



Introduction to Genetics

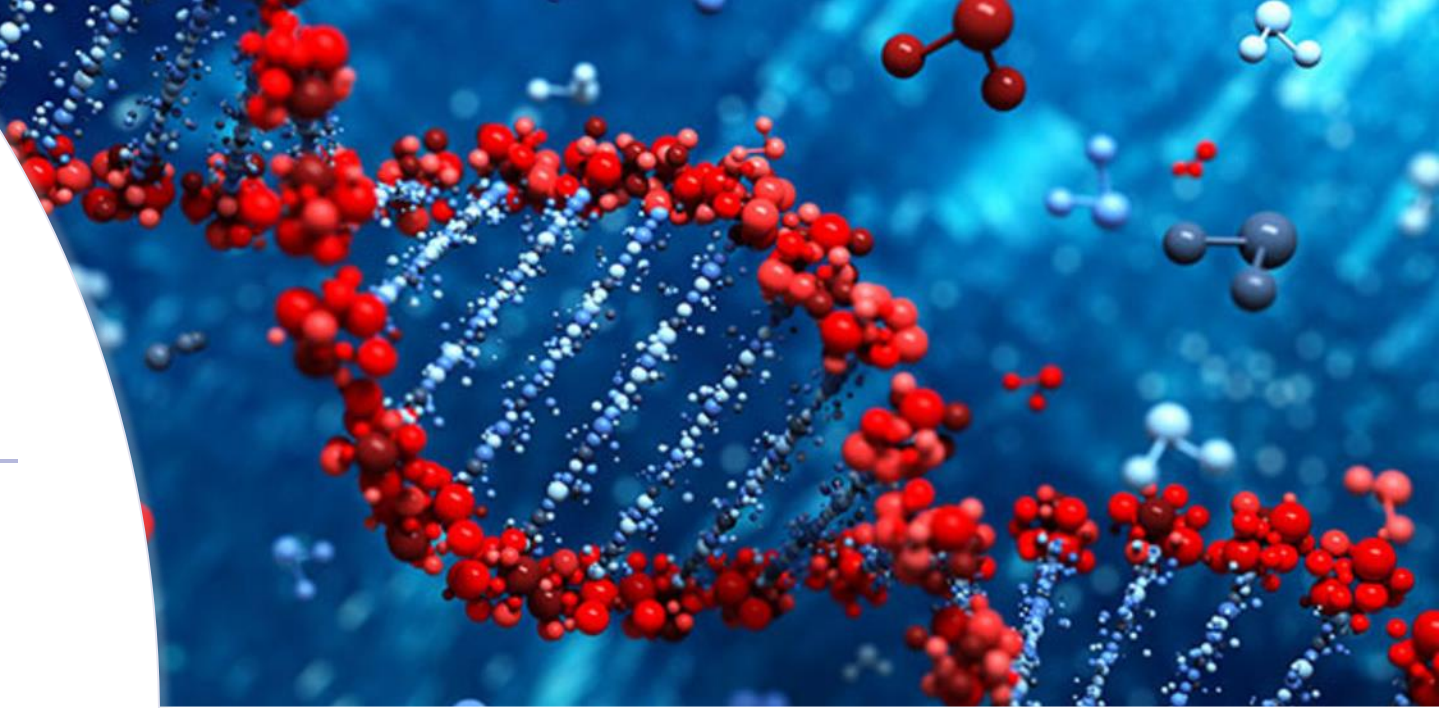
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Statistics and Risk

- Predicting the inheritance of traits in individuals is NOT a precise science
- Lots of influences in gene function
- Multiple factors



Genetic Counselor

- Calculates the risk of clients that want the risk of a new family member will inherit a particular disease
- OR has inherited it but does not have symptoms yet



RISK Is Expressed As Relative Figures

- **Absolute risk** is the probability that an individual will develop a particular condition
- **Relative risk** is the likelihood that an individual from a particular population will develop a condition compared to individuals from another group
- **Relative risk** is expressed as a ration of the probability in the group compared to another



Patient1

- Age 30
- Age dependent risk for Down Syndrome (1:500)
- Risk based on previous child with Down Syndrome (1:100)



Patient2

- Age 42
- Age dependent risk for Down Syndrome (1:63)
- Risk based on previous child with Down Syndrome (1:100)



