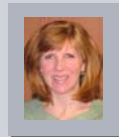


# Nursing Informatics: The Landscape for Today and Tomorrow

## Featured Speakers



**Ida M. Androwich**, PhD, RN-BC, FAAN  
Professor and Director of Health Systems Management & PICES,  
Niehoff School of Nursing, Loyola University Chicago



**Patricia J. Friend**, PhD, APRN, AOCN  
Assistant Professor, Niehoff School of Nursing, Loyola University Chicago

## Moderator



**Gail E. Latimer**, MSN, RN, FACHE, FAAN, Vice President, Chief Nursing  
Officer, Siemens Healthcare

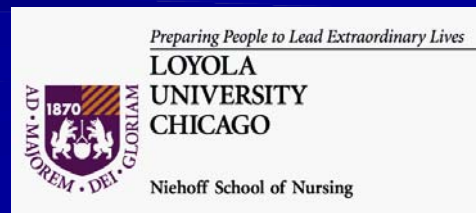
*April 2010*

# Nursing Informatics: The Landscape for Today and Tomorrow

April 29, 2010

**Ida M. Androwich, PhD, RN-BC, FAAN**  
Professor and Director of Health Systems Management & PICES,  
Niehoff School of Nursing, Loyola University Chicago

**Patricia J. Friend, PhD, APRN, AOCN**  
Assistant Professor,  
Niehoff School of Nursing, Loyola University Chicago



# Objectives

1. Discuss the role of nursing informatics in healthcare organizations today
2. Articulate types of activities that clinicians in nursing informatics might perform
3. Understand new areas of research for nursing informatics and how nursing informatics could play a role

“....all of that hands-on work is extremely important, but after they have mastered those skills, they begin to see that what matters the most is whether you can assess the patient, you can intervene early, you can prevent disaster. And that takes your brain, not your hands. At the end of the day, I need a nurse who is a knowledge worker.”

Karen Haller, Hopkins (2006)

“...decade of HIT” - (USDHHS, ONCHIT, 2004)

Genomic health care and interaction between genetic factors and environment require new understandings of types of information needed to meet decision needs – characterized as a “Data Tsunami” (NLM Strategic Plan) (in Bakken, et al, 2008)

“Why the Obvious has Taken so Long” (Shortliffe, 2005)

# From Industrial Age to Information Age.....

## Old Way (Industrial Age of Healthcare)

- Care episodic – provided in traditional settings
- **Provider centric**
- Clinical data interpretation limited by memory, intuition, pattern recall
- Knowledge development is produced in research settings
- Mass production

## New Way (Information Age)

- Care is ongoing – patient is the point-of-care
- **Patient centric**
- Clinical data is (often) supported by CDSS, alerts, reminders, evidence
- Knowledge development is by-product of patient care
- Mass **customization**

*Adapted from J. Perlin (2009)*

## Any Differences Between Panels (Patients)?

1) None, 2) One to Two, 3) Three to Four, 4) Five or more



# Dual Nature of Information Needs for Patient Care Decision Support

- First, evidenced-based information (content) needs to be available at the point-of-care to inform **present** patient encounter.
- Second, data entered in the process of documentation needs to be able to be aggregated to inform **future** patient encounters

# Goal

## ■ New Knowledge as a Transparent By-Product of Care:

- *From “TRIP” (Translating Research into Practice)*

*to*

- *“TPIR” (Translating Practice into Research (and evidence of value and quality))*

(Perlin, 2009)

# Nursing Informatics Research Agenda for 2008-2018

## ■ Genomic Health Care

- Genomes to Biology, to Health, to Society
- Bio-**Nursing** Informatics Role

## ■ Shifting Research Paradigms

- Interdisciplinary, Translational
- Comparative Effectiveness Research
- Practice-based Research Designs

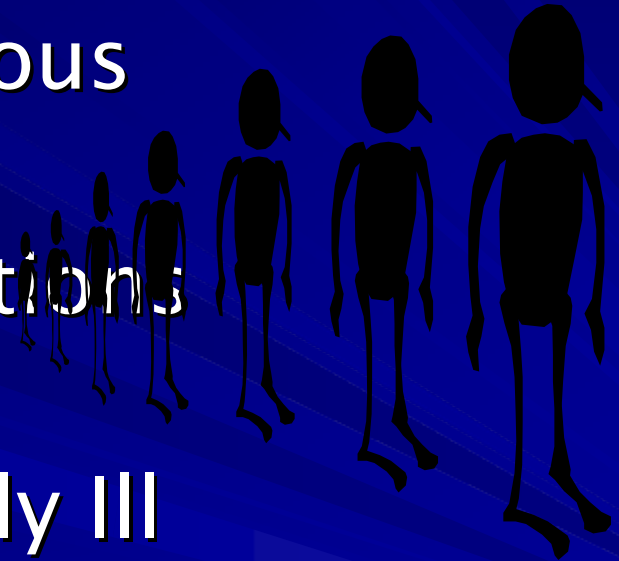
## ■ Social (Web 2.0) Technologies

- Blogs, Wikis, Podcasts, Facebook, etc

■ (Bakken, et al, 2008, Nursing Outlook)

# Special Populations & Problems

- Vulnerable and Underserved
- Chronically Ill, Infectious
- Cardiac, Diabetic
- Individuals with Infections
- Obese and Immobile
- Elders, Teens, Mentally Ill
- Physically and Mentally Handicapped
- Individuals with Health Literacy Issues



# Meaningful Use

- HHS' definition of **meaningful use** will include an organization's ability to use health IT to **improve quality and "inform clinical decisions at the point of care."**

David Blumenthal, national coordinator for health information technology

- Includes:
  - Full interoperability
  - Patient safety and quality reporting
  - Clinical documentation for physicians and the rest of the clinical team
  - Training and ongoing technical assistance to the clinical team to promote optimal exchange of information.
- Phased approach to implementation

# AAN - Meaningful Use R/T Nursing

## Include:

- All care settings and providers (includes ambulatory care sites and nursing care givers)
- Data not typically captured in encounters or information systems – such as problems, interventions and outcomes r/t functionality for use in comparative effectiveness research
- Real time evidence-based decision support

AAN, 2009

# Alliance for Nursing Informatics (ANI) Recommendations - 10/09

- Leaders in the Effective Design & Use of EHR Systems
- Integrators of Information
- Full Partners in Decision Making
- **Care Coordinators Across Disciplines**
- **Experts to Improve Quality, Safety, Efficiency and Reduce Health Disparities**
- **Advocates for Engaging Patients and Families**
- Contributors to Standardize Infrastructure within the HER
- Researchers for Safe Patient Care
- Educators for Preparing the Workforce

