Personal Genomics

CDC Genomics Translation Agenda

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Outline

Context for the Translation Agenda

Clinical Utility of Family History

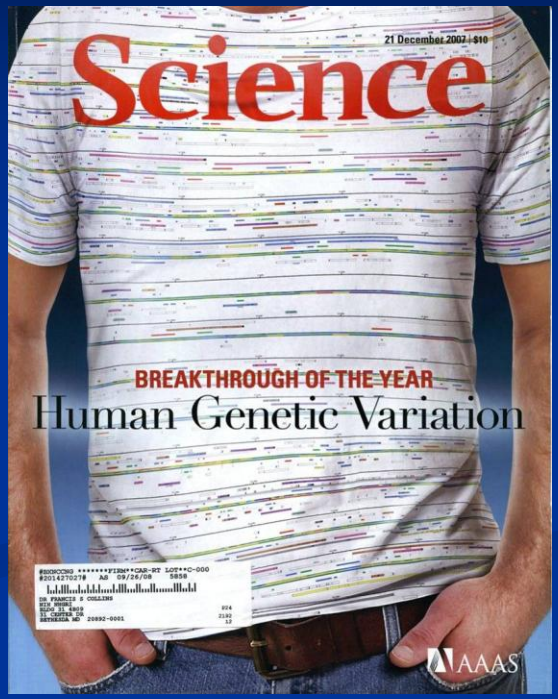
Extramural Translation Research

Extramural Translation Program

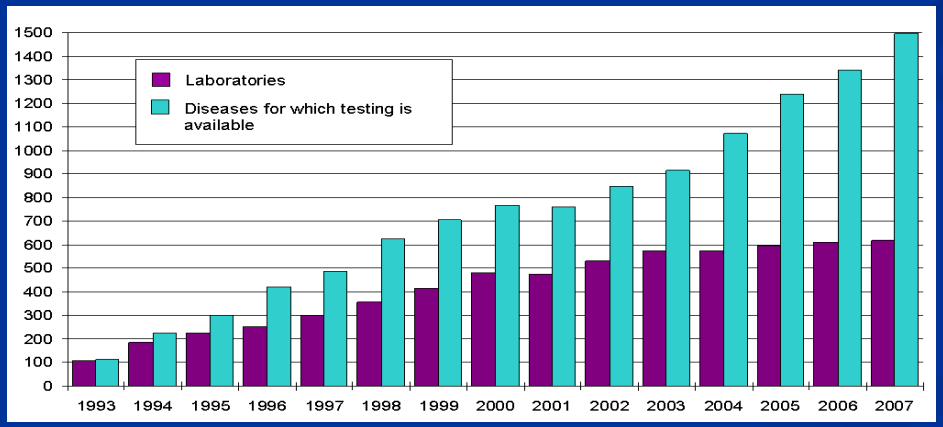
GAPPNet Initiative

Current translation to practice

Rapid advances in research



→ Rapid translation into practice



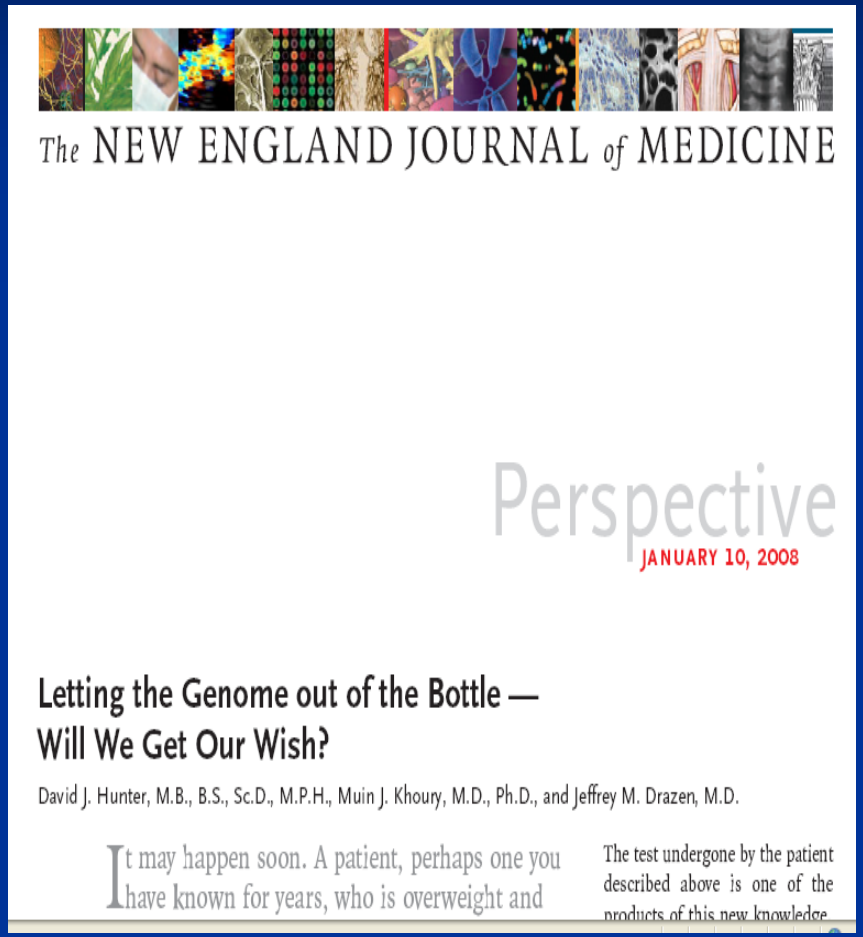
Genetests.org; Primarily for single gene disorders