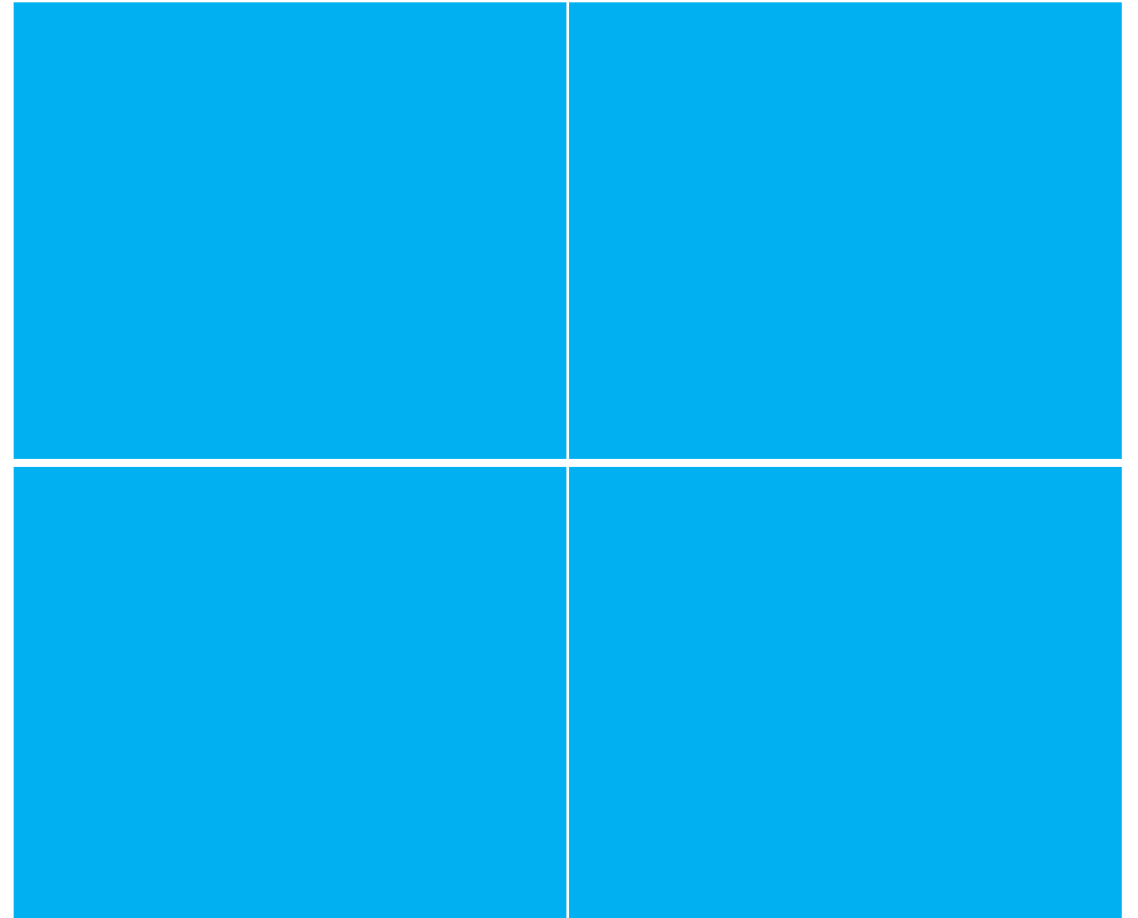
Analyzing The Patients

- Determining the relative risk requires knowing the risk to the general population
- Alzheimer's disease over a lifetime is 4 in 100 (4%)
- The patient's risk is $4/10 \sim .4$
- The relative risk is less than 1, indicating that this person has a risk less than the general population
- Patient 2 has an 8.4 relative risk- a risk greater than the general population



How Geneticists Derive Risk

- Empiric Risk
- Mendel's Laws
- For Example: Disease X
 - (See chart)
- What percent chance is there that they can contract disease X
 - ____% chance of contracting disease X



Application of Genetics: Genetics In The News

- *Forensics*
 - Plane Crash Victims
 - September 11th
 - Tsunami in Asia
2004
 - Hurricane Katrina in
2005



