



DNA STR Profiles: How to Read Electropherograms

NIJ animation Links and notes

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To better understand how to interpret an electropherogram or how a DNA STR Profile is derived, refer to the animations found on the National Institute of Justice, Multimedia Resources and the notes below.

<https://nij.ojp.gov/multimedia-resources-nijs-forensic-dna-training-courses>

Animation Showing Electropherogram Interpretation

Interactive animation that describes each section of an electropherogram — the graphic representation of the separation of molecules by electrophoresis or other means of separation.

Animation Showing How a Profile Is Derived from an Electropherogram

Interactive animation that shows details of an electropherogram — the graphic representation of the separation of molecules by electrophoresis or other means of separation.

Notes

X Axis refers to the size of the DNA sequence in base pairs, the longer the fragment, the further to the right it will appear on the electropherogram

Y Axis refers to the amount of fluorescence: relative fluorescent units

Based on the number of copies of the DNA sample being tested

Higher the peak, the greater the amount of the DNA sample

Lower the peak, the lesser amount of the DNA sample

Controls added: Mixture of known alleles in the population consisting of particular base pair size

Color of primer (dye) is the color the dye reflects as it passes through the prism not the actual color of the dye.

Graph

1. **Single peak** indicated homogeneity at the locus. Peak usually higher than heterogeneous alleles because there's more DNA for that allele at that loci. (Both alleles are the same, X X, or (8, 8)

2. **Two peaks**: Same color at the same locus, peaks not as tall because there are two different alleles for that one locus. Example (X Y) or (8,12)

3. **Color of the peaks**: due to different dyes attached to primers to distinguish different alleles for a particular locus. Each STR has a different color attached to its primer. Example green color peak found within a particular range on the X axis, refers to a single locus. Usually, individuals will have one or two peaks at that loci depending upon if they are homozygous or heterozygous for that STR.

Note the black peak is actually produced from a yellow dye. The yellow color is changed to black on the graph for easier visibility.

4. **Size Standards**: Extra tall red peak consisting of a combination of different size standards. Used to help calibrate and often not included in the print out.

5. **Flat Baseline**: no RFU (no fluorescence), appears as flat line but actually composed of all four colors. Visible only when electropherogram is viewed at a larger scale.

6. **Sex** Usually located to the far left on the electropherogram. One peak is female (XX). Two peaks would be male (XY). Sex determination is based on STR associated with amelogenin gene.

7. **Stutters**: Very small peaks of the same color, usually to the left of the peak. These are not actual alleles, only echoes of larger peaks. These are typically found with very strong peaks.

8. **Computer print-outs for STRs**: Will interpret the peaks and indicate the number of repeats for each allele found at a particular locus.

9. **Microvariants**: Most readings of repeats for any STR are usually whole numbers. (8,13). However, sometimes you will see some STRs written as a number with a decimal. (30, 9.3) (9.3 means that there are 9 full repeats and a partial repeat with only two bases)

Example repeat is GATA allele cited as 9.2

(9.2) GATAGATAGATAGATAGATAGATAGATAGATAGATAGATA 9 full repeats and 2 bases