

PSYCHOBIOLOGY OF AGING
NROD67 Lec 1 Winter 2009
(Wed 3-5pm MW223)

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Office hours: Mon 2-3pm and Thur 3-4pm

While the process of aging may be universal and inevitable, it is also heterogeneous and unpredictable. Why is it that some people live to the ripe old age of 90+, have all of their mental faculties intact, and are able to live vibrant, productive lives, while others barely reach the age of retirement before being robbed of their quality of life by dementia and other devastating cognitive and physical disorders? This is one of the questions that this course will attempt to address.

In this seminar course, we will explore the neurobiological changes that occur during the process of aging, and the relationship between these neurobiological changes and the cognitive changes that are experienced in the aged. We will examine both normal age-related changes, as well changes that occur in various age-related disease states. We will also explore some of the major theories that have been proposed over the past several years to underlie the normal process of aging, and how these theories account for some of the common age-related diseases.

One of the major objectives of this course is to help you gain an appreciation of the field of neuroscience, specifically as it applies to aging. You will be exploring issues relating to the neurobiology of aging and neurodegenerative diseases by reading various types of scientific journal articles. In some of these articles, you will learn about the experimental techniques used in humans to study the neurobiological processes involved in aging and the animal models developed to study these processes. In other articles, you will learn about some of the controversies surrounding which of these processes are critical for disease states. In addition to helping you gain an appreciation of the research and the theoretical ideas on the neurobiology of aging, this course also aims to facilitate the development of critical thinking skills, as well as reading and communication skills. Given the seminar nature of this course, you will be expected to engage in weekly classroom discussions, and on at least two occasions, to present articles to the class and facilitate the discussion of those articles. The success of this course really depends upon your active participation in the weekly seminars, that includes doing the readings and coming to class prepared for discussion.

READINGS

There is no textbook assigned for this course. Instead, you will read various journal articles on topics relating to the neurobiology of aging, including theoretical papers and review articles, as well as some primary experimental articles which present research findings supporting some of these theories. All of the assigned readings are posted on the course website and are listed on p.3-5

COURSE WEBSITE

Course-related information will be provided on **Blackboard**, including the course outline, weekly readings, and announcements. If you are unfamiliar with Blackboard, please come and speak to me right away. Please note that course-related materials will not be found on the UTSC intranet. Blackboard will also be used to facilitate out-of-class discussion between students on anything course-related, particularly the weekly readings. You are encouraged to post questions about the readings to your fellow students, as well as answers to those questions. All questions for me, however, should be sent via email to my email address above.

EVALUATION

There are no tests or final exam in this course. Instead, you will be evaluated based on four components:

Leading Article Discussion	25%
In-Class Participation	20%
Research Paper	30%
Research Paper Presentation	25%

Leading Article Discussion and In-Class Participation

Each week we will be exploring a series of readings. A group of three students will be responsible for presenting the articles to the class each week and to facilitate discussion of these articles. There is no one single way to present and facilitate discussion of the articles. Students should work together as a group to come up with a way to highlight the important issues discussed in the articles and to engage the rest of the class in a thoughtful and critical discussion of those issues. Students who are leading the article discussion for that week will be graded on their ability to summarize or highlight the important issues in the articles, their presentation skills, their understanding of the readings, their ability to lead and engage the class in a group discussion, and on their ability to work within the group that is leading the discussion that week. All other students who are not presenting during a given week will be graded on their participation in the weekly discussions (i.e., discussions of assigned readings, as well as research paper presentations).

Research Paper

You are to write a research paper on a topic relating to the neurobiology of aging. Your paper must provide a comprehensive review of the scientific literature on a specific topic within this area. Your topic must be sufficiently narrow to allow for an in-depth exploration of the issues pertaining to that topic. Your paper must have a clear thesis and must adequately review primary research articles that provide support for your thesis. Your paper must also demonstrate your critical thinking skills and your ability to thoughtfully synthesize the literature into a clear and unified story, even if the topic is controversial and the literature is mixed (i.e., for/against your thesis). Your paper should be about 15 pages in length, double-spaced. It should include a title page, an abstract, and a list of references. These are above the 15 pages or so of text which will constitute the body of your paper. APA style is preferred, but any style will be accepted, as long as all writing and citation conventions are used consistently throughout the paper. The paper is due on the last day of class, April 1.

