



FACULTY OF MEDICINE

SCHOOL OF MEDICAL SCIENCES  
DEPARTMENT OF PHARMACOLOGY

PHAR 3306

# PHARMACOLOGY FOR OPTOMETRY

COURSE OUTLINE

Session 2, 2011

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# PHAR3306 COURSE INFORMATION

## UNITS OF CREDIT (UOC)

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Pharmacology for Optometry is a 3<sup>rd</sup> year Science Course with 6 Units of Credit (UOC).

## PREREQUISITES

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VISN2111 Vision Science 2A

PHSL2101 Physiology 1A

PHSL2201 Physiology 1B

VISN2231 Introduction to Ocular Disease

## OBJECTIVES OF THE COURSE

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The aims of the course are to provide optometry students with

- a strong knowledge base in pharmacology and therapeutics that will benefit you in your future optometric practice
- the essential knowledge of the mechanisms of action of pharmacological agents and their therapeutic use in the treatment of systemic and ocular diseases, with emphasis on the agents that optometrists are licensed to prescribe (see appendix 1)
- basic principles of drug action, pharmacokinetics, pharmacodynamics, autonomic pharmacology, major drugs used in the management of cardiovascular, central nervous system, endocrine and inflammatory disorders and infection, drugs for eye diseases, side effects and contraindications of commonly used therapeutic agents

## COURSE CO-ORDINATORS

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Course Coordinator:

Dr. Lu Liu                      Room 209a, Wallace Wurth  
Phone: 9385 8762  
Email: [Lu.Liu@unsw.edu.au](mailto:Lu.Liu@unsw.edu.au)  
Consultation times: by email arrangement

Co-coordinator:

Dr. Nicole Jones              Room 408, Lowy  
Phone: 9385 2568  
Email: [N.Jones@unsw.edu.au](mailto:N.Jones@unsw.edu.au)  
Consultation times: by email arrangement

## LECTURERS IN THIS COURSE

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Dr. T. Binder                      [W.Binder@unsw.edu.au](mailto:W.Binder@unsw.edu.au)  
A/Prof. N. Di Girolamo        [n.digirolamo@unsw.edu.au](mailto:n.digirolamo@unsw.edu.au)  
A/Prof. G. Graham              [ggraham@stvincents.com.au](mailto:ggraham@stvincents.com.au)  
Dr. R. Grant                      [R.Grant@unsw.edu.au](mailto:R.Grant@unsw.edu.au)  
A/Prof. R. Griffith              [r.griffith@unsw.edu.au](mailto:r.griffith@unsw.edu.au)  
Dr. N. Jones                      [n.jones@unsw.edu.au](mailto:n.jones@unsw.edu.au)  
Dr. J. Langlands                [j.langlands@unsw.edu.au](mailto:j.langlands@unsw.edu.au)  
Dr. R. Lim                         [ridialim@optusnet.com.au](mailto:ridialim@optusnet.com.au)

Dr. L. Liu	<a href="mailto:Lu.Liu@unsw.edu.au">Lu.Liu@unsw.edu.au</a>
Prof. M. Morris	<a href="mailto:M.Morris@unsw.edu.au">M.Morris@unsw.edu.au</a>
Prof. D. Wakefield	<a href="mailto:D.Wakefield@unsw.edu.au">D.Wakefield@unsw.edu.au</a>
A/Prof L. Wakelin	<a href="mailto:L.Wakelin@unsw.edu.au">L.Wakelin@unsw.edu.au</a>

## **COURSE STRUCTURE AND TEACHING STRATEGIES**

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This 6 UOC course consists of

- 3 lectures per week
- tutorials and practical classes at alternative weeks, up to 3 hours

Lectures: Monday 3-4 pm and 4-5 pm; Wednesday 9-10 am. Week 1-12

Tutorials; Thursday 9-10 am (Group A) or 10-11 am (Group B). From Week 2, even weeks

Practicals: Thursday 9 am- 12 pm. From Week 3, odd weeks

You are expected to attend all scheduled activities for the full duration. You are reminded that UNSW recommends that a 6 units-of-credit course should involve about 125-150 hrs of study and learning activities. Apart from the formal learning activities you are strongly recommended to do your own studies throughout the semester.

Lectures will provide you with the concepts and theory essential for understanding basic pharmacology. To assist in the development of research and analytical skills practical classes and tutorials will be held. These classes and tutorials allow you to engage in a more interactive form of learning than is possible in the lectures. The skills you will learn in practical classes are relevant to your professional development.

## **APPROACH TO LEARNING AND TEACHING**

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The learning and teaching philosophy underpinning this course is centred on student learning and aims to create an environment, which interests, challenges, and enthuses students. The teaching is designed to be relevant and engaging in order to prepare students for future careers.

The primary source of information for this course is the lecture material, and the tutorials and practical classes will be directly related to the lectures. Nevertheless, effective learning can also be enhanced through self directed use of other resources such as textbooks, literature references and web based sources. Your practical classes will be directly related to the lectures and you are advised to prepare for practical classes before attendance. It is up to you to ensure you perform well in each part of the course; preparing for classes; studying for exams and seeking assistance to clarify your understanding.

## **STUDENT LEARNING OUTCOMES**

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PHAR 3306 will develop those attributes that the Faculty of Science has identified as important for a Science Graduate to attain. These include; skills, qualities, understanding and attitudes that promote lifelong learning that you should acquire during your university experience.

