

Bio 319

Ageing Physiology and Age-related disorders

Number of Credit Hours = 1; Contact hour/week= 1

Enrollment level - Sophomore

Course Description:

Aging (senescence) increases vulnerability to age-associated disorders. Aging and Aging-Related Disorders examines the interface between normal and pathological aging, and illustrates how this border can sometimes be diffuse. Understanding the incidence of age-related disorders will advance knowledge of the biology of senescence just as knowledge of childhood diseases advanced knowledge of human development.

Course Objectives:

The constant and rapid increase of life expectancy in western world is associated with a major aging of our populations. Increasing life expectancy is concomitant with increased risk of aging-associated diseases, e.g. obesity, diabetes, atherosclerosis, cancer, and neurodegenerative diseases. These diseases pose enormous challenges both for individuals and societies in terms of life quality and economic burden, thereby necessitating an urgent need for aging societies to address these health concerns. The aim of this course is to successfully highlight emerging knowledge and therapy for the understanding of the basis and development of aging-related disorders.

Policy Regarding Cheating: All students are required to read the “Academic Code of Conduct” which is published in the Student Reference Manual and Directory of Classes. Cheating will not be tolerated.

American Disabilities Act (ADA): Howard University is committed to providing an educational environment that is accessible to all students. In accordance with this policy, students who need accommodations because of a disability should contact Dr. Barbara Williams, Dean for Special Student Services (202-238-2420), as soon as possible after admission to the University or at the beginning of each semester. If you need a special accommodation required by the American Disabilities Act, please document and discuss your disability with the instructor during the first week of classes.

Text: Handbook of the Biology of Aging, 7th edition, Edited by Edward Masoro and Steven Austad. Academic Press

Instructors: Drs. Atanu Duttaroy, Kebreten Manaye, Joanne Allard, Sudha Sharma, Talitha Washington, Antonei Csoka, and Elizabeth Bertera.

Prerequisites: Bio 101 and Biological and Social aspects of aging (Bio 219)

Instructors: Drs. Atanu Duttaroy (aduttaroy@howard.edu) , Kebreten Manaye (kmanaye@howard.edu) , Joanne Allard (joanne.allard@howard.edu), Talitha Washington (talitha.washington@howard.edu) , Antonei Csoka (anatonei.csoka@howard.edu), and Elizabeth Bertera (ebertera@howard.edu), Dexter Lee (dlee@howard.edu), Sudha Sharma (sudha.sharma@howard.edu).

Week 1: Signs of Aging -----Dr. Joanne Allard

1. Skin and hair
2. Sensory perception
3. Musculoskeletal
4. Sleep.

Week 2: Aging of the nervous system -----Dr. Kebreten Manaye

1. Structural, morphological/histological changes that occur in the aging CNS,
2. Behavioral consequences of functional changes in the CNS
3. Describe the clinical/behavioral manifestations of Alzheimer's disease.

Week 3: Age related neurological disorder ----- Dr. Kebreten Manaye

1. Morphological changes,
2. Cellular and histological changes
3. Biochemical Changes,
- IV. Functional changes including sensory perception, Postural reflexes, Memory deficits, Sleep patterns.

Week 4: Cardiovascular aging -----Dr. Dexter Lee

1. Aging Cardiovascular System, Functional Changes,
2. Mechanisms Involved in Cardiovascular Aging,
3. Opportunities for Prevention, Reversibility and Therapy

Week 5: Renal aging -----Dr. Dexter Lee

1. Age-Related Changes in Kidney Function and Structure,
2. Renin-Angiotensin Aldosterone System,
3. Nitric Oxide

Week 6: Changes in endocrine system during aging -----Dr. Dexter Lee

1. Menopause.
2. Andropause.
3. Growth hormone-insulin-like growth factor-I axis.
4. Hypothalmo-pituitary-adrenal axis.
5. Dehydroepiandrosterone

Week 7: DNA damage and Aging -----Dr. Sudha Sharma

1. [DNA Damage, Reactive Oxygen Species, and Aging](#),
2. [The DNA-Repair Toolbox](#),
3. [Changes in DNA repair with Aging](#),
4. [The role of Mitochondrial DNA Damage in Aging](#)

Week 8: Early Aging Disease I -----Dr. Sudha Sharma

1. [Selected Models of Premature Aging](#),
2. [Diseases of Nucleotide-Excision Repair](#),
3. [Diseases of RecQ helicase deficiency- Werner Syndrome \(Progeroid Syndrome\)](#)

Week 9: Early Aging Disease II -----Dr. Antonei Csoka

1. Aging and Sirtuins, 2. Progeria, 3. Hutchinson-Gilford syndrome.

Week 10: Psychosocial aspects of Aging I ----- Dr. Elizabeth Bertera

1. Describe psychosocial aspects of aging, and successful aging.
2. Identify psychological and social factors that appear to impact the health of older persons, especially minority older adults both positively and negatively.

Week 11: Psychosocial aspects of Aging II----- Dr. Elizabeth Bertera

1. Document the prevalence of mental health conditions such as depression that may increase with age in older adults.
2. Class Exercise: Discuss personal experiences that illustrate some psychological effects of aging on individuals and/or caregivers that you know.

Week 12: Comparative Genetics of aging -----Dr. Atanu Duttaroy

1. Common non-mammalian models of aging, 2. Conserved longevity interventions, 3. Centenarian studies and single nucleotide polymorphism.

Week 13, 14, 15: Student presentations

Evaluation and grading:

Reflection papers:

Students will be expected to provide evidence that they are paying sufficient attention to the class. So, they will be asked on several occasions to develop reflective responses. Three reflection papers, each no less than one page long will cover 50% of the grade. These reflection papers are to be used as proof of thoughtful, meaningful, and critical thinking of the subject matter.

Student Presentations: 50% of the grade.