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Precompetitive Collaboration in Biomedicine: The Biomarkers Consortium

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Institute of Medicine

National Cancer Policy Forum

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A convergence of multiple factors has led to the emergence of public-private partnerships in biomedicine

Decline in NIH budgets → funding gap

Declining productivity in biopharma R&D → "externalization" of research

Regulatory challenges → increasing complexity, limited budgets

Increased Need for Public- Private Partnerships

Escalating complexity of biomedical science and technologies

Emergence of viable collaborative models → e.g., SNP Consortium, Gates Foundation

Expansion of "pre-competitive" field

Foundation for NIH Overview

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- FNIH is the sole organization authorized by the U.S. Congress to support the mission of the NIH by creating and managing public-private partnerships
- 501(c)(3) non-profit organization
  - Raised over $460 million since 1996
  - Activities include major research partnerships plus scientific education/training, conference, and facilities programs
  - 100+ currently active programs
- Non-governmental
  - Independent Board of Directors
  - NIH Director/FDA Commissioner *ex-officio* Board members

Foundation for NIH Overview

FOUNDATION FOR THE National Institutes of Health

- Creates innovative public-private biomedical partnerships that complement NIH priorities and advance the public health
  - Partners include industry, academia, other federal agencies, and the philanthropic community
  - Provides a neutral forum able to engage all partners to work together
- FNIH's structure enables efficient, effective collaborations
  - Directly solicits contributions
  - Flexible donor relationships
  - Focused grants, contracts, and project management capabilities
  - 96 cents of every dollar directly supports programs
  - Has received a 4-star Charity Navigator rating for the past four years
    - #1 among 64 medical research organizations; #3 among 582 health category organizations
    - Ranked among the ten fastest growing charities in 2009

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Some Major FNIH Research Partnerships

Grand Challenges in Global Health Partner: Bill & Melinda Gates Foundation	**$200M**
Collaboration for AIDS Vaccine Discovery (CAVD) Partners: VRC/NIAID, Bill & Melinda Gates Foundation	**$33M**
Alzheimer's Disease Neuroimaging Initiative (ADNI) Partners: NIA/NIBIB & 20 companies/2 non-profits	**$27M**
Genetic Association Information Network (GAIN) Partners: NHGRI, NLM & Pfizer, Affymetrix, Broad Institute, Perlegen Sciences	**$26M**
Observational Medical Outcomes Partnership Partners: FDA, PhRMA, multiple pharmaceutical partners	**$21M**
Osteoarthritis Initiative (OAI) Partners: NIAMS & Pfizer, Novartis, Merck, GlaxoSmithKline	**$19M**
The Biomarkers Consortium Partners: NIH, FDA, PhRMA, CMS, BIO, biopharmaceutical industry/non-profits	**$14M to date**


THE
biomarkers
CONSORTIUM


FDA


NATIONAL INSTITUTES OF HEALTH


FOUNDATION
FOR THE
National Institutes of Health


PhRMA
Pharmaceutical Research and Manufacturers of America


CMS


Bio
BIOTECHNOLOGY
INDUSTRY ORGANIZATION

Biomarkers are seen as key to reducing the time and expense required to bring new drugs to market

