Andrew Shepherd-66168

Toxicology Final
6/15/15

A:
According to the class notes, polycyclic aromatic hydrocarbons (PAHs) are formed from partial combustion of coal, oil, gas, garbage, other organic substances, they can be found in soil, crude oil, coal, creosote and road and roofing tar. You are probably most likely to get exposed to PAH's through vehicle exhaust, coal ash, wildfires, agricultural filed burns, hazardous waste sites, and foods particularly meat that is cooked at very high temperatures that causes charring. They typically occur as mixtures of two or more PAH's and overall there are more than 100 PAH's.

PAH's are highly lipophilic and is absorbed in the lungs, respiratory tract, skin as well as the GI tract from contaminated food and water. It is distributed and detected in all internal organs. Adipose tissue and the GI tract show highest accumulation. It is metabolized by the cytochrome p450 oxidase system where the CYP1 family is associated with metabolic activation of pro carcinogens. The PAH's conjugated metabolites are excreted by both billary-fecal and urinary excretion. With urinary excretion glutathione conjugates are converted to mercapturic acid and then excreted in urine.

Metabolites of PAH's may be more reactive and alkylation appears to increase carcinogenesis. Some of the effects are tumors in the lungs or bladder, stomach cancer and irritation of the skin on the face or scrotum.

14

B:
Yellow #5 Dye- This dye was found to contain carcinogenic contaminants and cause allergic reactions. There were no studies linking yellow #5 to cancer or tumor growth but 6 out of 11 studies gene toxicity and hyperactivity in children. Yellow #5 is the second most commonly used dye in the United States. It is commonly found in packaged snacks like chips, crackers, cheese flavored items, sweets, cereals, and a variety of breakfast products (1).
Yellow #6 Dye- This dye was also found to contain carcinogenic contaminants and cause allergic reactions. Studies in rats also showed a possible increase in adrenal and testicular tumors in those rats that consumed yellow #6 dye (1).

You can use safe and healthy alternative yellow food dyes. Some great foods that you can use for natural yellow food coloring include turmeric powder, yellow carrots, lemon zest, saffron, and bee pollen. Each one of these natural food may be a little more expensive to buy and take a little longer to prepare but the benefits are priceless. Turmeric is great food fighting inflammation, carrots are great for your vision, and bee pollen is great for your immune system, so use these natural alternatives and say no to buying unsafe and unnatural food dye.

15

1. http://cspinet.org/new/pdf/food-dyes-rainbow-of-risks.pdf

C:
Some common medications that the general public takes every day can alter food intake, cause complications with food intake, and alter the absorption, metabolism, and excretion of nutrients. Antacids are one of these commonly consumed medications. According to the class notes, antacids work by reducing the gastric acidity and lowering the absorption of Vitamin B12, Folate, and Iron.

If would first try to make a change in the patients diet and have them stay away from the foods that tend to give them problems. If this did not work and they insisted on taking the antacids I would have them take a Vitamin B12 supplement and have them increase there food intake of natural and healthy foods that were high in Iron and Folate.

I would have my patients eat a diet high in leafy green vegetables and consume brussel sprouts, avocados, asparagus, and broccoli as these all are good sources of folate and iron. Along with the B12 supplementation this change in diet could help counter the negative effects seen with antacid consumption. 15

E.

Sexual Dysfunction Therapy and Flibanserin

According to Sprout Pharmaceuticals Flibanserin Advisory Committee Briefing Document published on June 4, 2015, Flibanserin is a postsynaptic 5-HT1A agonist 5-HT2A antagonist developed as a novel, non-hormonal treatment for hypoactive sexual desire disorder (HSDD) in premenopausal women (1).

The document describes HSDD as the deficiency or absence of sexual fantasies and desire for sexual activity which causes marked distress or interpersonal difficulty, and is not better accounted for by another psychiatric disorder or due exclusively to the direct physiological effects of a substance or to the direct physiological effects of another medical condition.

The review committee also notes that CNS depression, presenting as sedation-related adverse effects (dizziness, somnolence, fatigue), is the hallmark adverse effect of Flibanserin and has been uniformly reported across the Flibanserin clinical development program.

Flibanserin has preferential affinity for serotonin 5-HT(1A), dopamine D(4k), and serotonin 5-HT(2A) receptors. According to a drug review from 2002 on the pharmacology of Flibanserin, Flibanserin reduces neuronal firing rate in cells of the dorsal raphe, hippocampus, and cortex with the CA1 region being the most sensitive in the brain. Flibanserin-induced reduction in firing rate in the cortex seems to be mediated through stimulation of postsynaptic 5-HT(1A) receptors, whereas the reduction of the number of active cells seems to be mediated through dopamine D(4) receptor stimulation. Flibanserin quickly desensitizes somatic 5-HT autoreceptors in the

dorsal raphe and enhances tonic activation of postsynaptic 5-HT(1A) receptors in the CA3 region. Flibanserin preferentially reduces synthesis and extracellular levels of 5-HT in the cortex, where it enhances extracellular levels of NE and DA. The review goes on to state that Flibanserin may induce some sedation but does not induce observable toxic effects at pharmacologically relevant doses (2).

There are some ways to naturally increase libido and sexual satisfaction naturally and this is what I would first want my patients to try if they were having issues. The first would be exercise as this can help to naturally boost testosterone and thus increase sexual desire. The next thing I would have my patient do is to try to increase their intake of natural foods known to increase libido. According to Margarita R. Ochoa-Maya, MD, CDE, these are some of the best foods to try (3). Increase avocado consumption to help increase testosterone production and regulate the thyroid gland. Increase almond and nut intake in general because there are a primary source of essential fatty acids and they provide us the raw material we need for healthy production of hormones. I would have my patients increase there soy intake because it is a natural phytoestrogen and may improve horomone levels leading to improved sexual desire and pleasure. Eggs are also good to eat in order to balance hormone levels. Lastly I would have my patient consume more Liver as it is a great source of glutamine and glutamine is known to enhance sex drive (3).

There are a number of other foods thought to increase libido like oysters, basil, salmon, and celery and I would have my patient try to switch to a diet high in these foods before they look to a pill for intervention.

I would also want to express the importance of getting adjusted and how regular chiropractic care can help improve libido. During my evaluation I would pay close attention to the lumbar spine and the nerves that innervate reproductive areas. Removing subluxations in these areas will allow the brain and body to communicate effectively and help increase libido naturally.

1. http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/DrugSafetyandRiskManagementAdvisoryCommittee/UCM449090.pdf

2. Borsini F1, Evans K, Jason K, Rohde F, Alexander B, Pollentier S. Pharmacology of Flibanserin. CNS Drug Rev. 2002 Summer;8(2):117-42. http://www.ncbi.nlm.nih.gov/pubmed/12177684.

3. http://www.freedomtoheal.org/2010/11/what-foods-and-supplements-help-libido.html

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME _____JENESSA DYKE_____

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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. **Pesticides—Insecticides: organophosphates**
   a. **Exposure**
      - Insecticides, pesticides, nerve gases, ophthalmic agents, antihelmintics, herbicides
      - One of the most common poisoning causes worldwide due to their common household use for pesticides, insecticides, and herbicides
      - spread agriculturally in fruits in vegetables, used to control insects in public spaces such as parks
   b. **Toxicokinetics**
      - Absorption: inhalation, ingestion, dermal absorption, injection, transplacentally
      - Distribution: stored in adipose tissue, may reach many different organs
      - Metabolism: metabolized into oxones and other inactive metabolites
      - Excretion: urinary, biliary/fecal, and milk in nursing mothers
   c. **Toxicodynamics**

- Acute toxicity: most impactful in fetuses and young children (still developing brain & nervous system) – delayed learning rates, reduced physical coordination, and increased probability of behavioral problems and/or ADHD
- Chronic Toxicity: impaired memory & concentration, irritability, confusion, headaches, slurred speech, disorientation, depression, delayed reaction, nightmares, sleepwalking, drowsiness or insomnia; possible flu-like condition with headache, nausea, weakness, loss of appetite & malaise
- Effects on Physiology: Inhibits acetylcholinestrase (AChE), which then accumulates acetylcholine (ACh) – this leads to overstimulation of muscarinic and nicotinic receptors
- Eliciting Pathologies: excess ACh in the body – extremely important neurotransmitter for brain and nerve development and function

Katz, Kenneth D., MD, FAAEM, ABMT. "Organophosphate Toxicity ." *Organophosphate Toxicity*. MedScape, 27 Jan. 2015. Web. 14 June 2015. <http://emedicine.medscape.com/article/167726-overview#a0104>.

Laborde, Amalia, MD. "Pesticides." *Pesticides*. World Health Organization, July 2008. Web. 14 June 2015. <http://www.who.int/ceh/capacity/Pesticides.pdf>.