### Graduate Attributes

- A. Research, inquiry and analytical thinking abilities
- B. The capability and motivation for intellectual development
- C. Ethical, social and professional understanding
- D. Effective communication
- E. Teamwork, collaborative and management skills
- F. Information Literacy – the skills to locate, evaluate and use relevant information.

On completion of this course you should:

1. have developed an understanding of the concepts of pharmacology
2. be able to apply pharmacological approaches to problem solving
3. be able to identify areas in the knowledge of pharmacology that could be improved, and carry out the research necessary to “fill the gaps”
4. be able to organise scientific information into a clear report
5. be able to demonstrate ability to work in teams and communicate scientific information effectively

## ASSESSMENT PROCEDURES

	<b>% total mark</b>
Mid session test (50 min duration)	<b>20%</b>
Practical assessment (2 short reports, 5% each)	<b>10%</b>
Group Assignment	<b>10%</b>
Final exam (2 hours duration)	<b>60%</b>

Mid session test format: multiple choice questions (MCQs).

Final exam format: multiple choice questions, short and long answer questions

### *Practicals and tutorials*

The practicals and tutorials are provided to support lecture material and practise analytical skills. The practical classes and tutorials help you to develop graduate attributes A, C, D, E & F. During the practical course students will be required to submit written reports for two of the practical sessions. Reports must be legible and as concise as possible. The electronic version of the prac report must be submitted via Blackboard **on the same day as the prac**. No hardcopy is required. There will be a “10% mark deduction per day penalty” for late submission unless in the case of documented illness or family emergency or by pre-arrangement with the course coordinator.

### *Group Assignment*

You will work in teams to research new approaches/developments in ocular pharmacology and a written report to summarise your findings is required. This assessment task will allow you to develop your research, information literacy, communication and time management skills, as well as allowing them to demonstrate the ability to work in a team and collaborate successfully (Graduate attributes A, C, D, E & F). The electronic version of the assignment must be submitted **via Blackboard through Turnitin**, and the hardcopy of the assignment accompanied by a signed plagiarism form must be placed in the box at the BABS.SOMS.BEES (B.S.B.) Student Office, located on the Ground Floor Room G27, of the Biosciences Building **before 9 am, Monday, 19th September**. There will be a “10% mark deduction per day penalty” for late submission unless in the case of documented illness or family emergency or by pre-arrangement with the course coordinator. The topics, instructions and marking criteria for the group assignment will be handed to you on the first tutorial class.

### *Mid session test and final exam*

The mid session test will be held during the session on the **31st August**. The format is MCQs.

The end of session examination will be held during the official examination period, and the format will be MCQs, and short/long answer questions.

The exam questions will mainly be based on the material covered in the lectures; however the material pertaining to the tutorials and practical classes will also be examinable.

The mid and end of session examinations will address graduate attributes A, B and F and give you feedback on how you are succeeding in the course.

## TEXTBOOKS

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### *Prescribed textbook:*

- Rang and Dale's pharmacology. 6<sup>th</sup> ed. Churchill Livingstone/Elsevier. c2007.

### *Recommended textbooks:*

- Goodman and Gilman's the pharmacological basis of therapeutics. 12<sup>th</sup> ed. McGraw-Hill Companies, c2011. (The e-book is available through UNSW Library Resources database).
- Clinical Ocular Pharmacology. 5<sup>th</sup> ed. Oxford: Butterworth-Heinemann. c2008.

These textbooks are available in the library. They are also available from the Medical Society Bookshop located in the Old Morgue Building, Prince of Wales Hospital, Barker Street Randwick. The opening hours of the Bookshop are: Mon, Tues, and Thurs. 11:00am-2:30pm, Wed 3:00-7:00pm and Fri 1:00-5:00pm.

**National Prescribing Service (NPS)** is a member-based organisation providing accurate, balanced, evidence-based information and services to health professionals and the community on Quality Use of Medicines (QUM). You are strongly encouraged to use this service: <http://www.nps.org.au/>

## COURSE EVALUATION AND DEVELOPMENT

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Each year feedback is sought from students about the courses offered in the Department of Pharmacology and continual improvements are made based on this feedback. The Course and Teaching Evaluation and Improvement [CATEI] Process of the UNSW is the way in which student feedback is evaluated and significant changes to the course will be communicated to subsequent cohorts of students. Also a staff-student liaison group will be set up and students will be invited to become class representatives to seek feedback from their colleagues and meet with academic staff to discuss any issues that arise. Improvements to PHPH3306 have been made based on feedback given in last year, including increases of practical laboratory and modifications of lecture contents.

## GENERAL INFORMATION

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The Department of Pharmacology is part of the School of Medical Sciences and is within the Faculty of Medicine. It is located in the Wallace Wurth building. General inquiries can be made at the BABS.SOMS.BEES (B.S.B.) Student Office, located on the Ground Floor Room G27, of the Biosciences Building. Office hours are 9.00 am - 5:00pm.

**Professor Margaret Morris** is Head of Department and appointments may be made through her Administrative officer Chris Riordan ([c.riordan@unsw.edu.au](mailto:c.riordan@unsw.edu.au)) in Room MG14.

**School Vacation Scholarships:** The School of Medical Sciences supports several summer vacation scholarships each year to enable good students to undertake short research projects within the school. For further details contact the Administrative Officer.

**There is an honours program** conducted by the School. The Honours program is co-ordinated by Dr Patsie Polly, Room 508, Wallace Wurth building (ph: 9385 2924; email [patsie.polly@unsw.edu.au](mailto:patsie.polly@unsw.edu.au)). Any students considering an Honours year should discuss the requirements with the co-ordinator. Medical students may take a year out of the medical course to undertake an Honours program. This is normally done between the 3rd and 4th year of the course. Outstanding students may be considered for scholarships offered by the University and School and these are offered annually.

