

Speaker: Ana M. Portillo, Universidad de Valladolid, Spain

Title: Mathematical models to study human follicular aging: influence of telomerase activity and initial distribution

Abstract: A discrete model is proposed for the temporal evolution of a population of cells sorted according to their telomeric length. This model assumes that, during cell division, the distribution of the genetic material to daughter cells is asymmetric, i.e. chromosomes of one daughter cell have the same telomere length as the mother, while in the other daughter cell telomeres are shorter. Telomerase activity and cell death are also taken into account.

The continuous model is derived from the discrete model by introducing the generational age as a continuous variable in $[0, h]$, being h the Hayflick limit, i.e. the number of times that a cell can divide before reaching the senescent state. A partial differential equation with boundary conditions is obtained. The solution to this equation depends on the initial telomere length distribution.

The model is applied to the human follicular growth from preantral to preovulatory follicle as a case study and the aging rate is studied as a function of telomerase activity, the initial distribution and the Hayflick limit.