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. Can wine be produced without using it? Are there alternatives?

a. Acute Toxicity: obstruction of airways, difficulty breathing, stomach pain, menstrual disorders, watery eyes, inhibition of thyroid function, loss of smell, headache, nausea, vomiting, fever, convulsions, and dizziness
b. Chronic Toxicity: chronic bronchitis, emphysema, respiratory illness, aggravation of existing heart disease, respiratory disease, decreased fertility,
c. Effects on Physiology: blocks nerve signals from pulmonary stretch receptors and negates the Hering-Breuer inflation reflex; regulates cardiac and blood vessel function; lowers rate of proliferation of endothelial smooth muscle
d. Eliciting Pathologies: can contribute to cardiovascular diseases such as arterial hypertension, atherosclerosis, pulmonary arterial hypertension, stenosis of the heart vessels
e. Wine production without SO2: Serves as an antibiotic and antioxidant, keeping wine from spoiling and oxidation; wine production without SO2 causes premature oxidation
f. Alternatives:
    - low electric current technology (LEC) – decreased survival time and increased death rates of apiculate yeasts; positive effect on grape juice fermentation
    - Dimethyl dicarbonate (DMDC) – effective against yeasts but not bacteria
    - lysozyme – effective against bacterial development
    - Ultrasound – high antiseptic and preservation effect
    - Ultraviolet radiation – inactivates yeasts & bacteria – more effective in whites than reds

- Pulsed electric fields – effective to destroy yeasts & bacteria

Alberto, Luiz. "The Use (or Not) of Sulfur Dioxide in Winemaking: Trick or Treat?" *The Wine Hub*. The Wine Hub, 9 Jan. 2013. Web. 14 June 2015. <http://thewinehub.com/home/2013/01/09/the-use-or-not-of-sulfur-dioxide-in-winemaking-trick-or-treat/>.

Lustrato, G., G. Alfano, C. Belli, L. Grazia, M. Iorizzo, and G. Ranalli. "Scaling-up in Industrial Winemaking Using Low Electric Current as an Alternative to Sulfur Dioxide Addition." *Journal of Applied Microbiology* 101.3 (2006): 682-90. *Wiley Online Library*. 12 June 2006. Web. 14 June 2015. <http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2672.2006.02931.x/abstract;jsessionid=72ABADEAD4119EB3A3BD2A827ACED811.f04t01>.

"Sulfur Dioxide." *Tox Town*. U.S. National Library of Medicine, 13 May 2015. Web. 14 June 2015. <http://toxtown.nlm.nih.gov/text_version/chemicals.php?id=29>.

Wang, Xin-Bao, Hong-Fang Jin, Chao-Shu Tang, and Jun-Bao Du. "The Biological Effect of Endogenous Sulfur Dioxide in the Cardiovascular System." *European Journal of Pharmacology* 670.1 (2011): 1-6. Print.

C. <u>Drug-Nutrient Interactions</u>. 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. Antacids

a. Affects on Diet/Nutrient Absorption:
- alkaline ions directly neutralize stomach acid
- can cause diarrhea, constipation, kidney stones, osteoporosis
- delays gastric emptying because there is less acid to break down foods
- temporarily eliminates symptoms, but in actuality stops breakdown of foods

b. Alternative Drugs/how to compensate
- apple cider vinegar
- yogurt
- ginger
- peppermint
- wheat grass
- aloe vera juice
- papaya
- pineapple

c. How to compensate:
- Calcium – 500-1,200 mg daily
- Vitamin B12 – 100-200 micrograms daily
- Folic acid – 400 micrograms daily
- Vitamin C – 500 mg daily

Young-Balch, Robin. "Antacid and Reflux Drugs and Their Natural Alternatives." *AARP Prescription for Drug Alternatives*. By James F. Balch and Mark Stengler. N.p.: John Wiley & Sons, 2012. 47-58. Print.

D. <u>Personal Care Products</u> . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Antiperspirants: aluminum chlorohydrate
   a. Acute Toxicity
      - none found
   b. Chronic Toxicity
      - Breast Cancer (with underarm shaving and antiperspirant/deodorant use)
      - Alzheimer's Dx (less than 1%)
      - Kidney Dx (in persons with 30% or less kidney function)
   c. Alternatives
      - Aluminum-free deodorant

15

Graves, Amy B., Emily White, Thomas D. Koepsell, Burton V. Reifler, Gerald Van Belle, and Eric B. Larson. "The Association between Aluminum-containing Products and Alzheimer's Disease." *Journal of Clinical Epidemiology* 43.1 (1990): 35-44. *Science Direct*. 25 June 2004. Web. 14 June 2015. <http://www.sciencedirect.com/science/article/pii/089543569090053R>.

Kalogria, Eleni, Athanasia Varvaresou, Spyridon Papageorgiou, Evaggelia Protopapa, Ioannis Tsaknis, Alexios Matikas, and Irene Panderi. "Pre-Column Derivatization HPLC Procedure for the Quantitation of Aluminium Chlorohydrate in Antiperspirant Creams Using Quercetin as Chromogenic Reagent." *Chromatographia*. Springer Berlin Heidelberg, 10 July 2014. Web. 14 June 2015. <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4177567/>.

McGrath, K. G. "An Earlier Age of Breast Cancer Diagnosis Related to More Frequent Use of Antiperspirants/deodorants and Underarm Shaving." *European Journal of Cancer Prevention* 12.6 (2003): 479-85. *Terra Naturals*. 30 July 2003. Web. 14 June 2015. <http://terranaturals.com/pdf/mcgrath_full.pdf>.

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME: Erick Dobrzynski

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)

Polyaromatic Hydrocarbons are found all around us. They are found in the air we breathe, the food that we eat and in the environment that we live in. Polyaromatic hydrocarbons are found on the tar for roads and people that work in this environment are at a risk of high levels of polyaromatic hydrocarbon exposure.

Polyaromatic hydrocarbons have a concentration in humans that is proportional to the exposure levels to that chemical. The most common way to become exposed is in the air we breathe and lifestyle like smoking or drinking. In order to eliminate the polyaromatic hydrocarbon it must first be oxidized through a reaction that involves NADH or NADPH. Once this oxidation occurs than the chemical is processed by the liver and kidneys and eliminated in feces and urine.

Short term exposure to polyaromatic hydrocarbons is typically found by inhalation or direct contact with the skin as seen with roofing or tarring. When the PAH's are combined with direct sunlight it can be an irritant on the skin and cause redness, blistering, and peeling.

Chronic Exposure to the polyaromatic hydrocarbons can lead to more serious illness such as cancer or organ failure. The organs that are more exposed are the lungs, those with large amounts of adipose tissue, or liver and kidneys which eliminate the toxicant. Organ failure is found with exposure to high levels of PAH's. Studies done on animals showed that exposure to Polyaromatic hydrocarbons can cause birth defects or other problems in unborn babies.

https://www.dhs.wisconsin.gov/chemical/pah.htm

http://www.crios.be/PAHs/toxicology.htm

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. Can wine be produced without using it? Are there are alternatives

Sulfur dioxide is a chemical that can be inhaled. It is also commonly found in foods and can be ingested. The molecular weight of sulfur dioxide is heavier than water and it can be encountered as a gas. People that inhale sulfur dioxide will experience a reaction with their mucus membranes in the throat. Long term exposure to high levels of sulfur dioxide can cause suffocation by blockage of the airways from the mucus production. 5 ppm and healthy will experience airway restriction, at 10 ppm coughing sneezing, and 20 ppm bronchospasm. If a healthy person is exposed to sulfur dioxide of 50-100 ppm for over 30 minutes they can die from airway obstruction.

Sulfur dioxide is not commonly found in foods because it is a gas at room temperature. However it is used as a preservative in wine. Healthy people may experience bronchospasm as a side effect of drinking wine that has sulfur dioxide in it. Sulfur dioxide turns into sulfurous acid when it reacts with the mucus membrane of the throat and gut. After ingestion it is processed and eliminated from the body by the liver and kidneys.

Chronic exposure to sulfur dioxide can lead to more serious conditions such as chronic bronchitis or a decrease in pulmonary function.

10

http://www.atsdr.cdc.gov/mmg/mmg.asp?id=249&tid=46

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. Antacids

Antacids are given to reduce GERD and inflammatory bowel pathologies in sick individuals. Unfortunately stomach acid is viewed as something that makes our lives miserable and doesn't allow us the luxury of eating the unhealthiest foods with no consequence. Antacids are proton pump inhibitors and they lead to a cascade of issues related to the stomach and the GI tract.

The problem with taking antacids to reduce heartburn is that the macronutrients will not be absorbed in the stomach. By lowering the acid concentration in the stomach, bacteria will begin to proliferate and can lead to more serious infections further along the GI tract. On top of that low acidity in the stomach will lead to undigested carbohydrates and protein, this will increase the gaseous production from the undigested macronutrients in the stomach and it puts a stress on the LES and pyloric sphincter. When these sphincters fail due to the prolonged stress GERD will occur along with undigested food particles, and bacteria that find their way into the small intestine

Lower stomach acid concentration will push undigested macronutrients into the small intenstine. Many of the digestive enzymes found in the duodenum need acidic chyme in order to become

active. This will further increase the change or proper nutrient absorption. People that take antacids for Heartburn will continue down a path of sickness and disease.

Healthy alternatives for antacid drugs are yogurt (with probiotics), ginger, peppermint. wheatgrass, aloe vera, papaya, pineapple, apple cider vinegar.

15

http://chriskresser.com/how-your-antacid-drug-is-making-you-sick-part-a/

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Antiperspirants: aluminum chlorohydrate

Aluminum is know to be a pro-oxidant. Using personal care products that contain high levels of aluminum will increased the oxidative stress load on the body. Breast cancer is one area where aluminum toxicity is being investigated. There is a correlation between anti-perspirant use and breast cancer levels that are diagnosed early. There is also a higher incidence of breast cancer near the axilla. There have been studies that have linked the incidence of anti-perspirant use to breast cancer nodes in areas that are higher and more later on the breast. This can be a direct result of the oxidative stress put on the lymphatic system from constant aluminum chorohydrate use to prevent underarm sweat.

