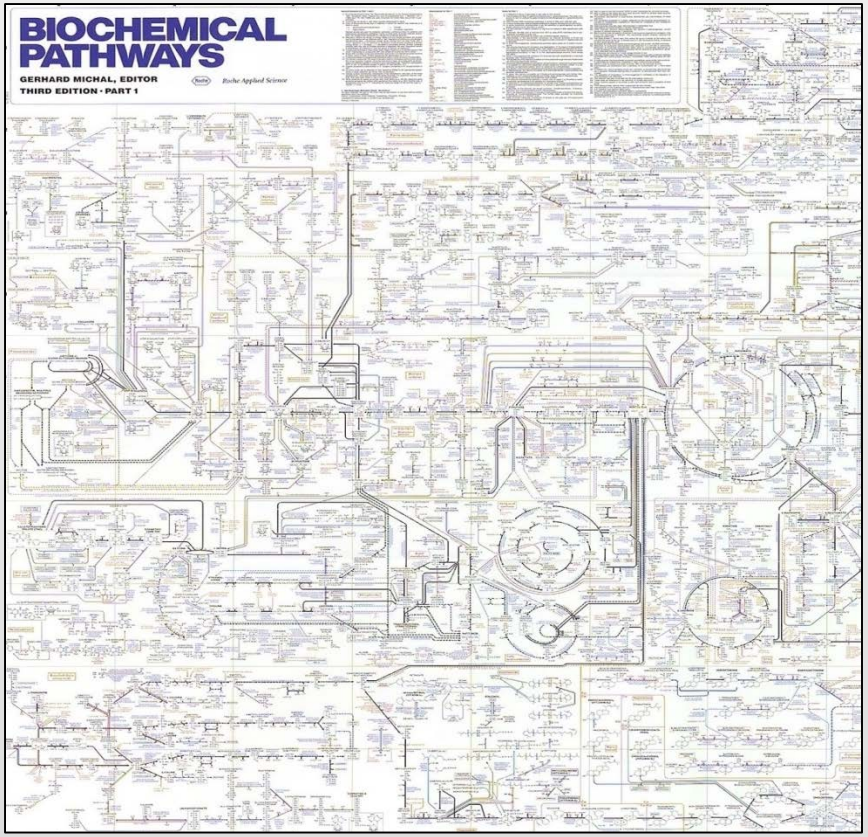
Current Common Fund Programs (FY16)



Why Metabolomics?

Metabolomics: The systematic study of the metabolites in cells, tissues, and a variety of biospecimens, typically utilizing MS or NMR analytical platforms.

- High potential to contribute greatly to our knowledge of health and disease.
- Applicable to basic, clinical, and translational research.
- Trans-NIH relevance.
- Likely to benefit from strategic coordination.



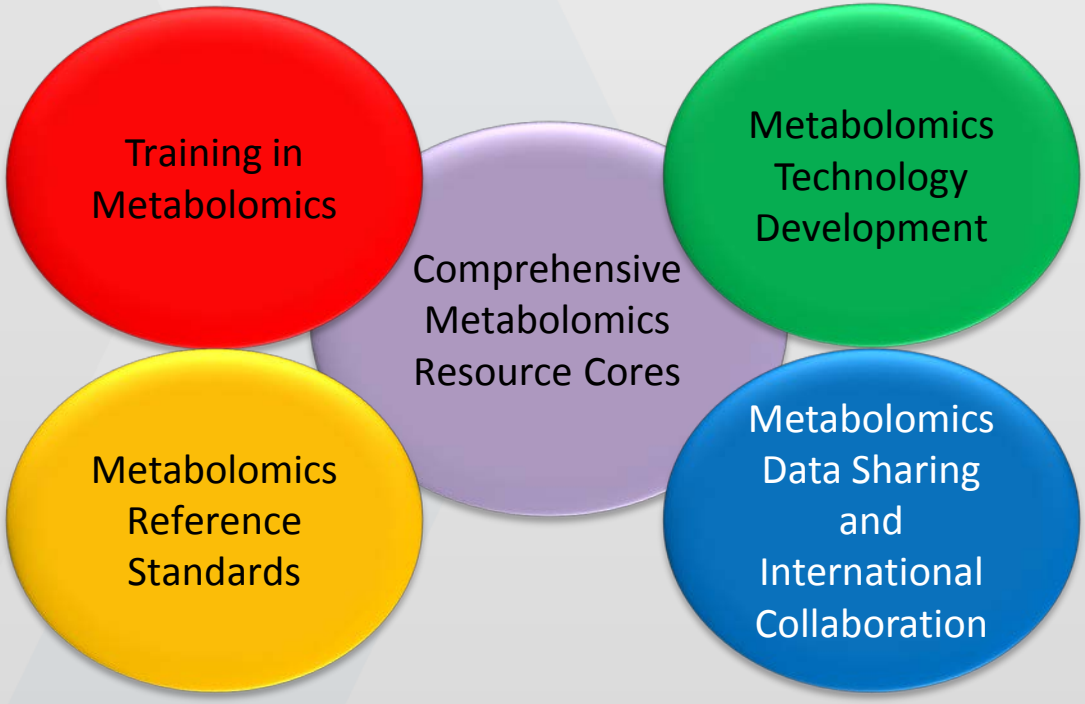
Biochemical Pathway Map courtesy of Roche

