Summary

Heterochromatin variants of human chromosome 9 belong to the most common variabilities of human karyotype. The variability involves the large block of constitutive heterochromatin in the pericentric region of chromosome 9, which is composed of various types of repetitive DNA sequences. Those variants can be studied from population epidemiologic, molecular cytogenetic and clinical genetic point of view.

We have performed a broad epidemiologic study of the incidence of pericentric inversion of chromosome 9 (inv(9)) and other variants of chromosome 9 in 6 different laboratory cohorts, which included the evaluation of more than 26.000 of cytogenetic reports, the study we published is currently the largest in the world. We expressed the overall incidence of inv(9) to be 1.6% and the total incidence of variants of chromosome 9 to be 3.3-3.9%. Inv(9) was more common in females, however the difference was not statistically significant.

Molecular cytogenetic part of the project was based on our own diagnostic approach, which involved the combination of three different commercial FISH probes. Combination of those probes allowed us to differentiate particular subvariants of chromosome 9, which cannot be analyzed only by using G- or C-banding. Using our method, we tested 49 carriers of chromosome 9 heterochromatin variant and 3 other individuals with different rearrangements of chromosome 9 involving the pericentric region. The methodology proved to be useful even for some routine diagnostic cases.

For the analysis of possible clinical association, we targeted mainly the idiopathic reproductive failure. We evaluated the incidence of heterochromatin variants of chromosomes 1, 9, 16 and Y in couples with idiopathic reproductive failure and compared the results to the incidence of the same variants in the control group of healthy fetuses that were karyotyped prenatally only because of the advanced age of their mothers. We have proved that the heterochromatin variants are more common among individuals with idiopathic reproduction failure; the results were significant mainly for the variants of chromosome 9 and especially in females. The explanation for this repeatedly reported phenomenon is not available right now, the key for the solution for this long-standing question may be the fusion of advanced molecular-cytogenetic diagnostics and further analysis of corresponding reproduction impairment – focusing different subvariants of chromosome 9.

Keywords: Chromosome 9, FISH, reproduction failure, karyotype, inv(9)