The role of time-lapse monitoring during *in vitro* fertilization

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Controlled ovarian hyper-stimulation is standard part of *in vitro* fertilization (IVF) treatment. Ideally it results in the retrieval of 10-15 oocytes that could give rise to the simultaneous developments of multiple embryos. Embryos are cultured under tightly controlled conditions that mimic the intra-tubal/intra-uterine environment. Removing them from this optimal environment compromises their development. Therefore, there is an important dilemma that the biologist faces that needs to be resolved. The embryologist would like to collect as much information as possible on the kinetic and morphologic changes that the embryos undergo but they also would like to keep them undisturbed as much as possible. Time-lapse (TL) embryo monitoring offers the solution. TL monitoring relies on the analysis of digital images taken by a camera that is either part of the incubator or is placed in a standard incubator. Time-lapse units come with custom-made software that creates a short film based on the images that can be analyzed without the need to take the embryos out of the incubator. This provides significantly more data on the kinetic and morphologic changes of early embryo development. This extra information could eventually be used to differentiate/rank the embryos. Over the past 6-8 years several groups collected morphokinetic data on embryos with known implantation outcome. Based on these markers various algorithms were proposed to identify the embryo with the highest implantation potential. External validation of these algorithms however has not been successful so far. In 2016 a new algorithm was built based on morphokinetic data of embryos with known implantation outcome from several independent clinics was published. It was suggested that this algorithm is universally acceptable. There are still only a few randomized controlled trials (RCT) that evaluated the full benefits of TL monitoring (undisturbed culture+algorithm based embryo selection). Most RCTs and their meta-analysis suggests improved clinical outcome when compared to outcome with standard daily morphologic assessment. During the presentation time-lapse technology, the key retrospective/prospective studies as well as the results of a meta-analysis based on the relevant RCTs will be discussed.

Speaker Biography

Peter Kovacs has graduated from the Albert Szent-Gyorgyi School of Medicine in Szeged, Hungary and then completed his OB/GYN and Reproductive Endocrinology and Infertility training at the Albert Einstein College of Medicine in New York. Subsequently, he was invited to join the largest Hungarian IVF Center, Kaali Institute, and in 2008 was promoted to become the Medical Director. In 2005, he earned a PhD degree for studies regarding the reproductive effects of diabetes. His current research interest is focused on stimulation protocols, predictors of IVF outcome, and the clinical benefits of time-lapse embryo monitoring. He has published 40 peer-reviewed papers and several book chapters; he was the co-editor of the first Hungarian textbook on infertility evaluation and treatment.

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