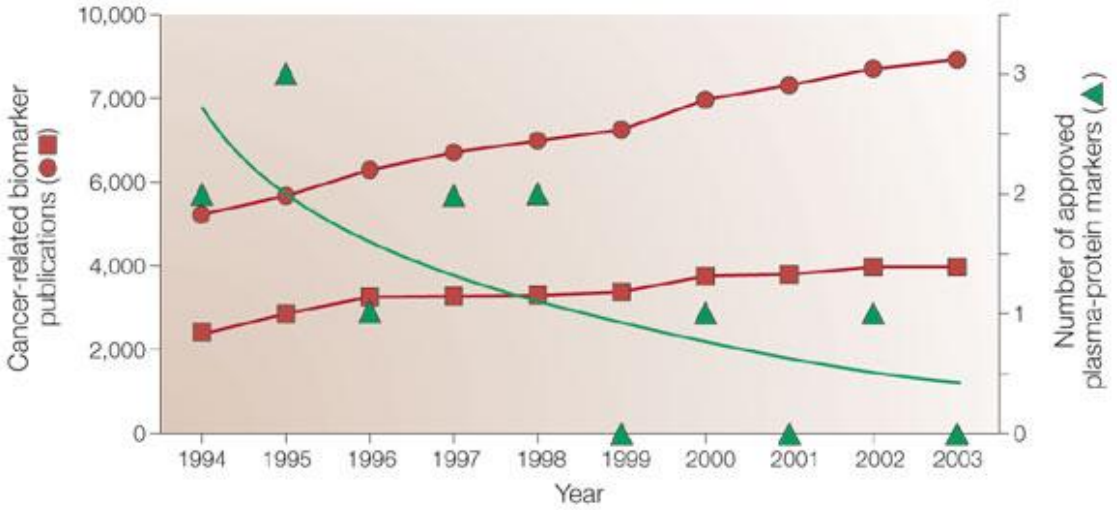
- The 2004 FDA Critical Path Initiative, which challenged the pharmaceutical industry to reduce the time (12-15 years) and expense (~$1-2 billion) to bring a drug to market, emphasized the utility of biomarkers in meeting these goals

- Cancer biomarkers have led the way via high-profile successes such as Herceptin

- However, despite such success and promise, much remains to be done…

Out of 1,261 putative cancer protein or peptide biomarkers described in the literature*, only 9 are FDA approved as “tumor associated antigens”

- Fewer than 1 per year have been approved by the FDA since 1998
- This high percentage of un-validated biomarkers is generalizable to other diseases
- This “biomarker barrier” in which candidate biomarkers have not been validated needs to be overcome



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Nature Reviews | Cancer

** Polanski and Anderson (2006). A List of Candidate Cancer Biomarkers for Targeted Proteomics. Biomarker Insights 2:1– 48*

Goals of The Biomarkers Consortium

- Facilitate the development and validation of biomarkers using new and existing technologies in a precompetitive context
- Help qualify these biomarkers for specific applications in diagnosing disease, predicting therapeutic response, or improving clinical practice
- Generate information useful to inform regulatory decision-making
- Make consortium project results broadly available to the entire scientific community

