

Newsletter No: 195 / Summer 2009



Society for Reproduction and Fertility

**Newsletter compiled by John Parrington and Rachel Webb.
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SRF Chairman's Thoughts

This is my final report as I complete my term of office as Chair of the SRF. Council have had an eventful 12 months. In the face of the economic down turn it is inevitable that we have kept a close eye on the Society's finances and we have continued to monitor the impact of the policies we have introduced over the last 4 years on membership numbers and recruitment. We have also completed a number of long-term projects and have generated some new ideas to take forward.

The Chair, Treasurer and Programme Secretary of SRF made a significant contribution to the planning, running and scientific agenda of the successful UK joint fertility societies meeting, Fertility 2009, which was held in Edinburgh in January. Hosting the meeting in January was an unknown quantity, but it proved to be the right decision. The meeting was attended by some 450 delegates from ACE, BFS and SRF and was very well supported by trade exhibitors. SRF members were disproportionately well represented in the free communications sessions. On the basis of delegate and financial feedback the joint executive committee of the constituent Societies have agreed that the joint meeting now has a firm financial footing and the planning has already started for the next joint meeting which will be held in Dublin in January 2011. It is proposed that this meeting will be run in collaboration with the Irish Fertility Societies. Further details of future conferences are provided in the Programme Secretary's report.

After a number of years of planning, I am pleased to report that we have now completed the retrodigitisation of the full archive of the *Journal of Reproduction and Fertility* and the digital archive has now been launched. This is an excellent, fully searchable electronic archive of all of the classic

scientific papers published by the Society's journal from 1960 onwards. The resource is freely available through the Reproduction website. This project came in under budget. If you have not yet used this facility we recommend you try it. Council are delighted to report that under the direction of our new Editor-in-Chief, Prof. Tom Fleming and with the hard work of the editorial board, the impact factor of *Reproduction* has increased to 3.07 this year and it is projected to rise further to 3.356 over the next 5 years.

Members of the Education Committee have completed a significant review and updating of the Society's website to make the site more accessible and useful to current members and future members. The revised site went live in December 2008. Management of the SRF site is subcontracted to ByteSize Solution, whose services have been retained by Council for the immediate future. It is a constant job to review and update the website content. Council would like to encourage members to contribute ideas for inclusion on the site.

Inevitably the activities of Council over the last 12 months have continued to focus on the three key areas which have been reported in previous newsletters, namely: the financial management and stability of the Society in the current economic down turn; recruitment of new members and retention of existing members; and the scientific and educational agenda of the Society. Following the financial review detailed in the Treasurer's report Council have decided to continue to provide postgraduate and postdoctoral members with grant support to attend the SRF annual conference in order to present their work as we have been encouraged to see a good uptake of these grants by the younger members of the Society. This strategy is increasing the number of new membership applications received year on

year. We have also agreed to continue to provide members with travel grants. All of the details of the grant application processes and eligibility can be found on the SR website. To fulfil the charitable and educational obligations of the Society we have provided a small numbers of sponsorship grants to support conferences external to SRF and we have run a second undergraduate essay competition. The winner of the essay prize for 2009 are detailed in the General Secretary's report. These activities will continue next year.

Perhaps the greatest challenge faced by Council over recent years has been the task of rebuilding the SRF membership. We now audit membership numbers, type and demographics at 6 monthly intervals. We have implemented strategies to recruit new members and we have streamlined the process for the award of honorary membership. There is still much to be done to ensure that SRF membership represents good value for money. A future focus for Council is how best to support established members of the Society as it is vital to engage the interests of these members and to encourage their contribution to the scientific debate at the SRF annual conferences and to the management of the Society. Council are currently discussing the possibility of establishing an academic scholarship fund which will be open to long-standing members of the Society. The SRF Secretariat will initiate a membership recruitment drive over the coming months and it will be more active in following up lapsed members who do not have a current payment record. To simplify this process we are changing the scheduling of annual membership. Currently, annual membership runs for 12 months from December and not, as is a common misconception, for 12 months from the time of payment of the subscription. From January 2010 we plan to simplify membership renewals so that annual membership corresponds to the calendar year. This change in scheduling means that all members will get 1 month of free membership in December 2009.

