Pathology 438 Final Examination due: 15 June 2015
Spring 2015
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The electronic responses to this examination are due on Monday, 15 June 2015 at end of day (5:00 pm). Submit them to shalloran@lifewest.edu OR to smhbizness@gmail.com. You will be sent an acknowledgement receipt.

You are not allowed to consult with classmates or any individuals *other than* the instructor as you research, prepare and compose your responses to the questions posed in this examination. Lecture content (slides) and your oral presentations are on MOODLE for you to use in preparing answers, in addition to access to the LCCW library, reference books and course text books, and on-line resources. Please proofread and organize your work and assemble the exam before submitting it.

Some answers require you to include a citation of the sources you consult to formulate your response. Format your citation according to MLA or APA standards. (If you wish, you can use the built-in Word feature that formats your references: under the References tab, use Insert Citation and fill in the fields as much as possible. Later you will use Bibliography->Insert Bibliography at the point of the cursor. You might learn how to use Section Break too in order to insert bibliographies under separate answers. I have put in section breaks in this document between questions.)

By working the examination and submitting it for grading you are agreeing to work independently of all other individuals and you are certifying that all the responses and answers to the examination questions are your own work.

Within group A through C, choose ONE of any of the choices answer.
Choose between D or E, and within D, choose ONE of any of the choices

A. Environmental Toxicants. Pick one from the three class of substances below and discuss exposure (places where it might be encountered), its toxicokinetics (ADME) and toxicodynamics (acute, chronic toxicity, effects on physiology and eliciting pathologies. You are allowed to focus on one compound in the class or discuss the toxicology of the class generally.

1. **Polyaromatic hydrocarbons (PAHs)**

Exposure: Sources of PAHs in the environment can be Natural Sources and Anthropogenic sources. Most of them are formed by a process called thermal decomposition. Naturally they are formed by: forest and grass fires, oil seeps, volcanoes and chlorophyllous plants. Anthropogenically they are produced by: petroleum, electric power generation, refuse incineration, home heating, internal combustion engines, production of coke, carbon black, coal tar and asphalt. (1)
Toxicokinetics/Toxicodynamics: "PAH in particles follows biphasic absorption kinetics in the lungs. The absorption kinetics depends on the site of deposition in the respiratory tract. A fraction of B[*a*]P in diesel particles was quickly desorbed and absorbed into circulation through type I epithelial cells in the alveolar region and systemically rapidly metabolized. The fraction deposited in the tracheobronchial region was more slowly absorbed into circulation and intensely locally metabolized. The release rates of B[*a*]P from particles decreased drastically after the

initial burst and a notable fraction of B[*a*]P (up to 30%) remained unaffected on the surface of particles in lungs and in lymph nodes for several months." (2) PAHs are rapidly and widely distributed in the body. Lipophilic compounds easily pass biological membranes. Detectable levels of B[*a*]P can be observed in most tissues in minutes to hours after exposure, irrespective of the exposure route. PAHs undergo hepatobiliary clearance and high concentrations of PAHs and their metabolites are detectable in the gastrointestinal tract. PAHs do not accumulate in the body. Fat tends to contain more PAHs than other tissues. Fat and PAH contents, however, did not correlate well in lungs. "PAHs are generally detectable in most human tissues, typically at the sub-μg/kg level. The reactive metabolites are bound covalently to proteins and nucleic acids and the turnover rate of adducts defines the half-life in tissues." (2)

B. Food Toxicants.

1. **Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features:** SO2 is known as a primary irritant and can have severe health effects, both short and long term. SO2 is normally exposed to humans in the gaseous form, which makes the respiratory system the main target for toxic action. Individuals with respiratory disorders like asthma or younger biological systems such as infants should strive to avoid exposure. **Can wine be produced without using it? Are there are alternatives?** Yes, there are wines produced without SO2. The problem with this however is that SO2 is a preservative used for its antibacterial and antioxidant properties. It is dominant in the white wines as the sulfites give the wine that fresh taste. There are good Sulfite-absent wines on the market, but are usually reserved for those with Sulfite allergies, as most people can deal with Sulfites just fine. (3)