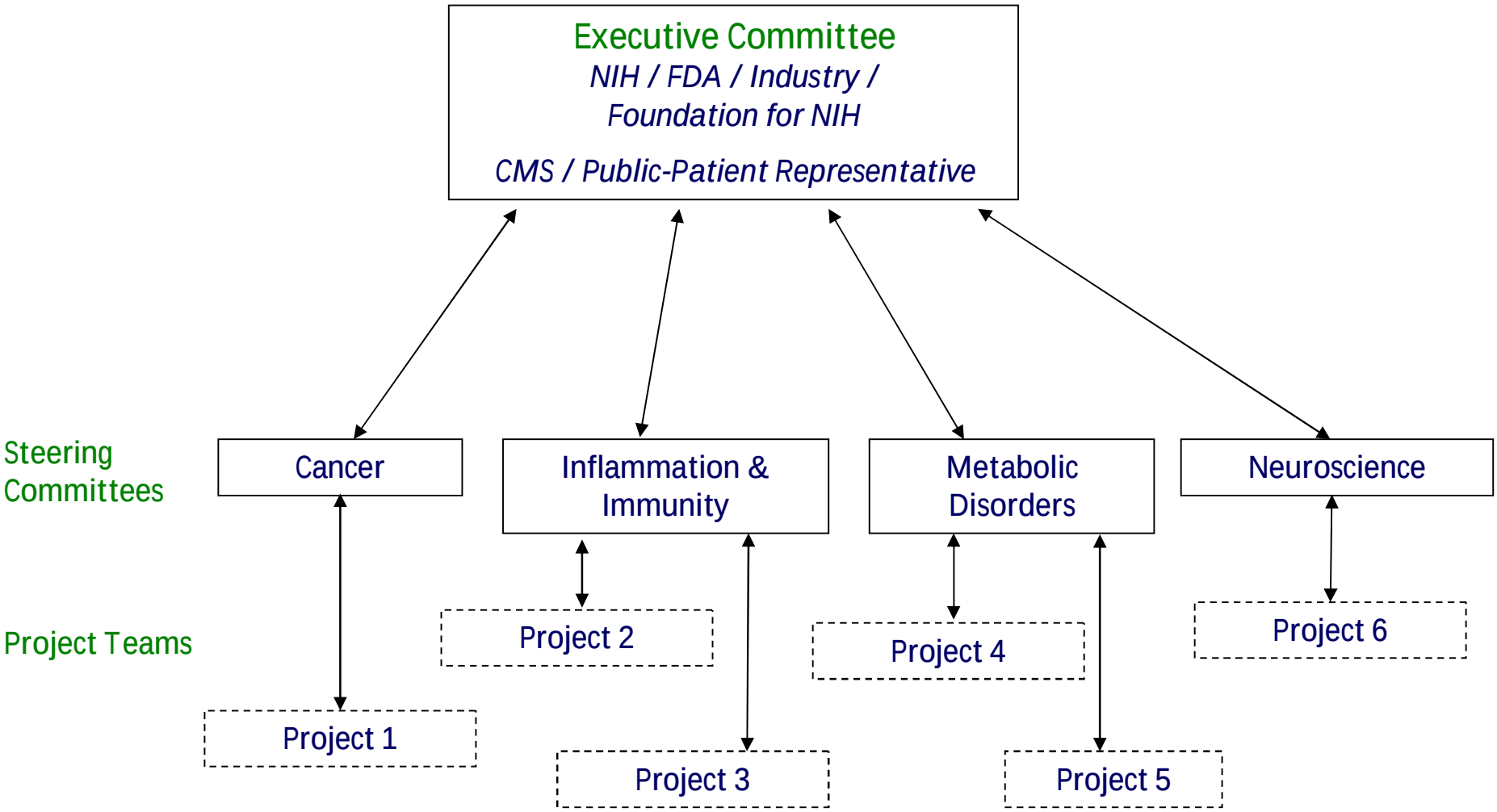
Contributing Members (52)

THE biomarkers CONSORTIUM

For-Profit Companies (22)
Abbott Laboratories
Amgen
AstraZeneca
BG Medicine
Boehringer-Ingelheim
Bristol-Myers Squibb
Genstruct, Inc.
GlaxoSmithKline
InfraReDx, Inc.
Johnson & Johnson
Eli Lilly and Company
Merck and Co., Inc.
Meso Scale Discovery
Metabolon, Inc.
NextGen Sciences
Novartis Pharmaceutical Group
Orasi Medical, Inc.
Pfizer, Inc.
F. Hoffman-LaRoche
Scout Diagnostics
Sepracor
XOMA, Ltd.

Non-Profit Organizations (30)
Academy of Molecular Imaging
Advanced Medical Technology Association
Alliance for Aging Research
Alzheimer's Association
American Association for Cancer Research
American College of Neuropsychopharmacology
American Health Assistance Foundation
American Society of Clinical Oncology
American Society for Clinical Pharmacology and Therapeutics
American Society for Therapeutic Radiology and Oncology
Association of Clinical Research Organizations
Autism Speaks
Avon Foundation
Battelle Memorial Institute
Biotechnology Industry Organization
CHDI Foundation
Cystic Fibrosis Foundation Therapeutics
Federation of Clinical Immunology Societies
The Hamner Institutes for Health Sciences
The Immune Tolerance Institute, Inc.
Juvenile Diabetes Research Foundation
Kidney Cancer Association
The Leukemia and Lymphoma Society
Michael J. Fox Foundation for Parkinson's Research
Ontario Cancer Biomarker Network
Pharmaceutical Research and Manufacturers of America
Radiological Society of North America
Ryan Licht Sang Bipolar Foundation
Society for Nuclear Medicine
University of Illinois

