Title Slide: Multilevel Research and the Challenges in Implementing Genomic Medicine

Muin Khoury on behalf of
Ralph Coates,
Mary Fennell,
Russ Glasgow,
Maren Scheuner,
Sheri Schully,
Marc Williams,
Steven Clauser

Slide 2: Outline

- The Promise and Challenge of Implementing Genomic Medicine
- A Translational Research Agenda for Genomic Medicine
- Multilevel Intervention Research in Implementing Genomic Medicine
- Example of Lynch Syndrome
- Issues for Discussion

Slide 3: The Vision of "Personalized Medicine" Based on Genomics

[image]

Table 1: Results of Genetic Testing in a Hypothetical Patient in 2010
A 23 year old man name John

Condition	Genes Involved	Relative Risk	Lifetime risk (%)
Reduced risk			
Prostate Cancer	HPC1, HPC2, HPC3	0.4	7
Alzheimer's disease	A P O E, F A D 3, X A D	0.3	10
Elevated Risk			
Coronary artery disease	A P O B, C E T P	2.5	70
Colon cancer	FCC4, A P C	4	23
Lung Cancer	N A T 2	6	40

[End image]

- Primary Prevention
- Smoking Cessation

- Secondary Prevention
- Colon Ca Screening
- Tertiary Prevention
- Pharmacogenomics
- New Drugs, Interventions & Diagnostics

Slide 4: The Evidence Gap in Genomic Medicine
[image]

Headlines of articles:
- The Evidence Dilemma In Genomic Medicine by: Mulin J. Khoury
- Closing the Evidence Gap in the use of Emerging Testing technologies in Clinical Practice by: Kathryn A. Phillips, PhD
- Perspective, The Health Benefits of Genomics: out with the old, in with the new by: Kathy Hudson
- Perspective: The Human Genome and Translational Research: How Evidence is Enough? by: Janet Woodcock

[End image]

Slide 5: The Challenges of Genomic Medicine, Getting to the Center of the Onion....

- An increasing number of genomic applications
- Incomplete information on genotype-outcomes relationships
- Incomplete information on gene-environment and gene-drug interactions in relation to cancer occurrence and outcomes
- Incomplete evidence on clinical utility that may or may not be amenable to randomized clinical trials
- Health technology assessment slow to adapt
- Uneven coverage and reimbursement
- Little or no oversight or regulation of genomic applications
- Uneven, spotty implementation , and potential for disparities
- Direct to consumer advertisement of personal genomic tests
- Unknown outcomes of testing in practice
- Uncertain quality of testing and follow up
- And a few more

Slide 6: The Genomics Translation Highway from Discovery to Health Impact

[image]

   Visual representation of "The Genomics Translation Highway from Discovery to Health Impact". The representation has three areas with subareas to each areas. The total areas are 5 and they are connected to each other in a linear progressive circular shape. In the middle of the circle is "Knowledge Synthesis" which is connected to each area circling it. The areas are as define starting from the bottom and going clockwise:

- Population Sciences with a subarea
    - Reducing the Burden of disease (1)
- Basic Sciences with two subareas
    - Discoveries (e.g., genetic risk factor) (2)
    - Promising Application (e.g., genetic test) (3)
- Clinical Sciences with two subareas
    - Evidence-based Guideline/Policy (4)
    - Practice and Control Programs (5)

The areas besides being connected to "Knowledge Synthesis" are also connected to each other in the following manner:
"Reducing the Burden of disease" is connected to "Discoveries" by T0.
"Discoveries" is connected to "Promising Application" by T1
"Promising Application" is connected to "Evidence-based Guideline/Policy" by T2
"Evidence-based Guideline/Policy" is connected to "Practice and Control Programs" by T3
"Practice and Control Programs" is connected to "Reducing the Burden of disease" by T4

[End image]

Slide 7: Genomics Translation Highway: The Road Less Traveled

[image]

Article headline: Translation Research in Cancer Genetics: The Road Less Traveled

A bar graph with no title or legend. In the lower left hand corner is the letter "a'. The data show is:
T0: 827
T1: 174
T2: 9
T3: 9
T4: 1

[End image]

Slide 8: Multilevel Factors in Implementing Genomic Medicine

- Clinical and laboratory (pre-analytic, analytic, post-analytic)
- Behavioral, social, and communication issues
- Health care organizations
- Public health system
- Regulatory oversight

Slide 9: EGAPP Lynch Summary Statement, Genetics in Medicine - Jan 2009

"The Evaluation of Genomic Applications in Practice and Prevention (EGAPP) Working Group found sufficient evidence to recommend offering genetic testing for Lynch syndrome to individuals with newly diagnosed colorectal cancer (CRC) to reduce morbidity and mortality in relatives.

Slide 10: Potential Impact of Lynch Syndrome (LS), Cascade Screening in the US

- Newly diagnosed colorectal cancer
- 146,970 new cases of CRC in the US in 2009
- 4,115 have Lynch syndrome (2.8%)
- 12,345 of their relatives have LS

Slide 11: Challenges to Implementation

- Lack of provider knowledge of Lynch syndrome and testing issues
- Question of informed consent
- Availability of genetic services
- Cost and coverage
- Psychosocial impact
- Informing relatives – who is responsible?
- Patient and provider compliance
- Infrastructure needs
- Testing limitations (e.g., IHC accuracy by site)

Slide 12: Debate About Implementation

[image]

Article headlines from JNCCN, May, 2010:

- Point: Justification for Lynch Syndrome Screening Among All Patients With Newly Diagnosed Colorectal Cancer by: Heather Hampel, MS, CGC, Columbus, Ohio
- Counterpoint: Implementing Population Genetic Screening for Lynch Syndrome Among Newly Diagnosed Colorectal Cancer Patient - Will the Ends Justify the Means> by: Michael J. Hall. MD, MS, Philadelphia, Pennsylvania
- To Screen or Not to Screen for Lynch Syndrome by: Judy Press

[End image]

Slide 13: Issues for Discussion

- Is there anything unique about genomics?
- What do we do with lack of evidence to inform intervention science in genomic medicine?
- How do we manage the push and pull forces of translation?
- Can we develop a robust multilevel research agenda for genomic medicine that is informed by other fields?

[End Presentation]