Cancerous breast tissue has been shown to have higher amounts of aluminum which has an effect on estrogen receptors in breast tissue and the aluminum acts as a metalloestrogen. Further studies have shown that aluminum is not directly mutagenic but it induces a proliferative stress leading to higher rates of breast cancer in women.

Studies have also shown that anti-perspirant use with poor kidney function can lead to Alzheimer's disease or fatal encephalopathy.

12

http://www.sciencedirect.com/science/article/pii/S0946672X13002034

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME _____fatemeh masoodi 71951_____

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1. Polyaromatic hydrocarbons (PAHs)

2. Pesticides—Insecticides: organophosphates

3. Polychlorinated Biphenyls (PCBs)

Because of the lower vapour pressure PCB first stores in the hydrosphere in the natural part of soil.in the oceans the large and huge amounts of water is capabale of dissolving the considerable amounts of PBC. Also some amounts of PBC seen in atmosphere that

in rural area it is really not a lot and not considerable to big cities.]
where they can get to 1 ng/m3 or more.in milvaki this amounts is reelly more to 1.9 and this source alone was just estimated to account for 120 kg/year of PCBs enter into Michigan lake. Some places in united staes you can find in the house large amount more than amounts consider from EPA. “Volatilization of PCBs in soil was thought to be the primary source of PCBs in the atmosphere, but recent research suggests ventilation of PCB-contaminated indoor air from buildings is the primary source of PCB contamination in the atmosphere”.
In the air and athmospher PBC can change to some hydroxyl radicals. But in the biosphere the PBC can change to bacteria or eukaryotes but if we want to see how fast is the reaction it depends on number and disposition of the chlorine atomes in the molcules.

8

B. Food Toxicants.

1. Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies

2. Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives
These days adding so2 or sulfate dioxide in mine making job is really acceptable.so2 is famous for food additive 220or202.it has really simple chemical structure and naturally it can produce in wine but really in low amounts during the alchoholic fermentation. But most so2 add to wine by wine maker factory or people.mostly it is added for making white wine and has less usage for red wine.so2 can add as powder or gas to wine bottle. So2 can really cause sever allergic affect in some people.

   “So why do winemakers use it? Put simply, it is very difficult to make wines that have an aging potential beyond a few months if sulfur dioxide is not used during winemaking. A big statement but true.”so2 has 2 role first this chemical substance is antimicrobial and second it is antioxidant as well too. protection the wine's fruit integrity and protecting it against browning. Despite its chemical easiness, SO2 can have a few different shape in a wine. One form is called 'molecular SO2'. When in this form, it is around 500 times more effectual in killing wine microbes than when in any of the other forms that it can take. Luckily for us, the desirable yeasts that undertake wine fermentation are more strong to SO2 than most of the waste yeasts.When dissolved in wine, SO2 can also happen in what is called an ionised form. This form has the greatest antioxidant consequence. In actuality, SO2 isn't that strong to react directly with oxygen, but it does readily combine with other oxidising agents that are formed in the presence of oxygen. In combination with molecular SO2 which plays a further role of 'knocking out' the naturally occurring enzymes in grapes that cause wines

to brown (called polyphenoloxidases), SO2 is a powerful force in keeping wines fresher longer.

3. Food Coloring Dyes. FD&C Blue No. 1, Red No. 40, Yellow No. 5, and Yellow No. 6 are common additives to food. Pick TWO of these and discuss what is known about the effect on health and name one alternative to using the dye, comparing financial costs and effect on health.

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

B. Laxatives

This material is mostly increase movement for gi track and then decrease the time for absorption the material , if we use a lot of amounts of this subctance we mostley depleted from all vitamins and minerals that is needed for the bodies function . and also we will loose alarge amounts of water as well that can ciuse to dehydration in body.

Water: Water is the most overlooked laxative. It softens stools and prevents dehydration
Prunes: purple and sweetened fruits that are high in potassium and vitamin A. They are often seen as a home remedy for constipation
Coconut water: Coconut water is similar to tree sap. It is sweet with increasing semen and promotes digestion and the clearing of the urinary path. Additionally research has found coconut water to have a positive effect on cholesterol.

C. Antacids

Antacids make neutralize for stomach acid, and they are acid blockers deacrease stomach acid creation. use of these drugs for long times may cause to certain nutrient deficiencies. This is because stomach acid is important in the digestion and/or absorption of nutrients. Older people the produce very few amounts of stomach acid, which leads to low absorption of vitamin B12. normal usage of antacids or acid blockers reduce and decrease B12 absorption even more. Vitamin B12 supplements may be needed in this situation.Antacids reduce a lot of stomach acidity and may conflicet with iron, folate and vitamin B12 absorption

D. Anticonvulsants

A. Anticonvulsant drugs can help control seizures. Phenytoin (Dilantin), phenobarbital and primidone may lead to diarrhea and a reducing the appetite. This can really reduce the amounts that is available of many nutrients. These drugs also increase the use of vitamin D in the body. This means that not enough vitamin D is available for important functions such as calcium absorption. Vitamin D supplements may be really needed in this situation. Some anticonvulsants also has conflict with the B vitamin

folic acid. When drug therapy is starting, folic acid degree in the body decrease. Because folic acid supplements affect blood levels of the drug, folate supplementation must be supervised by a doctor.Some anticonvulsants can decrease folate absorption. Folate deficiency can result in megaloblastic anemia.

You can do either D or E below

B. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Lipstick: lead acetate

lead is a chemical substances that usually aim for nervous system , brain and kidney and reproductive organ,it can have affection of low doses as well ,mostly can affect the brain iq and damage and dermatome problem like rashes and allergies and for high dosage can cause cancer too. in reproductive system can cause fertility problem and miscarriage . large doses are really dangerous because can cause several sever problem for brain and serious cancer and kidney damage and fertility and spontaneous abortion .during pregnancy it has very dangerous effect for fetus and can cross placenta and can lead to impaired brain damage ,premature birth small baby and growth problem. By decreasing and check your exposure to lead now, you can decrease its bioaccumulation in your body, and protect your future infant. According to the CDC, no safe blood lead level in children has been identified. The CDC recommends eliminating lead in children's environment before they are exposed. our question here is about pretense of lead in cosmetics. this material in low does you can mostly every where , we try to see the affection of this chemical on our body for lipstick which is a product that aim for topical use with limited absorption and it is only ingested in few amounts and very low dosage and we do not need to be worried for the softly use of lipstick and also it is under the authorities of public health in united sates to check the amounts of lead in lipstick.

11

2. Antiperspirants: aluminum chlorohydrate

3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

C. 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
(b) Discuss alternative therapies, including those in chiropractic medicine

Jereme Sommers
Toxicology Final
6/15/15

1. PCBs are man-made chemicals that are found in electrical equipment, surface coatings, inks, adhesives, flame-retardants, and paints. They are released into the environment when stored in landfills or incinerated. PCBs are made of carbon, hydrogen and chlorine atoms. There are 209 different PCBs, all of which are man-made. Possible exposure to humans is food, air and drinking water.
   After entering the body, PCBs move into the cell membranes and into the blood and lymphatic vessels. They will usually concentrate in the liver, fatty tissue, brain and skin. Exposure to one large dose of PCBs can cause diarrhea, breathing difficulties, dehydration, decreased response to pain, and coma. PCBs were found to mainly damage the lungs, the stomach, and the pancreas. Lower doses of PCBs administered over a period of time can interfere with liver and thyroid function, and may, in the long term, lead to liver cancer. Effects on fertility, reproductive organs, and female hormonal activity have also been seen in test animals exposed for a long time to high doses of PCBs through their food. The offspring of animals fed PCBs during pregnancy and during breast-feeding may also be affected and many have shown learning and behavioral difficulties. In the young, development of the immune system and certain organs such as the liver, thyroid and kidney have also been affected by exposure to PCBs. Observed effects of PCBs on the immune system included a lesser production of antibodies, an increased susceptibility to disease, and decreased weight of the thymus gland. Adult animals appear to be less sensitive than the fetus to the effects of PCBs. 12

2. Most concern for exposure to sulfur dioxide is in gas form. It is a respiratory irritant and can be dangerous to life at levels of 100ppm or more. In wine it is regulated at "safe" levels but still poses a risk to workers who make wine as they may be exposed to the gas during the fermentation process. Sulfur dioxide is important to wine makers as an antimicrobial and an antioxidant. The overall focus of the wine industry concerning sulfur dioxide safety is in using less. During the crushing process, some winemakers are using lysozyme to kill bacteria which makes the use of sulfur dioxide less.

