

The birth of the biological clock

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(PhysOrg.com) -- Researchers have moved one step closer to solving the inner workings of the biological clock, by studying it from the moment it starts ticking.

A successful collaboration between the Universities of St Andrews and Edinburgh has resulted in a better understanding of how many eggs a woman has in her ovaries (ovarian reserve) from conception to menopause. It is the first time that scientists have ever modelled human ovarian reserve from establishment before birth to menopause around 50 years of age.

The new research, by Dr Tom Kelsey (St Andrews) and Dr Hamish Wallace (Edinburgh), provides further evidence for the theory that women are born with a fixed number of non-growing follicles (eggs) that decline with increasing age.

The study, using data from women in the UK, US and Europe, models the establishment and decline of the number of eggs in the [ovary](#) to its peak at about twenty weeks after conception, and its subsequent decline until menopause when no eggs are left usually around 50-51 years.

Tom Kelsey, a Senior Research Fellow at the School of Computer Science at St Andrews, said, "Previous models have looked at the decline in ovarian reserve, but not at the dynamics of ovarian reserve from conception onwards. Our model shows that for 95% of women, by the age of 30 years, only 12% of their maximum ovarian reserve is present, and by the age of 40 years only 3% remains. Using the model, Drs

Kelsey and Wallace have identified several important new findings that are likely to inspire research.

Hamish Wallace, a consultant oncologist at Edinburgh's Royal Hospital for Sick Children, said, "A better understanding of the dynamics of ovarian reserve will help us to predict which children and young people treated for cancer are most at risk of an early menopause. These patients may benefit from having their eggs frozen before cancer treatment starts.

"Furthermore our model provides no evidence for the presence of stem [germ cells](#) in the ovary that could increase the number of eggs present in the ovary and delay the [menopause](#)."

The new study identifies an important but unexplained change in ovarian reserve dynamics at around 14 years of years.

Dr Kelsey explained, "At around 14 years, something happens that we've never seen before: the rate of recruitment of immature eggs towards mature [eggs](#) drops off and we don't know why. Of course at that age there are a lot of hormonal changes that might account for this new observation."

More information: The research is published by *PLoS One*:
www.plosone.org/home.action

Provided by University of St Andrews

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