To ensure the appropriateness of your research topic, you are to have your topic approved by me. To do this, you must submit a 2-page proposal of your topic which includes the thesis statement, the arguments that you will put forth, and a brief summary of at least three studies that you will discuss in your paper (include references). Ideally, your topic will be unique and will not overlap significantly with the topics that we have covered in the readings. You are to submit your proposal on February 11. Please note that I will not accept your final paper if you do not submit a proposal.

Note on topics: While I am open to various topics on the neurobiology of aging, I would encourage topics relating to treatment strategies and prevention of age-related diseases, as well as strategies for decreasing cognitive decline in normal aging. Since we will not be directly covering these topics in our readings, these would be excellent topics for student research papers and research paper presentations.

Research Paper Presentation

The last three weeks of class will be dedicated to student presentations. You will give a 15-20 minute presentation to the class on your research paper topic. In your presentation, you should introduce your topic by telling us what the problem is and why it is important to study, provide us with your thesis statement, and a synopsis of the studies that you reviewed. You should show us some data, and you should aim to teach students about your topic and what you have learned during the process of writing

your paper. You will also provide me with a pdf version of one paper on your topic (which I will post on Blackboard) that the rest of us will read before class. Because these presentations are meant to provide your fellow students with information about the neurobiology of aging not already learned in this course, your presentation should ideally focus on the unique aspects of your paper topic that will serve to enlighten us all.

POLICY ON MISSED OR LATE ASSIGNMENTS

I expect to receive all assignments (proposal and final paper) on time. No late assignments will be accepted. Rescheduling of presentations, missed or yet to come, will not be permitted. May I remind you that this is a D-level course and, as such, my expectations of you are D-level.

SCHEDULE OF CLASSES (*tentative*)

DATE	TOPIC	READINGS
Jan. 7	Course Introduction	
Jan. 14	Neurobiology of Healthy Normal Aging: <i>Age-Related Structural and Cognitive Changes</i>	Small 2001 Erickson & Barnes 2003 Hinman & Abraham 2007 Imhof et al. 2007
Jan. 21	Neurobiology of Age-Related Diseases: <i>Alzheimer's Disease</i>	Hyman et al. 1989 Braak et al. 1999 Swerdlow 2007
Jan. 28	Neurobiology of Age-Related Diseases: <i>Other Dementias and Mild Cognitive Impairment</i>	Petersen et al. 2001 McKeith et al. 2004 Jellinger 2005
Feb. 4	Neurobiology of Age-Related Diseases: <i>Parkinson's Disease</i>	Dauer & Przedborski 2003 Klockgether 2004
Feb. 11	Neurobiological Theories of Aging: <i>Cholinergic Models</i> -- Research paper topic is due --	Bartus et al. 1982 Perry et al. 1985 Schliebs & Arendt 2006
Feb. 18	READING WEEK: NO CLASS	
Feb. 25	Neurobiological Theories of Aging: <i>Cerebrovascular Factors</i>	Farkas & Luiten 2001 de la Torre 2004
Mar. 4	Neurobiological Theories of Aging: <i>DNA Mutations and Oxidative Stress</i>	Martin & Grotewiel 2006 Maruszak et al. 2006
Mar. 11	Neurobiological Theories of Aging: <i>Chronic Stress and Glucocorticoids</i>	Sapolsky et al. 1986 Yao et al. 2007
Mar. 18	Research Paper Presentations	TBA
Mar. 25	Research Paper Presentations	TBA
Apr. 1	Research Paper Presentations -- Final Paper is due --	TBA