Over the last three months there has been a major change in the SRF secretariat. Previously, our secretariat support was provided by Procon. In 2008 Procon was taken over by Universal and despite assurances otherwise, at the start of April UniversalProcon served the Council of Management with notice that they intended to terminate the SRF secretariat contract on the 30th June 2009. In May and June Council invited tenders to fill the secretariat vacancy and 3 companies were shortlisted and interviewed. I am pleased to report that Portland Customer Services (PCS), a subsidiary of the Biochemical Society, were awarded the SRF Secretariat contract from 1st July 2009. Council is working with PCS to ensure that the transition to the new secretariat is as seamless as possible and we are confident that the team at PCS will rapidly become an asset to the members.

Finally as I step down as Chair there are a number of people whose contributions I would like to acknowledge. Council would like to thank Pat

Kitching, from UniversalProcon for her loyal support and hard work over the last 4 years and we would all like to wish Pat every success in her new job. I would like thank all of the members of Council I have served with over the last 4 years for their hard work, humour and robust discussions on the behalf of the Society. Thanks are due to Andy Childs, Colin Duncan, Franchesca Houghton, Henry Jabbour and Eduardo Roldan who stepped down from Council at this year's AGM. Finally, I would particularly like to thank Martin Luck for his hard work and wise council as SRF treasurer throughout my time in office. I will finish by wishing the new Chair, Paul Fowler, and all ongoing Members of Council every success in the challenges that lie ahead.

Helen Picton

Members of SRF Council

Chair:	Paul Fowler
Treasurer and Company Secretary:	Richard Lea
General Secretary:	John Parrington
Programme Secretary:	Robert Abayasekara
Editor in Chief:	Tom Fleming

Committee Chairs:

Finance:	Richard Lea
Meetings:	Robert Abayasekara
Education & Development:	John Parrington

Ordinary members:	Cheryl Ashworth Greg FitzHarris Ali Fouladi-NashtiK Kevin O'Bryne Tony Michael Rachel Webb Suzannah Williams
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Post-Grad/Doc Reps:	Mhairi Laird Leanne Williams
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Travel Grants and Vacation Scholarships

All non-statutory members of the Society are eligible to apply for travel grants to attend conferences organised by the SRF or other bodies. For further information including an online application form, please visit the website (<http://srf-reproduction.org>) or contact the SRF Business Office.

All travel grant recipients are required to write a short report about the meeting they attended and to acknowledge SRF support on any poster or oral presentations. These reports should be sent to the SRF General Secretary via the Business Office and may be published in the SRF newsletter.

The Society also sponsors Vacation Scholarships which help to fund promising undergraduate students who wish to carry out research projects in their Easter or summer holidays. If you have a project, or know of

a suitable student, please visit the website for further information about how to apply. Please note that students at all stages of their undergraduate degree are eligible.

This year 6 vacation studentships were awarded, in May of this year the recipients were:

Dominic Adams (University of Aberdeen, Supervisors PA Fowler, PJ O'Shaughnessy) Che Heun Chau, (University of Oxford; Supervisor J Parrington), Kemi Akindele (University of Westminster; Supervisor Dr Jo Murray), Liam Healy (University College Cork; Supervisor S Walsh), Anna Rogers (University of Oxford; Supervisor S. Williams).

The SRF would like to encourage Vacation Scholarship award recipients (student or supervisor) to present their results as a poster presentation at the next SRF meeting. Registration will be waived for **students** presenting their scholarship data at the SRF conference. In the event that the student/supervisor is unable to attend the SRF conference a full report will be required detailing the findings of their investigation. This report may be published in the SRF newsletter or on the SRF web site.