**Postgraduate research degrees:** The Department of Pharmacology offers students the opportunity to enter into **Doctorate (Ph.D)**. For further information contact the co-ordinator, Dr Pascal Carrive ([p.carrive@unsw.edu.au](mailto:p.carrive@unsw.edu.au))

**Student Advisor:** The School Student Advisor Ms Carmen Robinson (9385 2464) is able to provide additional information on any courses offered by the School. BABS.SOMS.BEES (B.S.B.) Student Office, G27 Biosciences Building. Ph:9385 2464, Email: [Carmen.Robinson@unsw.edu.au](mailto:Carmen.Robinson@unsw.edu.au)

## **OFFICIAL COMMUNICATION BY EMAIL**

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All students in the course PHAR 3306 are advised that email is now the official means by which the School of Medical Sciences will communicate with you. All email messages will be sent to your official UNSW e-mail address (e.g. z1234567@student.unsw.edu.au) and, if you do not wish to use the University email system, you **MUST** arrange for your official mail to be forwarded to your chosen address. The University recommends that you check your mail at least every other day. Facilities for checking e-mail are available in the School of Medical Sciences and in the University library. Further information and assistance is available from IT Service Centre, ph. 9385 1333. <http://www.it.unsw.edu.au/index.html>.

## **ATTENDANCE REQUIREMENTS**

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**Attendance at practical classes/demonstrations is compulsory, and must be recorded in the class roll ON THE DAY OF THE CLASS.** It is your responsibility to ensure that the demonstrator records your attendance and no discussions will be entered into after the completion of the class. Satisfactory completion of the work set for each class is essential. It should be noted that non attendance for other than documented medical or other serious reasons, or unsatisfactory performance, **for more than 1 practical class during the session** may result in ineligibility to pass the course.

## **BEHAVIOUR AND SAFETY IN PRACTICAL CLASSES**

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The practical class is an opportunity for students to develop graduate attribute C by behaving in an ethical, socially responsible and professional manner within the practical class.

- Punctual arrival is expected.
- Turn off mobile phones before entering the class.
- Lab coat and enclosed shoes are compulsory in week 9 Human Pharmacology practical class.

Information on relevant Occupational Health and Safety policies and expectations will be provided in the practical notes, as outlined at: [http://www.hr.unsw.edu.au/ohswc/ohs/ohs\\_policies.html](http://www.hr.unsw.edu.au/ohswc/ohs/ohs_policies.html).

Students must take due care with biological and hazardous material and make sure all equipment is left clean and functional. Those who don't adhere to these basic laboratory rules will be marked absent. Special attention should be paid to any precautionary measures recommended in the notes. If any accidents or incidents occur they should be reported immediately to the demonstrator in charge of the class who will record the incident and recommend what further action is required.

## **NOTICEBOARDS**

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Noticeboards for this course can be found on the 2nd floor of the Wallace Wurth building. Current timetables and information relevant to you will be displayed here and on the course page on Blackboard. It is your responsibility to check these regularly.

## TEACHING RESOURCES

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The Department of Pharmacology has chosen to use the University's central Blackboard service to provide teaching materials for all of its courses.

- To access these materials, either point your browser to the TeLT gateway (<http://telt.unsw.edu.au/>) or go to the School's home page at: <http://medicalsciences.med.unsw.edu.au/> then select "Current Students" from the menu bar and click on UNSW Blackboard Learning, under "Quicklinks" in the left column.
- Log in using your zPass (zStudentNo. and password).
- After logging on to Blackboard, look for the course PHAR3306. You should have access to it if you are properly enrolled.

You can make use of Lectopia (formerly ilectures) recordings taken of the lectures that are available on Blackboard. Lecture notes will also be made available on Blackboard before each lecture. It is recommended that students print these out and bring them to the lecture, so they can annotate them and make their additional own notes during the lecture.

## HANDWRITING

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Students whose writing is difficult to understand will disadvantage themselves in their written assessment. Make every effort to write clearly and legibly. Do not use your own abbreviations.

## SPECIAL CONSIDERATION

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**Please note the following Statement regarding Special Consideration.**

*If you believe that your performance in a course, either during session or in an examination, has been adversely affected by sickness or for any other reason, you should notify the Registrar and ask for special consideration in the determination of your results. Such requests should be made as soon as practicable after the problem occurs. **Applications made more than three days after an examination in a course will only be considered in exceptional circumstances.***

*When submitting a request for special consideration you should provide all possible supporting evidence (eg medical certificates) together with your registration number and enrolment details. Consideration request forms are available from Student Central. In exceptional circumstances further assessment may be given. **If you believe you might be eligible for further assessment on these grounds, you should contact the Course Coordinator as soon as possible.***

## MISSED ASSESSMENT ITEMS

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If in any circumstances you unavoidably miss the final exam, mid session test or cannot hand in an assessment task on time, **you must inform the course coordinator and you must lodge a special consideration request**, supported by a medical certificate or other documentation to Student Central (see web address above) within **3 DAYS**.

Your request for consideration will be assessed and a deferred exam may be granted. You cannot assume you will be granted supplementary assessment.

If necessary, a supplementary final examination will be held **in the week starting 5<sup>th</sup> December 2011**.

