Institutionen för klinisk vetenskap, intervention och teknik

Enheten för obstetrik och gynekologi

CULTURE AND VITRIFICATION OF HUMAN PREEMBRYOS

AKADEMISK AVHANDLING
som för avläggande av medicine doktorsexamen vid Karolinska Institutet offentligen försvaras på engelska språket

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Av

Fredwell Hambiliki, embryolog

Huvudhandledare:
Docent Anneli Stavréus-Evers
Institutionen för Kvinnors och Barns Hälsa,
Uppsala Universitet

Bihandledare:
Professor Outi Hovatta
Karolinska institutet
Institutionen för klinisk vetenskap,
intervention och teknik

Opponent:
Professor Arne Sunde
Norwegian University of Science and Technology
Department of Laboratory Medicine, Children´s and Women´s Health

Betygsnämnden:
Docent Kersti Lundin
Göteborgs universitet
Kliniska vetenskaper, Obstetrik och gynekologi

Docent Håkan Wramsby
Lunds universitet
Institutionen för obstetrik och gynekologi

Professor emerita Pia Ek
Uppsala university
Institutionen för medicinsk biokemi och mikrobiologi

ABSTRACT

Despite improvements in stimulation protocols, culture media formulations and laboratory protocols, the success rates in human IVF remain disappointingly low. The ability to successfully cryopreserve supernumerary embryos in a given IVF cycle without losing significant embryo viability is essential to maximize the cumulative benefit of a given treatment cycle. Therefore, studies on culture, cryopreservation and gene expression of human embryos fertilized in vitro were performed.

In these studies the impact of culture media on fertilization of human oocytes *in vitro* was investigated. Furthermore, the impact of growth factor supplementation to *in vitro* culture media and embryo survival and cryodamage after vitrification were studied. Using in situ hybridization and immunohistochemistry methods, the expression of genes in the human Fallopian tube, endometrium, and pre-implantation embryos and in human embryonic stem cells (hES) cells was studied.

The findings can be summarized as follows: *in vitro* culture media has impact on normal fertilization. Supplementation of growth factors to *in vitro* culture media implicates a physiological role in regulating pre-implantation development. Vitrification of embryos is an effective way of cryopreservation. In situ hybridization, immunohistochemical and matrix assisted laser desorption/ionization time of flight mass spectrometry methods are versatile tools in reproductive medicine research.

These findings will help to identify markers for embryo development and characterisation of hESC. Furthermore, knowledge obtained will give us tools to improve formulations of culture and cryopreservation media, which in turn might increase the overall results in IVF treatment and maximise the usage of hESC.

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