# Importance of Care Coordination

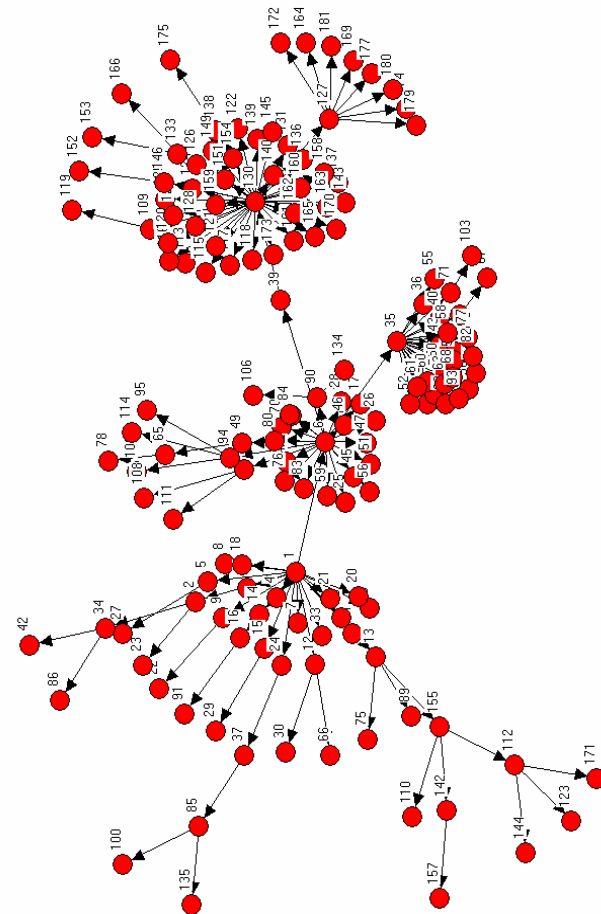
- Need good, technology-enabled models for care coordination
  - Models for care transitions/hand-offs
  - Models for special populations
  - Models for “medical” homes
  - Interdisciplinary/Inter - and Intra-professional models

# Decision Support Systems and EBP

- The delivery of evidence-based knowledge integrated within the EHR to support decision making is complex and involves a variety of skills
- Clinical decision support (CDS) “dashboards”
- Focus on populations at risk
- Syndromic surveillance (example)

# IT and Public Health Emergencies

- Initial detection – find first event
- Situational awareness and subsequent detection – identifying other possible cases
- Quantification – how many people are ill?
- Localization – where is it taking place?
- Investigation – demographics, etiology, conveyance
- Outbreak management – confirming true cases, tracking who was exposed
- Countermeasure administration – prevention information, isolation, prophylaxis, vaccination



**SARS cases in Singapore**

# Common Barriers to Adoption of Clinical Decision Support (CDS)

- Limited implementation of EMRs and PHRs
- Lack of standards
- Absence of a central repository or knowledge resource
- Poor support for CDS in commercial EHRs
- Alert fatigue
- Challenges in integrating CDS into clinical workflow
- Limited understanding of organizational & cultural issues relating to clinical decision support

# What is a PHR?



## ■ Historical

- “Birth to Seven Years”
- 1953 – MedicAlert bracelet
- Paper-based tracking of B/P, weight, glucose

## ■ Today

- Estimated 70 million have some form of PHR

## ■ Broad range of definitions and types

## ■ Independence continuum from tethered to interconnected to standalone

## ■ PHRs integrated with EHRs, either through tethering or interconnectivity, have the potential for greatest impact.

# Functionalities and Tools



- Access to providers electronic record, history, test results
- Personal health organizer, clinics, providers, tests, dates, non-prescribes therapy, scanned documents
- Self-management support, e.g. care plans, symptom graphing capabilities, passive biofeedback, tailored instructional or motivational feedback, decision aids, reminders, alerts
- Secure patient-provider communications for scheduling appointments, reorder Rx, seeking advice
- Links to static or interactive information about illness, treatment or self care
- Automated capture of symptoms or health behavior data

# Functionalities and Tools

(continued)



- PHRs connected to home monitoring tools
- Health care/disease management tools
- Linkages to education – the “teachable moment”
- Tools to build health literacy
- Links to decision support
- Single source for living wills/advance directives, health history, emergency contacts, allergy and immunization records, medications
- Health-related social networking



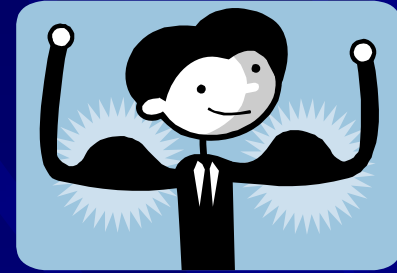
# Barriers to Adoption

- Barriers are at environmental, technical, and individual levels





# Do Providers Really Want Empowered Consumers?



- PHRs are an enabling technology
- PHR is likely to transform the provider-patient relationship
- Stethoscope had a profound impact on care; limited the value of the subjective (what the patient says)
- PHR has the power to create a more “balanced” view of the patient.

# Completed Research: Things We Know

- Consumer acceptance
- Provider acceptance
- Desired functionality
- Many vendors and providers already have tools available



# Research Gaps: Things We Need to Better Understand

## How to best move from concept to practical application?

- Function evaluation – collection, sharing, exchange and self-management of information
- Adoption and attitudes – focus on specific populations, trends, associated factors
- Privacy and security – data control, balance between access and security,
- Architecture – data, infrastructure and applications
- Cost and the business case for PHR



# Interactive Voice Response Technology (IVR)

- Method of patient communication & data collection which is increasing in utility with advances in HIT
- Can be combined with personal health records
- Automated reminders & alerts
- Can be used effectively in care transitions
- Examples of uses

# Regional Health Information Organizations (RHIOs) and a Nationwide Health Information Network (NHIN)

## Exchange of electronic health information to:

- improve the quality / efficiency of health care
- empower the individual patient
- support public health, emergency preparedness, and research

## Requires common elements:

- minimum set of detailed standards - a shared network “dial tone”
- support for consumer / inter-organizational trust
- value of exchanging data exceeds the cost

