Auditory Pharmacology

AUD 7205, SPRING 2020

Syllabus updated 6 January 2020

Course Information

Time: Wednesday, 4:15 pm - 6 pm
Location: Callier Dallas, Room B108
Course Credits: 2

Professor Contact Information

Instructor: Colleen Le Prell, Ph.D.
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Email: colleen.leprell@utdallas.edu
Office Hours: Monday 10-12;
Tuesday 3-5;
and by appointment

Course Pre-requisites, Co-requisites, and/or Other Restrictions

AUD 6305 Anatomy and Physiology of the Auditory System

Course Description

This course covers the effects of drugs on the inner ear, including both ototoxic insult and otoprotective benefit. Key content areas include: 1) assessment of medication history: requirements and rationale, 2) how drugs affect the inner ear/review of drugs that affect the inner ear, 3) regulation of new drug development/new drug testing, and 4) emerging data that may lead to new drug options in future years.

Upon successful completion of this course, students will be able to:

1) Review medication history and identify ototoxic drugs and chemicals
2) Describe common otologic medications
3) Summarize steps within the drug development process, key elements in preclinical and clinical trial design, and the role of Audiologists in this process
4) List ototoxic drugs and describe their mechanism of action
5) Describe processes by which different otoprotective drugs preserve hearing
6) Summarize the current status of research and evidence for otoprotective drugs

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ASHA Competencies Addressed in this Course:

Standard IV-A Foundations of Practice

The applicant must have knowledge of:
A8. Effects of pharmacologic and teratogenic agents on the auditory and vestibular systems
A10. Pathologies related to hearing and balance and their medical diagnosis and treatment
A18. Principles and practices of research, including experimental design, statistical methods, and application to clinical populations
A19. Legal and ethical practices (e.g., standards for professional conduct, patient rights, credentialing, and legislative and regulatory mandates)

Standard IV-B: Prevention and Identification

The applicant must have the knowledge and skills necessary to:
B1. Implement activities that prevent and identify dysfunction in hearing and communication, balance, and other auditory-related systems
B3. Screen individuals for hearing impairment and disability/handicap using clinically appropriate, culturally sensitive, and age- and site-specific screening measures

Standard IV-C: Assessment

The applicant must have knowledge and skills in:

C2. Assessing individuals with suspected disorders of hearing, communication, balance, and related systems
C3. Evaluating information from appropriate sources and obtaining a case history to facilitate assessment planning
C5. Conducting and interpreting behavioral and/or electrophysiologic methods to assess hearing thresholds and auditory neural function
C7. Conducting and interpreting otoacoustic emissions and acoustic immitance (reflexes)
C9. Evaluating functional use of hearing
C10. Preparing a report, including interpreting data, summarizing findings, generating recommendations, and developing an audiologic treatment/management plan
C11. Referring to other professions, agencies, and/or consumer organizations

Standard IV-F: Education/Research/Administration

The applicant must have knowledge and skills in:

F2. Applying research findings in the provision of patient care (evidence-based practice)
F3. Critically evaluating and appropriately implementing new techniques and technologies supported by research-based evidence

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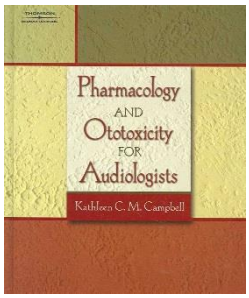
Required Textbook



- POA: Pharmacology and Ototoxicity for Audiologists (2007). Kathleen Campbell, Thomson Delmar Publishing. ISBN (Americas): 1-4180-1130-4.

This book is out of print. New and used copies are available on Amazon.com, Barnesandnoble.com, and other on-line book sellers. The book is also available for rental through Amazon.com. In addition, the Course Instructor has copies of this textbook which are available to be signed out to students for the semester in which the course is taken. ***Textbooks borrowed from the course instructor are required to be returned on April 22, 2020, at the time of the second examination. Textbooks are UTD property.***

Chapters from These Textbooks Available Electronically Through UTD Library

- NIHLSA: Noise-Induced Hearing Loss: Scientific Advances (2012). Le Prell, C.G.; Henderson, D.; Fay, R.R.; Popper, A.N. (Eds.) Springer; ISBN 978-1-4419-9522-3.
- FRENTP: Oxidative Stress in Applied Basic Research and Clinical Practice: Free Radicals in ENT Pathology (2016). Miller JM, Le Prell CG, Rybak LP. (Eds). New York: Springer. ISBN 978-3-319-13472-7
- TRANHS: Translational Research in Audiology, Neurotology, and the Hearing Sciences (2016). Le Prell, C.G.; Lobarinas, E.; Popper, A.N.; Fay, R.R. (Eds.) Springer; ISBN 978-3-319-408460-0.
- OTOTOX: Ototoxicity (2004). Roland, P.S. and Rutka, J.A. (Eds). BC Decker. ISBN: 1-55009-263-4.

