

EXPLORING FACTORS IN THE EMBRYOLOGY LABORATORY AFFECTING THE QUALITY OF PGT-A RESULTS

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Background:

Accurate results in Preimplantation Genetic Testing for Aneuploidy (PGT-A) are essential for ensuring subsequent optimal clinical treatment. However, various methodological factors may influence the quality and reliability of PGT-A data. While these factors are often proposed, their impact is largely theoretical and not well understood.

Objective:

To identify factors in the embryology laboratory that can affect the quality and reliability of PGT-A results.

Materials and Methods:

Retrospective analysis using data from an IVF multicenter network with in-house PGT laboratory. Data from ~10,000 samples processed for PGT-A were analyzed for potential correlations between test result quality ('No Result', 'Inconclusive' Result, Mosaicism, and MAPD technical noise) and methodological variables, including biopsy technique, laser use, sample loading method, experience of embryologist, culture media, and assisted prehatching. Comparisons between groups with categorical outcome variables were performed with a two-tailed Chi-square test, and comparisons with quantitative variables were performed with an unpaired, two-tailed t-test. $P < 0.05$ was considered statistically significant.

Result(s):

Of the embryology laboratory variables tested, two factors contributed significantly to the incidence of 'No Results': the pulling technique for biopsy isolation generated more 'No Results' than the flicking technique (0.96% vs 0.51%, $P=0.048$, $n=1,664$ vs $n=6,299$), and dry loading the tube generated more 'No Results' than pre-loading the tube with buffer (1.20% vs 0.55%, $P=0.0045$, $n=7,417$ vs $n=1,910$). Within the range of tested variables, none contributed significantly to the generation of artificial mosaic results, and no single factor contributed significantly to technical noise in the PGT results.

Conclusion(s):

A 'No Result' during PGT-A may indicate the absence of intact DNA in the sample collection tube, necessitating either a rebiopsy and retesting of the embryo or proceeding without genetic information. In the dataset analyzed, the flicking technique for biopsy isolation proved superior to the pulling technique, and preloading the sample collection tube with buffer was more effective than dry loading, both leading to significantly fewer instances of 'No Result' in PGT-A procedures. Additionally, the analysis indicated that factors such as laser usage, assisted pre-hatching, embryologist experience, and the culture media employed did not significantly influence the occurrence of 'No Result', artificial mosaicism, or technical noise, providing flexibility in laboratory methods within those tested parameters.