Introduction

This is the 1\textsuperscript{st} Fact Sheet for the Lectures

The 1\textsuperscript{st} lecture is titled “Introduction”

You may want to open the PowerPoint Slides for the Introduction Lecture at the same time you go through the Fact Sheet. You may also want to listen to the Audio that will be posted AFTER the 1\textsuperscript{st} class session for the face-to-face section, or watch the videos.

The Syllabus and the FAQs contain information important to your success. Read them.

The syllabus and FAQs for the online sections of Pharmacology 203 (PHRM 203) are posted in Laulima. Make sure you read them.

- You are responsible for all due dates and deadlines (in Hawaii Standard Time).
- You are responsible for identifying and notifying the instructor of which testing center (on which campus) you will be using for your midterm and Final. A list of the testing centers will be posted in the announcements.

To get started in this course...

1. Log into Laulima, locate the tab for Pharmacology 203 and enter our main page.
2. Locate the Announcements panel in the upper right corner. READ the ANNOUNCEMENTS.
3. Locate the Chat panel at the lower right corner. Read and communicate through Chats.
4. Locate the Blue navigation link to Tasks, Tests and Surveys... this is where you will find quizzes, practice Student Learning Objective question sets, practice exams and real exams.
5. Locate the Grade Book link... this is where you keep track of your scores.
6. Locate the “Course Index.” Click on “Course Index” to enter the page hosting our course materials. READ the WELCOME and FAQs.

Six Rights of Medication Administration

1. Right Client
2. Right Drug
3. Right Dose
4. Right Route
5. Right Time
6. Right Documentation

We will cover approximately 300 drugs, many will be covered in multiple lectures to help make it easier, but you must have a Drug Handbook.
Laulima is your connection to me... it is our lifeline.

You need to be able to access Laulima on a regular basis and be able to open and print documents that are housed there for our class. Also available to help you through the material are audio recordings from previous and current semesters. The current semester recordings will be posted following the corresponding face-to-face session.

If you want to listen to the audio, you may need to download free conversion software if you are using an Apple Computer. I use Flip4Mac. The audio files are recorded on an Olympus digital recorder and saved as WMA files.

The videos will be housed on the Laulima server and shouldn’t need to be converted, regardless of which operating system you use.

Know your Greek Alphabet

<table>
<thead>
<tr>
<th>Alpha</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta</td>
<td>β</td>
</tr>
<tr>
<td>Gamma</td>
<td>γ</td>
</tr>
<tr>
<td>Delta</td>
<td>δ</td>
</tr>
<tr>
<td>Epsilon</td>
<td>ε</td>
</tr>
<tr>
<td>Kappa</td>
<td>κ</td>
</tr>
<tr>
<td>Lambda</td>
<td>λ</td>
</tr>
<tr>
<td>Mu</td>
<td>μ</td>
</tr>
<tr>
<td>Pi</td>
<td>π</td>
</tr>
<tr>
<td>Sigma</td>
<td>σ</td>
</tr>
<tr>
<td>Tau</td>
<td>τ</td>
</tr>
<tr>
<td>Omega</td>
<td>ω</td>
</tr>
</tbody>
</table>

Some lectures, like the introduction, have background handouts

Go to the “Course Index” link and click it. Select the “Introduction” lecture. Scroll down to the HANDOUTS. You should find a PDF titled “Board Notes.” It gives you more detailed information about topics covered in lecture. The forms of medication and routes of administration are listed in much more detail, for instance. Under number 10 on that handout, you should find a listing of the classes of medications. This is just one of several different ways to classify pharmaceuticals.
Your Textbooks

2. **Nurse’s DRUG GUIDE 2013.** Pearson.
3. You may purchase these at the WCC bookstore or online.

Become familiar with the **Student Learning Objectives [SLOS]** for PHRM 203. It is expected that you will be able to:

1. *Describe the basic mechanisms of action of the drugs we cover.*
   a. Usually this will entail knowing about receptors.
      i. For instance, morphine and other opioids, interact with opioid receptors. That one is easy.
   b. And, how drugs interact with various receptors.
      i. IF a drug is cholinergic, it is an **AGONIST** at acetylcholine receptors; if it is anticholinergic, it usually blocks acetylcholine receptors (**ANTAGONIST**).

2. *Demonstrate knowledge of the terminology and concepts important in pharmacology.*
   a. Yes, you need to know what "cholinergic" means… there will be many terms you are probably unfamiliar with, but you have a glossary as one of your resources & making flash cards will help.

3. *Describe variables that affect drug action, including how individual differences affect therapeutics.*
   a. Genetic testing can improve the therapeutics of many drugs.
   b. You will need to be able to recognize “sensitive populations.” For instance, the very young or very old, pregnancy status and sex-related differences, genetic differences, and pre-existing conditions (allergies, diabetes, and liver, kidney and cardiovascular diseases, … there will be more).

4. *Define pharmacokinetics for specific drugs.*
   a. The vast majority of drugs are metabolized by something called Phase I metabolism. These enzymes are called Cytochrome P450s (CYP 450’s). They have names like CYP3A4 and CYP2C9. There are only a few that you will have to know.
   b. CYP3A4, CYP2C9, CYP2C19 to start.
Continued from page 3.

c. Other drugs are metabolized by Phase 2 metabolism (some by both). Phase 1 reactions are redox, Phase 2 are conjugations (another chemical is attached to improve the ability of the body to excrete the drug). You will learn all of this starting in the Kinetics lectures.