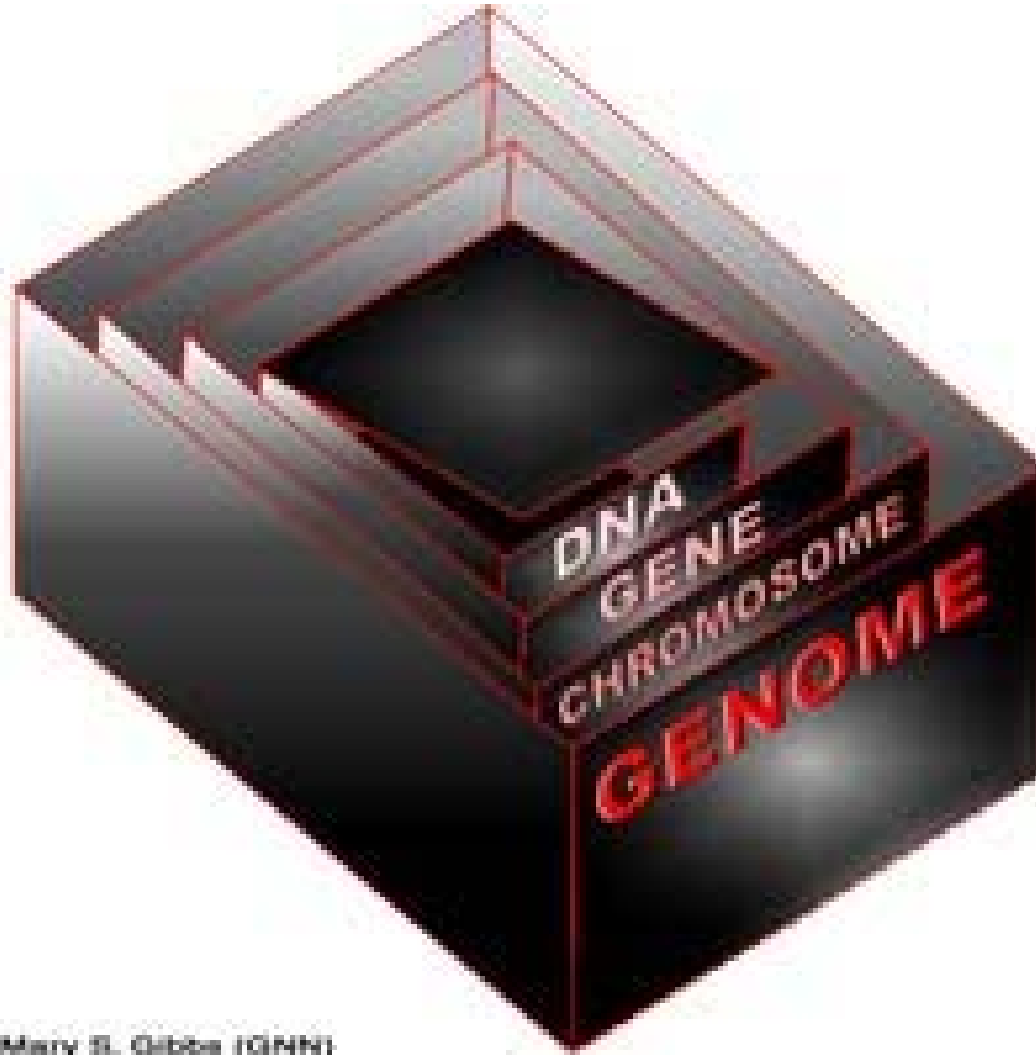
# Health Record “Banking”



Health record systems used today for recording and maintaining health records are “nonstandard, partitioned, and consumer-hostile” (Gold, JD and Ball, MJ, 2007)

- Proposed alternative to RHIOs and NHIN
- Emulate commercial banking
- Provide a means for financial independence and a mechanism for fostering medical research
- Structured to have **envelope information** (metadata used for searching record) and **letter contents** (complete data)

# Genetics or Genomics?

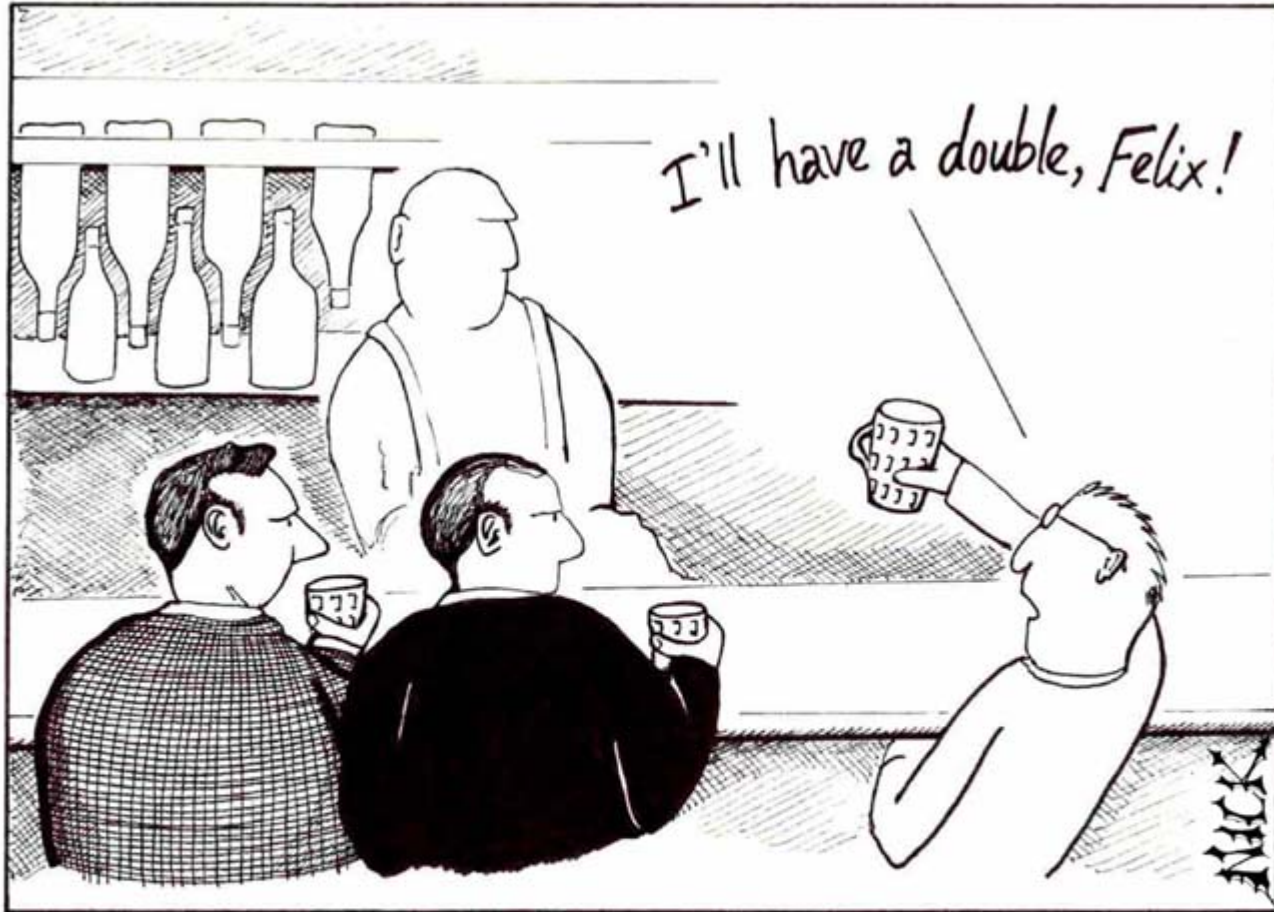


Mary S. Gibbs (GNN)

[http://www.genomenewsnetwork.org/resources/whats\\_a\\_genome/Chp1\\_1\\_1.shtml](http://www.genomenewsnetwork.org/resources/whats_a_genome/Chp1_1_1.shtml)