Normally, if you miss an exam (without valid reasons) you will be given an absent fail. If you arrive late for an exam no time extension will be granted. It is your responsibility to check timetables and ensure that you arrive with sufficient time.

## **MISSED PRACTICAL CLASSES**

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Students who miss practical classes due to illness or for other reasons must submit a copy of medical certificates or other acceptable documentation to the course co-ordinator in Room 209, Wallace Wurth. **Certificates should be lodged no more than 7 days after an absence. Certificates lodged after 7 days will not be accepted.** The following details must be attached: Name, Subject number, Date of the class, Name of class/es missed.

## **REPEATING STUDENTS**

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Practical class exemptions may be granted to repeat students but students **must** check with the course co-ordinator whether they have exemption **prior** to their first practical class. All students must be familiar with the material covered in the practical classes.

## **STUDENT SUPPORT SERVICES**

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Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course coordinator prior to, or at the commencement of, their course. Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.

Student Equity and Disabilities Unit, Ground Floor of the Goodsell Building

Tel: +61 2 9385 4734/5434

Email: [seadu@unsw.edu.au](mailto:seadu@unsw.edu.au)

Website: [www.studentequity.unsw.edu.au](http://www.studentequity.unsw.edu.au)

## **STUDENT RIGHTS AND RESPONSIBILITIES**

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<https://my.unsw.edu.au/student/resources/Policies.html#StudentResponsibilities&Conduct>

Student equity and diversity issues can be addressed via Student Equity Officers (Disability) in the Student Equity and Diversity Unit (9385 4734).

## **APPEAL PROCEDURES**

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Details can be found at MyUNSW via the Student Central link.

<https://my.unsw.edu.au/student/academiclife/StudentCentralKensington.html>

## **GRIEVANCE RESOLUTION OFFICER**

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In case you have any problems or grievances about the course, you should try to resolve it with the Course Organizer (Dr. Lu Liu ph:9385 8762) or the Head of Department (Prof Margaret Morris ph: 9385 1560). If the grievance cannot be resolved in this way, you should contact the School of Medical Sciences Grievance Officer, Dr P.Pandey (9385 2483, [P.Pandey@unsw.edu.au](mailto:P.Pandey@unsw.edu.au)).

## PLAGIARISM

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The School of Medical Sciences will not tolerate plagiarism in submitted written work. The University regards this as academic misconduct. Evidence of plagiarism in submitted assignments, etc. will be thoroughly investigated and may be penalised by the award of a score of zero for the assessable work. Evidence of plagiarism may result in a record being made in the Central Plagiarism Register and the Faculty Students Ethics Officer being notified.

### What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.<sup>1</sup> Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.<sup>2</sup>
- For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.
- Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.
- Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.
- The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.
- The Learning Centre website is the main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via: [www.lc.unsw.edu.au/plagiarism](http://www.lc.unsw.edu.au/plagiarism)

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

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<sup>1</sup> Based on a document proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle.

<sup>2</sup> Adapted with kind permission from the University of Melbourne.

# LECTURE OUTLINES

The course **timetable** is appended at the end of this book (**Appendix II**) and can also be found on Blackboard.

## **Pharmacodynamics - Sites of drug action**

This lecture provides an introduction to pharmacodynamics – what the drug does to the body; it includes: receptors, affinity and efficacy, side effects, desensitisation, up and down regulation, quantitation of drug-receptor interactions, dose-response curves, ED<sub>50</sub>, and spare receptors.

## **Pharmacodynamics - Agonist and antagonist activity**

Competitive antagonism, irreversible antagonism, functional (physiological) antagonism, chemical antagonism, concept of tone, potentiation, partial agonist, quantitative response, quantal response, therapeutic ratio, indirectly acting drugs.

## **Pharmacokinetics - Drug absorption and distribution**

Pharmacokinetic parameters, half-life, volume of distribution and clearance. Relationship between lipid solubility and drug absorption, distribution, excretion: drug dosage forms, advantages and disadvantages. Renal filtration, reabsorption and secretion. Renal dysfunction and elimination.

## **Pharmacokinetics - Drug metabolism**

Pathways of metabolism of drugs including phase I and phase II metabolism. Hepatic and extrarenal metabolism, genetic polymorphisms and their effects on duration of drug action. Important pathways of ocular drug metabolism. Pharmacokinetic formulae and calculations.

## **Autonomic nervous system - Cholinergic mechanisms**

Introduction to the autonomic nervous system (ANS) and the parasympathetic nervous system (PNS). Synaptic release of acetylcholine and cholinergic transmission. Cholinergic receptor classifications and distributions.

Introduction to 3 classes of cholinergic agents: Muscarinics, Nicotinic and Anticholinesterases. Representative agents of each class, mechanisms of action, clinical uses, side effects and contraindications.

## **Autonomic nervous system - Adrenergic mechanisms**

Catecholamines. synthesis and metabolism of catecholamines. Adrenergic receptors. Alpha-1 adrenergic agonists and antagonists. Alpha-2 adrenergic agonists and antagonists. Beta adrenergic agonists and antagonists. Indirectly acting sympathomimetic amines. Examples of use of these classes of drugs in the eye will be given throughout the lectures.

## **Autonomic control of the eye and autonomic ocular drugs**

Commonly used autonomic drugs as cycloplegics, miotics, mydriatics, including. Parasympathomimetics: carbachol and pilocarpine; Parasympatholytics: atropine, tropicamide and cyclopentolate; Sympathomimetics: phenylephrine and dipivefrine; Sympatholytics: brimonidine and timolol. Mechanisms of action, side effects and contraindications.