Assessing Outstanding Needs

- Development of **new technologies** and adoption of existing technologies and methods.
- Availability of **metabolite reference standards** and mechanisms to make new ones as needed.
- **Specialized facilities** that provide high quality metabolomics data, analyses, and interpretation available for collaboration or fee-for-service.
- **Training** for biomedical scientists in the technology, biochemistry, and bioinformatics needed for metabolomics studies.
- A centralized location to store **high-quality metabolomics data** and provide tools for **data analysis**.

Rationale for the Metabolomics Program

The Common Fund Metabolomics Program was initiated in 2012 **to increase the national capacity in metabolomics** by developing:

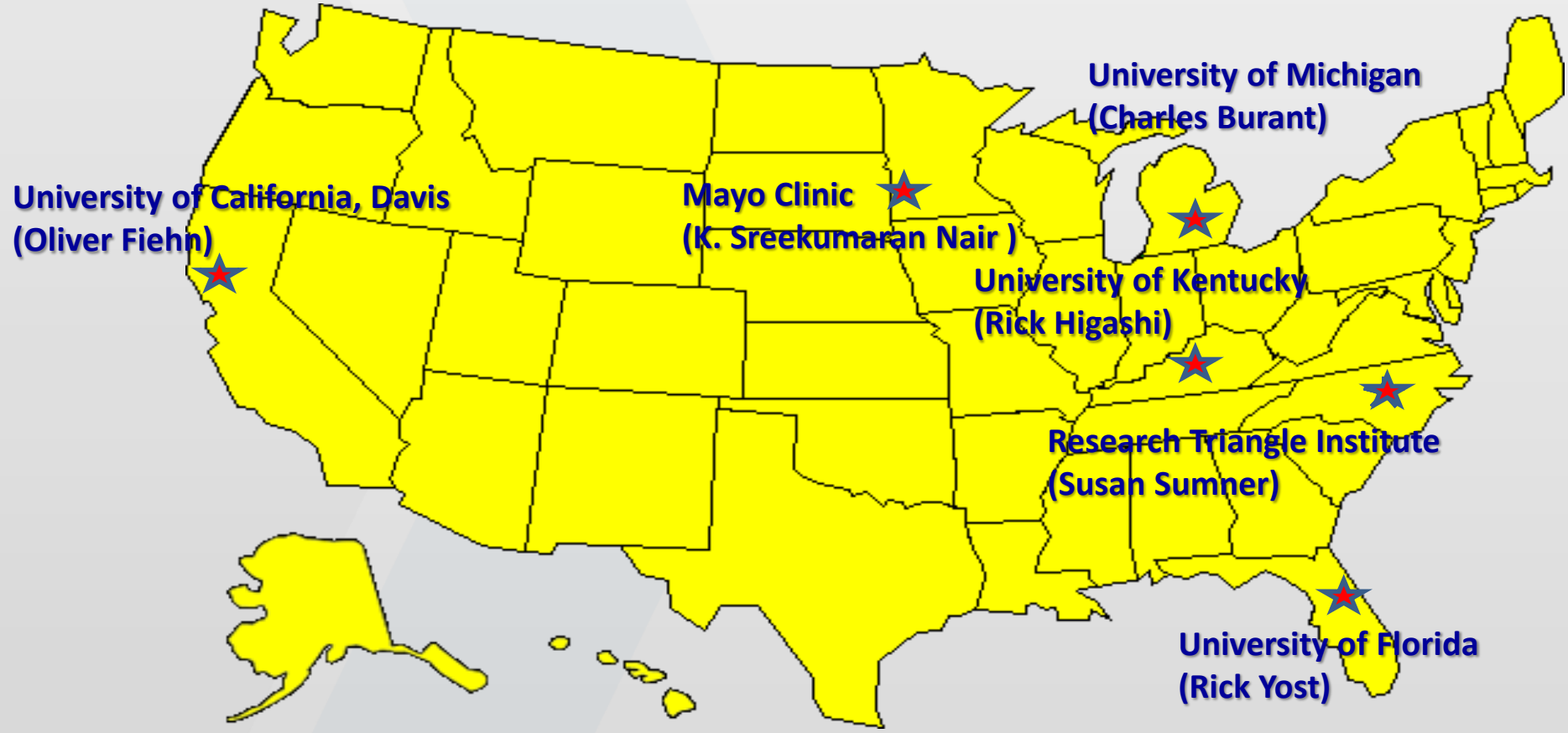


To Meet These Goals:

- Regional Comprehensive Metabolomics Resource Cores (RCMRCs)
- Data Repository and Coordinating Center (DRCC)
- Technology Development (R01) Awards
- Mentored Research Training (K01) Awards
- Grants to Develop Metabolomics Courses
- Metabolite Standards Synthesis Contracts
- Administrative Supplements to Existing NIH Grants
- Pilot and Feasibility (P&F) Awards
- Data Analysis Grants (R03)

Metabolomics Resource Cores

The Regional Comprehensive Metabolomics Resource Cores (RCMRCs)



Visit their individual webpages or access through: **http://www.metabolomicsworkbench.org/**

Metabolomics Resource Cores

Goals of the RCMRCs:

- **Provide metabolomics services for the research community**
  - Fee-for-Service (at cost)
  - Collaborative Pilot and Feasibility (P&F) Program
- **Technology development**
  - Data generation and analysis
- **Metabolomics workforce development**
- **Consortium member - enhancing the field of metabolomics**
- **Data Sharing**
- **Build customer base to become self-sustaining**

Metabolomics Resource Cores

RCMRC Accomplishments:

159 P&F awards since 2013

73 % outside home institution

Workshops

Symposia

1781 service requests accepted in past 2 years

39 unique institutions/year per RCMRC

289 publications in past 2 years

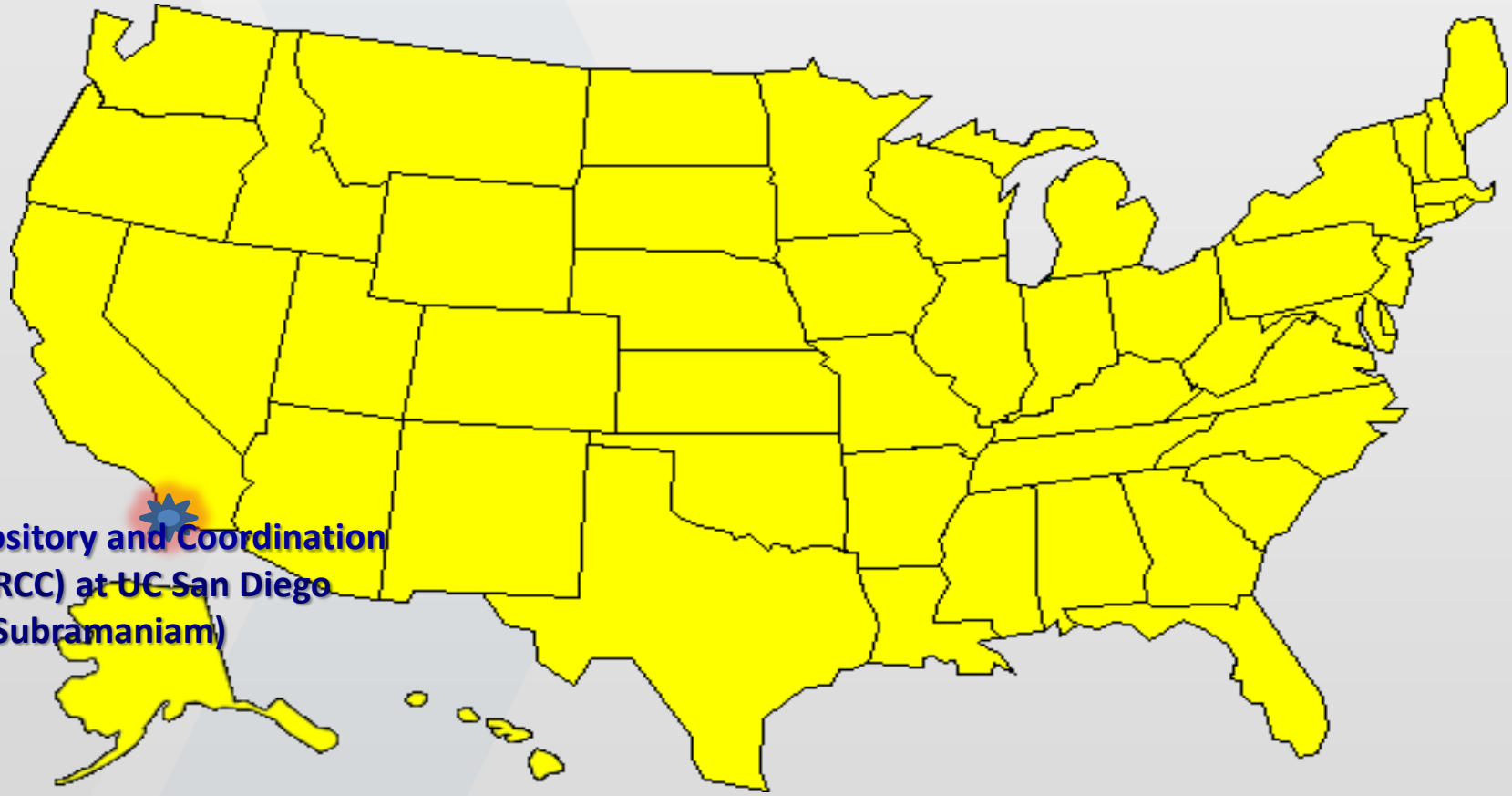
307 datasets deposited

Individual training

- **RCMRCs on target to be financially self-sufficient**

Data Sharing and International Collaboration

Data Repository and Coordinating Center (DRCC)



Data Repository and Coordination Center (DRCC) at UC San Diego (Shankar Subramaniam)

Visit their individual webpages or access through: **http://www.metabolomicsworkbench.org/**

Data Sharing and International Collaboration

Goals of the DRCC:

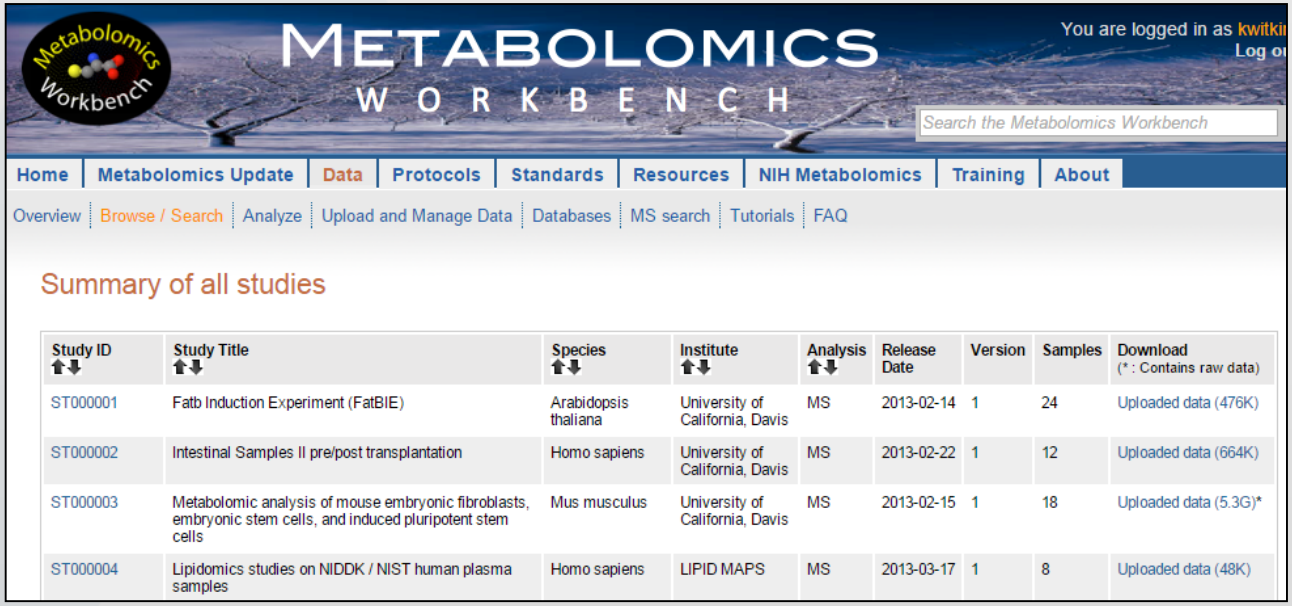
- Develop **data repository** to accept high quality metabolomics datasets from a wide variety of studies
- Collaborate with **international colleagues** to develop minimum requirements for submission of data
- Coordinate **consortium activities** to maximize exchange of best practices and technical advances
- Develop overall **Promotion and Outreach** plan for the Program

Metabolomics Data Sharing and International Collaboration