Translation of genetic testing in context of other health services in US

- Healthcare Spending High, Exceeded Record $2 Trillion in 2006. ~16% of GDP
- U.S. behind many advanced countries in health
- ~55% of Americans receive recommended care for acute or chronic conditions, 50% receive recommended preventive care
- ~20%-30% receive contraindicated care
- ~30- 40% of dollars spent on overuse, underuse, misuse of services,etc.
- Where does personal genomics fit?

U.S. Institute of Medicine: Building a Better Delivery System, 2005; NY Times, 1/8/2008; McGlynn NEJM 2003;248:2635; Shuster Milbank Quarterly 2005; 83:243; Schroeder NEJM 2007;357:1221

What Consequences of Increasing Easy Availability of Genetic Testing?



The NEW ENGLAND JOURNAL of MEDICINE

Perspective

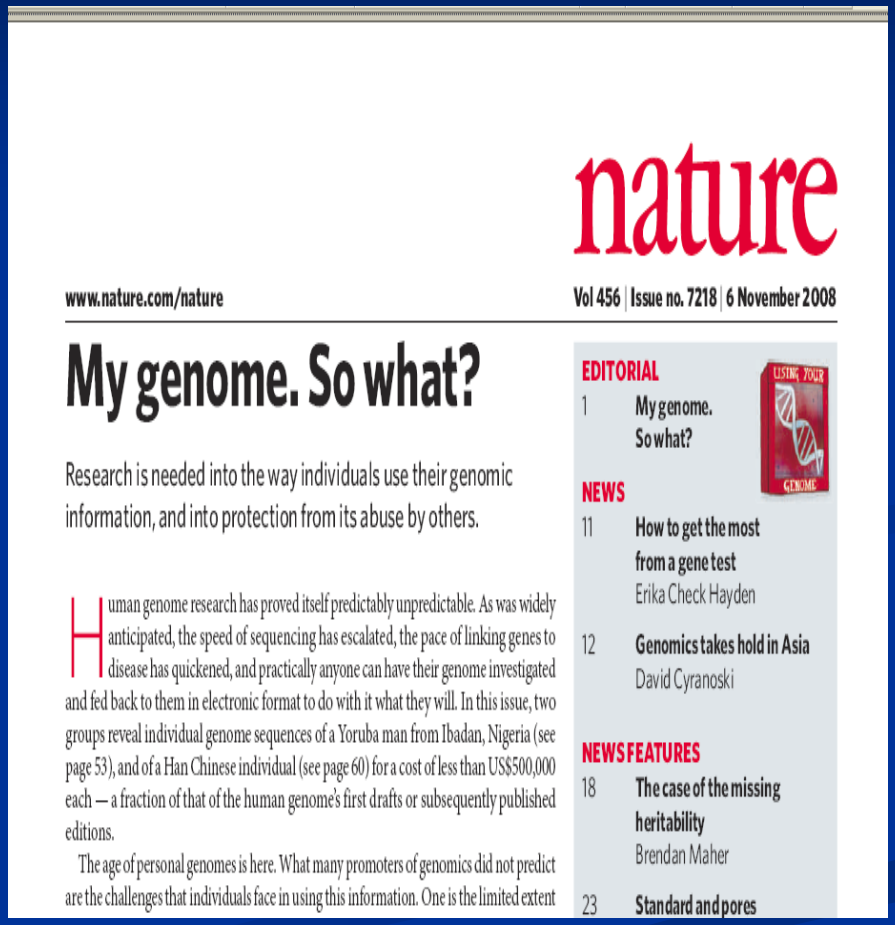
JANUARY 10, 2008

Letting the Genome out of the Bottle — Will We Get Our Wish?

David J. Hunter, M.B., B.S., Sc.D., M.P.H., Muin J. Khoury, M.D., Ph.D., and Jeffrey M. Drazen, M.D.

