In Vitro Growth of human Primordial Follicles.

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The ability to develop human oocytes from the earliest (Primordial) follicular stages through to maturation and fertilisation *in vitro* could revolutionise fertility preservation practice. This process has been achieved in mouse where *in vitro* grown (IVG) oocytes from primordial follicles have resulted in the production of healthy live offspring. However, developing IVG systems to support complete development of human oocytes has been more difficult because of differences in scale of timing and size. The aim of our work is to determine whether complete oocyte development can be achieved from human ovarian tissue grown in a multi-step culture system. We have developed a dynamic 3 step culture system that supports the activation of primordial follicles (In Vitro Activation (IVA) step 1) growth of multi-laminar follicles (In Vitro Growth (IVG1) step 2) and oocyte growth out with the large follicular environment (step 3). Using this system a population of oocytes capable of reaching Metaphase II can be obtained. This system also allows us to test the role of various regulatory factors such as components of the PI3K pathway (e.g. PTEN, mTOR1) on human oocyte development. This presentation will focus on the challenge to improve quantity and quality of in vitro grown human oocytes and will discuss the effect of various regulatory factors and age on human oocyte development in vitro.