   Sulfur dioxide free wine is possible with healthy fruit, scrupulous cleanliness and perhaps some tolerance for elevated vinegar. These wines may not be as tolerant to shipping worldwide or long-term storage. There are wineries that already employ this practice and are very successful. 14

3. Antacids – A specific type of antacid called a proton pump inhibitor can cause a vitamin B12 deficiency. The cells in the stomach that produce acid are also responsible for the production of intrinsic factor. This intrinsic factor is essential for the absorption of vitamin B12. Without vitamin B12 you may become anemic and lose nervous system

function as it is essential for the production of myelin sheathing of neuronal axons. The conventional wisdom that acid reflux is caused by excess production of stomach acid has been proven false. Dietary changes are advised if you have heartburn. You can also use natural foods like aloe juice to improve stomach function and nutrient absorption. If you must take an antacid you can switch to one that is not a proton pump inhibitor. 14

4. Aluminum chlorohydrate – This is one of the main active ingredients in antiperspirants. The FDA considers it safe and is permitted in concentrations up to 25%. Some studies have indicated that it can be absorbed transdermally and enter the brain. This is believed to contribute to Alzheimer's disease. There are natural alternatives to underarm antiperspirants and it seems a few people at Life West are dedicated to using them. Lets just say that the natural alternative is to just get used to the smell because none of them seem to work very well. 15

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Widely Used Antacids Can Cause Vitamin B12 Deficiency. (n.d.). Retrieved from http://articles.mercola.com/sites/articles/archive/2014/02/05/antacids-vitamin-b12-deficiency.aspx

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME _____Jessica Cheung_____

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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)

2. Pesticides—Insecticides: organophosphates 15

Exposure: Organophosphates are found in common pesticides that are very effective and have a minimal environmental impact. However, it is a deadly neurotoxin to humans. It is more regulated in the United States than other parts of the word such as India, where it is common to find cases of death due to organophosphate poisoning. In the US, farmers make sure the small amounts that are on the crops do not surpass safe levels whereas in Indian, they do not and have the risk of poisoning when ingesting the crops.

Toxicokinetics: It is absorbed mainly through oral intake (usually on food), but can be transdermal and through inhalation as well. Time is usually less than 4 hours depending on the exact type of organophosphate. Since certain types are lipid soluble, this is how it can cause chronic effects by building up in the adipose tissue in the body. Total time for elimination depends on if it is lipid soluble, how quickly it acts on acetylecholinesterase, and whether or not it needs to be metabolized before it can be eliminated. Certain forms of organophosphates require cytochrome P450 to form the active oxon in order to be eliminated while other do not. In the end, most forms as metabolized as serum esterases and are eliminated by the kidneys.

Toxicodynamics: Organophosphates are highly toxic to humans as it is a nerve agent by inhibiting acetylcholinesterase. In acute toxicity, it causes acetylcholine to accumulate in the central and peripheral nervous system. Symptoms include weakness or paralysis, altered mental status, diarrhea, vomiting, sweating and could lead to respiratory arrest due to weakness/paralysis of muscles. Since it affects the nervous system, there is a long list of possible signs and symptoms that will present with toxicity. If acute poisoning occurs, one needs to get to the hospital in the intensive care unit to be observed for at least 12 hours. The drug, Pralidoxime, is used to treat nerve agent poisoning.

Chronic toxic effects will be similar to the acute symptoms, just in a delayed timeline if someone is consistently exposed to low level doses. Some symptoms will include memory loss and impaired cognitive function, delayed reaction times, insomnia, and death, just to name a few.

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"Nerve Agent and Organophosphate Pesticide Poisoning." *CDC*. Centers for Disease Control and Prevention, n.d. Web. 14 June 2015.

"Parathion". *Pesticide Information Profiles*. Extension Toxicology Network. Sep 1993. Web. 14 June 2015.

B. Food Toxicants.

1. Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies

2-Amino-3methylimidazo[4,5-*f*]quinoline, which is abbreviated at IQ, is a compound in this class. It is formed in cooking when foods are smoked or burned at high temperatures of 125 – 300°C. When the creatine, amino acids and monosaccharaides heated together, IQ is formed within minutes. Factors that determine how much IQ is formed depends on temperature, what is cooked, degree of browning, and length of cooking time. Most common source of exposure if ground beef as it is common at all fast food chains. Other common sources include chicken and fish which have higher concentration of HCAs compared to pork. Interestingly, one studied by Knize and Kelton showed that by flipping beef patties every minute reduced the formations of HCA since each side is exposed for a shorter time, reducing the amount of charring that occurs.

There is not enough evidence that indicate that chronic toxicity of specifically IQ causes carcinogenic effects because most studies link fried foods. However, in animal studies, there is sufficient evidence that IQ causes both benign and malignant tumor formation in rats after long term exposure to IQ. Specifically, colon and mammillary glands were affected in rats after long term exposure. The rats' offspring also had a higher change of development adenocarcinomas as it is transferred in the milk. Even though there are no specific studies of the long term effects of IQ on humans, what happens in rats may also apply to humans as well.

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Knize, Mark G., and James S. Felton. "Formation and Human Risk of Carcinogenic Heterocyclic Amines Formed from Natural Precursors in Meat." *Nutrition Reviews* 63.5 (2005): 158-65. Web. 14 June 2015.

Skog, K.I, M.A.E Johansson, and M.I Jägerstad. "Carcinogenic Heterocyclic Amines in Model Systems and Cooked Foods: A Review on Formation, Occurrence and Intake." *Food and Chemical Toxicology* 36.9-10 (1998): 879-96. Web. 14 June 2015.

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

The exact mechanism of laxatives are unknown. There are 4 common types which include bulk forming laxatives, saline and osmotic laxatives, stimulant laxatives and stool softeners. They work by changing osmotic effects and the release of extracellular regulators of the GI tract membrane. Some laxatives increase NO synthase and platelet-activating factor (PAF) in the gut. Laxatives affect diet absorption by accelerating the rate of which nutrients travel though the gastrointestinal tract which may impair absorption of all nutrients including lipids, carbohydrates and protein. However, in one study, the laxative, polyethylene glycol (PEG), showed that lipid absorption in the intestines were not impaired in rats. The laxative itself is minimally absorbed so it is considered safe to use during pregnancy.

An alternative to using laxatives can be to eat more insoluble and soluble fiber foods to help GI motility, keep your body hydrated and to increase movement such as going for walks. All these can help the GI tract function better and help intestinal motility in healthy individuals without the use of laxatives.

Those who use laxatives should compensate for the effect by consuming for electrolytes as the increased GI motility may cause an electrolyte imbalance. Another factor to consider is hydration levels while consuming laxative as both solid and liquids move faster through the system which may result in dehydration.

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2. Antacids

3. Anticonvulsants

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Lipstick: lead acetate

2. Antiperspirants: aluminum chlorohydrate

Aluminum chlorohydrate is the most common active ingredient in antiperspirants. The aluminum acts as a plug on the sweat ducts to temporarily prevent sweat to come to the surface of the skin. However, there are many risks associated with that.

Acute toxicity: Most people can use antiperspirants with this compound without any harmful effects on the skin. However for some, it may cause irritation to the skin, eyes and respiratory system. It also may be harmful if swallowed. The oral toxicity is low to moderate with LD50 range of 162 – 750 mg of Al/kg body weight. There are very few studies that explore the effect of aluminum chlorohydrate so the effects are largely unknown.

Chronic toxicity: In long term exposure to the skin, it may be harm to people with kidney disorders as they are not able to eliminate it from their system as efficiently. There are a few questions that show a link below the use of underarm, antiperspirants and breast cancer. One study (Mannello et al., 2009) suggested that breast cysts could form is enough aluminum is absorbed through the skin into the breast tissue over the long-term. At this point, there is not enough information to suggest there is a causal relationship, only a correlation.

Alternatives: There are many alternatives to antiperspirants with aluminum in it. Look for ones that are aluminum free or choose use deodorant instead so that your sweat ducts can be free, but you can still control the body odor. Some options include large crystals made from potassium aluminum sulfate that is wetted and applied to the underarm, corn starch and baking soda, and lemon juice. The large crystal, even though it as aluminum, the molecules are too large to be absorbed which is why it is a safer option.

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Joe Botkin
Toxicology
15 June 2015

Toxicology Final

A. Environmental Toxicants

DEET – (N,N-Diethyl-meta-toluamide) It is the most common active ingredient in insect repellents. It is intended to be applied to the skin or to clothing, and provides protection against mosquitos, ticks, fleas, chiggers, leeches, and many other biting insects.

- Absorption - Studies have found that the dermal absorption of DEET in intact human adult skin is between 5% and 17% of the applied dose.
- Distribution - Studies determined the effects of he insect repellent in male and pregnant mice. After the dose was given via injection, high tissue concentrations of DEET were found in the liver, kidney, lacrimal gland and nasal mucosa.
- Metabolism - One pathway involves oxidative hydroxylation of the aromatic methyl group in the meta position, yielding N,N-diethyl-m-hydroxymethylbenzamide. The second pathway involves dealkylation of an N-ethyl group, producing N-ethyl-m-toluamide. Subsequent oxidation or hydroxylation can then yield additional metabolites.
- Excretion - Excretion studies using radiolabeled DEET in humans showed that 3.8% to 8.33% of the applied dose of DEET is recovered form the urine. The majority of the applied radioactivity was recovered in skin rinses.

12

Reference:
ATSDR. Agency for Toxic Substances and Disease Registry, 14 Aug. 2008. Web. 14 June 2015. <http://www.atsdr.cdc.gov/consultations/deet/index.html>.

B. Food Toxicants

HCAs are chemicals formed when muscle meat, including beef, pork, fish, or poultry, is cooked using high-temperature methods, such as pan frying or grilling directly over an open flame. MeIQx (2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline) is a type of HCA that is oxidized to hydroxyamino derivatives by cytochrome P450s, and further converted to ester forms by acetyltransferase and sulfotransferase. Eventually, they produce DNA adducts through the formation of N-C bonds at guanine bases and can lead to DNA damage and mutations.