It may happen soon. A patient, perhaps one you have known for years, who is overweight and

The test undergone by the patient described above is one of the products of this new knowledge



nature

www.nature.com/nature

Vol 456 | Issue no. 7218 | 6 November 2008

My genome. So what?

Research is needed into the way individuals use their genomic information, and into protection from its abuse by others.

Human genome research has proved itself predictably unpredictable. As was widely anticipated, the speed of sequencing has escalated, the pace of linking genes to disease has quickened, and practically anyone can have their genome investigated and fed back to them in electronic format to do with it what they will. In this issue, two groups reveal individual genome sequences of a Yoruba man from Ibadan, Nigeria (see page 53), and of a Han Chinese individual (see page 60) for a cost of less than US$500,000 each — a fraction of that of the human genome's first drafts or subsequently published editions.

The age of personal genomes is here. What many promoters of genomics did not predict are the challenges that individuals face in using this information. One is the limited extent

EDITORIAL

1 My genome. So what?

NEWS

11 How to get the most from a gene test
Erika Check Hayden

12 Genomics takes hold in Asia
David Cyranoski

NEWS FEATURES

18 The case of the missing heritability
Brendan Maher

23 Standard and pores

Unanswered Questions about Genetic Tests in Translation

- How valid and reliable are the genetic tests & how well do they predict outcomes?
- What are the benefits and harms (utility)?
- What actions should be taken based on results?
- How should the medical community, public health, policy makers respond?

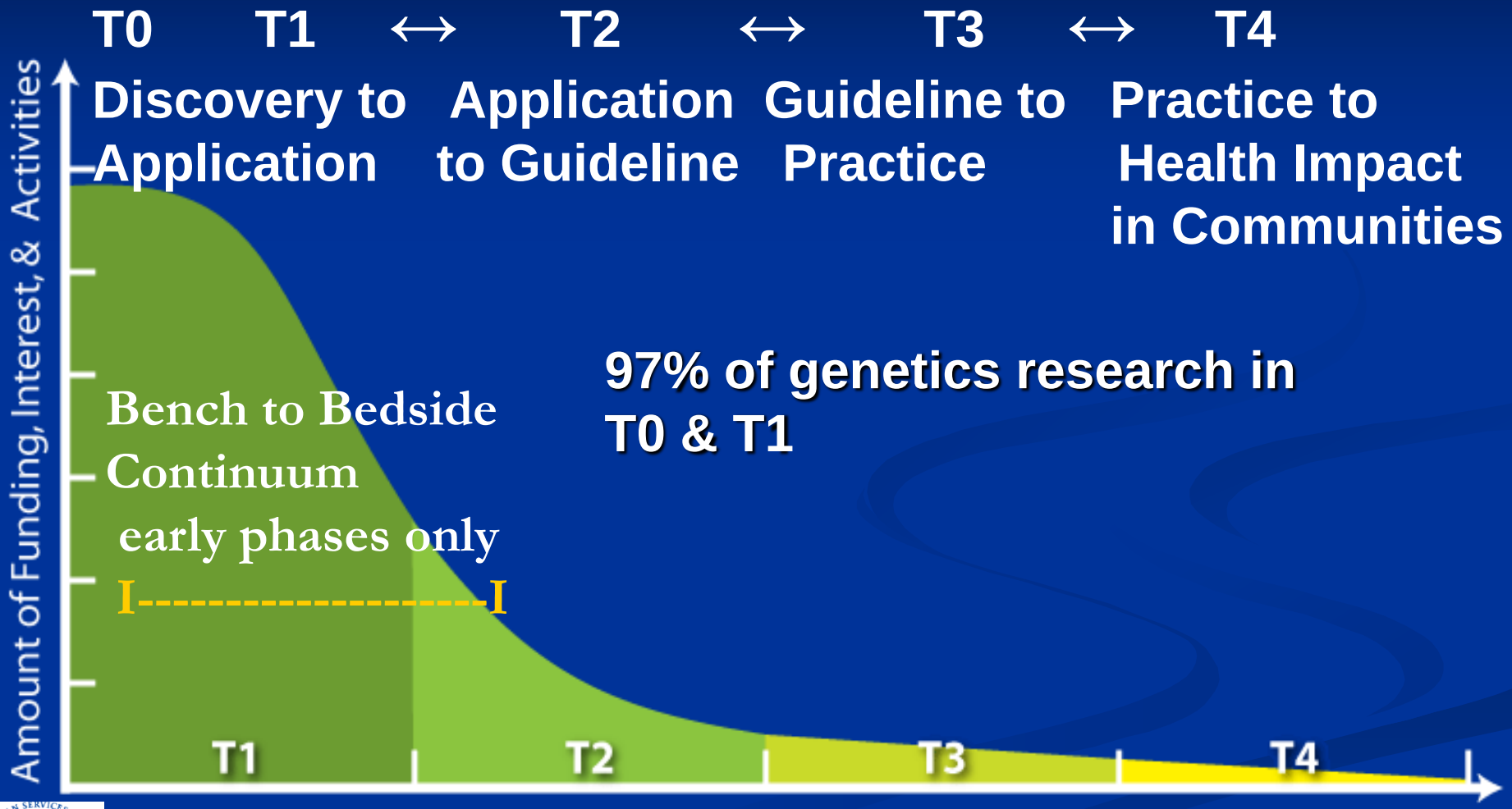
CDC-Proposed Translation Research Continuum in Genetics

