DNA: Steps for Profile Interpretation- Step 4

Step four *Identify the type of mixture, if possible.*

Determine mixture type

To determine the mixture type, consider

- the assumed number of contributors and
- the relative DNA proportions of each contributor resulting in a mixture that is either resolvable or irresolvable.

A resolvable mixture is a DNA typing result from a mixed sample for which alleles can be attributed to their relative contributor(s).

An irresolvable mixture occurs when

- relatively similar amounts of DNA (< ~4:1 ratio) are contributed to the sample by two or more unknown contributors or
- the quality of the profile prevents the analyst from confidently resolving the mixture.

There are four mixture types, and the following sections contain approaches for interpreting each of them. When quantitative peak height information and donor ratio assessments are used in the interpretation of a mixture, the approach is termed “restricted.” When this information is not used in the interpretation, the approach is termed “unrestricted”.

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Type 1 Mixture

A Type 1 mixture consists of DNA from two individuals, and the profiles of the two individuals can be resolved into their individual components resulting in major/minor or known/unknown contributors.

NOTE: When resolving a 2-person mixture, the terms "major contributor" and "minor contributor" can be used for mixtures with a donor ratio average greater than ~ 4:1. At a 4:1 ratio, the major contributor's alleles are expected to be "major" across the entire profile (even at the 3x range). When resolving a mixture with a known contributor, the terms "known" and "unknown" can be used when the donor ratio average is less than ~ 4:1.

A Type 1 mixture must have one of the following features:

- The average donor ratio of the two contributors is ~ 4:1 or greater.
- A mixture with an assumed known contributor can be resolved into known/unknown contributors regardless of the donor ratio.

A restricted interpretation approach is used for the Type 1 mixture.

Type 2 Mixture

A Type 2 mixture consists of DNA from two individuals, and the profiles of the two individuals *cannot* be resolved into their individual components.

- A Type 2 mixture has an average donor ratio of ~ 4:1 or less with no assumed known contributors.

An unrestricted interpretation approach is used for the Type 2 mixture.

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Type 3 Mixture

A Type 3 mixture consists of DNA from three or more individuals, and the relative peak heights allow for a major component to be separated from a minor component.

NOTE: When interpreting a Type 3 mixture, the terms "major component," "minor component," and/or "trace component" can be used. "Component" describes a portion of the mixture and may include one or more contributors. The terms used to describe each of the components should be defined in the case notes.

For mixtures of three or more contributors, reliable donor ratio calculations may be difficult. The analyst may use one or more of the following to determine if the mixture can be resolved into its relative components:

- donor ratio approximations
- significant peak height difference between components
- the presence of an assumed known contributor, if applicable.

In a 3+ person mixture, the analyst should make the following observations before determining if the mixture can be resolved into its relative components:

- the quality of the profile, including signs of degradation, differential degradation, inhibition, etc.
- the presence of alleles in the stochastic range
- the effects of allele sharing.

A Type 3 mixture may use a restricted or unrestricted interpretation approach depending on the nature of the mixture.

Type 4 Mixture

A Type 4 mixture consists of DNA from three or more individuals, and the mixture *cannot* be resolved into its individual components.

An unrestricted interpretation approach is used for the Type 4 mixture.