Date	Topic	Assigned Reading
Wed 1/15	**Drugs: Terminology and Definitions**	• Besser J, Stropahl M, Urry E, Launer S.Comorbidities of hearing loss and the implications of multimorbidity for audiological care. Hear Res. 2018 Nov; 369:3-14. • Offerdahl T, Vallabhi M. (2019). Pharmacology for the Audiologist. Sem Hear, 40(2). 87-96. • POA – Pages 1-32. (Ch 1: An Introduction to Pharmacology, Ch 2: Pharmacodynamics and Pharmacokinetics, Ch 3: Pharmacotherapeutics and Patient Factors)
Wed 1/22	**Drug Development and the FDA**	• POA – Pages 33-45. (Ch 4: Role of Food and Drug Administration in Drug Development) • Cousins RPC. (2019). Medicines discovery for auditory disorders: Challenges for industry. J Acoust Soc of Amer, 146(5): 3652-3667. • Hammill TL. (2017). A review of the progress and pitfalls of FDA policy process: Planning a pathway for pharmaceutical interventions for hearing loss. Hear Res, 349: 172-176.
Wed 1/29	**Drugs that Influence Hearing: Loop Diuretics, Aspirin, NSIADs, Quinine, Macrolides**	• DiSogra RM. (2019). The Impact of Pharmaceutical Side Effects on Audiological and Vestibular Measurements. Sem Hear, 40(2). 97-103. • DiSogra R. (2008). Adverse Drug Reactions and Audiology Practice. https://tucsonaudiology.files.wordpress.com/2009/08/adverse-drug-reactions-2008.pdf; Read pages 4-11; scan pages 12-42. • POA - Pages 177-196. (Ch 12: Loop Diuretics; Ch 13: Aspirin and other NSAIDS, Quinine and Macrolides)
Wed 2/5	**Drugs that Influence Hearing: Cisplatin and Aminoglycoside Antibiotics**	• DiSogra RM. (2019). Common Aminoglycosides and Platinum-Based Ototoxic Drugs: Cochlear/Vestibular Side Effects and Incidence. Sem Hear, 40(2). 104-107. • Paken J, Govender CD, Pillay M, Sewram V. (2019). A Review of Cisplatin-Associated Ototoxicity. Sem Hear, 40(2). 108-121. • Rybak LP, Mukherjea D, Ramkumar V. (2019). Mechanisms of Cisplatin-Induced Ototoxicity and Prevention. Sem Hear, 40(2). 197-204. • Jiang M, Karawasa T, Steyger PS. (2017). Aminoglycoside-induced cochleotoxicity: A review. Front Cell Neurosci, 11, article 308.
Wed 2/12	**Ototoxicity Monitoring**	• Callier Ototoxicity Monitoring Protocol • ASHA (1994) and AAA (2009) Ototoxicity Monitoring Guidelines • Lord SG. (2019). Monitoring Protocols for Cochlear Toxicity. Sem Hear, 40(2). 122-143. • King KA, Brewer CC. (2018) Clinical trials, ototoxicity grading scales and the audiologist's role in therapeutic decision making, Int J Audiol, 57:sup4, S19-S28. • Konrad-Martin D, et al. (2018) Applying U.S. national guidelines for ototoxicity monitoring in adult patients: perspectives on patient populations, service gaps, barriers and solutions, Int J Audiol, 57:sup4, S3-S18. • Brungart D., et al. (2018) Using tablet based technology to deliver time-efficient ototoxicity monitoring, Int J Audiol, 57:sup4, S78-S86.
Wed 2/19	**EXAM 1**	