T0 = gene discovery

T1	↔	T2	↔	T3	↔	T4
Genetic Discovery To Candidate Health Application		Application to Evidence-Based Guideline		Guideline to Clinical & Public Health Practice in Communities		Practice to Impact on Health in Communities

Continuum Adapted from Khoury Genet Med 2007;9:665; for related see: Woolf JAMA 2008;299:211; IOM Clinical Research Roundtable, Sung 2005

Currently, Limited Research for Evaluation & Implementation



Khoury Genet Med 2007;9:665

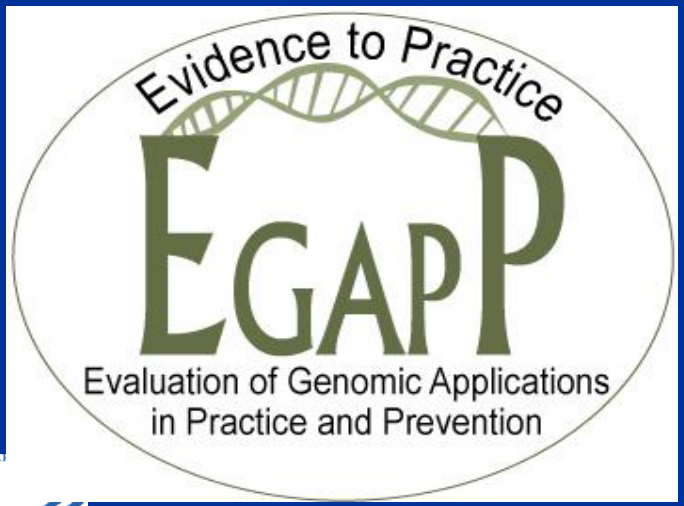
Need for More Translation Research & Programs

"The past decade has seen a torrent of funding for basic research that dwarfs the funding for translational research and oversight of genetics and genomics. Consequently there is no capacity or infrastructure to meet the tsunami of basic research discoveries and move these discoveries rationally into clinical application."

Hudson K. Health Affairs 2008;27(6)1612-5.

Genomic tests ready for use?

Evaluation of
Genomic
Applications in
Practice and
Prevention



Purpose:

Establish and test a systematic, evidence-based process for evaluating genetic tests and other applications of genomic technology in transition from research to practice