## **Antihypertensives**

Rationale for treating hypertension, the place of drug therapy, major classes of antihypertensive drugs - ACE inhibitors, calcium antagonists, diuretics, beta-blockers, alpha blockers; commonly used examples from each class; review of basic pharmacology/mechanisms of action; adverse effects and contraindications.

## **Diuretic agents**

Brief review of renal physiology. Diuretic drugs: acetazolamide, furosemide (frusemide) and loop diuretics, chlorothiazide and distal tubule acting diuretics. Potassium sparing diuretics,

amiloride, triamterene and spironolactone. Actions, interactions and side effects of the diuretics will be covered, and their clinical uses.

### **VEGF and angiogenesis in eye disease**

Vascular endothelial growth factor A (VEGF-A) is a central mediator in blood vessel growth (angiogenesis) in the eye. "Wet AMD" is a particular form of age-related macular degeneration caused by abnormal growth of blood vessels under the macula. Currently available antiangiogenesis drugs for the treatment of wet AMD will be presented.

### **Antiepileptic drugs/sedatives/hypnotics**

Different types of epilepsy. Anticonvulsant drugs and how they work: (clonazepam, valproate, vigabatrin, phenobarbitone, primidone, phenytoin, carbamazepine, ethosuximide, trimethadione); adverse effects on CNS, blood and other tissues. Desirable properties of sedatives and hypnotics. Mechanism of action of benzodiazepines and barbiturates. Pharmacology of benzodiazepines. Advantages of benzodiazepines over barbiturates. Zopiclone, a new hypnosedative. Indications for use.

### **Antidepressants**

Monoamine theory of depression; pharmacology of antidepressant drugs. Tricyclic antidepressants, possible modes of action, side effects, overdose. MAO inhibitors: side effects including food interactions (hypertensive crisis) of non-specific MAO inhibitors. Specific MAO inhibitors (moclobemide). SSRI's (fluoxetine as prototype). Li<sup>+</sup> for bipolar depression.

### **Opioid analgesics**

Historical introduction. The opioid receptors. The chemistry of the opioids: naturally occurring, semisynthetic, synthetic. Commonly used agents: morphine, codeine, pethidine, methadone, dextropropoxyphene, fentanyl, oxycodone, naloxone, bupremorphine. The assessment of analgesic activity and pain management. Adverse effects of the opioids.

### **Drugs used to treat asthma**

Treatments for asthma and associated pharmacology. Bronchial asthma, inflammatory cells and mediators, commonly used anti-asthmatic drugs [ $\beta$ -adrenergic agonists, xanthines, glucocorticoids, oral steroids]. Asthma management, treatment of severe acute asthma, viral infections, novel treatments for asthma

### **Antiglaucoma drugs**

Brief introduction to the pathology of glaucoma and ocular hypertension. Rationale for the use of directly acting cholinomimetics, acetylcholine esterase inhibitors, adrenergics, carbonic anhydride inhibitors, etc, in treatment. Comparison of pharmacokinetics, routes of administration, contraindications and side effects.

### **Dry eyes and treatment**

The tear film, functions of the tear film and tear secretion; Causes and pathophysiology of dry eye; Management and pharmacology treatment of dry eye

### **Drugs to treat thrombosis**

Review of the mechanism of thrombosis formation. The mechanism of actions of (i) Anti-platelet drugs, (ii) Anti-coagulation drugs and (iii) Thrombolytic drugs. By the end of the lecture students should be able to (i). Describe how aspirin prevents platelet activation; (ii) Identify drugs which prevent thrombosis formation versus drugs which remove thrombosis (iii) Describe the mechanisms of action of warfarin and heparin.

### **Endocrine drugs- thyroid drugs**

Drugs used to treat deficiencies or overactivity in thyroid secretion: thyroxine, triiodothyronine, propylthiouracil, carbimazole, radioactive iodine, high dose iodine,  $\beta$  blockers.

### **Endocrine drugs- antidiabetic drugs**

Improving glycaemic control using orally active agents, incorporating mechanism of action, clinical use, side effects of the following drugs: Sulphonylureas; metformin, tolbutamide, chlorpropamide, glibenclamide. The insulin sensitising agents.

### **Antihistamine and mast cell stabilizers**

History. synthesis & storage. Histamine release. Metabolism. Effects of histamine with focus on allergic reaction and gastric acid secretion. The "triple response". Histamine H<sub>1</sub> and H<sub>2</sub> receptors. Anti-histamines: actions & clinical uses. Commonly used mast cell stabilizers and how mast cell stabilizers work to prevent or control allergic disorders.

### **Anti-inflammatory drugs-NSAIDs**

Gross effects, therapeutic uses (including ocular) and side effects of non-steroidal anti-inflammatory drugs. Relationships of effects of NSAIDs to inhibition of cyclooxygenase, analgesia, anti-inflammatory, antipyresis, anti-platelet effects, effects on uterus, gastrointestinal tract. Selective COX-2 inhibitors.

### **Anti-inflammatory drugs-steroids**

Inappropriate inflammatory or immune reactions are involved in many disease processes. Antiinflammatory drugs have been either glucocorticosteroids (GCS), or non-steroidal agents (NSAIDs). The pathway of synthesis of the prostaglandins and their major actions. The gross effects (including the anti-inflammatory effects) of the GCS. Dose forms of eye drops and ointments. Additives to eye drops of GCS.

### **Diseases of the human ocular surface**

This lecturer will cover the pathogenesis of common and rare diseases of the human ocular surface with particular focus on the impact of ultraviolet radiation exposure. Other topics covered will include ocular surface stem cells and techniques used to treat patients with stem cell failure.

