Investigation of mutations in the SRY, SOX9, and DAX1 genes in sex reversal patients from the Sichuan region of China

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ABSTRACT. We investigated the molecular genetic mechanism of sex reversal by exploring the relationship between mutations in the sex-determining genes SRY, SOX9, and DAX1 with genetic sex reversal disease. Mutations in the three key genes were detected by polymerase chain reaction (PCR) and sequencing after karyotype analysis. The mutations detected were then aligned with a random sample of 100 normal sequences and the NCBI sequence database in order to confirm any new mutations. Furthermore, the copy number of SOX9 was measured by fluorescence quantitative PCR. Seven of the 10 male sex reversal patients (46, XX) contained an excess copy of the SRY gene, while one of the eight female sex reversal patients (46, XY) was lacking the SRY gene. Additionally, a new mutation (T-A, Asp24Lys) was detected in one female sex reversal patient (46, XY). No other mutation was detected in the analysis of SOX9 and DAX1, with the exception of an insertion mutation (c.35377791insG) found in the testicular-specific enhancer (TESCO) sequences in an SRY-positive
female sex reversal patient (46, XY). Eight of the 18 sex reversal cases (44.4%) showed obvious connections with \( SRY \) gene translocations, mutations, or deletions, which was significantly higher than that reported previously (33.3%), indicating a need to further expand the range of sample collection. Overall, these results indicated that the main mechanism of sex reversal are not associated with mutations in the coding regions of \( SOX9 \) and \( DAX1 \) or copy number variations of \( SOX9 \), which is consistent with results of previous studies.

**Key words:** Sex reversal; \( SRY; \) \( SOX9 \); \( DAX1 \); Gene mutation; Real-time fluorescence quantitative PCR