www.egappreviews.org/

cdc.gov/genomics/gtesting/

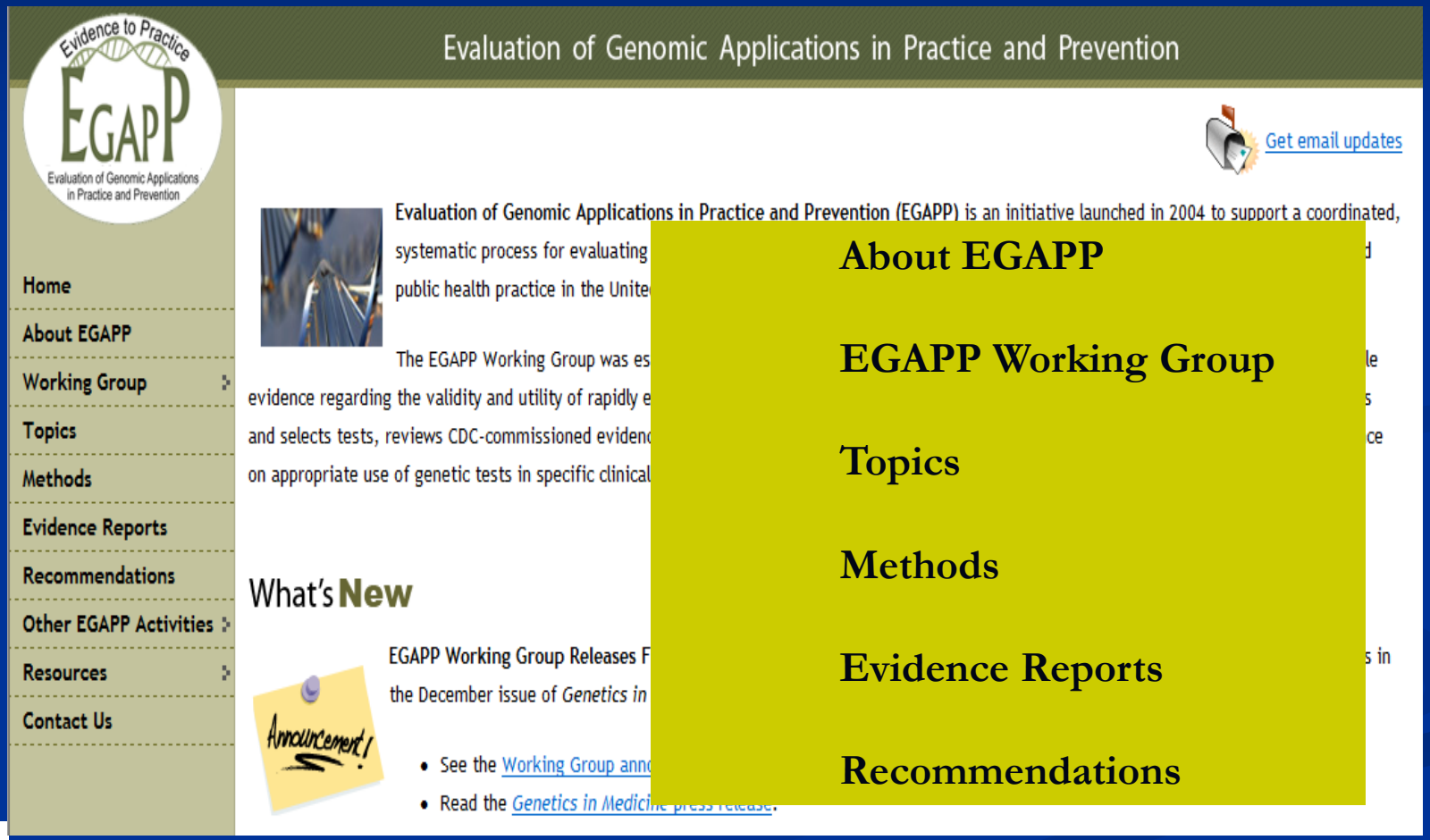
EGAPP Products Help Guide Translation Research Agenda

- Systematic evidence reviews evaluating analytic & clinical validity & clinical utility
- Recommendations on appropriate use of genetic tests & other applications
- Recommendations for research to fill specific evidence gaps

www.egappreviews.org/

cdc.gov/genomics/gtesting/

Information at www.egappreviews.org



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Context for the Research Agenda

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Family History & Genomics Contribute to Personalized Medicine

Components of Personalized Medicine

- Quality clinician-patient relationships
- Informed patients, shared decisions
- Personal medical & **family health histories**
- Health habits evaluation, Preventive services
- Current diagnostic, treatment technologies
- **Genomics**, Health Information Technology