Wed 2/26	**Vestibulo-toxicity; Guest Lecture, Dr. Scott Griffiths**	• Gans RE, Rauterkus G. (2019). Vestibular Toxicity: Causes, Evaluation Protocols, Intervention, and Management. Sem Hear, 40(2). 144-153. • Handelsman, J.A. (2018) Vestibulotoxicity: strategies for clinical diagnosis and rehabilitation, Int J Audiol, 57:sup4, S69-S77, DOI: 10.1080/14992027.2018.1468092 • *Optional – POA - Chapters 17: Vestibular Ototoxicity and 18: Audiologic Findings in Vestibular Ototoxicity*
Wed 3/4	**Treatment of Sudden Hearing Loss Using Steroids**	• TRANHS – Ch 4. Montgomery, Bauer, Lobarinas. Sudden Sensorineural Hearing Loss. • Marx M, Younes E, Chandrasekhar SS, Ito J, Plontke S, O'Leary S, Sterkers O. International consensus (ICON) on treatment of sudden sensorineural hearing loss. Eur Ann Otorhinolaryngol Head Neck Dis. 2018 Feb;135(1S):S23-S28. • Chandrasekhar et al., (2019). Clinical Practice Guideline: Sudden Hearing Loss (Update). Otolaryngol–Head Neck Surg, Vol. 161(1S) S1–S45.
Wed 3/11	**Potential Prevention of Hearing Loss: Otoprotective Drug Interventions (Prophylaxis, Rescue)**	• Hammill TL, Campbell KC. (2018) Protection for medication induced hearing loss: the state of the science, Int J Audiol, 57:sup4, S87-S95. • Le Prell CG. (2019). Otoprotectants: From Research to Clinical Application. Sem Hear, 40(2). 162-176.
Wed 3/18	***No Class***	***UTD Spring Break***
Wed 3/25	**Potential for Hearing Restoration: Treatment of Hearing Loss Using Gene Therapy/Stem Cell Therapy**	• POA - Chapter 20: Regeneration of Hair Cells • TRANHS – Ch 8. Staecker, Klickstein, Brough. Developing a molecular therapeutic for hearing loss. • Ahmed H, Shubina-Oleinik O, Holt JR. (2017). Emerging therapies for genetic hearing loss, JARO, 18: 649-670.
Wed 4/1	**Diabetes and Associated Medications (watch online lecture in lieu of class)**	Watch: • ADA Webinar: Diabetes and Audiological Monitoring of Ototoxic Vestibulotoxic Medications https://www.youtube.com/watch?v=Uque8FFOBjk Read: • Elangovan S, Spankovich C. Diabetes and Auditory Vestibular Pathology. Semin Hear. 2019 Nov;40(4):292-299. • Spankovich C, Yerraguntla K. Evaluation and Management of Patients with Diabetes and Hearing Loss. Semin Hear. 2019 Nov;40(4):308-314. • Piker EG, Romero DJ. Diabetes and the Vestibular System. Semin Hear. 2019 Nov;40(4):300-307. • DiSogra RM, Meece J. Auditory and vestibular side effects of FDA-approved drugs for diabetes. Semin Hear. 2019 Nov;40(4):315-325.

Wed 4/8	**Common Aural Medications**	• POA - Ch 5: Common Classes of Drugs Used in Otolaryngologic Practice • POA - Ch 6: Nutraceuticals and Herbal Supplements
Wed 4/15	**The Road to a Dispensing Profession?**	• American Psychological Association Designation Criteria for Education and Training Programs in Psychopharmacology for Prescriptive Authority, 2019. https://www.apa.org/education/grad/rxp-designation-criteria.pdf • American Psychological Association Model Educational and Training Programs in Psychopharmacology for Prescriptive Authority, 2019. https://www.apa.org/about/policy/rxp-model-curriculum.pdf • American Psychological Association Model Legislation for Prescriptive Authority, 2019. https://www.apa.org/about/policy/rxp-model-act.pdf • Stewart D, MacLure K, George J. (2012). Educating nonmedical prescribers. British Journal of Clinical Pharmacology, 74(4): 662-667. DOI:10.1111/j.1365-2125.2012.04204.x • Rhatican P, Mandel SH, Rutka JA. Medicolegal aspects of ototoxicity. Pp 198-206.
Wed 4/22	**EXAM 2**	
Wed 4/29	**Implications for Practice – Guest, Dr. Andrea Gohmert**	• Abel, D. (2019). Coding and Reimbursement for Cochleotoxicity and Vestibulotoxicity Services. Sem Hear, 40(2). 188-196. • POA - Ch 22: Staying Current: Web Sites and Resources for Pharmaceutical Information

Examinations: True/False, Multiple Choice, Short Answer, and Essay questions that will assess factual knowledge, understanding of theories and controversies, ability to assess levels of evidence, and ability to identify gaps in knowledge. Exams cover assigned readings, assigned videos, and lectures.