Governance Structure



Executive Committee

THE biomarkers CONSORTIUM

Chairman
Charles Sanders, Foundation for NIH

NIH
Thomas Insel, *National Institute of Mental Health*
John Niederhuber, *National Cancer Institute*
Lawrence Tabak, *National Institute of Dental and Craniofacial Research*

Public Member
Mary Woolley, *Research!America*

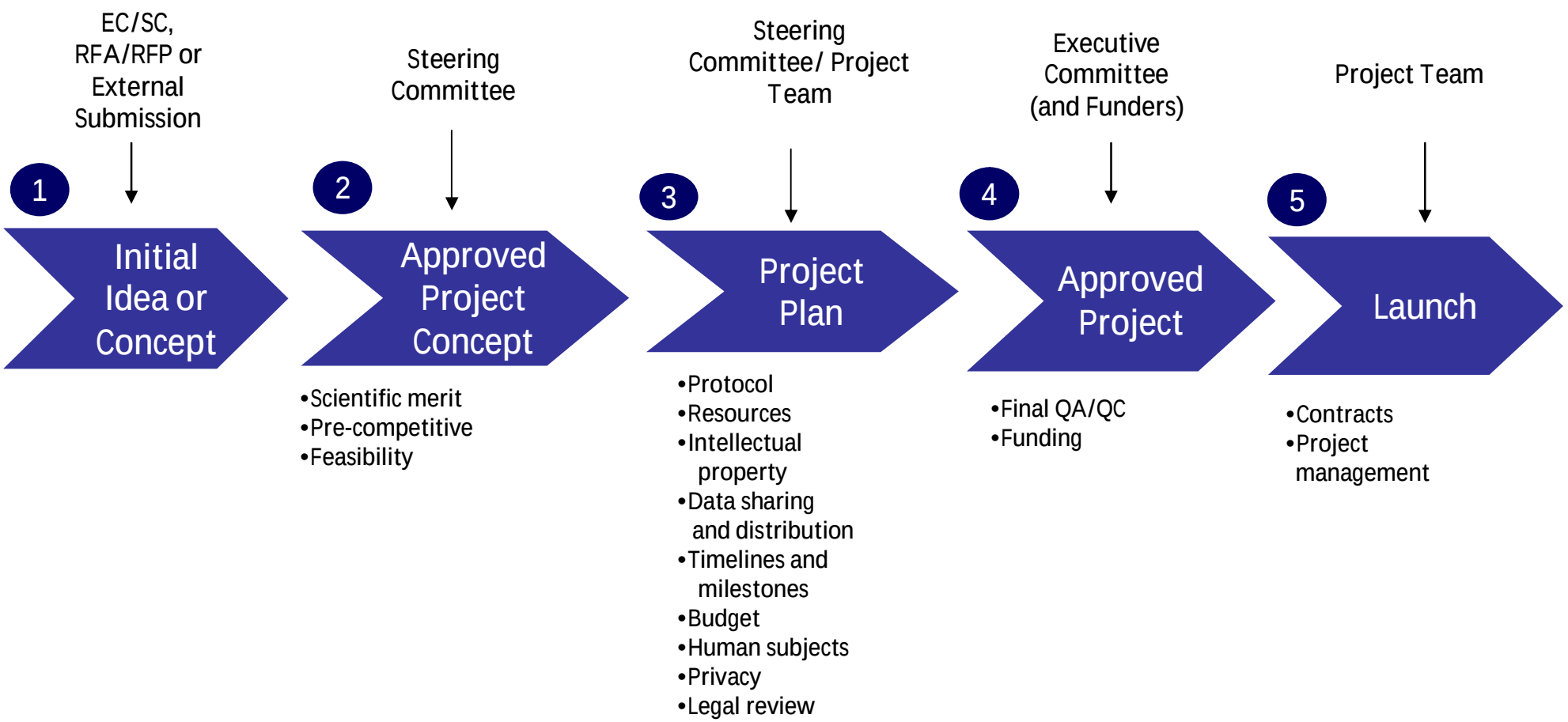
CMS
Barry Straube

FDA
ShaAvhree Buckman, *Office of Translational Science*
Janet Woodcock, *Center for Drug Evaluation and Research*