Combination → personalized health care

Research Needed to Evaluate Clinical Utility of Family History & Genomics

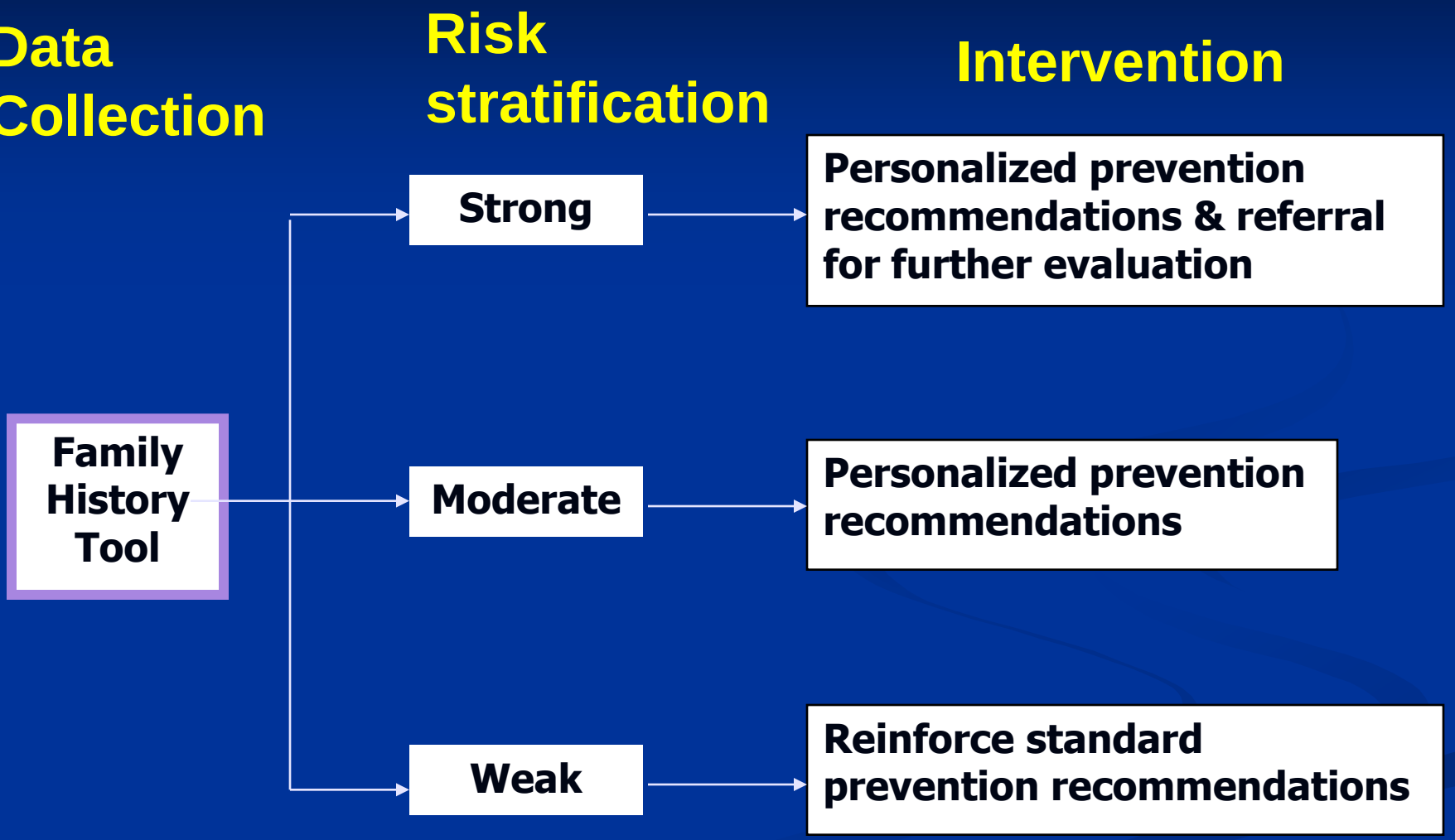
- Everyone has family history (FH)
- FH risk factor for most diseases
- FH risk ratios ~ = or > genetic variants
- FH combines information on gene combinations, environment, behaviors
- FH low cost “omics” tool (<$1,000s)
- Randomized clinical trials needed to evaluate clinical utility of both

CDC Supported Study Evaluating Clinical Utility of Family History

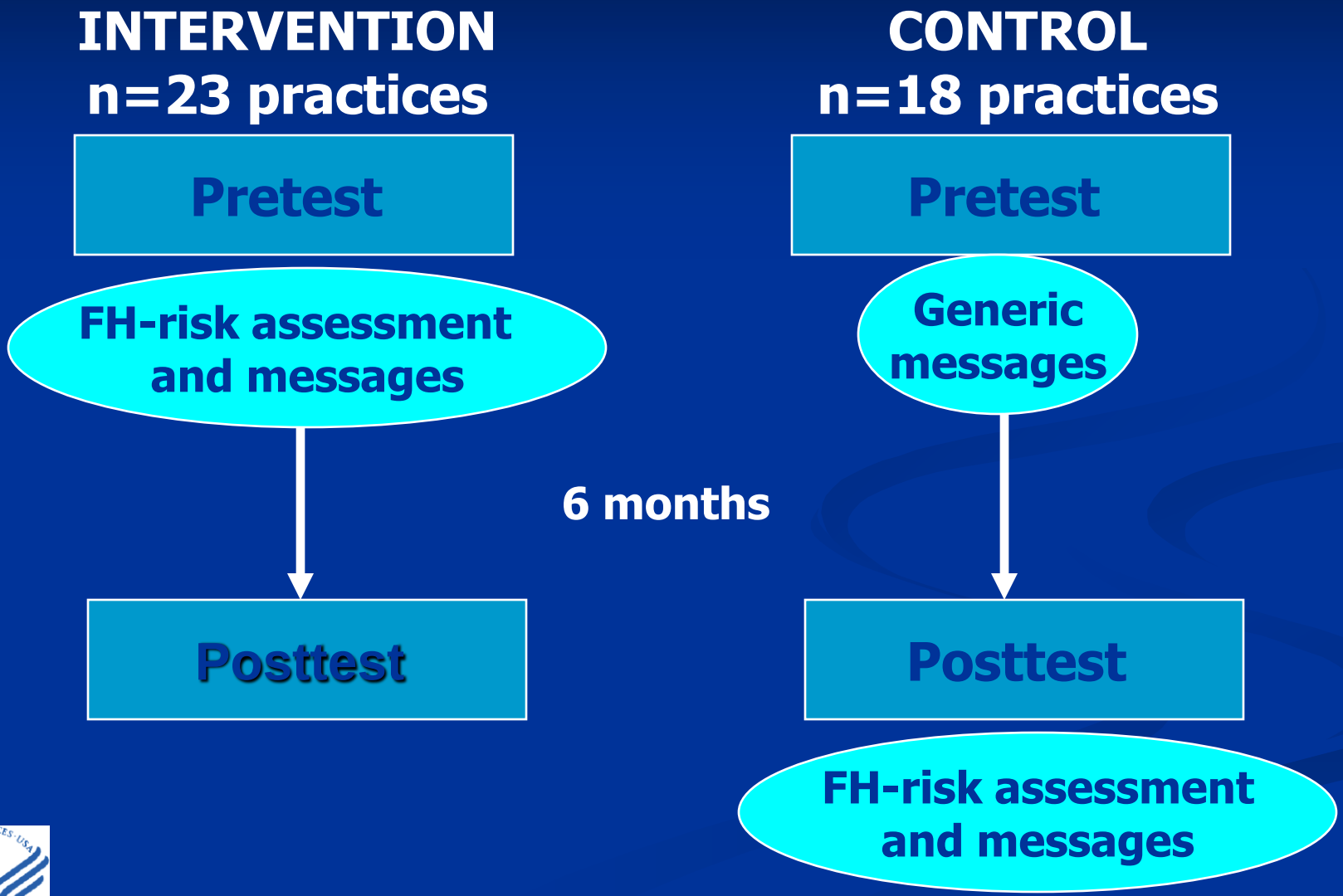
Will the risk notification and tailored messages using a family history tool change behaviors?

