

MEIOTIC SPINDLE TRANSFER BETWEEN HUMAN DONOR OOCYTES USING CHEMICALLY-INDUCED OR HVJ-E KARYOPLAST FUSION: PRELIMINARY RESULTS

Costa-Borges, Nuno¹; Nikitos, E²; Rink, Klaus¹; Mestres, Enric¹; Garcia, Maria¹; Vanrell, Ivette¹; Kallergi, S.³; Botzaki, D.⁴; Agapitou, Kristi⁴; Makri, C.⁴; Vassilopoulos, G.⁴; Vlachos, N.⁴; Zervomanolakis, G.⁴; Polyzos, P.⁴; Dimitropoulos, K.⁴; Grigorakis, S.⁴; Kontopoulos, G.⁴; Prokopakis, T.⁴; Psathas, P.⁴; Kostaras, K.⁴; Calderon, Gloria¹

¹Embryotools SL, ²Institute of Life, Athens, ³Institute of Life, Athens (Greece), ⁴Institute of Life, Athens, Greece

Abstract Body

Meiotic spindle transfer (MST) is a promising technology that has been proposed to avoid the transmission of devastating mitochondrial DNA (mtDNA) diseases. A recent clinical application of this technique resulted in the birth of the world's first child using this technology. Membrane fusion between the removed karyoplast (spindle) and cytoplasm (enucleated donor oocyte) has been considered as crucial step for the success of the technique. Usually, fusion is performed by either electrofusion or by the use of an inactivated extract of Sendai virus (HVJ-E). Both methods are efficient in terms of fusion rates, but electrofusion may result in premature activation of the oocytes, while the HVJ-E may represent a risk of introducing foreign proteins in the resulting embryos. Here, we wanted to evaluate the feasibility of using a chemical protocol to induce the karyoplast-cytoplast fusion in human oocytes and compare its efficiency to the HVJ-E method.

Experiments were authorized by the Greek National Authority of Assisted Reproduction and approved by the IRB of the IASO Maternity Hospital. Informed consent was obtained from all donors participating in the study. Experiments were carried out at the Institute of Life (Athens) and a total of 54 MII oocytes were used. Oocyte enucleation was performed with a spindle image birefringence system (PolaraidTM, Octax) with 97.7% efficiency. Fusion rates were higher with the HVJ-E (98.2%) than using the chemical method (71.7%). After insemination with the same donor's sperm, fertilization rates were similar between the control (70%), HVJ-E (75%) and chemical-fusion (66.7%) groups. All embryos were cultured in single medium (LifeGlobal) in an Embryoscope⁺ (Vitrolife) and no differences ($p > 0.05$) were found in blastocyst rates between the control (85.7%) and the HVJ-E (73.3%) or chemical-fusion (60.2%) groups. Our preliminary results suggest that MST does not seem to affect the potential of the manipulated oocytes to develop up to the blastocyst stage. The chromosome status and amount of mtDNA carryover transferred during MST is currently under evaluation.