From the Programme Secretary

Since my last report, the society's members have had the opportunity of attending *SRF 09* in Oxford (12-14 July 2009). A big "thank you" to all those SRF members that supported this meeting. Although not as many members availed themselves of this opportunity, those that attended were treated to a conference of high calibre science. The social activities for which SRF conferences of yesteryear are famed seemed to be captured at *SRF 09* despite the absence of a ceilidh!

The conference featured various symposia (Symposium 1: Lifestyles and Reproduction, Symposium 2: Communication in Pregnancy and Symposium 3: Non-transcriptional modifications), the post-doctoral scientist and the student prize sessions and a great lecture from the recipient of the distinguished scientist award, Professor Doug Stocco. The programme also included lectures by the winners of the SSR/SRF New Investigator awards, Dr Humphrey Yao and Dr Kurt Sales. The audience was treated to two excellent lectures delivered by two reproductive biologists that are destined for greater and better things. The delegates were also treated to some wonderful after dinner anecdotes by a true SRF stalwart, Professor Twink Allen who received the Marshall medal for services to reproduction. A feature of the SRF meetings are the various prizes awarded to members at the early stages of their careers. The prize sessions featured science of the highest order presented with panache. The society should justifiably take pride in the calibre of its junior members. Holding off stiff international

competition, Dr Andy Childs was awarded the post doctoral prize of £300 for his talk entitled *Dynamic changes in the expression and functionality of BMP signalling accompanies the transition from germ cell proliferation to differentiation in the human fetal ovary*. Likewise, Ms Sharron Eddie was awarded the student prize of £250 for her talk titled *Identifying targets of IL-6 action in the human fetal ovary*. The poster prize of £100 which is open to ALL members regardless of age/stage of career was awarded to Ms Kirsten Hogg for her poster titled *Localisation of inhibitor differentiation (ID) proteins in the sheep ovary*. For the second year in succession, ALL prize winners hailed from that bastion of reproductive biology, the Centre for Reproductive Biology in Edinburgh. What money on the CRB repeating this achievement next year? Further details of *SRF 09* can be found at: <http://www.srf-reproduction.org/meetings/conf2009/programme.pdf>

The next item on the meetings committee's agenda is the programme and organisation of *SRF 10* in Sutton Bonington (11-13 July 2010). As this meeting will also celebrate 60 years of SRF, we hope that the programme will reflect the changing nature of the challenges faced by reproductive biologists at the inception of SRF in 1950 through to the present day. Further details of this exciting programme will be available on the SRF website later this year.

Planning will shortly get underway for *Fertility 11*, with a meeting of the joint executive committee in September. At the present time the favoured venue for this meeting is the fair city of Dublin. We hope to firm up on the venue and programme in the not too distant future. It is to be hoped that members will encourage young scientists to join the society as well as attend and present at the society's conferences. Grants of up to £375 are available for student members as well as post doctoral researchers at the early stages of their careers.

The SRF Distinguished Scientist Award is the premier award of the society and as such it is essential that the recipients of this prestigious award are of the highest calibre. The list of winners reads like a "who's who" of reproductive biology. In order that we maintain this tradition, it is vital that Council receives nominations – could I therefore ask the membership to actively participate in this vital task. Details of the nomination process (a less than onerous task!) will be posted shortly on the SRF website. Nominations are similarly requested for members at either end of the spectrum, the Marshall Medal and New investigator awards. In the first instance, nominations for the above award should be submitted to the SRF programme Secretary via the Business Office. Feedback from members on matters relating to SRF meetings will be gratefully received.

Finally, council is always happy to receive nominations for future Marshall Medallists and for the SRF Distinguished Scientist Award (see below).

In the first instance, nominations for the above award should be submitted to the SRF programme Secretary via the Business Office. Feedback from members on matters relating to SRF meetings will be gratefully received by me at rabayase@rvc.ac.uk.