5. Identify frequent complications and side effects associated with major drug classes.

   a. Anticholinergic drugs block the effects of the parasympathetic nervous system (and a few other key things). Drugs with anticholinergic effects always cause symptoms remembered by the mnemonic: red as a beet, hot as a poker, fast as a hart, mad as a hatter, dry as a bone, blind as a bat. You will learn what this means in the Peripheral Nervous System lectures.

6. Describe significant drug interactions.

   a. There are a number of ways drugs may interfere with each other; they may:
      i. Inhibit metabolism, absorption or excretion
      ii. Promote metabolism, absorption or excretion
      iii. Block the receptor
      iv. Sensitize the receptor

7. Use pharmacokinetics to determine dosing schedules and routes of administration.

   a. It takes 4 – 5 half-lives (t ½) to reach steady state.
      i. Drugs with a long t ½ will usually be started with a loading dose.

   b. Most drugs are formulated to be given orally, but some have no bioavailability via the oral route.

8. List the therapeutic use(s) for each drug

   a. Sometimes, the side effects in one patient are therapeutic uses in another....
Drug Discovery and Development

Discovery

The process of drug discovery starts with someone going “out into the field.” They go out into nature and collect samples of soil, plants, bacteria, fungi, insects, and animals. They collect samples of toxins produced by those organisms, too, as well as other “body” fluids. They may collect whole organisms or parts of organisms (like just the flowers from a plant).

The samples are carefully collected and then returned to a laboratory where technicians or scientists, “clean up” the samples to isolate specific chemical fractions. They then compare the chemicals they have isolated against chemical databases that are online. They are looking for structural similarities between known chemicals and the ones they have found. They will also be able to eliminate chemicals that have already been investigated.

Any chemicals that appear to have promise are synthesized or further isolated, to obtain enough material for the next step.

At the end of discovery, the chemical is believed to have the potential for activity against either a specific organism (a pathogen) or against a specific receptor (or target molecule).

There are many unknowns including if it is safe, if it is toxic, how the body will process the material and how the material will behave in the body.

Development

The company will then conduct experimental studies (or they may sell the chemical to a company who will do the studies). Experimental studies start in cell and tissue cultures, not in whole animals. If the in vitro studies are promising, then whole animal studies are conducted in an appropriate animal model – usually rats or mice.

The whole animal studies allow more information to be gathered regarding toxicity. If these studies are promising, the company will petition for a permit called an Investigational New Drug application or IND. In the IND, clinical trials will be proposed to the FDA. Once approved, clinical trials begin.

Phase 1 Clinical Trials, using healthy volunteers in a tightly controlled class, start off the process. These volunteers are usually young, white, males, without any known pre-existing conditions (diseases).

If the Phase 1 trials are successful, the drug is tested in sick individuals in Phase 2 trials. These are still tightly controlled and have few participants. If the results are promising, it’s on to Phase 3.

The Phase 3 trials are the 1st time the drug is administered to patients in the actual target population. These tend to be very large studies and may be conducted in many locations. Even though there may be 1,000’s of participants, it won’t be until the drug is marketed, and 100’s of thousands of people take it, that rare effects will become evident.

Once completed, the company petitions for a label from FDA using a New Drug Application (NDA). Because of the expense, many companies will only seek a specific indication during the clinical trials. It is this indication, or therapeutic use, that appears on the label.

Once the drug is marketed, clinical experience may present other, additional, therapeutic uses (which may have been considered “side effects”). If few clinicians use the drug this way, it is called “off label use.” If the company goes back and does additional, Phase 4 clinical trials and petitions FDA for a label change, these uses may become additional indications.

This happens all the time. If you look at “newly” approved drugs, most of them are just new indications for currently marketed drugs.
Controlled Substances
require special training, security & record keeping

**Schedule 1**: No recognized therapeutic use (according to DEA)!! and a high potential for abuse. Except for medical marijuana, no prescriptions.

**Schedule 2**: There is a therapeutic use, but still high abuse potential, including addiction. Available by prescription and distribution is tightly controlled by DEA.

**Schedule 3**: Lower abuse potential, otherwise much like schedule 2.

**Schedule 4**: Still less potential for abuse, otherwise much like 2 & 3.

**Schedule 5**: Very low abuse potential, so distribution is not tightly controlled, but still only available by prescription.

---

- You will need to provide a photo, in an email to me, after the start of class, and before the end of the 2nd week of classes. Email it to abeale@hawaii.edu.

- PHRM 203 is an intense, rigorous survey of pharmacology. Don’t think that because the class is online, it will be easy.

- One reason this class is tough: the epidemic of medication errors. Read from a report titled, “Preventing Medication Errors: Quality Chasm Series (2007)” published by the National Academies Press, outlining extent of the problem of medication errors by clicking HERE.

---

**Homework and Exercises**

1. Read the **START HERE** announcement in Laulima for updates and instructions.
2. **Read** Chapters 1, 6 and 7 in Pharmacology: Connections to Nursing Practice, 2nd Edition. Adams and Urbans. Pearson Publishing. Check the Course Index, Introduction Lecture for more information about reading assignments.
3. Listen to the face-to-face audio recording along with your **powerpoint slides**. You may choose to watch the videos, too. Both the audio and the video are optional, but they are recommended. Several semesters of audio will be available, I recommend you listen to the audio that matches your semester.
4. Complete the SLO questions in the **SLO Practice set for the Introduction in Tasks, Tests and Surveys**.
5. **Take the quiz in Tasks, Tests and Surveys**.