### **Antibiotics**

Mechanisms of action of antibiotics and antimicrobial agents, including inhibitors of DNA synthesis (inhibitors of DNA gyrase and folic acid biochemistry), cell wall synthesis (inhibitors of peptido-glycan synthesis), and the various steps in protein synthesis.

### **Anaesthetics**

Definition of local anaesthesia. Structure activity relationships. Mode of action, metabolism. Commonly used agents. Therapeutic applications. Toxicity.

### **Adverse drug effects**

Epidemiology, severity, most common drugs; type A reactions, dose dependent, related to usual actions of drug; type B reactions, not dose dependent, not related to usual actions of drug. Adverse ocular and systemic effects of drugs administered in eye drops. Adverse ocular effects of drugs administered orally or by injection.

### **Antiviral and antifungal agents**

Pathogenic viruses, viral life cycles, virus-specific targets, DNA polymerase inhibitors, reverse transcriptase inhibitors, protease inhibitors, inhibitors of virus attachment. Pathogenic fungi, sites for chemotherapeutic intervention, antifungal antibiotics including amphotericin and nystatin, antifungal drugs including flucytosine, azoles such as ketoconazole and clotrimazole.

# INFORMATION ABOUT GROUP ASSIGNMENT

**Graduate Attributes** will be assessed in this group project are:

- Research, inquiry and analytical thinking abilities
- Effective communication
- Teamwork, collaborative and management skills
- Information Literacy – the skills to locate, evaluate and use relevant information

## **Aims:**

The aims of the group project are:

- To develop your basic and clinical science skills by researching a topic related to eye diseases
- To update your knowledge of recent developments in the treatment of eye diseases
- To develop your skill in collaborative learning (teamwork)

**Number of students per group: 4**

**Each group will be allocated a topic to research and present the information in the form of an assignment.**

## **Task description:**

- Research recent advances in the treatment (or potential therapeutic) of your assigned eye disease
- All members should receive a fair amount of task. The group should produce an integrated assignment with a word limit of 3000 words (excluding tables, figures, figure legends and references)
- A hard copy of the assignment must be accompanied by a signed plagiarism form (signed by each member of the group) and placed in the locked box in room MG14. An electronic version must also be submitted via Blackboard.
- The assignment is to be submitted by **5pm on the 24<sup>th</sup> of September 2010**. A penalty will apply for late submissions.
- Each member should use the “Group Members – Evaluation Form” (see attached) to evaluate the members of your group, including yourself. The form should be submitted individually via Blackboard.

## **Assessment:**

- The assignment will be worth 10% of your total grade.
- The assignment will be assessed by one of the members of the PHAR 3306 lecturing staff.

## **Group Assignment Topics:**

### **Novel therapeutic approaches to treat eye diseases:**

1. Infection
2. Inflammation
3. Glaucoma
4. Allergic eye disease
5. Age-related macular degeneration
6. AIDs-related vision impairment
7. Eye cancer
8. Dry eyes
9. Diabetes-related eye disease
10. Corneal angiogenesis
11. Retinitis pigmentosa
12. Giant cell arteritis

## Group Assignment Marking Criteria

### PHAR 3306 S2, 2010

Student names:

Assignment Topics:

SECTION	COMPONENT PARTS	COMMENTS
<b>Preliminaries</b>	<p><b>Title page</b></p> <p>Assignment title, students' names and numbers; Course name &amp; number, date</p> <p style="text-align: right;"><b>1</b></p>	
<b>Introduction</b>		
<b>The introduction gives an overview of the whole paper</b>	<p>Introduce the topic area; state clearly the purpose of the assignment article; give the reader an indication of what to expect.</p> <p style="text-align: right;"><b>5</b></p>	
<b>Body of Essay</b>		
<b><i>Background information</i></b>	<p>Clearly discuss and introduce the pathophysiological and pharmacological issues related to your topic; outline your main argument</p> <p style="text-align: right;"><b>30</b></p>	
<b>Evaluation of the issues identified from the sources</b>	<p><b>Critical evaluation</b> of the issues identified and supported by your chosen sources. A balanced and logical presentation that explores the strengths and weaknesses of your issue</p> <p style="text-align: right;"><b>30</b></p>	
<b>End of Essay</b>		
<b>Conclusion</b>	<p><b>Re-state key findings</b> and state position/argument about the identified issue</p> <p style="text-align: right;"><b>4</b></p>	

Writing Checklist	Writing Conventions	Comments
	<b>Overall readability</b> -Sentence structure-correct grammar and word usage. Sentence and paragraphs well connected. Question clearly answered. Topic sentences, supporting and concluding sentences <p style="text-align: right;"><b>5</b></p>	
	<b>Appropriate written expression</b> Discipline specific – appropriate vocabulary-use of formal not oral language. Has been proof read. <p style="text-align: right;"><b>4</b></p>	
	Support –sources-evidence <i>BJP*</i> – <b>in-text citations (4) and reference list (4) follow conventions relevant information selected.</b> <p style="text-align: right;"><b>8</b></p>	
	<b>Word Limit- 3000 words</b> <p style="text-align: right;"><b>1</b></p>	
	<b>Assignment Presentation</b> -Neat, margins, 1.5 spacing, 12 point font. Simple staple. Page numbering <p style="text-align: right;"><b>2</b></p>	

\*: Reference follows the style of *British Journal of Pharmacology*

Content & structure: /70

Writing Conventions: /20

Peer/Self evaluations: /10

Total: /100 FINAL /10%

**Additional comments:**

## Group Members - Evaluation Form

**Group number** \_\_\_\_\_ **Student name:** \_\_\_\_\_

**Instructions:** Use this form to evaluate the members of your group. Write the name of each group member, including yourself, on top of one of the columns, then assign a score of 0 to 10 (0 being the lowest grade, 10 the highest) to each group member for each criterion. Because each group member has different strengths and weaknesses, the scores you assign will differ. At the bottom of this sheet, write down any comments you wish to make.