Robert Abayasekara

From the Treasurer and Company Secretary

2008 and the first half of 2009 have been financially stable periods for the Society. Despite the alarming global economic environment, and the consequent decline in the value of our investments (detailed in the Annual Report and Accounts), the Society's income remains stable. Income from membership subscriptions largely cover the costs of running the Society. The income from investments is declining but this has been more than balanced by a substantial rise in income from Reproduction. As a result, we have been able to maintain our active programmes of charitable activities for the benefit of members and others. This position is likely to continue for the foreseeable future.

The financial health of the Society has given Council the freedom to undertake costly but worthwhile projects, such as the retrodigitisation of JRF, and to provide assistance to younger members in the form of Vacation Scholarships and the very popular Support for Conference Attendance scheme. The Society has also felt able to go ahead with its annual conferences at affordable rates of registration, despite the unlikelihood of these events breaking even. The outstanding scientific quality of the Oxford conference, despite the unavailability of commercial sponsorship, clearly justifies the use of the Society's income in this way.

Membership of the Society remains roughly stable but there is sufficient interest from new members to indicate that we are providing what people want and encouraging them to join. Council is now considering ways of increasing the benefits of membership for more established researchers and academics. The current financial outlook suggests that innovative ideas can be seriously considered.

The completion of my term of office as Treasurer has coincided with the transfer of secretariat services to Portland Customer Services. This change will modernise and streamline many aspects of the way the Society is managed, not least from the Treasurer's point of view. Portland will be taking over both book-keeping services and the running of bank accounts, cheque books, expense claims and other payments. The removal of these important but somewhat mundane activities from the Treasurer's desk will mean that he will be able to concentrate less on day-to-day operational matters and more on strategy and decision-making.

The change of secretariat was forced on the Society, yet it has turned out to be an opportunity to re-

evaluate all aspects of our operation and the service we provide for members. I am delighted to be handing over the keys of the safe to Richard Lea in such a spirit of optimism and confidence. I know that Council will be able to rely on Richard's wisdom and good sense and that the Society as a whole will feel that its assets are in very safe and shrewd hands.

Martin Luck

Call for nominations – New Investigator Award 2010

The Society is currently calling for nominations for the SRF New Investigator Award 2010. This is a very prestigious award for which suitably qualified candidates should be nominated. Nominations should take the form of a comprehensive curriculum vitae, a proposer and a short statement (100 words).

The criteria for this award are as follows:

SRF members or those whose applications are under consideration, who are within 10 years of being awarded their PhD are eligible. The recipient of this award is expected to present their paper as an oral presentation in the SRF/SSR New Investigator session at the SRF Annual Conference and the SRF/SSR Transatlantic Lecture at the SSR Annual Conference in the SAME year.

For more information please visit <http://www.srf-reproduction.org/honours/investigator.htm>. Please nominate colleagues that members feel are suitably qualified to be a recipient of this prestigious award which affords the winner the opportunity of showcasing their research at the annual meetings of both SSR and SRF.

Nominations need to be received by the SRF business office by **30 October 2009**.

Marshall Medal / SRF Distinguished Scientist Award

Council is always happy to receive nominations for future Marshall Medallists and for the SRF Distinguished Scientist Award. Each should take the form of a letter of commendation accompanied by an abridged CV for the candidate detailing:

- The area of expertise of the nominee
- Major contributions of the nominee to the field of reproductive biology
- Details of any professional honours already bestowed on the nominee
- An outline of the publication record of the nominee (total number of publications, indicating year of first publication)

Although nominations can be made by any individual member of the Society (irrespective of non-statutory or statutory status), the letter of commendation should list other members of the Society prepared to formally endorse the nomination.

Honorary Members

Would you like to nominate a colleague for the distinction of becoming an Honorary Member of the Society for Reproduction and Fertility? If you consider someone to be worthy of this tribute, please pass their details forward to the General Secretary, giving justification for your nomination and the name of a second, supporting member of the Society. Proposals for Honorary Membership may be put forward by both Statutory and Non-Statutory members of the Society.

