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Can the presence of multinucleated cells in cleavage-stage embryos predict aneuploidy?

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Introduction

Multinucleated cells in cleavage-stage human embryos are blastomeres containing more than one nucleus.

This phenomenon can result from errors in cell division, such as incomplete cytokinesis or nuclear fusion. Studies indicate that embryos with multinucleated cells at the cleavage stage are more likely to exhibit chromosomal abnormalities and aneuploidy, leading to compromised developmental potential, low blastocyst formation rates and reduced implantation rates. However, not all embryos with multinucleation are aneuploid, and some retain developmental potential, albeit reduced.

Our aim was to examine the correlation between the presence of multinucleated (MN) cells at cleavage-stage embryos and aneuploidy.

Multinucleated cells in two days human embryo

Results

At two-cell stage MN incidence was similar among both groups (aneuploidy 51.8% vs. euploidy 50%) with no significant difference.

At four-cell stage MN was present only at aneuploidy group (25% vs. 0%) with a statistical significant difference (P value<0.05).

Conclusions

Multinucleation at the four-cell stage might be a reliable indicator of potential aneuploidy, possibly due to the greater complexity and cellular processes involved at this later cleavage stage. At the two-cell stage, embryos are still in the very early stages of development, and the effects of cellular irregularities may not yet manifest in a way that significantly impacts chromosomal integrity.

Previous studies have shown that the presence of multinucleated cells at later cleavage stages correlates more strongly with chromosomal abnormalities, which supports our findings at the four-cell stage.

Additional studies at larger scales are required to confirm these results and to clarify whether MN at four-cell stage can reliably predict aneuploidy unlike MN at two-cell stage. Findings a clear correlation between aneuploidy and MN, may have an implications for embryo selection in assisted reproductive technologies.

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