Màster de Biomedicina

Program

Name of the subject:

Aging and associated diseases

Credit number: ***3 ECTS***

Coordinators:

Gemma Marfany (Departament de Genètica)
Maria Soley (Departament de Bioquímica i Biologia Molecular)

Lessons:

Lesson 1 - Aging and Disease

Aging and human longevity. Genetic factors and environmental factors. Presenile diseases and progeria. Animal models. Hormones and aging. Theories on aging

Lesson 2 - Cellular senescence and cell death

Cellular senescence. Replicative senescence. Shortening of telomeres. Senescent phenotype. Programmed cell death. Consequences of cellular senescence and cell death. Relationship between aging and cancer.

Lesson 3 - Genetics and aging

Genetic bases of progeric syndromes. Progeria, nuclear lamina and mechanisms for maintenance of DNA. Genetics of longevity. Sequencing of centennarian genomes. Epigenetics and aging phenotype.

Lesson 4 - Oxidants and antioxidants in aging

Oxidants. Antioxidants. Oxidants and antioxidants in cells and organelles. Molecular consequences of oxidative stress: damage and repair. Oxidative stress and aging.

Lesson 5 - Aging of organs and systems

Biochemical changes associated with aging. The immune system. Aging and inflammatory response. Immunosenescence: clinical implications and therapeutic strategies. The skeleton and aging: osteoporosis. Skeletal muscle and heart: cardiac hypertrophy. Cardiovascular diseases and aging. Neurodegenerative diseases in aging.

Lesson 6 - Biological Bases of healthy in aging

Nutrition. Caloric restriction, immobilization and atrophy. Exercise.

Bibliography (books):

Arking R. **Biology of Aging: Observations and Principles,** 3rd Ed. Oxford Univ Press, Oxford (UK), 2006

Armesto, F. i Armesto, C. ***L'enigma de l'esfinx*.** Ed. Bromera, 2000

Everitt, A.V., Rattan, S.I.S., Le Couteur, D.G. and de Cabo, R. ***Calorie Restriction, Aging and Longevity****,* Springer, 2010

Marfany, G. i Soley, M**. Per què envellim? La resposta de la ciència a una vella preocupació humana.** Col·lecció Catàlisi (10), Publicacions i Edicions, Universitat de Barcelona, 2011

Mobbs, C.V. and Hof, P.R. ***Interdisciplinary Topics in Gerontology***, Vol 37 *Body Composition and Aging*, Karger, 2010

Masoro E.J. i Austad S.N. (eds.) ***Handbook of the Biology of Aging*,** 6th Ed. Academic Press, Burllington (USA), 2006

Medina J.J. ***El reloj de la edad*.** Ed. Crítica, 1997

Mobbs, C.V. and Hof, P.R. **Body Composition and Aging,** Interdisciplinary Topics in Gerontology, Vol 37, Karger, 2010

Park, S.Ch., Hwang, E.S., Kim, H-S. and Park, W-Y. ***Healthy Aging for Functional Longevity. Molecular and Cellular Interactions in Senescence****,* Annals of the New York Academy of Sciences, Vol. 928, 2001

Timiras, P.S. ***Physiological basis of aging and geriatrics*.** 4th Ed. Informa. Healthcare USA, 2007

Bibliography (articles):

Campisi, J. and d'Adda di Fagagna, F. Cellular senescence: when bad things happen to good cells. Nature Reviews in Molecular Cell Biology 8: 729-740, 2007.

Cantó, C. and Auwerx, J. Calorie Restriction: Is AMPK a key sensor and effector. Physiology 26: 214-224, 2011

Christensen, K., Johnson, T.E. and Vaupel, J. W. The quest for genetic determinants of human longevity: challenges and insights. Nature Reviews in Genetics 7: 436-448, 2006

Finkel, T. Serrano, M. & Blasco M. The common biology of càncer and ageing. Nature 448:767-774, 2007.

Fontana L et al. Extending healthy life span- from yeast to humans. Science 328: 321- 326, 2010.

Kenyon, C.J. The genètics of ageing. Nature 464: 504-512, 2010.

McDonald, R.B. and Ramsey, J.J. Honoring Clive McCay and 75 years of calorie restriction reseach. J. Nutr. 140 (7): 1205-1210, 2010

Mihaylova, M.M. and Shaw, R.J. The AMPK signalling pathway coordinates cell growth, autophagy and metabolism. Nature Cell Biology 13 (9):1016-1023, 2011

Rubinsztein, D. C., Mariño, G. and Kroemer, G. Autophagy and aging. Cell 146: 682-695, 2011.

Russell, S.J. and Kahn, C.R. Endocrine regulation of ageing. Nature Reviews in Molecular Cell Biology 8: 681-691, 2007.

Vijg, J. and Campisi, J. Puzzles, promises and a cure for ageing. Nature 454: 1065-1071, 2008.

Web sites

SAGE KE (Science of Aging Knowledge environment), http:http://sageke.sciencemag.org///

http://www.senescence.info/

http://www.rtve.es/mediateca/videos/20101014/imprescindibles-camino-a-inmortalidad-14-10-10/9029

http://thesciencenetwork.org/tags/Aging