Industry
Stephen Eck, Eli Lilly & Co.
Gary Herman, Merck & Co., Inc.
Garry Neil, Johnson & Johnson
Sara Radcliffe, BIO

Foundation for NIH Board
Steve Paul, Eli Lilly & Co.
Ellen Sigal, Friends of Cancer Research

Project Development Process



Progress to Date

- Announced October 2006, launched in 2007
- 7 projects funded and launched to date @ ~$14 million total cost
  - 1 project completed
- 8 additional projects fully planned and approved
- 4 additional project concepts in near-term development pipeline

Consortium Governing Policies

- Key overarching governing policies pre-negotiated with principals/legal counsel representing the Foundation for NIH, NIH, FDA, PhRMA and BIO:
  - Intellectual property and data sharing
  - Antitrust
  - Selection and award of grants/contracts
  - Confidentiality
  - Conflict of interest
- Specific policies for each project developed on a project-by-project basis
- Policies available at www.biomarkersconsortium.org

Cancer Steering Committee (1)

Full Name	Affiliation
Anna D. Barker, Ph.D., co-chair	**National Cancer Institute**
David R. Parkinson, M.D., co-chair	**Nodality, Inc.**
Aram Adourian, Ph.D.	BG Medicine Inc.
Binita S. Ashar, M.D., MBA, FACS	U.S. Food and Drug Administration
J. Carl Barrett, Ph.D.	Novartis Institutes for Biomedical Research, Inc.
Donald A. Berry, Ph.D.	The University of Texas M.D. Anderson Cancer Center
David K. Bol, Ph.D.	Avalon Pharmaceuticals
Bill Bro	Kidney Cancer Association
Peter F. Bross, M.D.	Pfizer
Richard Buller, M.D., Ph.D.	Pfizer
Glen Clack, M.B., MFPM	AstraZeneca Pharmaceuticals
Christina M. Coughlin, M.D., Ph.D.	Pfizer (ex-Wyeth Research)
William S. Dalton, Ph.D., M.D.	H. Lee Mofitt Cancer Center & Research Institute
Louis J. DeGennaro, Ph.D.	The Leukemia & Lymphoma Society
Chaitanya Divgi, MD	University of Pennsylvania
James M. Doroshow, M.D.	National Cancer Institute
Bernard Fine, M.D., Ph.D.	Genentech
Pearl Huang, M.D., Ph.D	Merck
Joe W. Gray, Ph.D.	Lawrence Berkeley National Laboratory

Cancer Steering Committee (2)