# ***Why do ALL health care professionals need to know Genomics?***

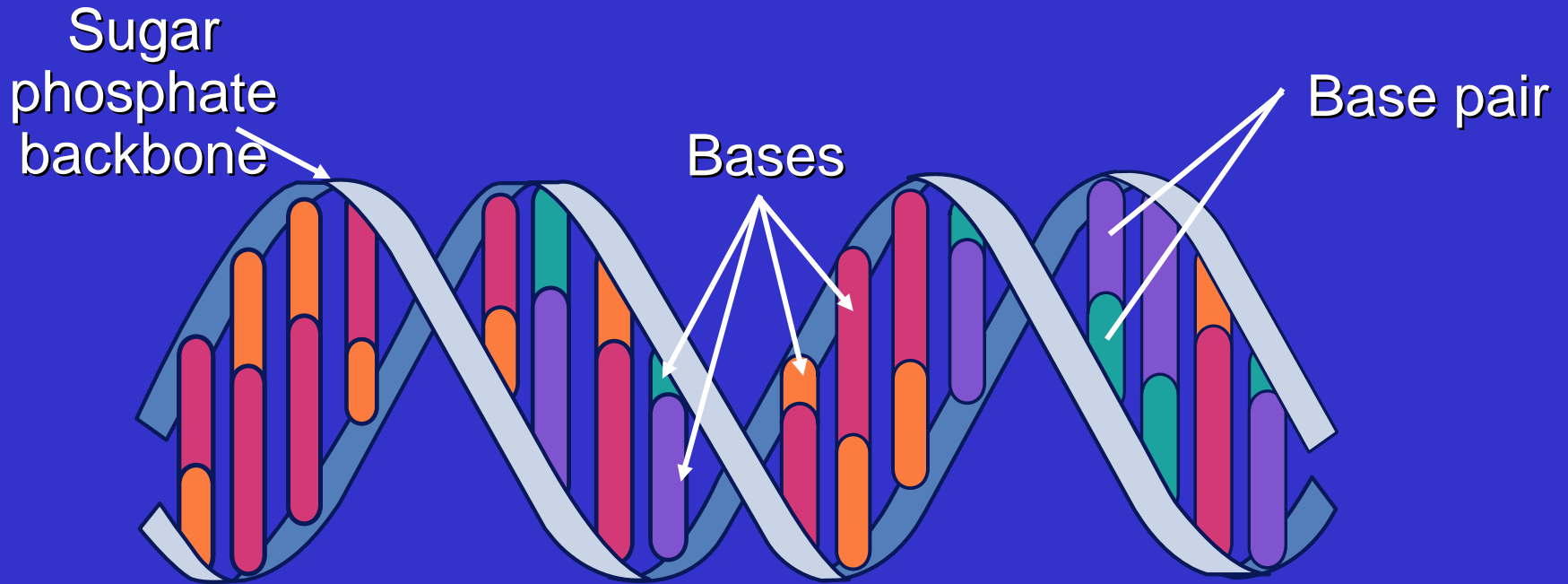
- Because your practice will be based on genetics/genomics
- Understanding implications of genetic/genomic information and impact of such on patients and families
- Need to build databases to support and enable use of genomic information
- You are already using genetic information in your practice







Cambridge, 1953. Shortly before discovering the structure of DNA, Watson and Crick, depressed by their lack of progress, visit the local pub.

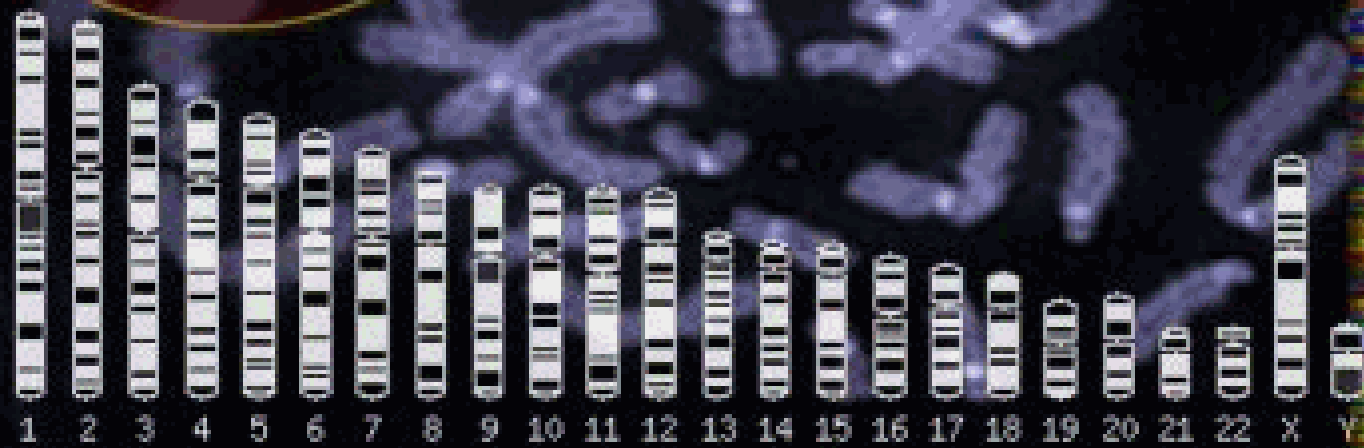
# The DNA Double Helix

---



- |   |             |  |              |
|---|-------------|--|--------------|
|  | Adenine (A) |  | Cytosine (C) |
|  | Thymine (T) |  | Guanine (G)  |

# Human Genome Project



3 billion basepairs

“If genomic innovations have great power to help, they also have power to harm, and patients and the public deserve a rigorous evaluation of what scientists bring to the table. It will not be easy. Genomic medicine presents profound challenges. Never before has the gap between the quantity of information and our ability to interpret it been so great. Whole-genome sequencing will produce abnormal results in all who are tested: everyone will have positive results, false positives and false negatives. Some results may prove harmful; some will be useless. Preserving the health benefits of genomics while minimizing the harms will be an important research goal.”