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History in Illinois



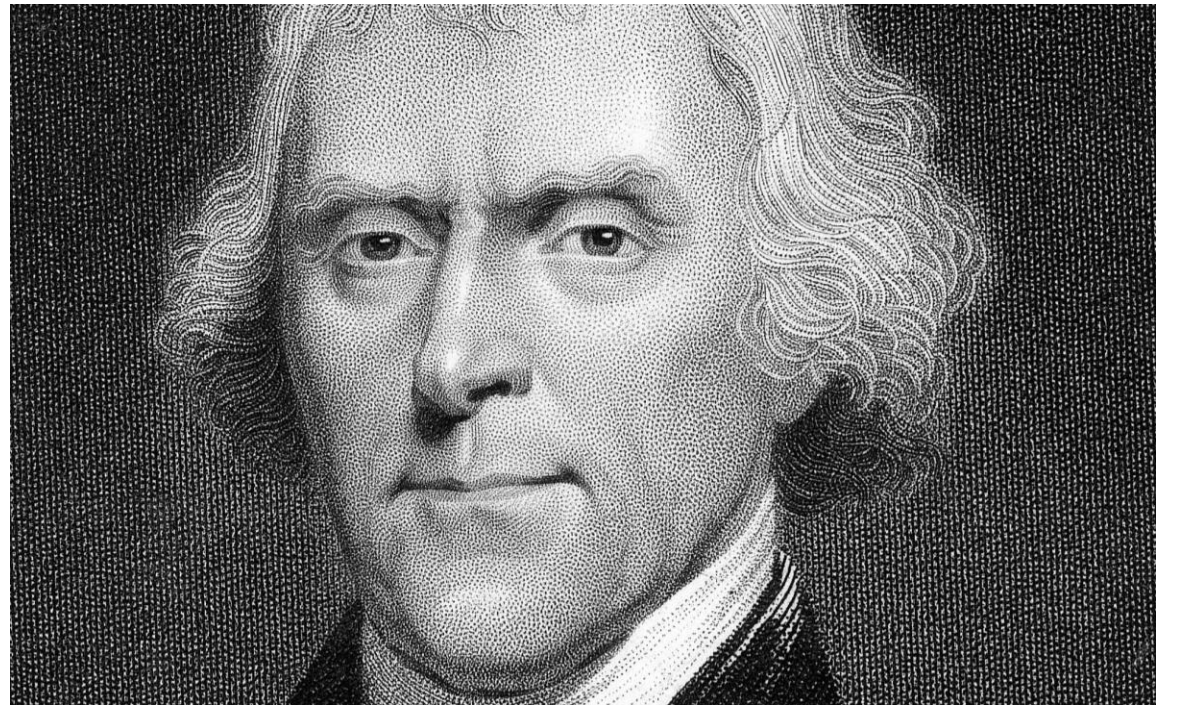
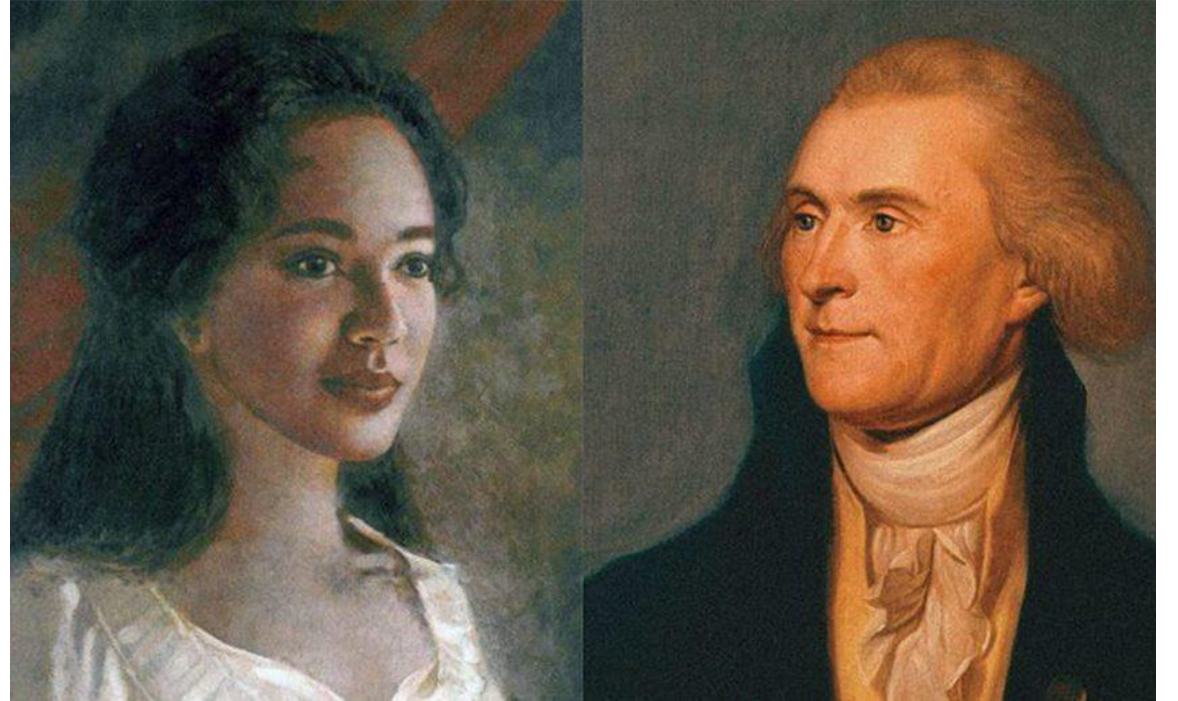
- Illinois has led the way in overturning convictions using DNA
- Ford Height Murders
 - 36 Million in Compensation-1999
 - 4 men convicted of rape and murder

- Governor Ryan concerned by the high number of overturned convictions, overturned the sentence of all death row inmates to life without parole



Thomas Jefferson

- Sally Hemings
 - Fathered 7 children
- Linked by unusual Y chromosome to Hemings descendants



Health

- Disease is being seen as the consequences between genes and environmental factors
- Inherited illness is the risk by developing symptoms that can be predicted
 - BRCA1- genetic mantra for breast cancer
- Genetic diseases may be more common in some populations than others
 - Economic consequences
 - Ethical consequences



Agriculture and Ecology

- **Agriculture**

- Biotechnology
- GM Foods



- **Ecology**

- Pollution
- Smog
- Oil Spills
- Sewage Treatment





THANK YOU!

Questions and Comments