Introduction to Genetic Genealogy
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- What is DNA? How does it work?
  - You have 46 chromosomes arranged in 23 pairs; half from your father, half from your mother.
  - The 23rd pair is the sex chromosome and is either XY (male) or XX (female).
  - DNA encodes so much information about a person, from hair and eye color to propensity to certain diseases to how certain foods taste.

- Using DNA in genealogy research
  - Since you get your DNA from your parents, who got theirs from their parents, who got theirs from their parents, and so on, you can use DNA to find relatives who have also tested because you will share the DNA that has been passed down parent to child in each generation.
  - The amount of DNA shared is measured in centiMorgans (cM); a higher number means you and the other person are more closely related while a lower number means you are more distantly related.
  - On average, you share 50% of your DNA with each of two parents, 25% with each of four grandparents, 12.5% with each of eight great-grandparents, and so on.
  - However, the farther back you go, the more likely that the percentages are not perfectly divided in half each time, as larger sections of DNA may make it through several generations intact.

- Limitations in research
  - Determining your ethnic origin from your DNA is a relatively new science. It is only broadly accurate at this point in time. Most researchers accept it as accurate to the continental level, so it can tell if you are from Europe vs. Africa, but not whether you’re from England vs. Germany.
  - This is why different companies will give different or “conflicting” ethnicity results.
  - If you have several close cousin marriages in your family (most people do if they get back far enough), your matches may appear to be more closely related to you based on shared DNA than they are on paper (pedigree collapse and endogamy).

- Where to test
  - Several major genealogy companies offer tests, including: Ancestry, 23 and Me, Family Tree DNA, and My Heritage.
  - Choosing a company depends on what you want to find:
    - Ancestry has the most participants, so you have more potential matches.
    - 23 and Me offers health information for an extra fee.
    - My Heritage has more participants from outside the United States.
  - All the testing companies run frequent sales, so it’s easy to avoid paying full price.
  - All companies allow you to download your results, but not all companies allow you to upload results from other companies. For the companies that do allow uploads,
transferring results between companies is often cheaper than separate tests, but you may not have access to the full range of features available to new test purchasers.

- **I’ve tested, now what?**
  - Once your test is processed, you’ll get a list of matches.
  - If your matches have a family tree posted, you can use that to help figure out how you are related. Also if they joined under their real name you may recognize the surname.
  - Except for very close relationships (parent-child, grandparent-grandchild, uncle/aunt-nephew/niece), DNA will not tell you the exact relationship, just an educated guess.
  - Most sites will let you compare yourself to multiple other people at once, a process called triangulation.
    - For example, if John and I are related, and Sally matches both of us, then John, Sally, and I are likely all related along the same family line or lines.
  - If the company you chose offers a chromosome browser, you can use that to see exactly which segments of which chromosomes you share with a match or matches.
  - Sometimes it will not be immediately clear how you are related to a match, so you may need to do further research or contact them directly.
  - All companies have a system for contacting matches. However, matches may or may not respond.

- **Ethics and considerations**
  - Your DNA is not just yours—while you have a unique genetic code, you share large portions of your DNA with close relatives, including future relatives.
  - Once you look at your results, you can’t “unsee” them. Family secrets may be uncovered.
  - Every testing company has a privacy policy and a user agreement. Read them before you test and know what you are signing up for. Make a decision based on what you are comfortable with.
  - Law enforcement has made the news recently for using genealogy DNA databases to help solve crimes. The pros and cons of this are currently under debate in the genealogical community, but not every company allows law enforcement access, so you can plan accordingly when choosing a testing company.
  - Genetic Information Nondiscrimination Act (GINA): United States law bans the use of genetic test results for employment and health insurance purposes.

- **Further resources**
  - The Legal Genealogist: [https://www.legalgenealogist.com/](https://www.legalgenealogist.com/)
  - DNA Geek: [https://thednageek.com/blog/](https://thednageek.com/blog/)
  - Central Indiana DNA Interest Group: [https://cidig.org/](https://cidig.org/)
  - The Genetic Genealogist: [https://thegeneticgenealogist.com/](https://thegeneticgenealogist.com/)
  - Shared CentiMorgan project: [https://dnainter.com/tools/sharedcmv4](https://dnainter.com/tools/sharedcmv4)