- use of clinical services
- lifestyle changes
- family communication

Family History Stratification & Intervention



Randomized Trial in Primary Care



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CDC Translation Research

Goal: Support research needed for evidence-based clinical and public health practice in genomics

Focus: Fill Evidence Gaps

identified by EGAPP & USPSTF reviews & recommendations

Research Objectives

Evaluations of validity, utility, ELSI
tests identified by EGAPP Working Group
egappreviews.org/workingrp/topics.htm

Effectiveness of interventions to increase use clinical practices recommended by the USPSTF for *BRCA* testing (use of family history & counseling & testing)
ahrq.gov/clinic/uspstf/uspsbrgen.htm

Research Objectives

Effectiveness of interventions to educate the public or providers about gaps in existing knowledge for tests and potential harms & benefits of tests for which an EGAPP review found insufficient evidence to support a recommendation

egappreviews.org/workingrp/reports.htm

Clinical utility of family medical history tools

Funded Project

D. Veenstra, U. WA.

Evaluate the clinical utility (improved health outcomes, value in clinical decision making) of:

- Warfarin pharmacogenomics
- Gene expression profiling for treatment of early stage breast cancer
- Factor V Leiden testing for pregnant women with clotting or adverse pregnancy outcomes

Collaborative process with stakeholders

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CDC Translation Program

Goal: Promote evidence-based clinical and public health practice in genomics

Focus: EGAPP, USPSTF reviews, recommendations

Supported activities: education, policy, surveillance, evaluation

Funded Project: MI Public Health

J. Bach, Michigan Department of Community Health

Multi-faceted, state-wide comprehensive program

Surveillance, health education, & policy

Translation of USPSTF *BRCA* recommendations into practice

Translation of EGAPP recommendations on hereditary colorectal cancer into practice

Evaluate effectiveness in changing knowledge, test use, insurance coverage

Funded Project: Los Angeles, VA

M. Scheuner, Sepulveda Research

Implement multi-component for primary care clinicians within Department of Veterans Affairs Greater Los Angeles Healthcare System

For hereditary breast-ovarian cancer & hereditary nonpolyposis colorectal cancer

Following USPSTF & EGAPP recommendations

Evaluate: family history documentation, referral of patients for counseling & testing

Funded Projects: Pharmacists

- G Kuo, University of California, San Diego
- Educational program with the American Pharmacists Association, the American Society of Health-System Pharmacists, & the American Association of Colleges of Pharmacy
- Increase pharmacists' awareness of current knowledge of validity & utility of pharmacogenomic tests, potential benefits & harms
- Focus EGAPP-evaluated tests
- Evaluate: education coverage, delivery, & cost