**Muin J. Khoury, James Evans  
and Wylie Burke** *Nature* Vol  
464|1 April 2010



# The Future: Per the crystal ball of Francis Collins



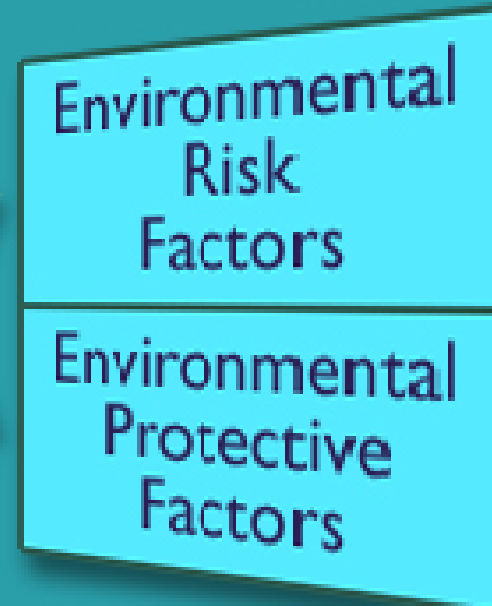
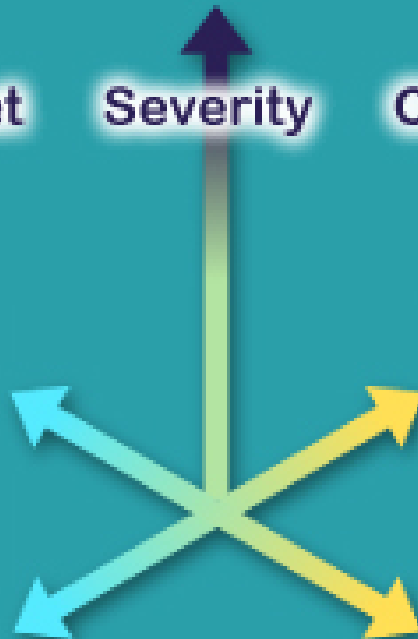
- 2010: genetic testing for 25 common conditions
- 2020: gene-based designer drugs available, genetic diagnosis and treatment of mental illness
- 2030: genes for aging fully elucidated, \$1000 genome
- 2040: complete genomic-based health care will be the norm, average lifespan will be 90

# Disease Status

Age of Onset

Severity

Clinical Symptoms



# Genomic or Personalized Medicine

***“Personalized medicine uses new methods of molecular analysis to better manage a patient’s disease or predisposition toward a disease. It aims to achieve optimal medical outcomes by helping physicians and patients choose the disease management approaches likely to work best in the context of a patient’s genetic and environmental profile.”***

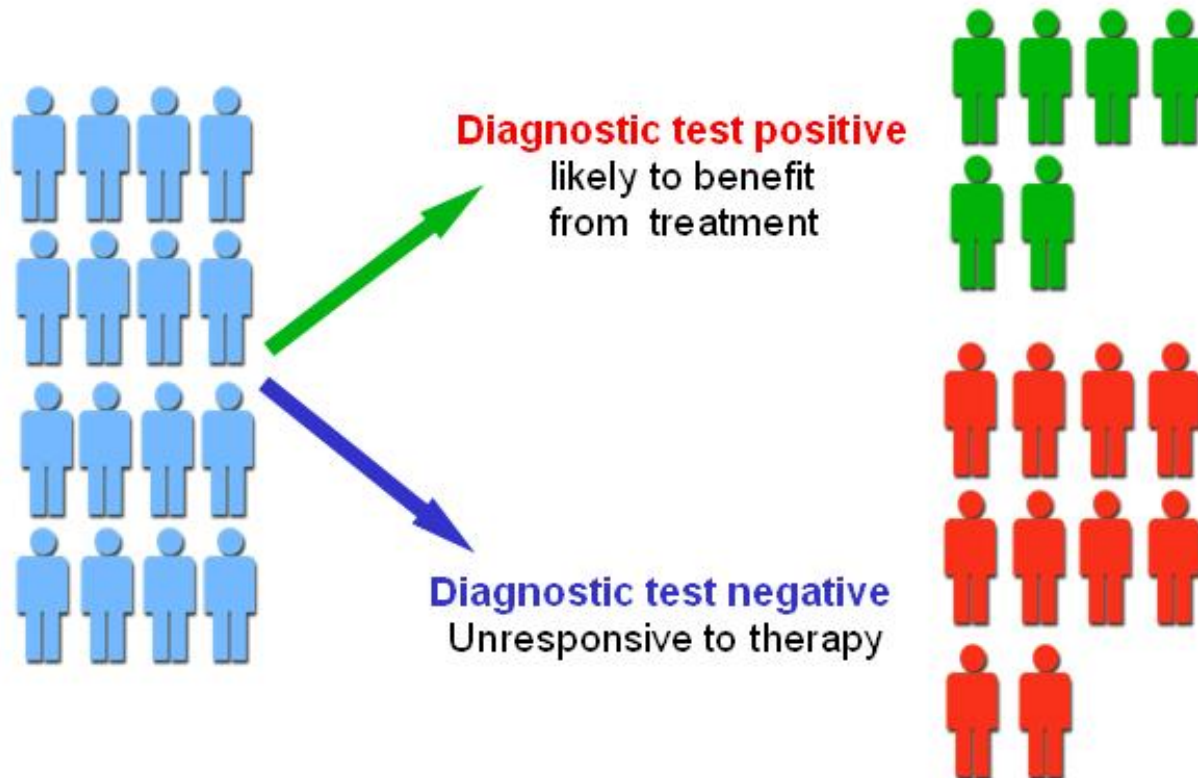
<http://www.personalizedmedicinecoalition.org/>



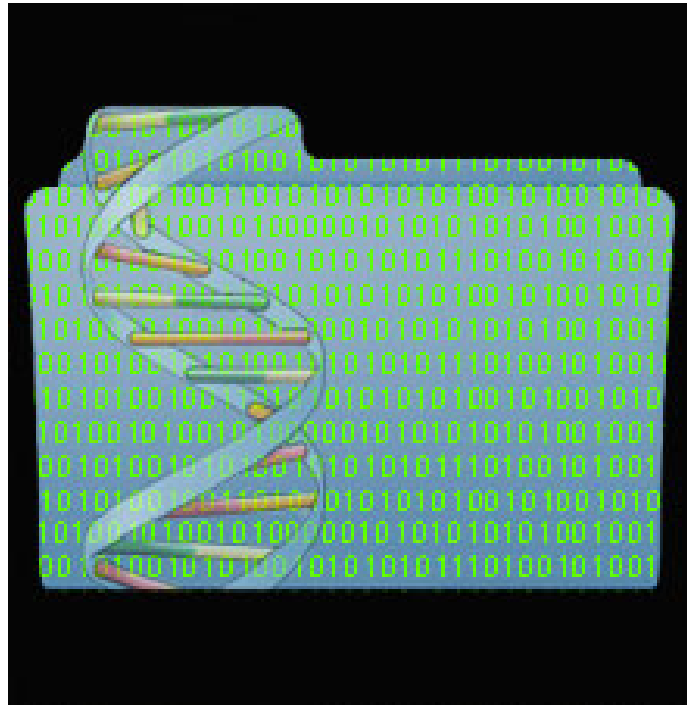
**Genetic Variants and Risk of Lung Cancer in Never Smokers: A Genome-Wide Association Study Lancet Oncol. 2010 Mar 15**