High intake of HCAs, particularly red and processed meat cooked at high temperatures, has been associated with an increased risk of a number of common cancers,

such as cancers of the breast, colorectum, pancreatic and prostate. MeIQx has been found to be carcinogenic in both mice and rats. In the mouse, MeIQx induces liver and lung tumors, lymphomas, and leukemias, whereas in the rat it causes tumors in the liver, the skin, the zymbal gland, and the clitoral gland.

Reference:
Gooderham, Nigel J., et al. "Food-derived heterocyclic amine mutagens: variable metabolism and significance to humans." *Drug Metabolism and Disposition* 29.4 (2001): 529-534.

C. Drug-Nutrient Interactions

Stomach acid is very important to maintain a balance in the healthy digestion of food and nutrients. The breakdown and absorption of nutrients occurs at an optimum rate only within a narrow range of acidity in the stomach. If there isn't enough acid, the normal chemical reactions required to absorb nutrients is impaired. Over time this can lead to diseases such as anemia, osteoporosis, cardiovascular disease, depression, and more.

When food is eaten, the secretion of stomach acid triggers the production of pepsin. Pepsin is the enzyme required to digest protein. If stomach acid levels are depressed, so are pepsin levels. As a result, proteins don't get broken down into their component amino acids and peptides. This can lead to a deficiency of essential amino acids, which in turn may lead to chronic depression, anxiety and insomnia. As acid declines and the pH of the stomach increases, absorption of nutrients becomes impaired. Having low stomach acid, whether it occurs on its own or as a result of using antacid drugs, reduces absorption of several key nutrients such as iron, B12, folate, calcium and zinc.

An alternative to antacids is to try using apple cider vinegar. The slightly lower pH of the vinegar will slightly reduce the pH of the stomach acid. This will allow the stomach acid to still break down the food, but will have fewer complications since the pH will be lower. Take a tablespoon of apple cider vinegar, and chase it with a glass of water. Stomach churning and pain should subside within minutes, unless the problem is ulcers. Another alternative to antacids would be to exercise more frequently and lose weight. This has been shown to improve symptoms that people normally take antacids for in the first place such as heartburn and indigestion.

Reference:
Antacids. International Foundation for Functional Gastrointestinal Disorders, 12 Sept. 2014. Web. 14 June 2015. <http://www.iffgd.org/site/manage-your-health/diet-treatments/antacids>.

D. Personal Care Products

Aluminum chlorohydrate is the active ingredient in many anti-perspirant deodorants. The average concentration is 10-25% and works by having the aluminum ions pass into cells in the top layer of the skin which lines sweat gland ducts and water passes in with them. This causes the cells to swell, squeezing the ducts closed so that the sweat cannot get out.

Because aluminum compounds in antiperspirants create a chemical reaction with your sweat and clumping to clog your sweat glands, it may cause irritation in sensitive underarm areas. This may result in allergic reactions like contact dermatitis, acne or itching. Some research has suggested that these aluminum compounds may be absorbed by the skin and cause changes in estrogen receptors of breast cells. Because estrogen can promote the growth of both cancer and non-cancer breast cells, some scientists have suggested that using the aluminum-based compounds in antiperspirants may be a risk factor for the development of breast cancer. Aluminum toxicity may also lead to nerve damage, kidney damage and osteomalacia, and has been linked to increased instances of Alzheimer's.

Alternatives to using aluminum anti-perspirant deodorants would be to look for deodorants that do not contain any aluminum compounds. Some companies that advertise that they are aluminum free are Nature's Gate and Tom's of Maine products.

Reference:

"Antiperspirants and Breast Cancer Risk." *Antiperspirants and Breast Cancer Risk*. American Cancer Society, 14 Oct. 2014. Web. 14 June 2015. <http://www.cancer.org/cancer/cancercauses/othercarcinogens/athome/antiperspirants-and-breast-cancer-risk>.

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME Justine Bellefeuille

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A. Environmental Toxicants. Pesticides-Insecticides: organophosphates

These are found worldwide and inhibit acetylcholinesterase which leads to accumulation of excess acetylcholine. Very common in US as agricultural insecticide. These are used to kill pests or things that society deems harmful. Several of these are nerve agents that the military created. Some examples of agents are: Carbochol, neostigmine and echothiophate. Echothiophate covalently binds with the phosphate group to the active site of ACHE. Making the enzyme permanently inactive. The new phosphorylated enzyme releases an ethyl group which makes it so that chemical re-activators cannot break this bond. It is typically used as a topical for open-angle glaucoma but can cause cataracts. Toxicity signs show up as muscarinic and nicotinic symptoms. (lippincott)

13

B. Food Toxicants: Sulfur dioxide (SO_2)

"At room temperature, sulfur dioxide is a nonflammable, colorless gas with a very strong, pungent odor...It is handled and transported as a liquefied compressed gas. It easily dissolves in water...Although sulfur dioxide does not burn in air, cylinders of compressed liquid can explode in the heat of a fire." Asthmatics can get bronchospasm from ingesting this toxicant found in the wine. "Chronic exposure can result in an altered sense of smell (including increased tolerance to low levels of sulfur dioxide), increased susceptibility to respiratory infections, symptoms of chronic bronchitis, and accelerated decline in pulmonary function. Chronic exposure may be more serious for children because of their potential longer life span." (ASTDR). High doses in wine can lead to severe hangovers. There is such a potent smell that will alter the taste of the wine. There are many effects that this compound has on wine according to Radikon:" 1)Antiseptic effect: the main two antiseptic effects of sulphur dioxide are the selection on must microflora and the antimicrobial action for wines preservation.

2)Antioxidant effect: sulphur dioxide compounds catalizators with dissolved oxygen: this reaction protects wine from chemical oxidations as e.g. some polyphenols or some aromatic essences oxidation.
3)Antioxidasic effect: sulphur dioxide inhibits the action of oxidase enzymes in the must and sometimes totally destroys them. Must is therefore protected from prefermentative oxidations.
4) Solubilisation: sulphur dioxide, coming in contact with grape skins, helps along the diffusion of less polymerized colouring substances from the cells through little holes on the cell walls. In so doing, it also helps the anthocyans outflow.
5)Mixer: a wise use of SO_2 improves wine fragrance and taste, because this preservative combines with some substances with unpleasant smell or taste, as acetaldehyde or pyruvic acid, that are no longer perceivable on taste.
6)Clarifier: SO_2 finally has a bland clarifying action, because it helps along coagulation of colloidal substances and increases the spontaneous fall of the wine bottoms."

Red wines do not need any added because they have their own anti-oxidants. White wines have high doses added because the skin are not used with fermentation and so there is not anti-oxidant heavy properties. Some wines have already stopped using sulfur dioxide "when grapes are healthy, and in particular thanks to extraction or use of natural antioxidants as e.g. oak tannins, ellegic tannins from grape skins, proanthocyanidins from grape seeds and ascorbic acid (Vitamin C)" (radikon).

15

C. Drug-Nutrient Interactions.

Antacids, weak base that will react with gastric acid and forms salt and water. End result will decrease gastric acid. Pepsin in inactive with pH over 4 therefore it will decrease overall pepsin activity. There is a wide variety between different antacids. How it is digested is controlled heavily by the stomach being empty or full. Food will delay the stomach digestion giving the antacid more time for reaction to occur. Combinations of aluminum and magnesium are common. Along with sodium bicarbonate which will react with HCL is also common. This converts into carbon dioxide and calcium chloride. Metabolic alkalosis can occur with too much sodium bicarbonate. These should not be used long term. These are used to relief of GERD symptoms and peptic ulcer diseases. Common side effects include: diarrhea, constipation, hypophosphatemia, flatulence, belching and occasionally renal impairment. (lippincott)

12

D. Personal Care Products .

BeyondPesticides

Gillette® Complete Skin Care MultiGel Aerosol Shave Gel contains Triclosan. Triclosan is a "synthetic, broad-spectrum antimicrobial agent." "Triclosan is lipophilic, so it can bioaccumulate in fatty tissues." In regards to acute toxicity "there have been reports of contact dermatitis, or skin irritation, from exposure to triclosan. There is also evidence that triclosan may cause photoallergic contact dermatitis (PACD), which occurs when the part of the skin exposed to triclosan is also exposed to sunlight. PACD can cause an eczematous rash, usually on the face, neck, the back of the hands, and on the sun-exposed areas of the arms." There are cases of immunotoxic and neurotoxic reactions.
Chronic toxicity of this product is not fully known. There are "Concerns over triclosan interfering with the body's thyroid hormone metabolism led to a study that found that triclosan had a marked hypothermic effect, lowering the body temperature, and overall causing a "nonspecific depressant effect on the central nervous system" of mice." Its most common health and environmental effects include: skin irritation, allergy susceptibility, bacteria and antibiotic resistance, dioxin contamination of aquatic ecosystems. Dioxin is carcinogenic and shown to cause decreased immune function, fertility, miscarriage and birth defects along with cancer. Study found that in water, triclosan can be converted into dioxin. The dermal LD50 for rats is 5000 mg/kg. The oral LD50 for rats is 4500-5000 mg/kg, for mice it is 4000 mg/kg, and for dogs it is over 5000 mg/kg.22.

