APPLICATIONS OF GENETIC TESTING

Pharmacological Applications

**Purpose:** To personalize the medications we take.

**How it works:** This method identifies specific drugs that would best work for a certain genotype. Why do it? Precise prescribing produces better results.

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Researchers identify specific genetic markers, then target the patient population for their individual needs.

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**FACTS**
- Research and development are currently being done by private companies intending to sell their products to major drug marketers.
- Very new and innovative technology.
- Identifies the most common forms of genetic variability associated with medication response.

Predisposition for Genetic Diseases

**Purpose:** To find out how likely it is that you or your children do or will have a certain genotype.

**How it works:** Genetic counseling centers are able to conduct a DNA analysis of one’s chromosomes, perform prenatal, pediatric, and/or adult genetic testing, figure out whether you are a carrier and calculate the probabilities of certain genetic risks.

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**FACTS**
- Questions you might ask: If my father developed Alzheimer disease, will I? My mother developed breast cancer at age 30; what is my chance of doing so also? Am I a carrier for cystic fibrosis?
- Treatment/therapy options may be available at a nearby genetic counseling center.

Problems/Concerns with Genetic Testing

*Who should have access to the genetic test results?*
*Should insurance companies, employers, or the government have the authority to obtain personal information and use it against someone?*
*Should insurance companies pay for the testing? And if so, will they refuse insurance coverage or increase premiums upon knowledge of the results?*

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Forensic Applications

Purpose: To match a sample from a crime site with a suspect.

How it works: The DNA sample is tested and matches are made through RFLP analysis; it can be determined if someone was the perpetrator of the crime.

FACTS
- Can be performed on chewing gum, hair, semen, razors, clothing, anything that would contain cells.
- Can give greater than 99% probability that someone is the right (or wrong) suspect.
- Takes 3-6 weeks to get results.
- 1/3 of FBI cases in which DNA was tested proved the current suspect could not have committed the crime.

Paternity Testing

Purpose: To determine the genetic relationship of an individual to another person, usually the child in question.

How it works: Swabbing the inside of the mother's, father's and child's mouths to obtain cheek cells can be sufficient to test the DNA. Samples can be taken from hair or toothbrushes (for when you want to be sneaky about it).

FACTS
- At-home paternity tests can be ordered from a number of online sources like www.genetree.com for free, though there is a lab fee.
- Paternity testing completed at a certified laboratory is usually required in a court case; at-home paternity tests would be mostly for personal benefits.

Lineage/Surname Testing

Purpose: This can be used for people who want to find out to whom they are related. Trying to connect the family tree (example: adopted individuals...).

How it works: Geneticists and anthropologists characterize chromosomes, particularly the Y chromosome. They can then determine the biological relationships between two males by comparing the DNA of both Y chromosomes.

FACTS
- Thomas Jefferson supposedly fathered a child (maybe more) with one of his slaves. He of course, denied it, being of great political power and influence. In 1998, it was determined that he was the father of that child by testing other male descendents of known relation.
- Can only be done with males since only males have a Y chromosome.