## Personalised medicine: future vision



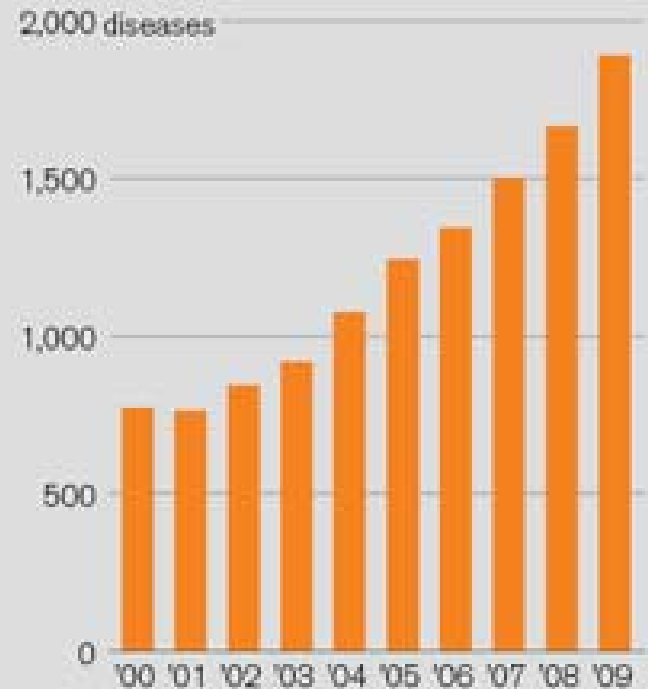
# “data tsunami”



## TEST EXPLOSION

The number of genetic tests available for clinical and research purposes is rapidly increasing.

Diseases for which testing is available



Source: NCBI

# 2007: The Year of GWA Studies

**BREAKTHROUGH OF THE YEAR**

## Human Genetic Variation

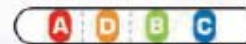
Equipped with faster, cheaper technologies for sequencing DNA and assessing variation in genomes on scales ranging from one to millions of bases, researchers are finding out how truly different we are from one another

THE UNVEILING OF THE HUMAN GENOME ALMOST 7 YEARS AGO cast the first faint light on our complete genetic makeup. Since then, each new genome sequenced and each new individual studied has illuminated our genomic landscape in ever more detail. In 2007, researchers came to appreciate the extent to which our genomes differ from person to person and the implications of this variation for deciphering the genetics of complex diseases and personal traits.

Less than a year ago, the big news was triangulating variation between us and our primate cousins to get a better handle on genetic changes along the evolutionary tree that led to humans. Now, we have moved from asking what in our DNA makes us human to striving to know what in my DNA makes me me.



Inversion



Insertion



Deletion



Copy number variation

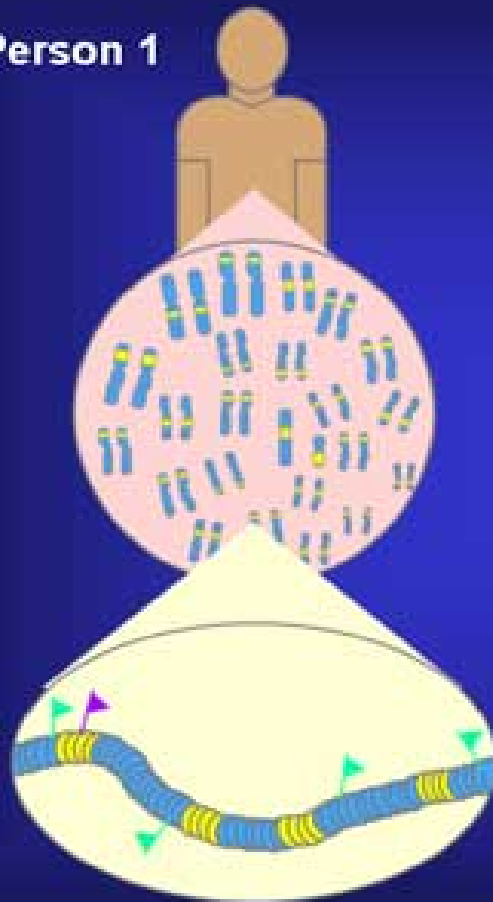
**What makes us unique.** Changes in the number and order of genes (A–D) add variety to the human genome.



