Dr Mary Herbert

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Research Focus

Reproductive Cell Biology

My research group is involved in parallel basic science and translational research programmes. The translational programme aims to improve the efficiency of somatic cell nuclear transfer in humans and to derive embryonic stem cell (ES) for therapeutic use. These objectives are complemented by a basic science programme focussed on the regulation of chromosome segregation in oocytes and in ES cells.

Research Areas

1. Our work on female germ cells has made a significant contribution to knowledge of basic cell cycle mechanisms regulating the meiotic divisions in mammalian oocytes. Ongoing work in this area seeks to gain insight into the molecular pathways underlying aneuploidy during meiosis. In addition to its obvious application in the field of infertility, this research will help us to better understand the underlying causes of aberrant reprogramming and aneuploidy in cloned embryos. Collaborators in this area of research include Professor Christer Hoog, Karolinska Institute; Professor Tom Kirkwood, Institute of Ageing and Health, and Dr Gordon Strathdee, Crucible Laboratories, Newcastle University.

2. In collaboration with Professor Doug Turnbull, Institute of Neuroscience, I am working on a project to develop pronuclear transfer techniques in human zygotes, with the ultimate aim of preventing transmission of mitochondrial disease from mother to child (Brown et al, Lancet, vol. 368, 2006).

4. In collaboration with Professor Alison Murdoch, we are working towards the production of clinical grade embryonic stem cells and on optimising the efficiency of nuclear transfer in human oocytes. As part of this work, we have pioneered the development of novel process- and environmentally-controlled workstations designed to maintain physiological conditions while meeting GMP air-quality requirements for IVF and ES cell applications. The technology has been patented by NHS Innovations North.

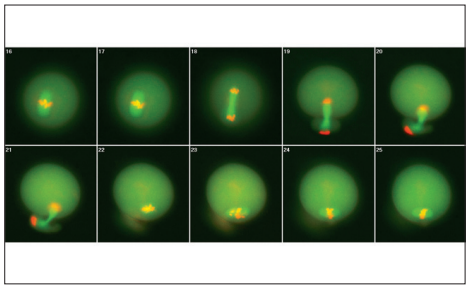
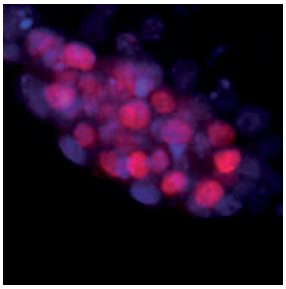


Image shows a mouse oocyte undergoing anaphase of meiosis Ifollowing injection with mRNA encoding Histone H2-RFP and Tubulin-GFP



A day 6 human blastocysts with nuclei stained in blue and NANOG-expressing cells (stained in red) contained in the inner cell mass.

A day 6 human blastocyst with a clearly visible inner cell mass.

A central focus of our research concerns the Lab Members
Research Team: Sarah Pace, Lisa Lister, Louise Hyslop, Lyndsey Craven, Gareth Greggains and Rez Prathalingam.
Clinical Team: Jeanette Fenwick, Steve Harbottle, Katie Feenan, Sam Byerley, Sharon Parker, Simon Cassley and Lynne Novak.
Funding: MRC; Muscular Dystrophy Foundation; Birth Defects Foundation; Infertility Research Trust; ONE NorthEast, and the Spitzer Foundation

Selected publications

Brown D.T., **Herbert M.,** Lamb V.K., Chinnery P.F., Taylor R.W., Lightowlers R.N., Craven L., Cree L., Gardner J.L., Turnbull D.M. Transmission of mitochondrial DNA disorders: possibilities for the future. (2006) Lancet 368, 87-89

Homer H., McDougall A., Levasseur M.D., Yallop K., Murdoch A.P., **Herbert M.** Mad2 prevents aneuploidy and premature proteolysis of cyclin B1 and securin during meiosis I in mouse oocytes. (2005) Genes & Development, 19, 202-207

Stojkovic M., Lako M., Stojkovic P., Stewart R., Przyborski S., Armstrong L., Evans J., **Herbert M.,** Hyslop L., Ahmad S., Murdoch A., Strachan T. Derivation of human embryonic stem cells form Day 8 blastocysts (2004) Stem Cells 22, 790-7

Herbert M., Levasseur M.D., Homer H., Yallop K., Murdoch A.P., McDougall A.P., (2003) Proteolysis of cyclin B and securin is required for homologue disjunction in mouse oocytes. Nat. Cell Biol. 5: 1023-1025