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Re-imagining the ovary: Recent advances and technical hurdles in recapitulation of the human ovarian micro environment

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Stem cell-based strategies for improvement of female infertility harbor tremendous potential not only restoring or sustaining fertility via oocyte production and development but also minimizing severity of the health consequences that accompany the endocrine disruption that occurs at menopause. Recent advances from our work and others have convincingly demonstrated that viable oocytes can be generated from primitive stem cell sources, opening the door for new avenues of research centered on ovarian regeneration and tissue bioengineering. However, both the endocrine function of the ovary and our current ability to generate fertilizable eggs is dependent upon the ovarian follicle structure, which includes the germ cell surrounded by a highly specialized layer of somatic cells responsible for the synthesis of sex steroid hormones. These cells, termed granulosa cells are requisite for the maintenance of hormonal stasis with the hypothalamic-pituitary axis. With advancing age these cells decline in number and function, ultimately resulting in cessation of fertility and endocrine dysfunction. Accordingly, cell- or tissue-based strategies aimed at generating an 'artificial ovary' for fertility or endocrine purposes must take into account multiple cellular lineages that work together in a complex microenvironment, comprised of distinct biological matrices. Working towards this, we have evaluated human ovarian composition throughout development and adulthood via a comprehensive quantitative proteomic analysis and are directly applying this toward the development of an ovarian stem cell-based artificial ovary system.

Biography

Dori C Woods has completed her PhD at the University of Notre Dame, working on granulosa cell function and steroidogenesis. She is currently an Assistant Professor at Northeastern University in Boston, MA, with a research focus on ovarian stem cells and the decline in female fertility with age. She has published over 30 manuscripts and review articles on ovarian function.

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