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DISTINCTION OF MONOZYGOTIC TWINS – NOVEL APPROACH IN DNA ANALYSIS AND ITS MEDICO-LEGAL SIGNIFICANCE

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Dear Editor,

We have read with interest the recent article of Yuan L *et al.* [1]. In this article, the authors described successful distinction of monozygotic twins (MZT) using a case report, whereas suspect for series of crimes from 2003 to 2016, including rapes and murderous adultery, had identical twin. In order to have criminal twin convicted and the other MZT excluded as a potential suspect, serious deep sequencing and molecular analysis were performed. Moreover, identical twin samples from this case were differentiated using a "combination of whole-genome sequencing (WGS), allele-specific polymerase chain reaction, and deep-amplicon sequencing". This was the first report describing the clear MZT differentiation using genetic sequencing and identification of criminal among the identical twin pair.

The topic of monozygotic twin discrimination is troublesome in many medical, legal and daily circumstances, such as paternity and kinship tests, criminal investigations, airport security etc. Forensic medicine and genetics have been battling the issue utilizing different approaches, in order to identify the individual in identical pair [2]. The individual identification is achieved employing "autosomal and gonosomal short tandem repeats (STRs) and their genotyping by capillary electrophoresis", which has been considered gold standard. However, this is unfit for MZT, with one single zygote origin [3]. Unlike nuclear DNA, mitochondrial DNA and its single nucleotide polymorphisms has surpassing capacity for MZT discrimination. The identification of heterogeneous single nucleotide polymorphisms by amplicon sequencing resulted in clear distinction of identical twins in four criminal cases, using variable samples: blood, saliva, semen, nail and hair [1].

Epidemiological researches described continual growing birth rate of twins in general, and rate of almost 4 per 1000 live births of MZT, which has grown almost double globally. This has certainly been affected by increasing use of assisted reproduction, various fertility medications, rising maternal age etc [4]. Even though monozygotic twins are not common in general population, their involvement in criminal investigations is puzzling, due to the fact that previously used genetic tests, such as STR profiling, didn't offer their individual identification. Due to this, many cases were stalled [3]. Also, this problem raises the issue of possible encouragement of criminal behavior in identical twins, who recognized the controversy of being able to deceit the judiciary [5].

Therefore, it is crucial to follow the latest trends in forensic genetics and validate the newest techniques by scientific community all over the world. This could be done by joint effort of scientists globally, creating databases, meeting criteria and standards for the latest combination of analysis, and validating the results as legal evidence.

Conflict of interest

The authors declare that they have no conflict of interest.

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