

American Society of Human Genetics

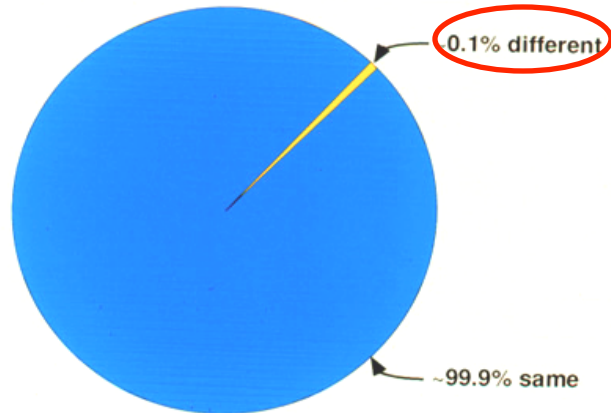
Professional society for human genetics specialists worldwide

- About 7,500 members in research, academic, and clinical settings
- Variety of careers: researchers, educators, clinicians, laboratory professionals, genetic counselors, nurses, and students
- Part of the Federation of American Societies for Experimental Biology (FASEB)

Mission

Our mission is to advance human genetics in science, health, and society through excellence in research, education, and advocacy.

Using DNA for Human Identification



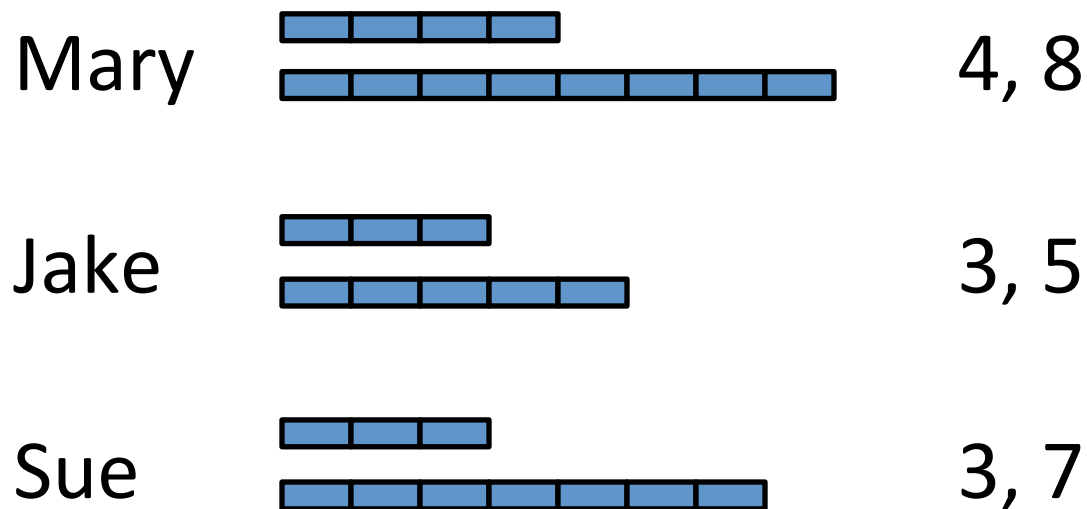
- DNA sequence markers: analogous to distinguishing physical traits

Ex. Short, female, blue eyes, rotated right shoulder blade

- **Restriction fragment length polymorphism (RFLP)**
- **Short tandem repeats (STRs)**

Short Tandem Repeats (STRs)

- The repeat is 2-10 bp long (for example: CTTG → 4 bp)
- An STR allele can have 3 to 100+ repeats arranged head-to-tail (CTTGCTTGCTTGCTTGCTTG → 5 repeat allele)
- The number of repeats in a row varies in the population



Polymerase Chain Reaction (PCR)



DNA Learning Center, Cold Spring Harbor Laboratory

- For STR analysis, you design primers that flank the STR of interest
- The **size** of the PCR products tells you what alleles are present

Your Task

- Work in small groups, each group will have a different sample
- “PCR” one STR region to complete your sample’s DNA profile

In a cell

Each group needs:

- Sample sheet for FGA region
- 2 forward FGA primers (purple)
- 2 reverse FGA primers (purple)
- Tape

1) Where do the primers bind?