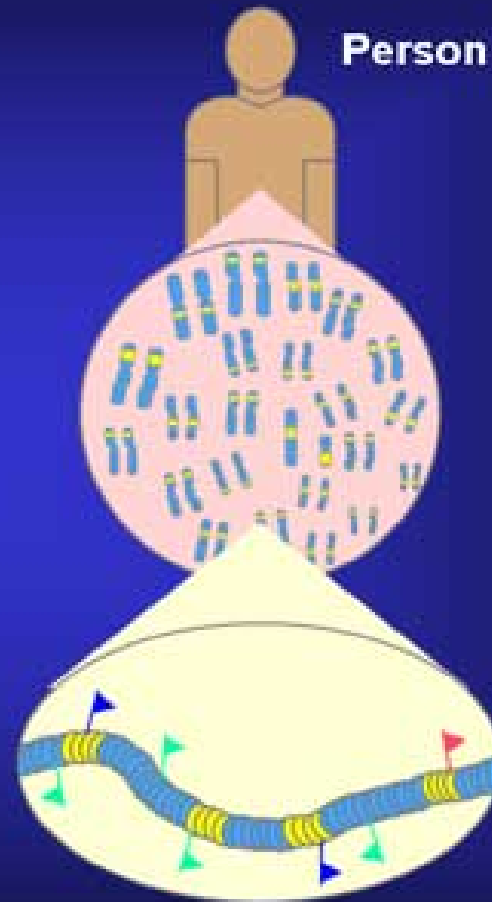
Reference

# Variation in the Human Genome

Person 1

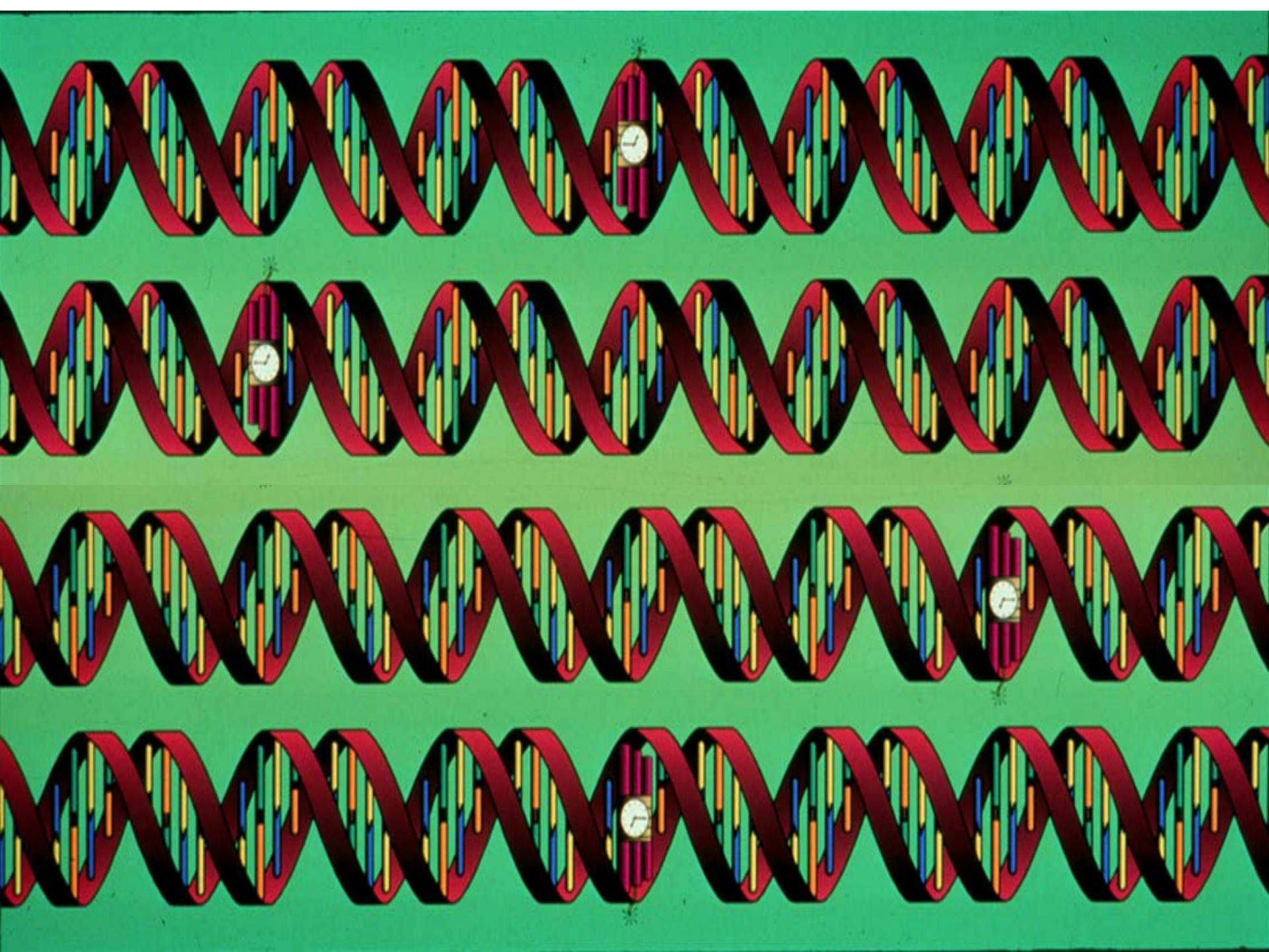


Person 2

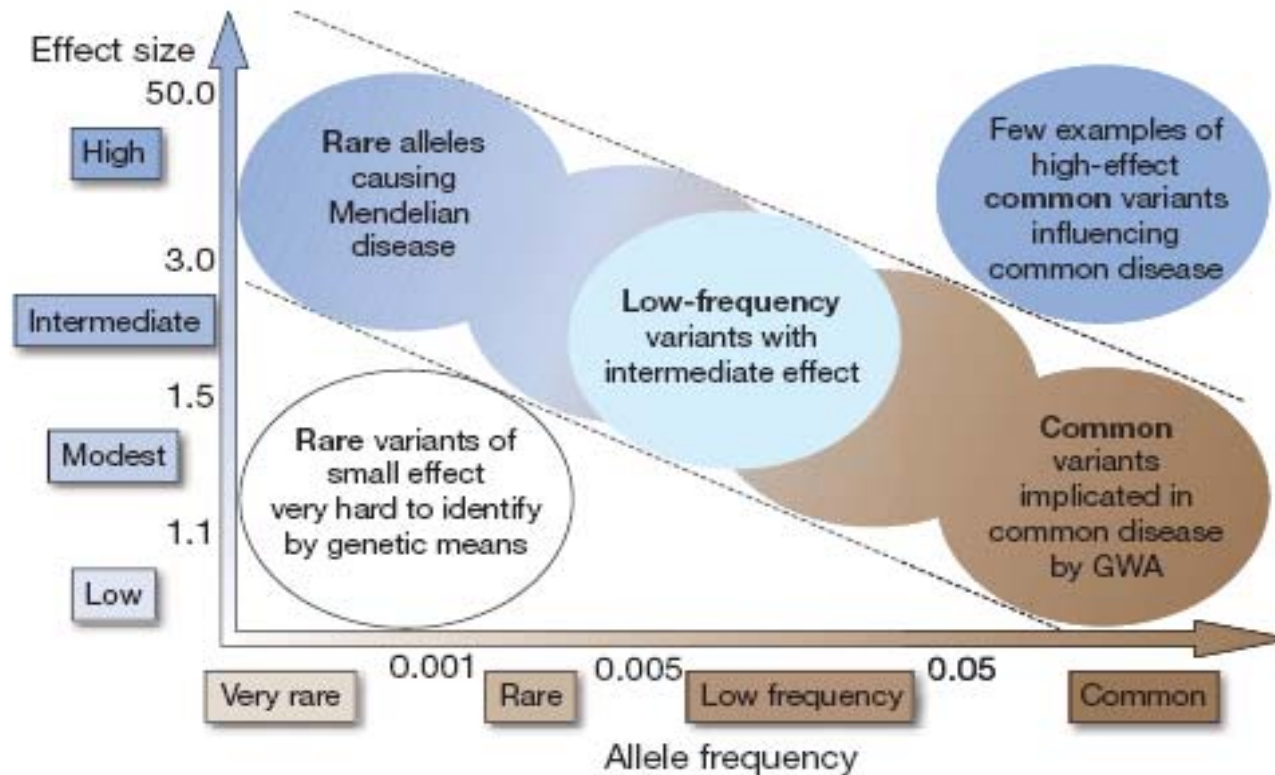


Adapted by Jennifer Kelly, © 2008

 = Variations in DNA



# Genome-Wide Association Studies



**Figure 1 | Feasibility of identifying genetic variants by risk allele frequency and strength of genetic effect (odds ratio).** Most emphasis and interest lies in identifying associations with characteristics shown within diagonal dotted lines. Adapted from ref. 42.

**Manolio, TA et al. (2009) *Nature* 461, 747-753**

# How much “heritability” is explained by GWA studies?

**Table 1 | Estimates of heritability and number of loci for several complex traits**

Disease	Number of loci	Proportion of heritability explained	Heritability measure
Age-related macular degeneration <sup>72</sup>	5	50%	Sibling recurrence risk
Crohn's disease <sup>21</sup>	32	20%	Genetic risk (liability)
Systemic lupus erythematosus <sup>73</sup>	6	15%	Sibling recurrence risk
Type 2 diabetes <sup>74</sup>	18	6%	Sibling recurrence risk
HDL cholesterol <sup>75</sup>	7	5.2%	Residual* phenotypic variance
Height <sup>15</sup>	40	5%	Phenotypic variance
Early onset myocardial infarction <sup>76</sup>	9	2.8%	Phenotypic variance
Fasting glucose <sup>77</sup>	4	1.5%	Phenotypic variance

\* Residual is after adjustment for age, gender, diabetes.

