JAN VIJG, Ph.D.

Positions:

Chair and Professor, Department of Genetics
Professor, Department of Ophthalmology and Visual Sciences
Albert Einstein College of Medicine

Research interests:

My laboratory is focused on genome instability in somatic cells as a possible cause of aging. We study genome instability as a function of age in various model organisms, including mice and fruit flies, as well as in cultured somatic cells, including stem cells, in relation to cellular senescence and differentiation. We developed transgenic reporter systems in mice and fruit flies, which allows us to determine tissue-specific frequencies of various forms of genome instability, e.g., point mutations, deletions and translocations. To improve our understanding of the possible role of stochastic alterations in genome or epigenome in aging and disease we have now begun to explore single-cell approaches. To access putative cell-to-cell variation in genomes and epigenomes during aging we developed procedures to analyze single cells or nuclei in a genome-wide manner for DNA sequence changes or alterations in DNA methylation. These procedures will allow us to directly measure the rate of mutations and epimutations in organs and tissues during aging.

Current grant funding:

5R01AG034421-03 (Vijg) NIH	07/15/2009–06/30/2013 Single-cell functional genomics
5P01AG017242-15 (Vijg) NIH	04/01/2009–03/31/2014 DNA repair, mutations and cellular aging
MCB1021720 (Promislow) NSF	08/01/2010–07/31/2013 The genetics architecture of somatic mutation rate
5R01NS041142-02 (Swanson) NIH	07/01/2010–06/30/2015 Mechanisms of PARP and PARG mediated cell death
5R21ES019520-02 (Vijg) NIH	01/01/2011–12/31/2012 Direct somatic mutation analysis through sequencing
(Vijg) Glenn Foundation	08/01/2011–07/31/2012 Biological methods of aging
(Vijg) SENS Foundation	10/01/2008–09/30/2012 Stochastic, epigenomic changes in the aging brain

Five recent publications:

1. Bahar R, Hartmann CH, Rodriguez KA, Denny AD, Busuttil RA, Dollé MET, Calder RB, Chisholm GB, Pollock BH, Klein CA, Vijg J. Increased cell-to-cell variation in gene expression in aging mouse heart. ***Nature*** 2006, 441:1011–14.
2. Garcia AM, Derventzi A, Busuttil R, Calder RB, Perez E Jr, Chadwell L, Dollé ME, Lundell M, Vijg J. A model system for analyzing somatic mutations in *Drosophila* melanogaster. ***Nat. Meth.*** 2007, 4:401–3.
3. Edman U, Garcia AM, Busuttil RA, Sorensen D, Lundell M, Kapahi P, Vijg J. Lifespan extension by dietary restriction is not linked to protection against somatic DNA damage in *Drosophila* melanogaster. ***Aging Cell*** 2009, 8:331–8.
4. Garcia AM, Calder RB, Dollé ME, Lundell M, Kapahi P, Vijg J. Age- and temperature-dependent somatic mutation accumulation in *Drosophila* melanogaster. ***PLoS Genet.*** 2010, 6:e1000950.
5. Gundry M, Li W, Maqbool SB, Vijg J. Direct, genome-wide assessment of DNA mutations in single cells. ***Nucleic Acids Res***. 2012, 40:2032–40.