C. Drug-Nutrient Interactions. Select any of the drugs or drug classes below and explain how it affects diet (nutrient absorption). Either suggest an alternative drug and/or explain how an individual can compensate for any effect on nutrition

1. Laxatives affect your nutritional absorption because it loosens your stools to the extent that your body isn't given the opportunity to get any nutritional value from your foods before it is excreted. Medical problems associated with laxative abuse include electrolyte and acid/base changes that can involve the renal and cardiovascular systems and may become life threatening. The renin-aldosterone system becomes activated due to the loss of fluid, which leads to edema and acute weight gain when the laxative is discontinued. (4) Especially individuals using these products for the purpose of bulimia or anorexia, overuse and abuse is highly prevalent, especially since their body tries to counteract these drugs and retain fluid weight.
   Maintaining a healthy diet is great alternative, as well as figuring out what you're allergic to that may be causing you to want to turn to laxatives in the first place. Foods high in

fiber and psyllium husk are great more natural approaches to helping bowel movements move along, if it's really necessary.

You can do either D or E below

E. **Sexual dysfunction therapy. A medication for hypoactive sexual arousal disorder recently was in the news. This medication, flibanserin, is being called a "female Viagra."**

(a) Discuss the effect of the drug both at clinical and molecular level: Clinically, the drug company who made flibanserin is saying that instead of the women's "sex pill", it should be seen as the pill that brings women's sex drive back to a normal state. In the same way that antidepressants don't give you a euphoric state, but rather stabilize your mood, this is how flibanserin is designed to work. "About 85 percent of a flibanserin dose is handled by a drug metabolizing enzyme called CYP3A4. We know very well that some drugs inhibit the action of CYP3A4, such as antifungal drugs like fluconazole, and that almost half of all drugs are handled by that enzyme. Not just flibanserin." (5)

(b) Discuss alternative therapies, including those in chiropractic medicine: The body tends to function properly when it is given the appropriate foods, nutrition and is devoid of toxins. Doing a doctor recommended detoxification program, as well as nutrition guided eating program would do wonders for the patient. Sacral and Lumbopelvic subluxations tend to lead to urinary or sexual dysfunction when not resolved. Analyzing and fixing these subluxations would be essential for our chiropractic treatment of the patient. Along these lines, analyzing the upper cervical complex to make sure no significant subluxations are still present altering endocrine functions would be recommended also.

References:

1) Buha, Aleksandra. "Polycyclic Aromatic Hydrocarbons." *Toxipedia*. 9 May 2011. Web. 13 June 2015. http://www.toxipedia.org/display/toxipedia/Polycyclic+Aromatic+Hydrocarbons

2) Hyunok, Choi et al. "Polycyclic Aromatic Hydrocarbons". *NCBI*. Web. 13 June 2015. http://www.ncbi.nlm.nih.gov/books/NBK138709/

3) Gorman-McAdams, Mary. "The Truth About Sulfites in Wines". *The Kitchn*. 5 April 2015. Web 13 June 2015. http://www.thekitchn.com/the-truth-about-sulfites-in-wine-myths-of-red-wine-headaches-100878

4) Roerig JL, Steffen KJ, et al. "Laxative Abuse: epidemiology, diagnosis and management." *NCBI*. Web 13 June 2015. http://www.ncbi.nlm.nih.gov/pubmed/20687617

5) Kroll, David. “The True Significance of Flibanserin’s ‘Modest’ Boost To Female Sexual Desire.” *Forbes.* 14 June 2015. Web 15 June 2015. http://www.forbes.com/sites/davidkroll/2015/06/14/the-true-significance-of-flibanserins-modest-boost-to-female-sexual-desire/