

Think Genomically...

Act Locally



WREN 2004 Annual Meeting

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Overview

- Introduce concept of genomics in public health
- Give examples of how genomics affects our workplaces, homes, and communities
- Propose strategies to prepare today's public health programs for tomorrow's genomics tools



Genetics or Genomics?

- Genetics: The study of single genes and the effects of these genes
- Genomics: The study of the functions and interactions of all of the genes in the genome, including their interactions with environmental factors

– Guttmacher AE, Collins FS. Genomic medicine: a primer. *New Engl J Med* 2002; 347:1512-1520.



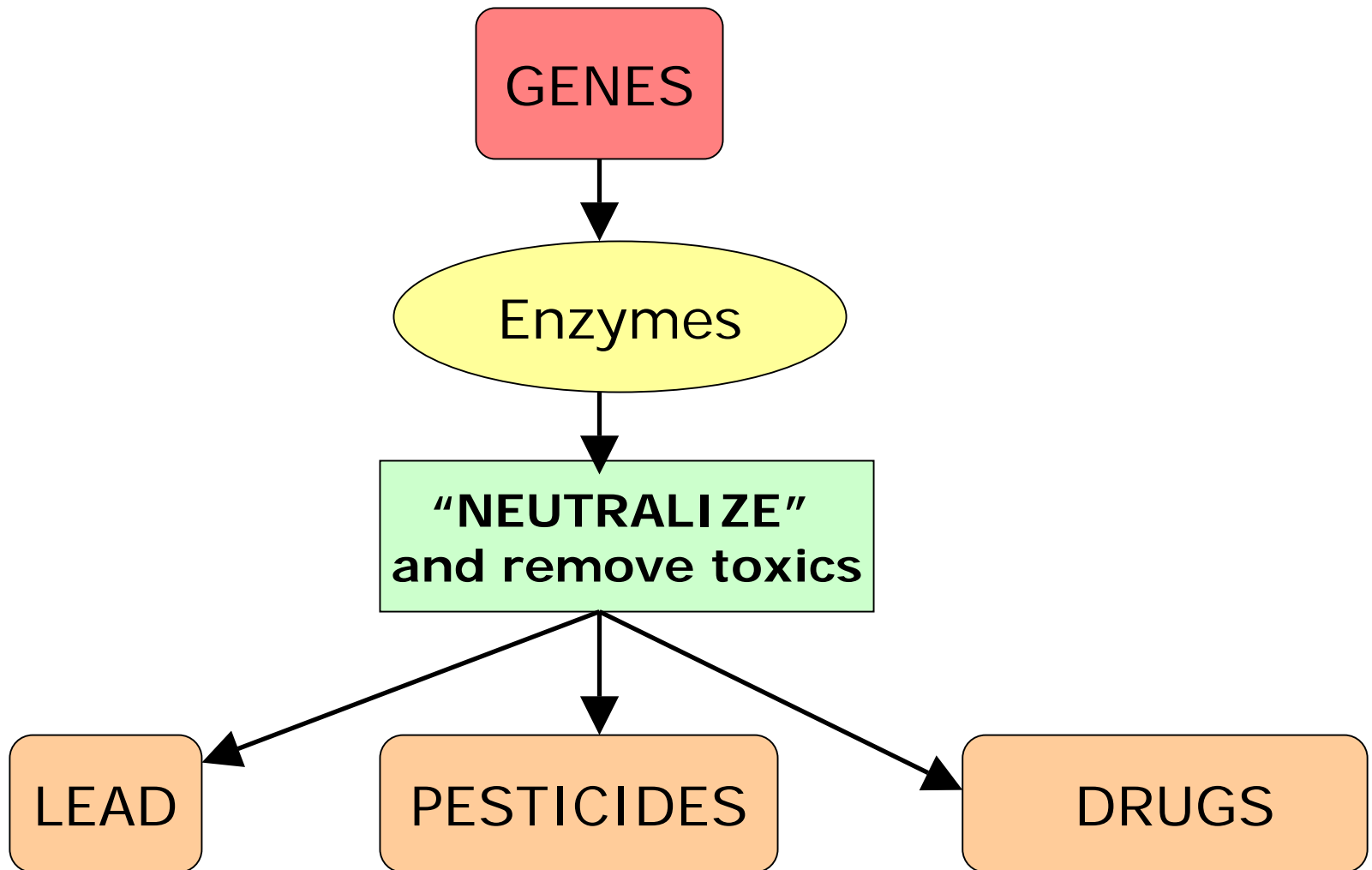
Traditional Public Health Genetics

- Rare diseases
- Single gene disorders
- Public health activities
 - Newborn screening
 - Prenatal diagnosis
 - Reproductive genetic services

