The results obtained confirmed that the QF-PCR method demonstrates 100% sensitivity and, when analyzing 5 investigated chromosomes, is capable of identifying up to 90% of clinically significant chromosomal aberrations. A negative result from QF-PCR analysis reduces the residual risk of detecting a significant chromosomal aberration, which is undetectable by QF-PCR in patients with a negative ultrasound finding, to below 1/1500. This fact is very important for alleviating concerns in patients with a risk of fetal chromosomal abnormalities.The QF-PCR test, focused solely on the analysis of chromosome 21, proved to be an economically viable and clinically acceptable component of Down syndrome screening in the second trimester. If the indication criteria are strictly followed (positive biochemical screening and ultrasound performed by a certified specialist with no pathological findings), it can detect up to 87.5% of significant chromosomal aberrations with complete specificity. Based on the informativeness of the STR markers used in our population, we managed to create a diagnostic set of markers with high informativeness, including supplementary marker sets for the individual tested chromosomes. This minimizes the risk of uninformative test results and enables reliable diagnosis of chromosomal aberrations of the tested chromosomes, including monosomy X, which was problematic when using an insufficient number of markers. The results obtained indicate that QF-PCR represents a suitable and reliable molecular cytogenetic method for the rapid diagnosis of aneuploidies.