Postgraduate / Postdoc Corner

With the Oxford conference now behind us, we can look forward to the next meeting at the University of Nottingham. Held on the beautiful, rural Sutton Bonington campus the 2010 SRF conference promises to be another successful event.

The Oxford meeting as usual kicked off with a great afternoon of seminars followed by the infamous SRF quiz. Where once again a hot topic of conversation for the remainder of the evening revolved around the dubious nature of some of the questions and answers coming to think of it! Congratulations to the winning team.

The standard of presentations from the student faction was, as ever, very high this year; the finalists were Alan Tang, Antonella Fidanza, Sharon Eddie, Fabio Comim, Jennifer Connolly and Samantha Garside. After a very competitive session, Sharon Eddie took home the prize after giving an excellent presentation on identifying the targets of IL-6 ligand action in the human fetal ovary. Congratulations also go to Kirsten Hogg from Edinburgh who won the poster prize session fending off stiff competition from a variety of high calibre posters.

Finally we would like to extend our thanks to Andy Childs for his contributions as postgraduate rep as he stands down from this position. He was involved in the education and development, programme committee and council committee and was therefore an integral member of the SRF. Andy will be missed by all and we wish him every success.

Elected at this year's meeting to stand in his place is Leanne Williams, a first year PhD student of The University of Nottingham working on ovarian follicular development. Many years of research experience and more recently a lecturer of Biology in further education Leanne hopes to continue Andy's good work and looks forward to representing the postgraduate cohort of the SRF.

Any post graduate or postdoc members who would like to voice their ideas and opinions of the society should feel free to contact Mhairi Laird

(mhairi.laird@nottingham.ac.uk) or Leanne Williams (sbxlw3@exmail.nottingham.ac.uk) who are here to look out for the junior members of the SRF.

That's it for now

Mhairi, Leanne and Andy

Publications

Dear Colleagues

The reputation and quality of *Reproduction* continues to improve with the policy of our Editorial Board to only accept submissions of significant originality, scientific quality and high likely level of interest to our readers. Our push for quality coupled with our encouragement for submissions within key emerging areas within reproductive biology over the last few years has resulted in the latest impact factor for the journal, publicised in July, rising again this year to 3.075. This rise is particularly encouraging not just because it pushes us across the '3' barrier but because several of our competitor journals were not as successful and our overall ranking within the reproductive biology field also improved. Well done to all the Editorial Board Members for their careful and critical work in evaluation of manuscripts – they make my job easy in completing the final decision. I would also like to thank all the editorial staff at our publishers, Bioscientifica, especially Lindsay Hook who is the Senior Peer Review Administrator for *Reproduction*, for their energy, efficiency and support.

We recently launched our new form of manuscript called 'Research Highlight' to run alongside our current Research papers and Reviews. Research Highlights were introduced as brief, high priority, original research manuscripts reporting a major discovery or advance in a particular field of reproductive biology. These manuscripts will cover experimental studies offering new insight into reproductive mechanisms likely to be of significant interest across the readership of the journal. Research Highlights will be processed after review as high priority for rapid publication and will be given due prominence and recognition in our monthly issues. We hope that this new format will encourage submissions of very high quality and impact to *Reproduction*, further enhancing our reputation.