European countries are trying to warn population against using antibacterial hygiene products and household antibacterials for domestic everyday use. They are unnecessary and increase the likelihood of antibiotic resistance spreading. Hospitals and health care facilities and individuals with weakened immune systems. Using regular soaps are more than sufficient for bathing and shaving with.

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME ___**Steven Keener**_____

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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)

2. Pesticides—Insecticides: organophosphates

3. **Polychlorinated Biphenyls (PCBs)**

Answer A3-

Polychlorinated Biphenyls (PCBs) are a group of manmade chemicals first manufactured in the U.S. in the late 1920's. PCBs are used in various products, including but not limited to: electrical equipment, surface coatings, inks, adhesives, flame-retardants and paints.[1] Since developing an understanding of the dangers PCBs have on the environment and to humans and animals, they have largely been banned around the globe. However, about 10% of all PCBs manufactured since 1929 still remain in the environment today. Humans are largely exposed to

PCBs through consumption of foods and liquids in plastic containers that are heated and subsequently released and consumed.

The toxicokinetics of PCBs are vast and well researched. Toxicokinetics includes Absorption, Distribution, Metabolism and Excretion.

PCBs are absorbed through various routes, but most commonly through oral, inhalation, and transdermal. Inhalation exposure is largely responsible for occupational exposures to PCBs. Oral exposure is predominately the route, this occurs when plastic containers are heated and the PCBs are released from the plastic. Transdermal exposure is not of huge concern, but does tend to occur in the adipose tissue of manufacturer workers.

Studies pertaining to the distribution of PCBs in humans largely come from exposure to humans through occupational and manufacturers workshops. Initially PCBs are taken up by the liver and muscle due to the high blood perfusion rates. Highly chlorinated congeners are metabolized very slowly and thus stored in adipose tissue. PCBs have also been found in high concentrations of glandular tissues, including ovaries and breast milk. This is thought to be largely due to the increased fat content of these body parts.

The metabolized half-life of PCBs depends largely on the ability of the body to break it down. This is because the metabolism of PCBs is the rate limiting step in the elimination of toxic compounds. As a rule of thumb, PCBs with more than five chlorines are less susceptible to hydroxylation and therefore show the longest half-lives.

The absorbed PCBs can either be excreted or retained in adipose tissue, skin, specific tissue (organs such as the liver, kidney, muscle, adrenal, lungs, or spleen) on a lipid basis, or in body fluids. PCBs are broken down into polar compounds that can then be excreted from the tissues. Elimination is achieved via biphasic elimination commonly. The initial half life is short, but the subsequent half-life is long and structure dependent.

The toxicodynamics of PCBs are a bit more straight-forward, I believe. They seem to be much less potent when compared with dioxins and furans, often times by a factor of 10,000 or 100,000.[2] As mentioned previously, the higher chlorine content, the higher the toxicity to animals. “Coplanar” PCBs are associated with higher “TCDD-like” toxicity (hence the comparison to the furans and dioxins). Studies including animal models showed various forms of toxicity, including: hepatotoxicity, neuropathy, reproductive abnormalities, decreased antibody response, certain cancers, xenoestrogen effects. Studies including human and primate models include the following toxicities: hepatotoxicity, otitis media, reproductive harms, neuro-developmental disorders.

B. Food Toxicants.

1. **Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies**

2. Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives

3. Food Coloring Dyes. FD&C Blue No. 1, Red No. 40, Yellow No. 5, and Yellow No. 6 are common additives to food. Pick TWO of these and discuss what is known about the effect on health and name one alternative to using the dye, comparing financial costs and effect on health.

Answer B1-

Heterocyclic Amines (HCAs) are chemicals formed when muscle meat, including beef, port, fish, or poultry, is cooked using high-temperature methods, including pan frying or grilling over an open flame. These chemicals include at least one heterocyclic ring. Pyrrolidine seems to be the most common and therefor more researched HCA.

HCAs form when amino acids and creatine react at high cooking temperatures. Sources of HCAs are the various meat products listed above cooked at a high charbroiling temperature.

Researchers have identified 17 different HCAs that are thought to likely be carcinogenic. 15 The long term exposure toxicity to HCAs appears to be largely cancer, though undescribed neurologic disorders also occur with chronic toxicity.[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

2. Antacids

3. Anticonvulsants

Answer C2-

Millions of Americans currently take antacids to compensate for the indigestion and associated acid reflux involved with unhealthy digestive systems.

Antacids are a type of drug known as Proton Pump Inhibitors (PPIs).[4] These drugs work by stopping the acid production from cell within the stomach, which can often aid in the acid reflux disease symptoms. Unfortunately, these cells that PPIs target are also responsible for producing Intrinsic Factor, which is necessary to absorb B12. Therefore, chronic use of PPIs can result in Vit B12 deficiencies. Vit B12 deficiencies result in neurologic disorder symptoms and is also very common in Vegans.

To help someone experiencing a Vit B12 deficiency secondary to medicating with a PPI, I would first aim to take them off of the PPI. Acid reflux can often times be treated with household items such as Aloe Vera or apple cider vinegar. It can also be treated by consuming

healthy, nutritious fruits and vegetables with high levels of fiber and complex nutrients. I could also supplement the patient with a B12 tablet and IF.

15

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Lipstick: lead acetate

2. **Antiperspirants: aluminum chlorohydrate**

3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

Answer D2-

Aluminum Chlorohydrate, an antiperspirant chemical used in the majority of over-the-counter underarm deodorant/antiperspirants, is classified by the FDA in its safest category (big surprise).[5] A variety of symptoms have been reported following both acute and chronic exposures to Aluminum Chlorohydrate in the form of deodorant.

Aluminum is naturally found in the Earth's crust and is relatively non-toxic in its natural form. In antiperspirants, however, the aluminum is ionized, and this creates certain problems regarding toxicity. These ionic aluminum compounds react with sweat and produce clumping, which is what actually blocks and clogs your sweat glands which produce the desired effect of "less sweat".[6]

The most common symptoms/reactions caused by acute toxicity/exposure are the following: rash/dermatitis, acne, and itching. These will typically clear up and resolve after stopping use of the product.

Long-term health risks are also possible. Certain cancers, such as breast cancer, Alzheimer's, and other nodular masses have been documented. These complications/chronic toxicities are also linked with Vitamin D and Calcium deficiencies.

Many, many websites offer recipes for making your own deodorant/antiperspirant using mainly household items. Many use essential oils and coconut oil, though there are many different recipes which have proven to be both safe and effective.

15

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
(b) Discuss alternative therapies, including those in chiropractic medicine

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME: Kevin Carey

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 classes 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

Polychlorinated Biphenyls (PCBs)

Polychlorinated Biphenyls (PCBs) are man-made organic chemicals classified as chlorinated hydrocarbons. PCBs are non-flammable and were used in industrial and commercial materials such as hydraulic and electrical equipment, and as plasticizers in paint, plastic, and rubber, just to name a few. PCB is no longer produced in the USA, but may still be present in electrical equipment, motor and hydraulic oils, fluorescent light ballasts, oil-based paint, fiberglass and plastics made pre-1979. PCBs used were chemical mixtures made up of individual chlorinated biphenyl components known as congeners. Today, the environment is littered with PCBs as they have leached into water from run-offs in landfills. PCBs don't break down, therefore they accumulate and can travel via water, soil and air. According to the United States Environment

Protection Agency (EPA), clear evidence shows that PCBs have toxic effects in animals. Systems affected by PCBs are the immune system, reproductive system, nervous system and endocrine system, just to name a few. The EPA states that through research, PCBs have been found to cause cancer in animals, and analysis suggests that PCBs are most likely human carcinogens as well (U.S. Environmental Protection Agency, 2013).

Main exposure routes in occupational/work settings are through inhalation and dermal contact, while most of the population is exposure via oral routes. Inhalation absorption data is unreliable and cannot sufficiently state absorption rates. Data suggesting inhalation absorption varies significantly, however, data summarized by Wolf (1985) suggests that up to 80% of levels seen in the adipose tissue of workers exposed to capacitors, was most likely caused by inhalation (Wolf, 1985). Dermal absorption is also a major way that BCPs accumulate in adipose tissue of these workers. Oral exposure through food consumption is postulated to be the most common route of exposure, with vegetables accounting for most lower chlorinated PCBs, with fish, dairy products, and meat contributing the higher chlorinated PCBs.

In the GI tract, PCBs are absorbed as congeners. Once absorbed into the bloodstream, they are transported via lipoproteins and then accumulate in tissues with high fat content, such as the liver, adipose, skin, and breast milk. Initially, the liver and muscles experience the highest levels of PCB uptake, due to the high blood perfusion in both areas. Absorbed PCBs are either excreted or stored in adipose tissue, skin, and other organs and bodily fluids. Usually, less chlorinated congeners are readily metabolized and excreted, whereas highly chlorinated congeners are metabolized slowly and are the ones that tend to accumulate. Breast milk is a mode of transmission of PCBs from mother to child. Metabolism of PCBs is the rate limiting step, therefore in order to eliminate PCBs, the liver must hydroxylate and conjugate PCBs with glucuronic acid and sulfates. Generally, PCB's with more than five chlorines and para-chlorine atoms are less susceptible to hydroxylation and have the longest half-lives. Conjugation increases water solubility of these compounds, which aids excretion in bile. Metabolites of all congeners are eliminated primarily through bile and feces. Only a small degree of elimination (<5%) can occur through urine for less chlorinated congeners (Schlummer, Moser, & McLachlan, 1998).