- Exam 1 covers weeks 1-5.
- Exam 2 covers weeks 7-12.

Mid-term Project: due Friday March 13, 2020:

Part 1: Based on readings, Callier protocol, class discussions, and any other resources of your choosing, develop an evidence-based clinical protocol for monitoring the effects of drugs that can have both ototoxic and vestibulotoxic side effects.

Part 2: Provide written commentary including citations of the evidence on which your selection of each test element is based. i.e., why did you select the elements you have included in your battery, and how will you interpret the data from each element of the test battery.

Part 3: Provide written commentary discussing additional tests you could have included within your monitoring protocol, and your rationale for excluding these tests from the proposed standard battery. Be sure to consider efficiency – you do not have unlimited time at patient appointments and patients may be ill at monitoring appointments.

Submit your project online using e-learning.

Final Project: due Monday May 4, 2020:

Part 1: Identify three drugs that you saw listed on current patient case report forms this semester. For each of these three drugs, identify whether the drug is listed in the Adverse Drug Reactions publication by DiSogra, and whether the drug has any potential auditory effects per this document. Then, research potential side effects for the drug using online tools such as drugs.com, WebMD, MedicineNet, RXlist, medlineplus, etc. If you find that the drug may effect hearing (including tinnitus) or balance, reflect on the counseling process. Were side effects of the drug discussed with the patient or their physician?

Part 2: Reflect on the tools you used to identify side effects; discuss what additional tools would facilitate your readiness to identify drugs that may be contributing to patient hearing and balance symptoms. Discuss strategies that clinicians could use to assure information is both available and utilized as part of the appointment/encounter.

Submit your project online using e-learning.

Quizzes. There are no planned quizzes. Pop quizzes may be added without notice; students are expected to complete readings prior to class, and to come to class prepared to contribute to discussion.

Grading

Assignment	Due date	% of final grade*
Exam 1	February 19, 2020	35%
Mid-term Project	March 13, 11:59 pm	10%
Exam 2	April 22, 2020	35%
Final project	May 4, 11:59 pm	20%

*if quizzes are added, each quiz will be worth 3% of your course grade, and the weighting of each exam will correspondingly be reduced by 1% per exam.

Grading System: Course grades will be based on the weighted percent of points earned.

Minimum Percent Required	Letter Grade	Grade Points
94	**A**	4
90	**A-**	3.67
87	**B+**	3.33
84	**B**	3
80	**B-**	2.67
77	**C+**	2.33
74	**C**	2
70	**C-**	1.67
67	**D+**	1.33
64	**D**	1
60	**D-**	0.67
below 60	**E**	0
	WF	0
	I	0
	NG	0

Sample weighted grade calculation:
90% on exam 1, 80% on exam 2, 85% on final project
=(90%*0.4)+(80%*0.4)+(85%*0.2)
=36+32+17
=85
Class grade = 85% = B

Please be aware that per the AuD program handbook a C+ or poorer does not demonstrate adequate mastery of course content and is not an acceptable grade for a clinical doctoral student.

As per the AuD program handbook, a grade of C+ or poorer will require remediation or repetition of the course.

For greater detail on the meaning of letter grades and university policies related to them, see the Registrar's Grade Policy regulations at: http://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

Exam Policy

Exams are closed book and are to be completed independently.

Policy Related to Make up Exams and Late Work
Make up examinations will be allowed when exam is missed for illness (with physicians note), family emergency, military service, or religious holidays, or other university approved excuses. Late submission of the final project (submission after 11:59 pm Monday May 4) will result in 10% reduction of score unless accompanied by illness (with physicians note), family emergency, military service, or religious holidays, or other university approved excuses.

The information contained in the following link constitutes the University's policies and procedures. Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor; changes will be announced in class and via e-learning.