Criteria	Group Members			
Regularly attends meetings				
Is prepared at meetings				
Meets deadlines				
Contributes good ideas				
Effort given to researching subject				
Submits high-quality work				
Listens to other members				
Gives constructive feedback				
Responds to feedback				
Overall assessment of this person's contribution				
<b>Total (/100)</b>				

**Comments:**



FACULTY OF MEDICINE

SCHOOL OF MEDICAL SCIENCES  
DEPARTMENT OF PHARMACOLOGY

PHAR3306

# PHARMACOLOGY FOR OPTOMETRY

## **Practical Class Experimental Procedures**

SESSION 2, 2011

- 1. Pharmacokinetics**
- 2. Dose-response**
- 3. Pharmacology of the human autonomic nervous system**
- 4. Behavioural screening of CNS drugs**
- 5. Autonomic drugs on eye**

## **Appendix 1.**

### THE USE OF OCULAR THERAPEUTIC DRUGS IN NEW SOUTH WALES<sup>3</sup>

#### **Introduction**

The competency standards that an optometrist must achieve in order to be granted a drug authority are the therapeutic competencies that were developed by the Optometrists Association Australia. The criteria to ascertain whether an optometrist meets those competency standards is through the optometrist's provision of evidence of successful completion of an educational course or program which addresses the adopted competencies, that is recognised by the New South Wales Optometrists Registration Board for this purpose and which has been accredited by the Optometry Council of Australia and New Zealand.

The following qualifications are recognised by the Board on the recommendation of the Optometry Council of Australia and New Zealand:

Graduate Certificate in Ocular Therapeutics	University of New South Wales
Postgraduate Certificate in Ocular Therapeutics	University of Melbourne
Graduate Certificate in Ocular Therapeutics	Queensland University of Technology
The Auckland Programme in Ocular Therapeutics	University of Auckland
Bachelor of Optometry	University of Melbourne, conferred in 2007 and thereafter
Bachelor of Optometry	University of Auckland, conferred in 2007 and thereafter

#### **The Ocular Conditions that an Authorised Optometrist may treat**

An optometrist granted a drug authority in New South Wales shall be permitted to use, supply or prescribe topical preparations in the following circumstances:

- For dry eye and related conditions;
- As an anti-infective prophylaxis after foreign body removal;
- As an adjunct to co-management of surgical cases with an attending ophthalmic surgeon;
- For non-vision threatening inflammatory diseases of the anterior segment, and
- For infectious and inflammatory disease of the anterior eye, with the exception of uveitis and herpetic conditions.

<sup>3</sup> from [http://www.optomreg.health.nsw.gov.au/optom\\_ocular.htm](http://www.optomreg.health.nsw.gov.au/optom_ocular.htm)

## LIST OF APPROVED SCHEDULE 4 REGISTERED RESTRICTED DRUGS FOR TOPICAL USE IN NSW AS AT 20 JULY 2005

**a. Group 1 - Anti-infective agents**

- i. Chloramphenicol
- ii. Framycetin
- iii. Gramicidin
- iv. Neomycin
- v. Polymyxin
- vi. Tetracycline

**b. Group 2 - Decongestants & anti-allergic agents**

- i. Ketotifen
- ii. Levocabastine
- iii. Lodoxamide
- iv. Olopatadine
- v. Sodium cromoglycate

**c. Group 3 - NSAIDS**

- i. Diclofenac
- ii. Flurbiprofen
- iii. Ketorolac

**d. Group 4 –Topical Ocular Steroids**

- i. Fluorometholone
- ii. Hydrocortisone

**e. Group 5 - Glaucoma medications** (subject to the development of appropriate clinical pathways and protocols)

- i. Apraclonidine
- ii. Betaxolol
- iii. Bimatoprost
- iv. Brimonidine
- v. Brinzolamide
- vi. Carbachol
- vii. Dipivefrin
- viii. Dorzolamide
- ix. Latanoprost
- x. Levobunolol
- xi. Pilocarpine
- xii. Timolol
- xiii. Travoprost

**f. Group 6 – Mydriatics & Cycloplegics**

- i. Atropine
- ii. Cyclopentolate
- iii. Homatropine
- iv. Phenylephrine
- v. Tropicamide

**g. Group 7 – Local Anaesthetics**

- i. Amethocaine
- ii. Oxybuprocaine
- iii. Proxymetacaine

NB. There are certain medications that optometrists in NSW will **not** be permitted to use or prescribe. These are:

- Fluoroquinolones (ciprofloxacin, ofloxacin)
- Anti-virals (aciclovir)
- Deep-penetrating steroids (prednisolone, dexamethasone)

