

PATERNITY TEST IN THE ABSENCE OF PATERNAL DNA WITH SHORT TANDEM REPEATS ON THE X CHROMOSOME

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When a rich man dies, newspapers are often decorated with stories on paternity disputes as hitherto unknown children claim their right to inherit his property. In such cases, DNA paternity testing plays an important role in unraveling the truth. Paternity can be determined either by directly comparing the genotype of the deceased father with that of the putative child or by indirectly comparing it with that of the putative child through re-construction of the deceased father's genotype from the genotype of his true kin. However, both methods cannot provide solutions under certain circumstances, such that the father is missing or cremated and that there is no guarantee, all children are biologically related to him, so that re-construction of the deceased man's DNA may be inaccurate.

We found that the paternity of a daughter concerning a deceased man can be determined using the Short Tandem Repeat (STR) polymorphism on X chromosome. A man has only one copy of X chromosome, which is transmitted to all of his daughters. Thus, if a female is his true blood, she should share at least one allele at each STR locus on X chromosome with his other daughters. Alternatively, she can be tested against the mother of the deceased man, the alleged grandmother, since X chromosome of the deceased man would be descended from his biological mother. We gathered genotype data from more than 200 unrelated Korean females for 19 STR loci in order to estimate the probability of coincidence. The pair-wise comparison between the two females could not exclude only one pair, while excluding the rest of possible 12,000 pairs as biological sisters. This demonstrated that the approach using STR on X chromosome is highly discriminating in paternity determination in the absence of paternal DNA albeit limited to daughters.