(Tape them down.)

2) What is the repeat? How many for each allele?

5' caactcactttctttctttctttctttctttcttt

cttgagtgaaagaaagaaagaaagaaagaaa

ctttctttgctggcaat... 3'

gaaagaaacgaccgtta... 5'

Determining Sample Alleles for FGA

Locus: FGA (Chromosome 4q28)

Allele 1

Number of repeats: 20

5'-...ctgccagatagcccatagggttttgaactcacatttcctttcctttcctttcctttcctttcctttcctttcctttcctttcctttccttt

FGA F Primer: 5' -GCCCCATAGGTTTGA ACTCA-3' -----➔

3'-. . .gacgggtctatcgggggtatccaaaacttgagtgaagaaagaagaaagaagaaagaagaaagaagaaagaagaaaga

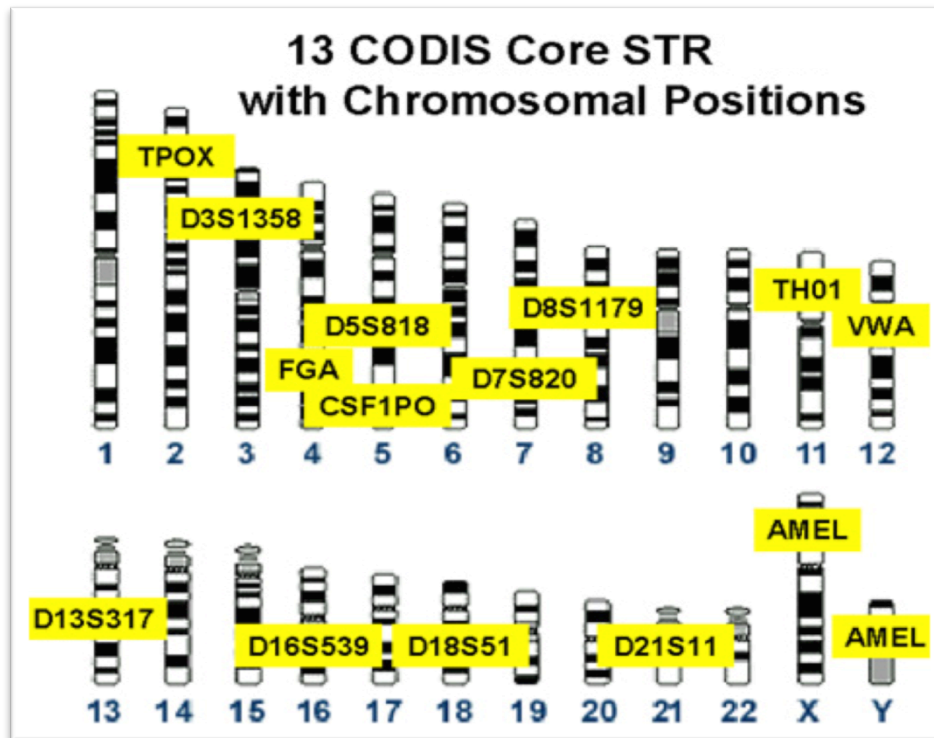
13 14 15 16 17 18 19 20
ctttctttctttctttctttctttctttctttgctggcaattacagacaaatcaattcgaatcacgtaagacccaattt...-3'

3'-CGACCGTTAATGTCTGTTTAGT-5' :FGA R Primer

gaaagaaagaaagaaagaaagaaagaaagaaacgaccgttaatgtctgtttagttaagcttagtgcattctgggttaaa...-5'

U.S. Uses 13 STR Regions for DNA Profiles

- CODIS (Combined DNA Index System)



1 in 1 trillion to 1 in 1 quadrillion chance of two unrelated people having the exact same set of 26 alleles.

World's population is only 7.2 billion people!

<http://www.cstl.nist.gov/strbase/fbicore.htm>