DRCC Accomplishments:

- Developed **data repository** for raw spectra and processed metabolomics data
- Created a **web portal** for consortium activities and resources including datasets, analytical tools, training, protocols etc.

- **492 registered users**
- **371 datasets deposited**



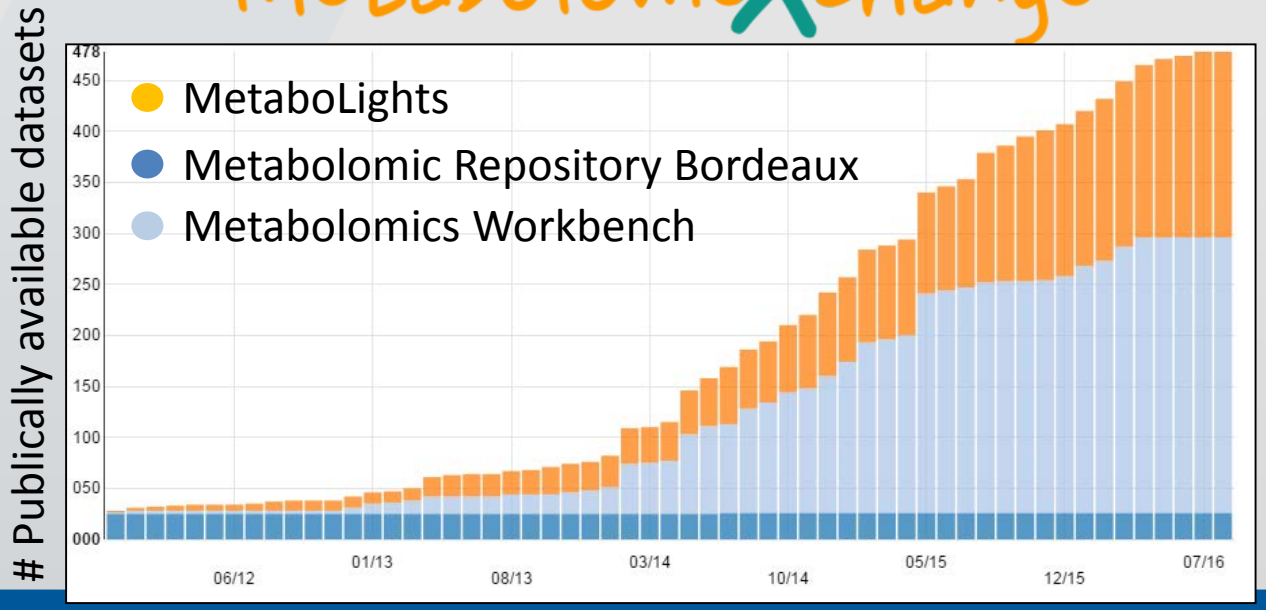
metabolomicsworkbench.org

Metabolomics Data Sharing and International Collaboration

DRCC Collaborative Accomplishments:

- Developed minimal **metadata standards**
- Created a **reference directory** of metabolite names
- Coordinated an inter-lab **reproducibility** exercise
- Worked with international metabolomics community to promote **data sharing**

MetabolomeXchange



Metabolomics Workbench

EMBL-EBI

Reference Standards

Metabolite Standards Synthesis Core

- **High-quality metabolite standards** are synthesized under contracts to SRI International and RTI International
- Provides metabolomics researchers with high quality metabolite standards that have high potential in translational research at no cost
- 20 standards completed; 35 in process

Nominate a compound or request an aliquot today!

View the list of nominated compounds or nominate new compounds at:

http://www.metabolomicsworkbench.org/standards/index.html

Metabolomics Technology Development

Metabolomics Technology Development

Project	PI	Technology	Publications
R01ES022181	Patti	Untargeted Workflow	21
R01ES022186	Patterson	Metabolite Extraction Standardization/ Optimization	20
R01ES022191	Fan	Chemoselective Probes	15
R01ES022190	Baker	Ultrarapid Chemical Separation	11
R01ES022176	Hu	Tissue NMR	7
R01ES022172	Murphy	Lipid Identification	3
Total			62

- **Program has improved the extraction, separation, detection and identification of metabolites**

Training in Metabolomics

Enhancing the Metabolomics Workforce

K01 mentored training
P&F projects
Admin Supplements
Internships/sabbaticals

Small group workshops:
R25 UAB course
RCMRCs

RCMRC symposia

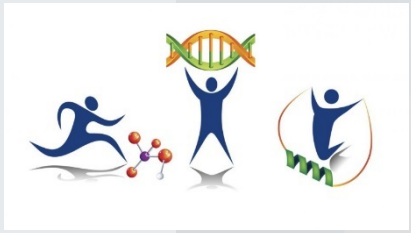
On-line course

Individual instruction

Reaching the masses

Supported by NIH/NIDDK award R25GM103798 and R25GM103802

The NIH Investment in Metabolomics Continues to Increase



Undiagnosed Diseases Network

Striving to Meet the Evolving Needs of the Metabolomics Community

- Continuing to enhance the **Metabolomics Workbench** in response to community feedback
- Improving the **tools** available for metabolomics studies, including data analysis and interpretation
- Offering **training** at all levels
- Working to identify and promote **best practices** in study design, data acquisition, and data analysis

Common Fund Metabolomics Working Group

Chairs:

NCI	Dinah S. Singer
NIDDK	Philip Smith

Coordinators:

NCI	Barbara Spalholz
NIDDK	Arthur L. Castle
OD	Leslie Derr

Project Team Leaders:

NCI	Keren Witkin (ME Program Director)
NHLBI	Pothur R. Srinivas (Reference Standards)
NIDDK	Padma Maruvada (RCMRCs, DRCC)
NIEHS	David M. Balshaw (Technologies)
NIGMS	Richard T. Okita (Training)

NCATS	Danilo Tagle
NCI	Mukesh Verma
NCI	Krista Zanetti
NHGRI	Lita M. Proctor
NHLBI	Simhan Danthi
NIA	Yih-Woei Fridell
NIAAA	Gary J. Murray
NIAID	Conrad Malia
NIAMS	Hung Tseng
NIDA	Amy Lossie
NIDCR	Lillian Shum
NIDDK	Leeanna Arrowchis
NIEHS	Andy Maynard
NIEHS	Dan Shaughnessy
NIMH	Laurie S. Nadler
NINDS	Katrina Gwinn
OD	Aron Marquitz
OD	Nicole Lim