A major reason for the continued improvement in the journal is the work of the Reviews Commission Group chaired by our Reviews Editor, Kevin Sinclair. This group oversee the steady recruitment and assessment of high quality topical reviews for *Reproduction*, reviews that usually become highly cited. Ramiro Alberio has recently joined the RCG. Recent reviews published in *Reproduction* since May 2009 include GnRH signalling in intrauterine tissues (Peter Leung), Small RNA molecules in the regulation of spermatogenesis (Martin Dym), Cell cycle regulatory control for uterine stromal cell decidualization in implantation (Sanjoy K. Das), Serum biomarkers for the diagnosis of ectopic pregnancy (Andrew Horne) and Kisspeptin (Rebecca Reynolds). Coming up in the August issue will be Recent developments

in xenografting testis tissue (Ina Dobrinski) and Comparative aspects of implantation (Fuller Bazer). The RCG also organises Focus issues for the journal, usually with a Guest Editor, where several papers, both review and research papers, focus on a single topic. Our last Focus issue was on Fertility Preservation and a Focus on Vascular Function is planned for the autumn with Henry Jabbour as Guest Editor.

I would also like to highlight the improvements made to the SRF website where several links to the *Reproduction* site have been added for topical articles and images. Thanks to all concerned.

Please can I encourage all SRF Members to press your institution library to subscribe to *Reproduction* if they currently are not doing so. We market the journal throughout the world at many international conferences with the help of our publishers. Remember when you are considering where to send your latest paper that we have no page charges and free colour with proceeds from the journal going to support the charitable work of the SRF for example in research travel support for PhD students.

Please contact me if you have comments or thoughts about any aspect of *Reproduction's* performance (tpf@soton.ac.uk).

With very best wishes

Tom Fleming

Trust for Research and Education in the Biology of Reproduction

The attention of SRF members is drawn to the TREBR which was established in 1982, under the management of independent trustees, to award travel and subsistence grants to scientists working in reproductive biology. The Trust was established to meet the needs of those who are ineligible to apply to the SRF for travel funds. Applications will therefore be considered from non-members of the Society for Reproduction and Fertility, and from members of the SRF who are not eligible for travel grants (i.e. statutory members). Funds may be used for attendance at scientific meetings or to support visits to other laboratories. Applications made by visiting scholars from developing countries are particularly encouraged. Applicants must be sponsored by a member of the Society. The maximum grant is £350. Further information on the Trust and application forms are available from the chairman:

Prof. APF Flint, School of Biosciences, University of Nottingham, Sutton Bonington, Loughborough, Leics LE12 5RD. Anthony.Flint@Nottingham.ac.uk.

SRF New secretariat

As our new secretariat Portland Customer Services (PCS) is the first contact point for any queries, travel, grant applications, membership question etc. Our new contact details are as follows:

Nora Green
Portland Customer Services
Commerce Way
Colchester
CO2 8HP
Direct Dial: +44 (0)1206 226 124
Switchboard: +44 (0)1206 796 351
Fax: +44 (0)1206 798 650

SRF@portland-services.com,

Biosciences Federation

The unification of the Bioscience Federation with the Institute of Biology is to take place on the first of October. The Society of Biology's mission is to create a *single unified voice for UK biology*. For details on the new society visit <http://www.bsfc.ac.uk>.

Undergraduate Essay Competition

This year for the second time the SRF held a student essay competition for undergraduates studying in the UK or Ireland. The competition was a great success with a wide variety of topics covered. The quality of the essays was very high, but three entries stood out for their scientific content but also skill in engaging not just scientists in the field but also more general readers.

This year's winner was Charlotte Bresslaw of Oxford University with her essay entitled "Kids after Chemotherapy?". Second place went to Graham Bell of Manchester University with the entertainingly titled, "Beyond Jonny and the Snip: Investigating the make contraceptive pill" and third place to Sophie Kay of King's College London with "Are whole ovarian transplants the future of reproductive technology?" Congratulations go to the winners and the full articles can be viewed on the web site at:

<http://www.srf-reproduction.org/education/essay.htm>

The deadline for this year's competition is 31st March 2010. Members should shortly be receiving a flyer with further details, which we hope you will use to publicise the competition around your departments to the undergraduates. The winner of the competition receives a prize of £500 and have the opportunity to attend the SRF annual conference, with costs of registration, accommodation and travel covered. The second prize is £250, and the third prize is £100. This year's prizewinning essay by Charlotte Bresslaw is reproduced below.

