Modern methods of fertility preservation: a tribute to Roger Gosden

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As a practitioner of ‘translational’ research, Roger Gosden’s contributions have been immense. Over a career spanning four decades, he has published numerous influential articles in peer-reviewed journals and books dealing with the fertility and fecundity of various mammalian species from mouse to (wo)man. His focus has ranged from the basic biology of ovarian development and aging through gonadal preservation and growth in vitro, to human tissue transplantation: all towards improving quality of life and reproductive health.

It was therefore entirely appropriate that the XVth Workshop ‘Development and Function of Reproductive Organs’ should honour Roger with an entire ‘festschrift’ session celebrating his work.

This issue of MHR contains three peer-reviewed ‘New Research Horizon review’ articles arising out of the Gosden session, set together with two original research articles relating to the same topic. Each connects directly with Roger’s own research interests or personal contribution to the field.

Silber begins by celebrating Roger’s fascination with ovarian transplantation through an elegant assessment of how the procedure has developed over the last half century, from exploratory animal experiment to successful clinical application. Modern tissue cryopreservation and surgical techniques mean that it is now entirely realistic for ovarian tissue to be removed, stored (so far, for up to 14 years) and donated such that recipients can now expect routinely to reinitiate normal ovulatory menstrual cycles within four months.

Roger’s interests extend beyond the ovary, which is why the series also benefits from the Diaz-Garcia et al. article on uterine transplantation. Findings from experimental animal studies emphasise the technical challenges presented by organ retrieval and ischemic preservation; also the problems around achieving satisfactory anastomosis and immunosuppression to avoid tissue rejection by the donor. The procedure also poses unique ethical and legal challenges that would have to be accommodated were it ever to be applied clinically.

An abiding theme of Roger’s research focus has been the dynamics of follicular depletion and ovarian ageing and he strongly advocates mathematical modelling to understand the physiological basis of these processes. This theme is picked up by the contribution from Kelsey et al., which applies a computational approach to harmonise rare and precious data sets for follicular counts on individual human ovaries. The outcome is a unique quantitative description of the dynamics of human ovarian reserve throughout reproductive life up until the menopause.

Roger was involved in early work supporting the so-called production line hypothesis of ovarian follicular formation whereby the timing of germ cell entry into meiosis during fetal development is held to influence timing of ovulation in adulthood. The model predicts that oocytes entering meiosis first also become the first to ovulate, in which case a locally timed mechanism to initiate meiosis is required. Thus the paper by Eddie et al. brings forward IL6-type cytokines and their receptors as candidate signals in this process, with potential to regulate the transition of

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differentiating germ cells into meiosis and influence the formation of primordial follicles in the human fetal ovary.

Finally, it is fitting to be reminded that more, much more, than any single gene or even gene family is active in such a fundamental reproductive process. Markholt et al. do this effectively using a data-driven approach by analysing global gene expression in oocytes isolated at different stages of development from human ovaries. Their data throw up myriad gene candidates for further investigation and underscore the inherent complexity of the pathway biology involved.

The workshop theme was ‘Reproductive Function and Dysfuction’. Roger Gosden has contributed massively to our understanding of both states. MHR is proud to carry this collection of articles, which honour Roger and testify yet again to the potential for soundly conducted basic research to benefit clinical outcomes in reproductive medicine.

References


