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MicroSecure-Vitrification (µS-VTF): A KISS principle approach to the highly effective cryopreservation of human blastocysts

In the last decade, vitrification has revolutionized the cryopreservation of human embryos and oocytes, much like sperm injection (ICSI) did for male infertility in the 1990's. Subsequently, the commercial industry capitalized on the technology by introducing numerous, potentially flawed devices. We have developed and validated a novel, aseptic closed vitrification system, called microSecure (µS-VTF), which combines established FDA compliant devices at a low cost. Our goal was to create a global approach that was safe, secure, simple/repeatable, and highly effective. Since 2009, we have performed and evaluated over 1500 vitrified-warmed blastocyst cycles, as well as investigated other practical factors potentially affecting post-warming viability. Upon direct plunging into LN2, insulated flexipettes cool at 1391°C/min, while warming occurs at 6233°C/min in a 37°C/0.5M sucrose bath. The elevated warming rate (4-fold) insures the avoidance of potentially harmful recrystallization associated with devitrification in our glycerol-based solutions (I.C.E.). To date, embryo survival exceeds 99% for biopsied blastocysts, with 70-75% live birth rates when a single euploid embryo is transferred post-warming. Indeed, success is similar to or better than fresh ET outcomes, depending on age groups. Furthermore, human blastocysts have exhibited tremendous resilience to osmotic stressors, cryotoxicity and revitrification, while sustaining their viability. The µS-VTF is a simple and reliable approach that minimizes intra- and inter-laboratory technical variation, while providing maximum cryosecurity using sterile products. It offers a "universal" alternative to alleviate current commercial quality control concerns. Overall, the clinical use of µS-VTF has justified a complete shift in our clinical practice, which includes vitrification-ALL cycles.

Biography

M C Schiewe attained a BS/MS at UC Davis (1981)/LSU (1983) focused on Animal Reproductive Physiology. Working with the Smithsonian Institution/National Zoological Park and the NIH, he completed his PhD in Human Physiology in 1989 at the Uniformed Services University of the Health Sciences (Bethesda, MD). Subsequently, he performed his Post-doctoral studies at NIH/NCRR as an NSF Associate. He is currently a Scientific/Technical Lab Director for Ovagen Fertility and the California Cryobank. He considers himself to be a Comparative Reproductive Physiologist, specializing in Embryology, and has published more than 35 peer-reviewed papers and 110 scientific abstracts, including several research award presentations.

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