

Precision Medicine: an Overview

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Precision Medicine

- Requires analysis of big data
 - Genes, exposures, lifestyle
- Identify “actionable” markers
- Results in personalized treatment of individuals affected by disease

Requires

- Team science
- Data sharing
 - How do you share and preserve privacy?
 - How do you share and maintain ownership of the data?
 - Who own the data?
 - Who should have access to data?
 - Insurers, employers, family members, the patient

Who will pay?

- Will coverage be equitable?
- Will knowledge of the genomic data influence
 - Treatment choice?
 - Insurance coverage of therapy?
 - Is the condition *worth* treating?

Requires: The Patient

- Patient donation
 - Who owns your genes?
 - Who owns discoveries from your genes?
- What does this mean for informed consent?
 - If we don't even know what tests might be performed on the DNA, how can consent be informed?

- How can I care about my genes if I don't have food in my fridge?
 - My patient

- What will you do with my lock of hair? Are you a witch doctor?
 - The NCI Sister Study

- What if you find that I am not who I think I am? Will I be erased?
 - PM Conference American Indian

Requires

- Patient engagement: inclusion
 - Medically underserved
 - Historically underrepresented in biomedical research
 - Experienced systematic social disadvantage

Results in disparities in health

If diverse populations do not participate

- Perspective/outcomes will be limited
- Clinical outcomes may worsen
- Disparities may grow

BioBank Participation: e.g. Latinos

- Openness to participation: 90%+
- Cancer Genome Atlas: <3%
- NCI's Cancer Epi Cohort: 4%
- Barriers: health literacy, language access, immigration status, cultural norms, trust

Trust

- Less of a barrier in foreign born
 - May relate to country of origin
 - Reason for migration
- More of a barrier in native born
 - Interaction with SES
 - Historical trauma

Variables

- Variables to consider: SES, race/ethnicity, health literacy
- Stress: may trigger biological processes that are co-factors in chronic disease development
- Explains: similar genetic makeup, similar exposures, *variable outcomes**

...it's complex

Complexity of human organism and illness

- Non-linear relationship
 - Multiple genes, continuous evolution
 - Variable Genotype/Phenotype relationship
 - Risk prediction does not always result in risk reduction behavior*

Question

- Will a focus on precision medicine, by definition, limit the focus to individual-based solutions instead of the health of the population?

Precision Public Health

- Genomic data can help:
 - stratify at risk populations
 - improve efficiencies in prevention and treatment strategies
 - result in targeted prevention* and treatment

Mass P, et al, JAMA Oncol; May 26 2016, online
Khoury MJ, Evans JE, JAMA. 2015; 313 (21); 2117-8

- Link populations to measurable and actionable outcomes
- Identify subpopulations: risk stratified by community – people and geography
- Interplay between genomics and population-level interventions: housing, nutrition, poverty, access to resources, education

Precision Public Health: the Future

- Genomic data used to
 - Prevent disease, promote health, and reduce health inequities
- Methodically measuring disease
- Developing targeted non-pharmaceutical interventions to improve health

Precision approaches for populations

Precision Medicine Entails

- Individual factors
- Macrolevel factors
 - Determinants of Health!

Thank you!

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