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PLOIDY CONDITION AND DEVELOPMENTAL COMPETENCE OF UNIPRONUCLEAR EMBRYOS.

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OBJECTIVE: To describe the 1PN embryos population from a morphometric and morphokinetic point of view, according to their ploidy.

DESIGN: Basic research study including 249 1PN zygotes recruited during 12 months.

MATERIALS AND METHODS: Pronucleus (PN) and zygote (ZY) diameters were sized in 217 zygotes and the corresponding area and volume were calculated. After sizing, 1PN-zygotes were fixed for ploidy determinations by FISH, using 5-chromosome probes. The remaining 1PN-zygotes (n¼217) were cultured in a time-lapse incubator for 5 or 6 days until the blastocyst stage in order to assess the direct variables: timing for PN appearance (tPNA) and fading (tPNF), cleavage to the 2-, 3-, 4-, 5-, 6-, 7-, 8-cell stages, morula and blastocyst (t2, t3, t4, t5, t6, t7, t8, tM, tB, respectively) which led us to calculate the indirect variables: duration of the first cycle S-phase (PNFPNA), duration of the second and third cell cycles (t4-t2 and t8-t5, respectively). Ploidy was determined by FISH on 17 blastocysts. Once the ploidy of 1PN-zygotes and blastocysts were known, morphometrics and morphokinetics were compared by test-t.

RESULTS: FISH results on zygotes showed that 56.5% were haploid, 34.8% diploid and 8.7% mosaic. Pronuclear diameter, area and volume were significantly larger ($p<0.05$) in diploid zygotes (28.5_1.5 mm; 6.3_0.9x100 mm2; 17.1_4.8 $x10^4$ mm3) than in haploid ones (25.2_1.9 mm, 5_0.8 x100 mm2, 9.9_4 $x10^4$ mm3). After culture, 26.3% (57/217) of 1PN-zygotes reached the blastocyst stage. FISH analysis showed that 82.3% blastocysts were diploid (7XX and 7XY) and three were female mosaic (XX/XXXX). None haploid blastocyst was observed. In 1PN-zygotes that had progressed to blastocysts, pronuclear fading (21.6_3.5hrs) and t2 (26.4_5.8hrs) occurred earlier ($p<0.05$) than in those arrested at cells (24.9_7.5hrs; 28.2_5.2hrs, respectively). In such blastocysts, the first Sphase duration was significantly shorter ($p<0.05$) than in arrested 1PN-embryos (14.3_3.2hrs vs. 17.1_7.5hrs, respectively).

CONCLUSIONS: The ploidy condition (haploid vs. diploid) of 1PN zygotes could be inferred by morphometrics. The haploid condition impairs embryo developmental competence to progress to the blastocyst stage which was observable by delayed morphokinetics.

Nevertheless, more data to confirm and assess the predictable value of these preliminary observations are required. Furthermore, complementary genetic analysis on euploidy and heteroparentality of 1PN-derived blastocysts are also required in order to use such 1PN embryos for reproductive purposes. Supported by: This work was founded by IVACE (IMIDCA/2017/22).