Kids after Chemotherapy?

Increased efficacy of chemotherapeutic regimes for childhood and paediatric cancers has ensured that a significant population cohort amongst many western societies is made up of young cancer survivors. Sadly for many girls in this category, the potential loss of fertility associated with the use of chemotherapy, can be almost as devastating as the malignancy itself. With effects on reproductive function being a sufficient priority to affect treatment decisions of many such patients, even at the expense of their own health, the gauntlet has been laid down for clinicians and researchers alike to design treatment protocols that will allow women to give birth after treatment, and thus maintain a normal quality of life.

There is only one routinely successful method of preserving fertility currently in the clinics, and this is ovarian stimulation prior to treatment in order to harvest oocytes for immediate use in IVF. Resulting embryos can be successfully cryopreserved, allowing healthy long term storage and later thawing without damage. In very young girls, this would be inapplicable, however, and many older women will be yet to find a long term partner before disease onset, for many of whom it would be upsetting to know that sperm donation was their only path to genetically related children. Many clinicians would not recommend IVF prior to chemotherapy anyway, due to the treatment delay required for ovarian stimulation. Furthermore, for breast cancer patients, the hormonal nature of ovarian stimulating drugs would counter indicate such treatments, due to the presence of potentially-disease-aggravating hormone receptors on their tumours (Blumenfeld, 2003). Alternative IVF protocols have been proposed to avoid this latter problem, including using tamoxifen to stimulate ovaries (with some success (Oktay et al, 2003)) or "natural cycle" IVF which bypass ovarian stimulation altogether, harvesting instead only the single naturally ovulated oocyte, accepting the lower success rate that results (Brown et al, 1996). With these treatments still requiring a dangerous postponement of chemotherapy, better strategies must be developed to safely protect fertility of these young affected women.

Techniques have been proposed involving the cryopreservation of either ovarian tissue, or oocytes themselves. Ovarian tissue transplantation (to non-natural sites eg. the arm) has resulted in five successful pregnancies to date (Brannstrom and Milenkovic, 2008); however, many women desire to conceive naturally, and uterus-linked grafting is yet to yield a live birth. Return of function after ovarian transplantation is rare due to ischemia/reperfusion injuries caused by anaerobic storage on ice (Gosden, 2008); however, the developing vitrification technique (whereby rapid freezing bypasses the cryopreservant crystalline state) minimises ischemic atresia and results in better rates of genetically normal pregnancies (Lucena et al, 2006). Autotransplantation of a whole ovary has produced live offspring in rats (Wang et al, 2002).

This enables many successive pregnancies as many follicles are re-implanted at once. Until human efficacy is confirmed, however, women are unlikely to risk a whole ovary in case irreversible damage is sustained upon revascularisation. Sadly, autotransplantation in cancer patients also has the inherent flaw that grafts may contain micrometastases that could cause disease re-instigation (Shaw et al, 1996).

Attempts have been made to store both mature and immature oocytes for use in IVF, but both have proved problematic with the former being highly susceptible to freeze-thaw injury, leading to low technique efficiency and a high degree of genetic abnormalities (Bernard and Fuller, 1996), and the latter being unusable due to *in vitro* maturation techniques (required to instigate oocyte competency for fertilisation) being woefully inadequate at the present time (Picton et al, 2008).

Some scientists, noticing that younger women maintain fertility post-chemotherapy more often than their older counterparts, have suggested that enforcing a pre-pubertal milieu upon patients for the duration of their chemotherapy might protect their long term fertility. Such a benefit could be explained by the holding of follicles (oocyte-containing units) at the primordial stage. This is the quiescent form in which follicles are maintained prior to onset of puberty when batches of follicles begin to develop further, destined for either ovulation or atresia after undergoing the irreversible transition to the primary stage. Since the primordial pool is fixed from birth, it is continually depleted as follicles develop, until menopause is reached when no more remain. As chemotherapeutic agents target dividing cells by design (tumour cells proliferate uncontrollably) late stage follicles are vulnerable since the granulosa cells are actively proliferating so as to continue to surround the expanding oocyte contained within them. Primordial follicles are not proliferating, making them impervious to chemotherapeutic cytotoxicity. Strategies holding follicles at the primordial stage could, therefore be highly successful at preserving fertility of young cancer patients.

