

The Symposium on Germ cells and Transgeneration Effects included presentations from five scientists from North America and Europe that highlighted recent findings and approaches in investigating mutational changes in germ cells and discussed transgenerational mechanisms of genomic alterations. The symposium began with a presentation from Dr. Yuri Dubrova (Leicester University) showing that mutation rates at an expanded simple tandem repeat loci and a protein-coding gene (*hprt*) are significantly elevated in both the germline and somatic tissues of all the non-exposed offspring of irradiated male mice. These transgenerational changes in mutation rates are attributed to the presence of a persistent subset of endogenous DNA lesions. Dr. Richard Winn (University of Georgia) summarized the latest investigations using the  $\lambda$  transgenic medaka, a fish model carrying the *cII* mutation target gene, to characterize mutagenesis in progeny mediated by ethylnitrosourea (ENU)-exposed male germ cells. Among his findings, he provided evidence of untargeted and delayed mutations, the hallmarks of genomic instability. These results are consistent with growing evidence that implicate processes post-fertilization in genomic instability and that challenge the paradigm of targeted mutagenesis. Jacquetta Trasler (McGill University) reviewed the current understanding of the sperm epigenome in humans and mice and presented data showing that perturbation of DNA methylation patterns in male germ cells through deficiencies in DNA methyltransferases or exposure to chemicals disrupt meiosis and reduce fertility. These results underscore the fact that modification of the sperm epigenome is a critical mechanism with important implications for health and diseases. Dr. George Douglas (presenting on behalf of Carole Yauk, Health Canada) described research demonstrating that exposure of male mice to mainstream tobacco smoke causes germline DNA sequence mutation. Using single-molecule PCR on sperm DNA, a significant increase in mutations was found at tandem repeat DNA sequences in spermatogonial stem cells following exposure to 2 cigarettes per day for 12 weeks. The results suggest that the repercussions of smoking cigarettes may extend beyond cancer and mutation in exposed individuals, to their unexposed descendents. The symposium concluded with a presentation from Dr. Francesco Marchetti (Lawrence Berkeley National Laboratory) describing research in mice showing that *in vivo* exposure of male mice to both mainstream and sidestream tobacco smoke affected the genetic integrity of male germ cells and had detrimental effects on early embryonic development. These findings show that paternal smoking or exposure to secondhand smoke may influence a couple's chance for a successful pregnancy and the birth of a healthy baby. The symposium was well attended, generated considerable interest among the participants and stimulated discussion during and after the symposium.