Skin conditions such as acne and rashes are the most common health effects that PCBs cause, as well as irritation of the respiratory tract, depression, fatigue, liver, thyroid, dermal, ocular, immunological, and neurodevelopmental effects. Additionally, reduced birth weight, reproductive toxicity, and cancer can be noted. Mechanisms of toxicity are complicated, but seem to involve what is known as an Ah receptor, with dependent and independent mechanisms. This Ah receptor is a ligand-activated transcription factor which regulates gene transcription, and when bound to PCBs, normal gene expression is halted. An example of this transcription block is the liver's production of UDP-glucuronyl transferase, which stimulates T4 elimination, therefore

depleting T4 hormone levels in the body. Also, additional research shows that independent and unknown factors cause hypothyroidism in humans; hypotheses suggest that this is due to the decreased secretion of adrenal steroids seen in animal studies (Guo, Yu, Hsu, et al., 1999). Human studies have shown increased volume and goiter risk in the Thyroid, increased liver T4 and T3 elimination and decreased circulating thyroid hormone levels of TSH, T4 and T3 with correlated PCB exposure (Langer, Tajtakova, Fofor et al., 1998). PCBs also exhibits estrogenic by inhibiting the metabolism of estradiol (Kester, Bulduk, Tibboel, et al., 2000). Anti-estrogenic effects seem mediated by PCBs that are Ah receptor agonists. In women, PCBs have shown association with menstrual irregularities, increased uterus size, reduced conception, and increased miscarriage (Gerhard, Daniel, and Link, 1998; Bae, Peters-Golden, and Loch-Caruso, 1999). Reproductive effects in men are unknown as research is scarce, but based on research in male laboratory animals; fertility will most likely be compromised, as well as teste size and testosterone levels (Cooke, Zhao, and Hansen, 1996; Lundkvist, 1990).

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. Can wine be produced without using it? Are there are alternatives?**

Sulfur dioxide is known as a closely related chemical oxide to sulfites, which are the most commonly used additives in wine. Sulfites are used in wine making to kill unwanted bacteria and yeast, as well as a preservative, preventing the wine from oxidizing. Foods such as jam, gelatin, cheese, deli meat, pizza dough, and even medications contain sulfites! Natural exposure to sulfur dioxides is seen with volcanic eruptions, however, high levels of sulfur dioxide would most likely be seen with burning coal or oil.

In the air, 100ppm is a dangerously toxic level of sulfur dioxide, and can burn the nose and throat. Long-term exposure has been seen to have decreased lung function, especially affecting asthmatics even in low doses. (Agency for Toxic Substances and Disease Registry (ATSDR), 1999). Through research on sulfur dioxides, no clear non-conflicting research was found regarding its toxicity and levels found in wine. Apparently, not using sulfites is more of a risk regarding bacteria exposure than its toxic effects, therefore it is not commonly done. In conventional wines, up to 350ppm of sulfites are allowed in the United States, with organic wines usually limited to 100ppm. Additional standards set in place by the USDA has listed that in “organic wines”, only 10ppm of naturally occurring sulfites are allowed in order for the wine to be sold as “organic (Organic Wine Company). Only non-scientific, informational companies spoke about it’s possible concerns with regards to allergies, saying asthmatics are the only true population effected by these sulfites. The only recommendations for avoid sulfite allergies was to consume organic wines, as they contain less pesticides, which may be the cause. Although all

mainstream wine is made with sulfur dioxides, wines made by natural wine makers only use sulfur when bottling white wines. Again, the risks vs. benefits of drinking wines without the use of sulfites must be further explored with more research on its toxic effects.

C. <u>Drug-Nutrient Interactions</u>. 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

<u>Antacids</u>

Antacids, histamine-2 receptor antagonists (H2 blockers) and proton-pump inhibitors (PPIs) are commonly prescribed for treating heartburn, gastro-esophageal reflux disease and peptic ulcers. Antacids are notorious for their ability to interfere with good nutrition if they are taken regularly for an extended period of time. Antacids may decrease the absorption of a variety of compounds including copper, fluoride, and iron. Simultaneous intake of manganese or magnesium-containing antacids may decrease manganese absorption (Higdon & Drake, 2012). Drugs that treat acid reflux or heartburn raise the pH environment of the upper GI tract, which reduces absorption of needed vitamins and minerals. This is especially problematic among the elderly, who often are already low in stomach acid. Aluminum antacids and calcium carbonate act by buffering or neutralizing the acid pH of the stomach. A reduction of stomach acid impairs the breakdown of the ingested food. Reduced stomach acid also significantly increases the risk of vitamin B12 deficiency especially in the elderly, since vitamin B12 requires adequate gastric acid for absorption. This lack of stomach acid also decreases the absorption of folic acid, iron and zinc (McCabe, 2004). Aluminum-based antacids may interfere with normal calcium metabolism. Aluminum can form compounds with phosphates, removing them from the body. As a result of this imbalance, bones may lose the calcium that keeps them strong (The People's Pharmacy , 1993). Proton pump inhibitors, the most potent of acid-reducing medications, are increasingly popular. High doses of PPIs, used for a year or more, have been shown to make individuals more susceptible to hip fracture than control subjects. This heightened risk of osteoporosis is probably due to the drastic drop in calcium and vitamin D absorption that occurs with these drugs.

Occasional use should not pose a serious risk, but continual consumption might make osteoporosis worse. Should an individual require an antacid it is suggested not to take it at meal-time (The People's Pharmacy , 1993). For anyone taking acid-reducing medication, additional daily supplementation of the following vitamins and minerals is recommended: vitamin D3 (2,000+ IU), B12 (200 mcg), folic acid (800 mcg), calcium (1,000 mg), chromium (500 mcg), iron (15 mg), zinc (25 mg to 50 mg) and phosphorus (700 mg). (Cass M.D., 2013)

D. <u>Personal Care Products</u>. Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to:

<u>Lipstick: lead acetate</u>

Lead acetate is a pigment stabilizer and potential impurity in many color cosmetics, including lipstick. However this is by no means the most likely or most significant source of exposure. Lead is present in the environment, old batteries, old toys and old paint, just to name a few. Because lead has many uses including that of a pigment stabilizer, it has had many uses. However since the discovery of many of its negative health effects its use in everyday products has been drastically reduced.

According to the Material Safety Data Sheet (MSDS), lead acetate is a well-known carcinogen, and neurotoxin that has been linked to learning, language and behavioral problems (Needleman, Schell, Bellinger, Levinton, & Allred, 1990). Many of lead's toxic properties are due to its ability to inhibit or mimic the action of calcium, this results in toxicity to almost every organ and system in the body (Agency for Toxic Substances and Disease Registry (ATSDR), 2014). It is known to have many negative health effects including irritation to the skin, eyes and respiratory system. Lead acetate can also affect the central nervous system, kidneys, blood and reproductive system. Lead is a cumulative poison and exposure even to small amounts can raise the body's content to toxic levels (Mallinckrodt Baker, Inc., 1999). Exposure to high amounts of lead may induce acute encephalopathy and can lead to death. Symptoms that develop after chronic exposure may include dullness, irritability, poor attention span, epigastric pain, constipation, vomiting, convulsions, coma, and death. The most sensitive targets for lead toxicity are the developing nervous system, the hematological and cardiovascular systems, and the kidney. Lead has been linked to reduced fertility in both men and women, hormonal changes and menstrual irregularities. Pregnant women are especially vulnerable because lead crosses the placenta and may enter the fetal brain, and has also been linked to miscarriage (Agency for Toxic Substances and Disease Registry (ATSDR), 2007). In pre-adolescents lead exposure has been linked to a delay in the onset of puberty in girls, and the development of testes in boys.

Toxic effects of lead are most pronounced through ingestion or inhalation and are less pronounced via dermal or ocular exposure. In volunteers who applied lead acetate from cosmetic preparations, less than 0.3% of the applied lead dose was absorbed (Mallinckrodt Baker, Inc., 1999). The most likely negative reaction to lead acetate based on absorptions such as this, would be mild skin irritation. Because it is so poorly absorbed from the skin and due to the small amount present in lipstick, it should not be a huge concern to the everyday user. However caution may be warranted in pregnant women and in the presence of young children to eliminate

the risk of any toxic effects. It is also possible to look for alternative such as products with a lead-free claim.

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME ZhiXuan Lawrence Jiang_____

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.

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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)
2. Pesticides—Insecticides: organophosphates
3. Polychlorinated Biphenyls (PCBs)

B. Food Toxicants.

1. Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies

2. Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives

3. Food Coloring Dyes. FD&C Blue No. 1, Red No. 40, Yellow No. 5, and Yellow No. 6 are common additives to food. Pick TWO of these and discuss what is known about the effect on health and name one alternative to using the dye, comparing financial costs and effect on health.

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

2. Antacids

3. Anticonvulsants

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Lipstick: lead acetate

2. Antiperspirants: aluminum chlorohydrate

3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

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
(b) Discuss alternative therapies, including those in chiropractic medicine

Answer

A) PAHs

PAHs have two or more fused aromatic rings. The have a relatively low solubility in water, but are hightly lipophilic. Most of PAHs with low vapor pressure in the air are adsorbed on particles. When dissolved in water or adsorbed on particulate matter, PAHs can undergo photodecomposition when exposed to ultraviolet light from solar radiation.

