FAMILIAL SEARCHING COMBINING AUTOSOMAL AND Y CHROMOSOMAL STRs AND SURNAMES

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Traditional familial searching utilizes autosomal DNA profiles to identify potential relatives of a perpetrator in a DNA database. It has been suggested that in societies that use patrilineal surnames, Y chromosomal DNA profiles can be used to predict surnames, since both the Y chromosome and the surname are transferred from father to son (reviewed in King and Jobling 2009). Indeed, the chance of sharing a Y chromosome type is greater amongst people with the same surname than with a person chosen at random. This concept was used in an attempt to identify a relative of the perpetrator of the rape and murder of a young Dutch woman in 1999.

Forensic (DNA) analysis of the crime scene and behavioral analysis led to the hypothesis that the perpetrator was a local person known to the victim and who lived nearby. The autosomal DNA profile of the perpetrator did not provide a match in the Dutch DNA database or within a group of 800 males tested between 1999 and 2012.

The introduction of new legislation in 2012 allowed us to conduct familial searching using autosomal and Y chromosomal DNA profiles. We have followed four lines of investigation to identify a (male) relative of the perpetrator:

1. Autosomal STR based Familial search in the Dutch DNA database. The autosomal DNA profile of the perpetrator was compared to autosomal DNA profiles of 140,000 suspects/convicts using CODIS7 and Bonaparte software. Likelihood ratios (PI and SI) were calculated.
2. Selection of males in the Dutch DNA database based on their birthplace or place of residency. A group of approximately 420 males with birthplace or place of residency in the area of the committed crime was selected from the Dutch DNA database. The Y STR DNA profile of the perpetrator was compared to Y STR profiles observed in this group.
3. Selection of rare surnames in the Dutch DNA database. A group of approximately 260 males that did not live in the direct area of the committed crime but who had rare surnames that reside in the area was selected from the Dutch DNA database. The Y STR DNA profile of the perpetrator was compared to Y STR profiles observed in this group.
4. Voluntary large scale Y STR based familial search amongst several thousands male individuals in the area.

Results of each of the four lines of investigation will be presented at the conference. ⌘