## Appendix II.

Timetable PHAR3306 Pharmacology for Optometry, S2, 2011 (Draft)<sup>#</sup>

LECTURES						TUTORIALS AND PRACTICAL CLASSES		
Wk	Date	Time	Theatre	Lecture title	Lecturer	Date	Time	Tutorial (T)/Practical (P)
1	Jul 18, Mon	3-4 pm	Biomed B	Welcome & Introduction. Sites of drug action	Liu / Binder			
	Jul 18, Mon	4-5 pm	Biomed B	Pharmacodynamics: agonist and antagonist activity	T. Binder			
	Jul 20, Wed	9-10 am	Mat D	Pharmacokinetics-Drug absorption and distribution	R. Griffith			
2	Jul 25, Mon	3-4 pm	Biomed B	Pharmacokinetics-Drug metabolism	R. Grant	Jul 28, Thur	9-10 am (A)*	Group project instructions (T)
	Jul 25, Mon	4-5 pm	Biomed B	Pharmacokinetic formulae and calculations	R. Grant		10-11 am (B)*	Mat 312
	Jul 27, Wed	9-10 am	Mat D	Autonomic nervous system-Introduction/Cholinergic	L. Liu			L. Liu
3	Aug 1, Mon	3-4 pm	Biomed B	Autonomic Nervous System-Cholinergic	L. Liu	Aug 4, Thur	9 am-12 pm	Pharmacokinetics (P)
	Aug 1, Mon	4-5 pm	Biomed B	Autonomic Nervous System-Adrenergic	A. Finch			G2/G4, Wallace Wurth
	Aug 3, Wed	9-10 am	Mat D	Autonomic Nervous System-Adrenergic	A. Finch			R. Grant & R. Griffith
4	Aug 8, Mon	3-4 pm	Biomed B	ANS control of the eye/cycloplegics, miotics, mydriatics	L. Liu	Aug 11, Thur	9-10 am (A)*	Cholinergic (T)
	Aug 8, Mon	4-5 pm	Biomed B	Antihypertensives	M. Morris		10-11 am (B)*	Mat 312
	Aug 10, Wed	9-10 am	Mat D	Drugs acting on renal system - Diuretic agents	M. Morris			L. Liu
5	Aug 15, Mon	3-4 pm	Biomed B	VEGF and angiogenesis in eye disease	R. Griffith	Aug 18, Thur	9 am-12 pm	Dose-response (P)
	Aug 15, Mon	4-5 pm	Biomed B	CNS-Antidepressants	N. Jones			G2/G4, Wallace Wurth
	Aug 17, Wed	9-10 am	Mat D	CNS- Antiepileptic drugs/Sedatives/Hypnotics	N. Jones			L. Liu & T. Binder
6	Aug 22, Mon	3-4 pm	Biomed B	Opioids	T. Binder	Aug 25, Thur	9-10 am (A)*	Adrenergic (T)
	Aug 22, Mon	4-5 pm	Biomed B	Drugs used to treat asthma	T. Binder		10-11 am (B)*	Mat 312
	Aug 24, Wed	9-10 am	Mat D	Antiglaucoma drugs	R. Lim			A. Finch
7	Aug 29, Mon	3-4 pm	Biomed B	Dry eyes and treatment	D. Wakefield	Sept 1, Thur	9 am-12 pm	Human Pharmacology (P)
	Aug 29, Mon	4-5 pm	Biomed B	Drugs to treat thrombosis	A. Finch			204 Wallace Wurth
	Aug 31, Wed	9-10 am	Mat D	<b>Mid session test (50 min)</b>				L. Liu & N. Jones
<b>Mid-semester break (5 Sept - 11 Sept)</b>								
8	Sept 12, Mon	3-4 pm	Biomed B	Endocrine drugs - Thyroid drugs	M. Morris	Sept 15, Thur		Work on assignments
	Sept 12, Mon	4-5 pm	Biomed B	Endocrine drugs - Antidiabetic drugs	M. Morris			(Due 9 am, Mon Sept 19)
	Sept 14, Wed	9-10 am	Mat D	Antihistamine/mast cell stabilizers	L. Liu			
9	Sept 19, Mon	3-4 pm	Biomed B	Anti-inflammatory drugs-NSAIDs	T. Binder	Sept 22, Thur	9 am-12 pm	CNS drugs (P)
	Sept 19, Mon	4-5 pm	Biomed B	Anti-inflammatory drugs-Steroids	J. Langlands			G2/G4, Wallace Wurth
	Sept 21, Wed	9-10 am	Mat D	Ocular surface disease	N. Di Girolamo			N. Jones
10	Sept 26, Mon	3-4 pm	Biomed B	Antibiotics 1	L. Wakelin	Sept 29, Thur	9-10 am (A)*	Antiinflammatory (T)
	Sept 26, Mon	4-5 pm	Biomed B	Antibiotics 2	L. Wakelin		10-11 am (B)*	Mat 312
	Sept 28, Wed	9-10 am	Mat D	Anaesthetics	N. Jones			T. Binder
11	Oct 3, Mon			<b>Public holiday</b>		Oct 6, Thur	9 am-12 pm	Autonomic drugs on eye (P)
	Oct 5, Wed	9-10 am	Mat D	Ocular side effects of systemic drugs	G. Graham			G2/G4, Wallace Wurth N. Jones
12	Oct 10, Mon	3-4 pm	Biomed B	Antiviral and antifungal agents	L. Wakelin			
	Oct 10, Mon	4-5 pm	Biomed B	Antimicrobial chemotherapy for ocular infection	L. Wakelin			
	Oct 12, Wed	9-10 am	Mat D	Revision	L. Liu			

<sup>#</sup>Timetable may be subject to change. \* Students are divided into two groups for the tutorial classes; Group A, 9-10am and Group B 10-11am.