DISRUPTION OF GENES SPANNING THE BREAKPOINTS IN BALANCED RECIPROCAL TRANSLOCATION CARRIERS CAUSES INFERTILITY

Carriers of some reciprocal translocations are infertile. The infertility is caused by two main mechanisms. The first is synaptic alterations at prophase I which lead to meiotic arrest. The second is the production of chromosomally unbalanced gametes by different modes of segregation at anaphase I which leads to reproductive failure. For a long time, some authors have claimed an additional source of infertility associated with the loss of functionality of the genes situated around the breakpoints.

In this new paper from the Journal of Assisted Reproduction and Genetics, the authors have performed a breakpoint analysis in nine reciprocal translocation carriers with subfertility (without any other apparent phenotypic effect) using single-molecule optical mapping (SMOM; also known as next-generation mapping). This genome mapping technique allows the construction of high-resolution karyotypes, and hence, is very useful in establishing genotype - phenotype correlations.

SMOM analysis on the nine translocation carriers was able to map the breakpoint regions allowing the identification of some genes spanning the breakpoint intervals. In four carriers, disrupted gene sequences were identified. Interestingly, some of the disrupted genes had been associated with infertility in previous studies: *FNDC3A*, *NUP155*, *DPY19L1*, and *BAI3*.

The authors suggest that the possibility of identifying disrupted genes in apparently balanced reciprocal translocations opens up a new scenario in the field of reproductive genetics. In these carriers, preimplantation genetic diagnosis techniques could be used not only to identify embryos with unbalanced segments of the reorganized chromosomes, but also to identify embryos with disrupted genes causing infertility; this would be embryos with a balanced chromosome constitution.