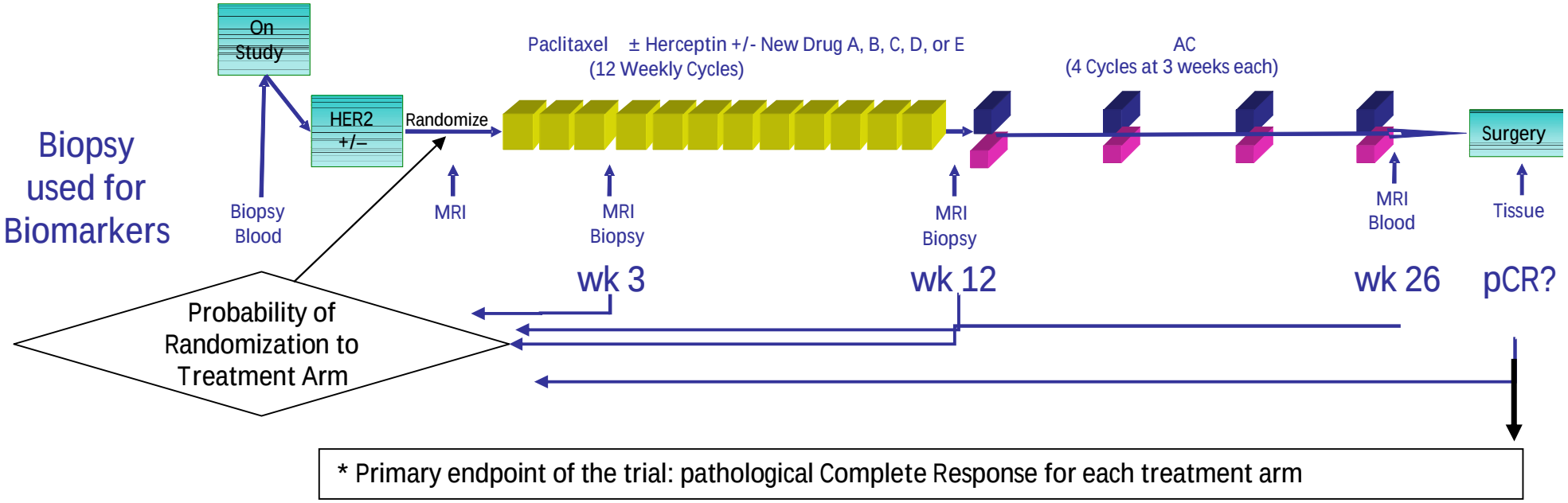
Full Name	Affiliation
Christopher Harbison, Ph.D.	Bristol-Myers Squibb
Andrew Hughes, MD	AstraZeneca Pharmaceuticals
Gordon F. Kapke, Ph.D.	Covance Central Laboratory Services, Inc.
Gary J. Kelloff, M.D.	National Cancer Institute
Samir Khleif, M.D.	U.S. Food and Drug Administration
Douglas P. Malinowski, Ph.D.	TriPath Oncology
Michael Meyers, Ph.D.	Johnson & Johnson Pharmaceutical R&D
Stanislaw Mikulski, M.D., FACP	Hoffmann-LaRoche, Inc.
Gordon Mills, M.D., Ph.D.	U of Texas MD Anderson Cancer Center
Uma Prabhakar, Ph.D.	Centocor R&D, Inc.
Angela Rominelli, Ph.D.	EMD Serono, Inc.
Richard L. Schilsky, M.D.	University of Chicago
Mitchell Schnall, M.D., Ph.D.	University of Pennsylvania
Jeffrey Shuster, Ph.D.	Metabolon, Inc.
Barry A. Siegel, M.D., Ph.D.	Washington University School of Medicine
Ellen V. Sigal, Ph.D.	Friends of Cancer Research
Christopher Slapak, M.D.	Eli Lilly and Company
Christine Smith, Ph.D.	Battelle
Dominic G. Spinella, Ph.D.	Pfizer, Inc.
Daniel C. Sullivan, M.D.	National Cancer Institute
Karen Weiss, M.D.	U.S. Food and Drug Administration

CSC Evaluation Criteria for Prioritization of Cancer Biomarker Project Concepts (summary)

- Fits biological mechanism(s) of neoplastic progression
- Biomarker measurement has potential impact
- Biomarker measurement clinically feasible
- Feasibility of evaluation/use
- Feasibility of commercialization

Example: I-SPY 2 Trial

(Investigation of Serial Studies to Predict Your Therapeutic Response with Imaging And moLecular Analysis)



* Primary endpoint of the trial: pathological Complete Response for each treatment arm

- Up to 12 new Phase II agents will be tested
- Patients will be assigned to an agent based on specific biomarker signatures
- As each patient moves through treatment, their response feeds back to the probability of the next patient who enters the trial (adaptive design)

I-SPY TRIAL 2

THE biomarkers CONSORTIUM

Will allow faster development of better targeted treatment for breast cancer:

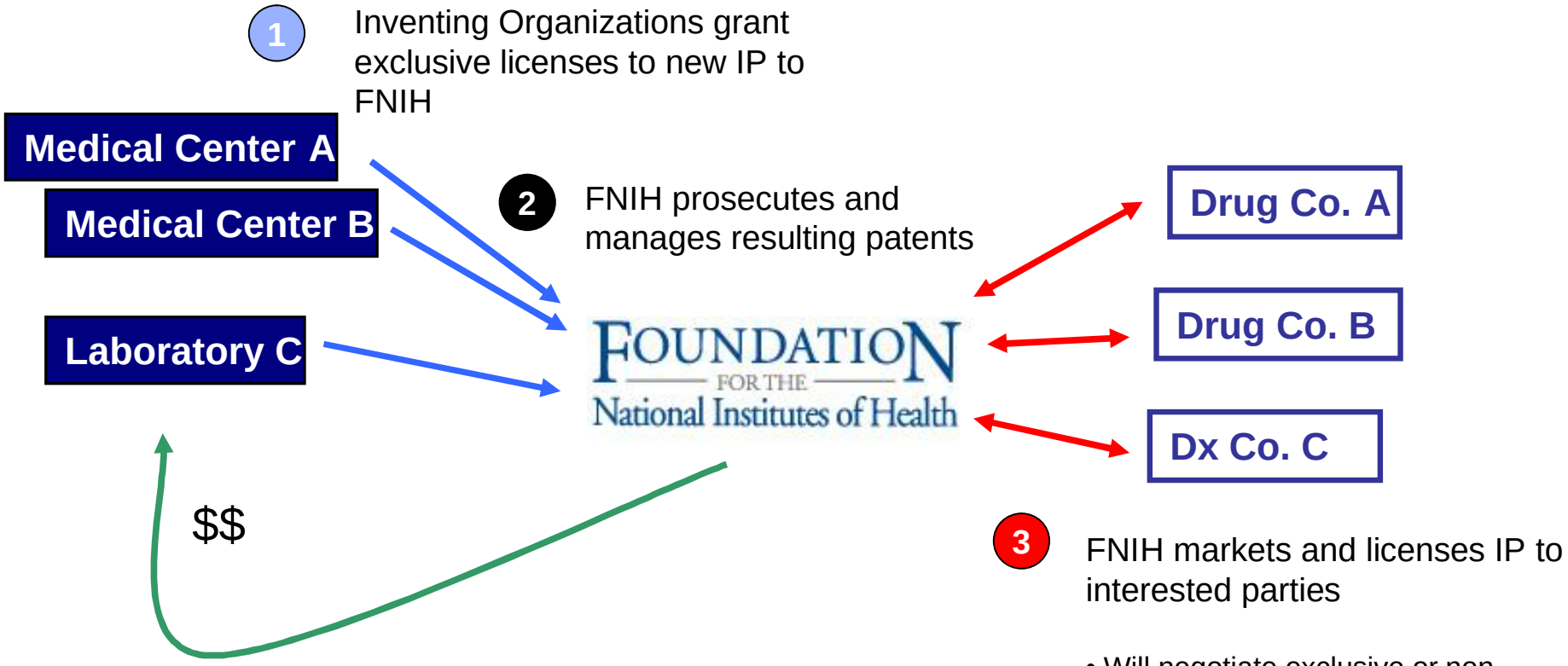
- Demonstrate how adaptive design can streamline clinical trials, enabling Phase II decisions in months instead of years, with significantly fewer patients
- Graduate each agent with data about efficacy for each biomarker profile, so that phase III studies for successful agents can be performed with hundreds rather than thousands of patients
- Help establish and demonstrate new regulatory pathways, using a master IND with the FDA, held by the FNIH
- Further validate known stratifying biomarkers in breast cancer and progress several qualifying biomarkers toward qualification; provide platform for additional exploratory biomarker work
- Improve outcomes for the highest-risk breast cancer patients for whom successful treatments promise the greatest chance of saving lives

Intellectual property will be handled according to Biomarkers Consortium policies

- No single company stands to be the sole beneficiary of the I-SPY 2 project
- Pre-existing IP related to agents contributed by companies will remain with the company owning that IP
- Pre-existing IP related to biomarkers and platforms will remain with those companies, and be licensed for use in the Project. In some cases the tests have been published and are available commercially
- New IP will be managed by the FNIH, acting as a trusted third party to hold and license the new inventions
- Results are expected to be broadly applicable and will be made broadly available

IP Plan

FNIH will act as trusted third party to ensure fair and appropriate licensing of new inventions arising from I-SPY 2



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