Funded Projects: Oregon

- K Bradley, Oregon Public Health Division
- Cancer genomics surveillance program of State's adult population & healthcare providers
- Monitor use of cancer-specific genomic tests & family history
- Focus on tests identified by EGAPP & USPSTF related to breast, colorectal, & ovarian cancers
- Evaluate: information completeness, quality & usefulness of information to others

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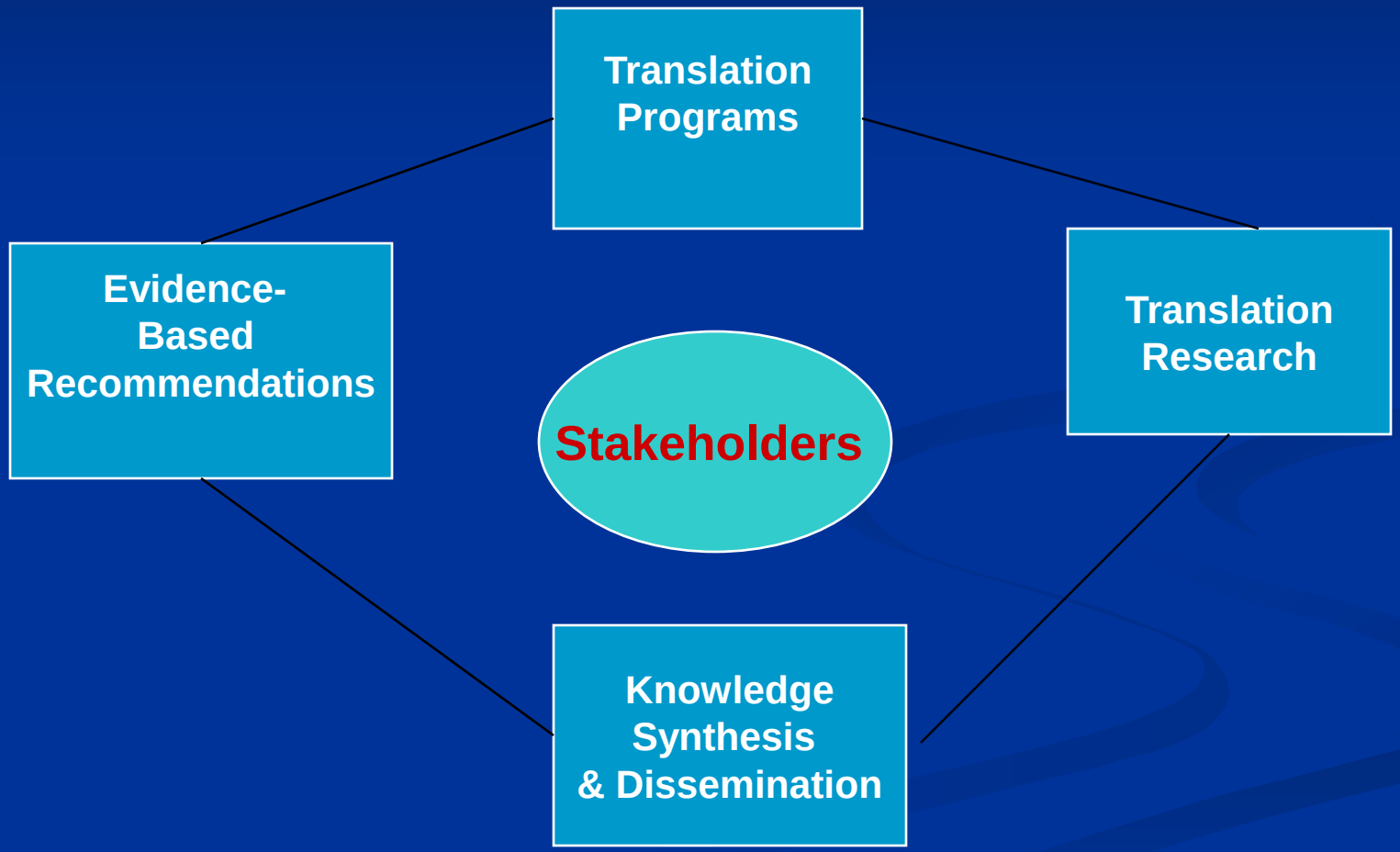
Genomic Applications in Practice and Prevention Network (GAPPNet)



Need for More Translation Research, Evaluation & Programs in Genomics

- Little or no research to guide translation to practice – 97% now in T0, T1
- Almost no infrastructure to implement newest genomic services
- Research, evidence reviews, & programs can benefit from information exchange (GAPPNet)

Khoury Genet Med 2007;9:665

Hudson K. Health Affairs 2008;27(6)1612-5.

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More information : Public Health Genomics
cdc.gov/genomics

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The findings and conclusions in this presentation are those of the author and do not necessarily represent the views of the Centers for Disease Control and Prevention.