The most obvious way to achieve this is to down-regulate the menstrual hormonal axes by chronically supplying a gonadotropin-releasing hormone (GnRH) analogue, to bind to and desensitise pituitary GnRH receptors, preventing release of both GnRH directly, and the gonadotrophins, LH and FSH, indirectly. Without these, further downstream effects occur including decreased steroid hormone secretion and decreased development of late stage follicles (not primordial follicles themselves, as these lack relevant receptor expression (Baarends et al, 1995)). Clinical trials have shown follicle-protective effects during chemotherapy with GnRH administration (Clowse et al, 2009) perhaps because of oestrogen-dependent decreased ovarian perfusion reducing chemotherapeutic doses follicles are exposed to (Kitajima et al, 2006) or due to loss of pro-development signals to primordial follicles from no-longer-developing late follicles (Blumenfeld and von Wolff, 2008).

Factors identified as promoting the primordial to primary transition include the hormone AMH, growth factors bFGF, KGF and LIF, and transcription factors NOBOX, Fox12 and Fig (Skinner, 2005). Many may represent future targets for intervention by exploiting their endogenous mechanisms. For example, administering AMH to mice decreases the number of simultaneously growing follicles and maintains the primordial pool size. The authors suggest that AMH prevents initial primordial follicle recruitment (Durlinger et al, 2002) which, with the knowledge that AMH is expressed by primary and preantral, but not primordial follicles (Hirobe et al, 1994), has led to proposals that AMH acts in a negative feedback system, preventing follicles developing when sufficient others already are. At least in rats, however, the AMH receptor is not expressed by primordial follicles (Baarends et al, 1995), making it unlikely that AMH could prevent the primordial to primary follicle transition. Furthermore, some data suggests that human follicle recruitment is actually enhanced by AMH (Schmidt et al, 2005). More experimentation is needed to identify AMH's role in the human adult ovary before it can be considered as a treatment for chemotherapy-induced POF.

Radical claims as to the existence of actively mitotic, germ stem cells in the adult ovary have been made, initially hoped to represent the "magic cure" for this problem. The main evidence provided was the co-expression of germ and stem cell markers, observed in first the ovary and then bone marrow, and the creation of chimeric follicles after transplanting murine wild-type ovarian fragments into transgenic, ubiquitously-green-fluorescent-protein (GFP)-expressing siblings (Johnson et al, 2004,2005). Sadly, mathematical modelling (Bristol-Gould et al, 2006) and failure of ovarian chimerisation in surgically conjoined parabiotic mouse pairs (Eggen et al, 2006), suggests that adult meiotic germ cells do not exist and that the follicle pool is fixed at birth, as has long been commonly accepted.

In the future, gene manipulation strategies may prove to be the ultimate answer. Since murine fibroblasts have recently been "de-differentiated" to give stem cells (Takahashi and Yamanaka, 2006), and oocytes have been produced from embryonic stem cells (Hubner et al, 2003), it may become possible to combine these two techniques so that women robbed of fertility by chemotherapy, may be able to donate somatic cells once recovered and have them manipulated *in vitro* to form genetically related oocytes to use during IVF. Time and money will be required to make this technique sufficiently safe and efficacious, but the enormous potential benefit to affected women should ensure that such research is persevered with.

Currently, for many women a prescription of chemotherapy heralds a death sentence to their reproductive competency, however, a brief glance at the relevant literature suggests that a time when this will no longer be the case may be waiting just around the corner.

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