**Manolio, TA et al. (2009) *Nature* 461, 747-753**

# EMR-linked Biorepositories



## The eMERGE Network

electronic Medical Records & Genomics

*A consortium of biorepositories linked to electronic medical records data  
for conducting genomic studies*

Main Menu

The eMERGE Network

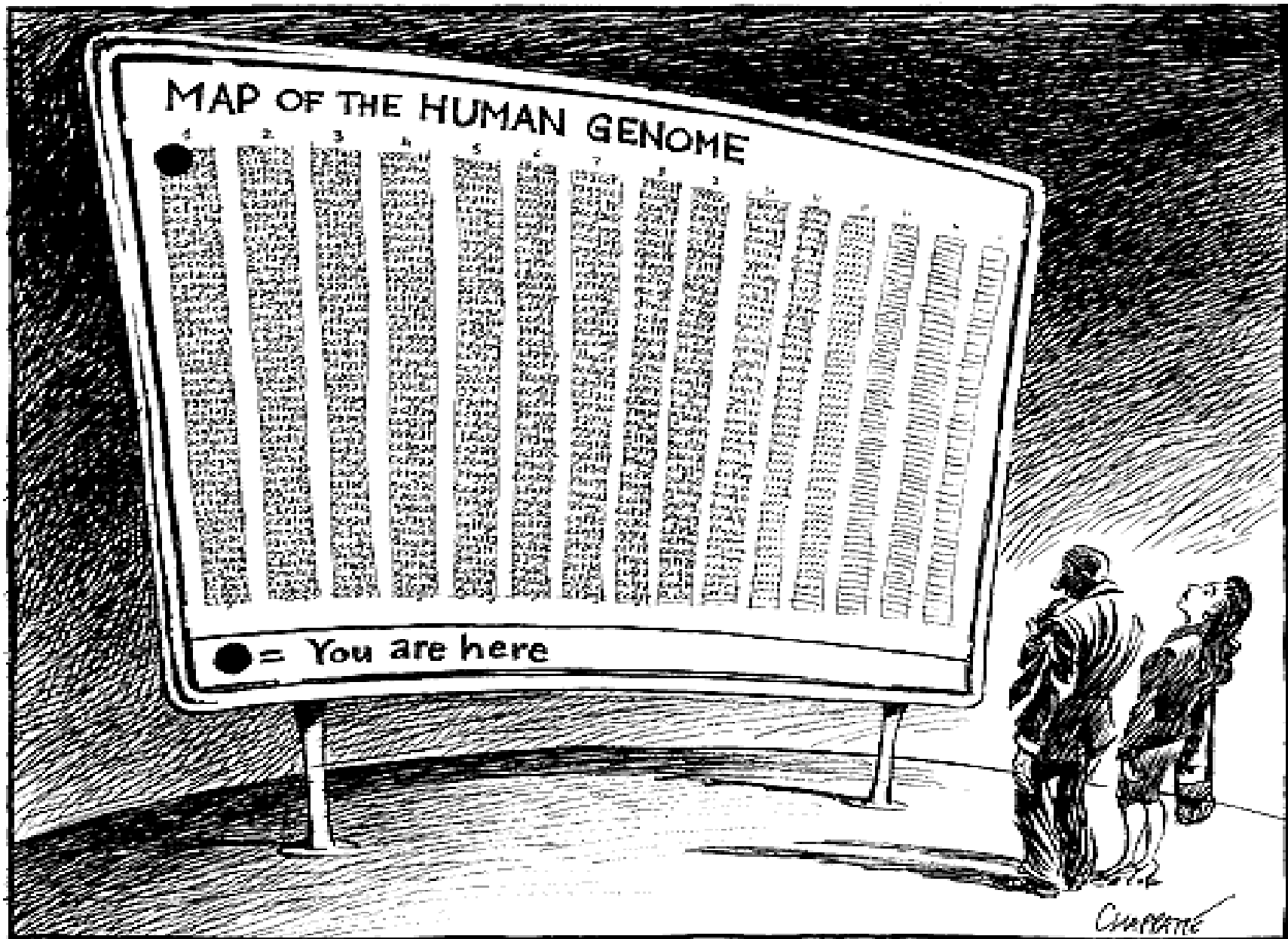
[https://www.mc.vanderbilt.edu/victr/dcc/projects/acc/index.php/Main\\_Page](https://www.mc.vanderbilt.edu/victr/dcc/projects/acc/index.php/Main_Page)

# Genome-Enabled Electronic Medical Record (GenE EMR)

- Knaus et al., University of Virginia, funded from NCI to develop an EMR that adds genetic/genomic data to clinical information in electronic health records.
- collection and sharing of family history (using Surgeon General's tool) and personal risk factor data, including genomic data

# Challenges

- Goal is to go from de-identified data repositories to one's that are patient-specific
- ELSI Issues
  - Privacy and confidentiality: Genetic Information Nondiscrimination Act (GINA), signed into law in 2008



# Increased Value Requires IT

1. Economic pressures will accelerate **value-based** healthcare
2. Value-based healthcare creates accountability for measured performance
3. Value will increasingly be measured longitudinally across sites and episodes-of-care, and reinforced through payment reforms like “bundling”
4. Longitudinal accountability for health and care spans traditional silos & requires “system-ness”
5. Information is the key to system-ness, producing value, and proving it

(Perlin, 2009)

# One Step at a Time



- Goal is transforming, not merely automating a “broken” system
- Spending more and ignoring current ineffective and inefficient system is not answer

## Considerations:

- Technology must be used to transform system – a means, not an end
- Consider incremental change – “restrained incrementalism”
- Seek common priorities and values
- Shift incentive strategies toward meaningful patient outcomes
- Focus on functional components of EHR, PHR
- Emphasize ongoing research, including comparative effectiveness

(adapted from Mark Frisse, 2009)

# Potential Future Applications



# Contact Hour Credits



## In order to receive contact hours for today's session:

- Complete the evaluation form by click on the evaluation link located on the left-side of your viewing console. Or you can access the survey directly at:  
[https://www.smed.com/nurse2010\\_survey/default.asp?wid=7](https://www.smed.com/nurse2010_survey/default.asp?wid=7)
- Once completed, print out your certificate for Continuing Nursing Education Credits of 1.0 contact hour offered by Corexcel.
  - *please be sure to check the box located on the evaluation form to enable the print function*

## Upcoming Siemens Webcast Topics

### Contact Information:

**Gail E. Latimer**, MSN, RN, FACHE, FAAN, Vice President,  
Chief Nursing Officer, Siemens Healthcare  
[gail.latimer@siemens.com](mailto:gail.latimer@siemens.com)

### Siemens Nursing Informatics Webcast Series Continues:

- **6/7/2010 - Integrating Evidence Based Practice as a Foundation for Care Delivery**
- **Patricia S. Button, EdD, RN**  
Chief Nursing Officer and Director of Nursing Content, Zynx Health

### For More Information

To view previous webcasts in this series or to learn more on how healthcare IT can help tackle the challenges clinicians face today visit Siemens Clinical Gateway at:  
[www.usa.siemens.com/clinicalgateway](http://www.usa.siemens.com/clinicalgateway)

# Thank you

for attending this session.

# Questions and Discussion