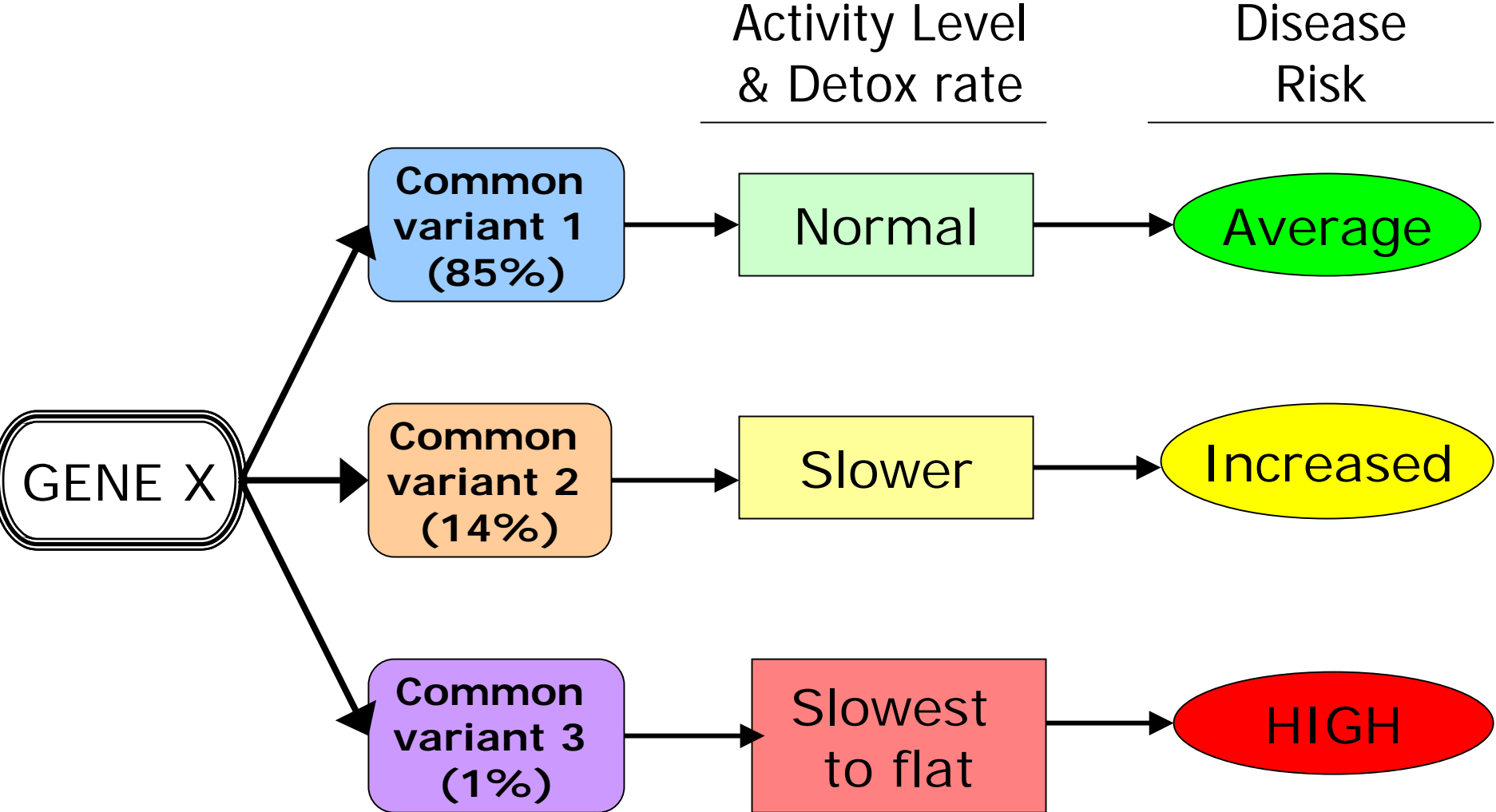
“New” Genomics in Public Health



Genes and Exposure



Genetic variation affects disease risk





Example 1: Exposures modified by genetic variation

- Beryllium manufacturing
 - Chronic beryllium disease (CBD)
 - Immune system disease
 - 1-5% beryllium workers have CBD
 - Up to 12% immunologically sensitized
 - 36%-100% of sensitized will develop CBD
 - Mediated by HLA-DP1



Example 2: Exposures modified by genetic variation

- Organophosphate pesticides in agriculture work
 - Pesticide toxicity caused by Organophosphate exposure
 - Symptoms mild to severe
 - Mediated by PON1/paraoxonase gene



Example 3: Exposures modified by genetic variation

- Lead in home and industry
 - Toxicity mediated by ALAD genotype
 - ~20% Caucasians have common gene variations
 - Variations may cause differences in
 - Post-exposure blood lead levels
 - Storage of lead in bone
 - Neuropsychological outcomes

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Keep up with genetic advances

- **Subscribe** to the CDC Genomics & Health Weekly Update
- **Read** the Public Health Perspective series on Genomics
- **Get to know** your state genetics program staff



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Integrate genetic information to make your programs more effective.

- **How** do genetic predispositions and environmental triggers interact to produce the disease I am working to prevent?
- **What** is different about people who do and don't get sick when they are exposed to the same environmental risk factors?
- **How** can I use this knowledge to enhance prevention strategies?





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