The Faculty of Medicine, Nursing and Health Sciences, in conjunction with co-sponsor Flinders Medical Centre Foundation, will support up to ten Summer Research Scholarships over the summer of 2014-2015. These scholarships will allow the recipients to participate in a supervised project in a supportive, real-life research environment, anywhere within the Faculty of Medicine, Nursing and Health Sciences. The strategic intent is that students who experience (and enjoy) a taste of research as undergraduates may decide to undertake an Honours degree in the Faculty of Medicine, Nursing and Health Sciences later in their candidature.

Research project title: Image analysis of mouse follicles harvested from enzyme disaggregated ovaries.

Supervisors:
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2. Mr Mohammad Assaduzaman

Location: Dept Medical Biotechnology and FMC Microscopy Suite

Background:
Chemotherapy causes infertility in women by destroying the ovarian tissue which contains follicles and oocytes. The collection of ovarian tissue before chemotherapy would allow preservation of follicles which can be transplanted back into the patient after treatment. Methods to isolate and cryopreserve follicles have not yet been refined and it is a challenge to maximise follicle yield and viability. This study explores the effect of using synthetic collagenase IV to disaggregate murine ovaries, and the follicle yield and viability after isolation.

Disaggregation of ovarian tissue with collagenase types II, IV and Liberase damaged the basement membrane surrounding the follicles, and compromised follicular viability. A purified Liberase blend approved for clinical use by the US FDA was compared with 1 mg/ml collagenase type IA purified from animal tissues (Dolmans et al., 2006). The collagenase-isolated follicles had poorer morphology and viability than the Liberase isolated follicles, but the effect of a new recombinant purified collagenase IV preparation on follicle yield and quality has not been examined.

In this study murine follicle quality will be determined using 4',6-diamidino-2-phenylindole (DAPI) nuclear staining, α-tubulin staining and Chloromethyl-X-Rosamine (CMXRos) staining. DAPI is taken up by all live and dead cells and will be used to determine the number of granulosa cells in each
follcile, and will enable application of a morphological quality scoring system (Dolmans et al., 2006). DAPI staining will be coupled with α-tubulin and CMXRos staining.

Aims:

- To compare follicle yield and quality after murine ovarian disaggregation using a purified recombinant synthetic collagenase IV or a crude animal-derived collagenase Type IV.
- Examine DAPI+CMX-Ros, and DAPI+alpha tubulin stained follicles using the confocal microscope.
- Compare image analysis data obtained after confocal and ‘normal 2D’ fluorescence microscopy. Specifically, how do the extended depth of field functions in FIJI for application to ‘2D’ micrographs compare to image analysis of confocal-derived data?

Possible techniques and methods:

- Collection of follicles from mouse ovaries
- Staining of mouse follicles with DAPI, CMX-Ros and alpha-tubulin (already have many stained follicles available)
- Confocal and fluorescence microscopy.
- Image analysis

Suggested readings:


Further information: Please refer to the Faculty website (http://www.flinders.edu.au/mnhs/students/scholarships.cfm) for full details about this scholarship opportunity.

Applications: Intending applicants are encouraged to contact potential supervisors before submitting an application through the Flinders University Student Administration and Systems’ website:

http://www.flinders.edu.au/scholarships-system/index.cfm/scholarships/display/ab20f8c

Applications must be submitted by Friday 21 November, 2014.