READINGS

- Bartus RT, Dean RL 3rd, Beer B, Lippa AS. (1982) The cholinergic hypothesis of geriatric memory dysfunction. *Science*. 217(4558): 408-414.
- Braak E, Griffing K, Arai K, Bohl J, Bratzke H, Braak H. (1999) Neuropathology of Alzheimer's disease: what is new since A. Alzheimer? *Eur Arch Psychiatry Clin Neurosci*. 249 Suppl 3: 14-22.
- Dauer W, Przedborski S. (2003) Parkinson's disease: mechanisms and models. *Neuron*. 39(6): 889-909.
- de la Torre JC. (2004) Is Alzheimer's disease a neurodegenerative or a vascular disorder? Data, dogma, and dialectics. *Lancet Neurol*. 3(3): 184-190.
- Erickson CA, Barnes CA. (2003) The neurobiology of memory changes in normal aging. *Exp Gerontol*. 38(1-2): 61-69.
- Farkas E, Luiten PG. (2001) Cerebral microvascular pathology in aging and Alzheimer's disease. *Prog Neurobiol*. 64(6): 575-611.
- Hinman JD, Abraham CR. (2007) What's behind the decline? The role of white matter in brain aging. *Neurochem Res*. 32(12): 2023-2031.
- Hyman BT, Damasio H, Damasio AR, Van Hoesen GW. (1989) Alzheimer's disease. *Annu Rev Public Health*. 10: 115-140.
- Imhof A, Kövari E, von Gunten A, Gold G, Rivara CB, Herrmann FR, Hof PR, Bouras C, Giannakopoulos P. (2007) Morphological substrates of cognitive decline in nonagenarians and centenarians: a new paradigm? *J Neurol Sci*. 257(1-2): 72-79.
- Jellinger KA. (2005) Understanding the pathology of vascular cognitive impairment. *J Neurol Sci*. 229-230: 57-63.
- Klockgether T. (2004) Parkinson's disease: clinical aspects. *Cell Tissue Res*. 318(1): 115-120.
- Martin I, Grotewiel MS. (2006) Oxidative damage and age-related functional declines. *Mech Ageing Dev*. 127(5): 411-423.
- Maruszak A, Gaweda-Walerych K, Soltyszewski I, Zekanowski C. (2006) Mitochondrial DNA in pathogenesis of Alzheimer's and Parkinson's diseases. *Acta Neurobiol Exp (Wars)*. 66(2): 153-176.
- McKeith I, Mintzer J, Aarsland D, Burn D, Chiu H, Cohen-Mansfield J, Dickson D, Dubois B, Duda JE, Feldman H, Gauthier S, Halliday G, Lawlor B, Lippa C, Lopez OL, Carlos Machado J, O'Brien J, Playfer J, Reid W; International Psychogeriatric Association Expert Meeting on DLB. (2004) Dementia with Lewy bodies. *Lancet Neurol*. 3(1):19-28.
- Perry EK, Curtis M, Dick DJ, Candy JM, Atack JR, Bloxham CA, Blessed G, Fairbairn A, Tomlinson BE, Perry RH. (1985) Cholinergic correlates of cognitive impairment in Parkinson's disease: comparisons with Alzheimer's disease. *J Neurol Neurosurg Psychiatry*. 48(5): 413-421.
- Petersen RC, Doody R, Kurz A, Mohs RC, Morris JC, Rabins PV, Ritchie K, Rossor M, Thal L, Winblad B. (2001) Current concepts in mild cognitive impairment. *Arch Neurol*. 58(12): 1985-1992.
- Sapolsky RM, Krey LC, McEwen BS. (1986) The neuroendocrinology of stress and aging: the glucocorticoid cascade hypothesis. *Endocr Rev*. 7(3): 284-301.
- Schliebs R, Arendt T. (2006) The significance of the cholinergic system in the brain during aging and in Alzheimer's disease. *J Neural Transm*. 113(11): 1625-1644.

Small SA. (2001) Age-related memory decline: current concepts and future directions. *Arch Neurol.* 58(3): 360-364.

Swerdlow RH. (2007) Is aging part of Alzheimer's disease, or is Alzheimer's disease part of aging? *Neurobiol Aging.* 28(10): 1465-1480.

Yao YY, Liu DM, Xu DF, Li WP. (2007) Memory and learning impairment induced by dexamethasone in senescent but not young mice. *Eur J Pharmacol.* 574(1): 20-28.