PAHs are formed mainly as a result of pyrolytic processes, especially the incomplete combustion or organic material during industrial and other human activity, such as processing of coal and crude oil, combustion of natural gas, including for heating, combustion of refuse,

vehicle traffic, cooking and tobacco smoking, as well as in natural processes such as carbonization.

Toxicokinetic

Absorption: In humans, the major routes of uptake of PAH are thought to be trough the lungs and the respiratory tract after inhalation, the gastro-intestinal tract after ingestion of contaminated food or water, and the skin as a result of contact with PAH-bearing materals.

Distribution: PAH occurs in almost all internal organs, organs rich in adipose tissue can serve as storage depots from which the hydrocarbons are gradually release.

Metabolism: Polycyclic aromatic hydrocarbons require multistep metabolic activation by specific enzymes. The enzyme system primarily responsible for PAH metabolism is the mixed-function oxidase system, which requires NADH or NADPH and molecular oxygen to convert the nonpolar PAHs into the polar hydroxyl derivatives and arene oxides.

Elimination: Most metabolites of PAH are excreted in feces and urine.

B)

2-Amino-3-methylimidazo[4,5-f] quinoline, IQ, is reasonably anticipated to be a human carcinogen based on sufficient evidence of benign and malignant tumor formation at multiple tissue sites in multiple species of experimental animals.

IQ is one of many heterocyclic amines formed when various meats and fish are cooked. Originally, it was isolated from broiled fish, fried ground beef, and beef extracts. No uses have been identified that would be expected to lead to the release of IQ into the environment. Environment occurrence of IQ may arise from food waste and disposal in landfills.

IQ was found when certain compounds were mixed and heated, such as in meat extracts. Meat extracts typically are formed by heating a source of amino acids, reduce sugars, fats, and other ingredients at temperature greater than 100 degree for times sufficient to develop flavor. IQ also was found in mixtures of creatinine and phenylalanine or creatinine, phenylalanine, and glucose, heated to 200 degree and in a dry mixture of serine and creatinine heated to 200 degree.

A substantial body of literature suggests that risk of several cancers may be related to consumption of meat, particularly red meat, and to methods of food preparation, particularly grilling and frying. Then mechanism underlying this risk it as yet unclear. One possibility is that HCAs formed when meat is cooked are involved.

IARC reviewed studies of IQ carcinogenicity in experimental animals (IARC 1993). In one of these studies, groups of 40 male and 40 female CDF mice, seven weeks of age, were fed either basal diet or diet containing IQ (> 99.6% pure) at a concentration of 300 ppm for 675 days. Survival of animals administered IQ was similar to that of controls. Body weights of females receiving IQ were slightly less than those of controls. Administration of IQ caused significant increases in the incidence of hepatocellular adenomas and carcinomas(combined), adenoma and adenocarcinomas (combined) of the lung, and papilloma and squamous cell carcinomas (combined) of the forestomach in both sexes.

C)Laxative

Laxative promote and facilitate bowel evacuation by acting locallyto stimulate intestinal peristalsis, to soften bowel contents, or both.

Bulk laxitives. Distention of the intestinal wall by bowel contents stimulates propulsive movements of the gut musculature. Activation of intramural mechanoreceptors induces a

neutrally mediated ascending reflex contraction and descending relaxation whereby the intraluminal bolus is moved in the anal direction.

Osmotically active laxatives are soluble but nonabsorbable particles that retain water in the bowel by virtue of their osmotic action. The osmotic pressure of bowel contents always corresponds to that of the extracellular space. The intestinal mucosa is unable to maintain a higher or lower osmotic pressure of the luminal contents. Therefore, absorption of molecules occurs isoomotically, i.e., solute molecules are followed by a corresponding amount of water.

Castor oil comes from Ricinus communis; it is obtained from the first coldpressing of the seed. Oral administration of 10-30 mL of castor oil is followed within 0.5 to 3 h by discharge of a watery stool. Ricinoleic acid, but not the oil itself, is active. It arises as a result of the regular processes involved in fat digestion: the duodenal mucosa releases the enterohormone cholecystokinin/pancreozymin into the blood. The hormone elicits contraction of the gallbladder and discharge of bile acids via the bile duct, as well as release of lipase from the pancreas. Because of its massive effect, castor oil is hardly suitable for the treatment of ordinary constipation. It can be employed after oral ingestion of toxin in order to hasten elimination and to reduce absorption of toxin from the gut. Castor oil is not indicated after ingestion of lipolhilic toxins likely to depend on bile acids for their absorption.

Anthraquinone derivatives are of plant origin. They occur in the leaves or fruits of the senna plant, the bark of Rhammus frangulae and Rh purshiana, the root of rhubarb, or the leaf extract from Aloe species. The structural features of anthraquinone derivatives are illustrated by the prototype structure. Among other substituents, the anthraquinone nucleus contains hydroxyl groups, one of which is bound to a sugar. Following ingestion of galenical preparation or of the anthraquinone glycosides, discharge of soft stool after a latency of 6 to 8 h. the anthraquinone glycosides themselves are inactive but are converted by colon bacteria to the active free aglycones.

D) Lipstick: lead acetate

Acute toxicity: No study is found in acute toxicity through dermal exposure.

Chronic toxicity: Lowered RBC count, decreased MCH and MCV are other concordant hematological change were found in the group which lead acetate was administrated. Anemia was in the form of microcytic and hypochromic. This might be due to effects of lead in cell metabolism, alteration of the enzyme activity, and interaction with reactions in which calcium is their secondary mediator. Lead induced inhibitory effects on the erythrocyte enzymes GA3PD and G6PD have already been proved. Interaction of lead with heme biosynthesis has been related to the inhibition of cytoplasmic and mitochondrial enzymes, and a decrease in the activity of the main enzymes in heme biosynthesis due to defects in iron metabolism has also been reported.

The use of lead acetate in the erythroid tissue culture medium has shown that lead nearly inhibits the proliferation of erythroid lineage, and perturbs cell development and hemoglobin synthesis. In the present study, total leukocyte count had increased mainly due to an increase in neutrophil and monocyte count.

Christina Lowenthal

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME _____

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_____

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

Polyaromatic hydrocarbons (PAHs): Short for polycyclic aromatic hydrocarbons, PAHs describe chemicals that are often found together in groups of two or more. PAHs are found naturally in the environment but they can also be man-made. In their purest form, PAHs are solid and range in appearance from colorless to white or pale yellow-green. PAHs are created when products like coal, oil, gas, and garbage are burned but the burning process is not complete. Although PAHs can exist in over 100 different combinations, the National Waste Minimization Program defines this group using the Toxic Release Inventory reporting category for polycyclic aromatic compounds. PAHs are a concern because they are persistent. Because they do not burn very easily, they can stay in the environment for long periods of time. Individual PAHs vary in behavior. Some can turn into a vapor in the air very easily. Most do not break down easily in the water. Most PAHs are used to conduct research. However, some PAHs are used to make dyes, plastics, and pesticides. Some are even used in medicines. One of the most common ways PAHs can enter the body is through breathing contaminated air. PAHs get into your lungs when you breathe them. If you live near a hazardous waste site where PAHs are disposed, you are likely to

breathe PAHs. If you eat or drink food and water contaminated with PAHs, you could be exposed. Exposure to PAHs can also occur if your skin contacts PAH-contaminated soil or products like heavy oils, coal tar, roofing tar, or creosote. Creosote is an oily liquid found in coal tar and is used to preserve wood. Once in your body, PAHs can spread and target fat tissues. Target organs include the kidneys and liver. However, PAHs will leave your body through urine and feces in a matter of days. You can be exposed to PAHs in the environment, in your home, and in the workplace. Because PAHs exist naturally in the environment and are man-made, you can be exposed in a number of ways. Fumes from vehicle exhaust, coal, coal tar, asphalt, wildfires, agricultural burning and hazardous waste sites are all sources of exposure. You could be exposed to PAHs by breathing cigarette and tobacco smoke, eating foods grown in contaminated soil, or by eating meat or other food that you grilled. Grilling and charring food actually increases the amount of PAHs in the food. If you work in a plant that makes coal tar, asphalt and aluminum, or that burns trash, you can be exposed to PAHs. You can also be exposed if you work in a facility that uses petroleum or coal, or where wood, corn, and oil are burned. A number of PAHs have caused tumors in laboratory animals that were exposed to PAHs through their food, from breathing contaminated air, and when it was applied to their skin. When pregnant mice ate high doses of a PAH (benzo(a)pyrene) they experienced reproductive problems. In addition, the offspring of the pregnant mice showed birth defects and a decrease in their body weight. Other effects include damage to the body fluids, and the immune system. However, these effects have not been seen in humans. There is a test that can measure the presence of PAH in your urine. This test can only tell you if you have been exposed; but it can't reveal how harmful the effects of the exposure will be. This test would have to be performed in a laboratory that has special equipment to detect the PAHs. Another test currently being developed will be able to measure PAHs in your body tissue and blood. Most exposures to PAHs happen every day at very low levels in the air we breathe and the foods we eat. Treatment for a short-term exposure is unlikely. There is no information available from studies on humans to tell what effects can result from being exposed to individual PAHs at certain levels. However, breathing PAHs and skin contact seem to be associated with cancer in humans. Animal studies showed that mice exposed to 308 parts per million (ppm) of PAHs (specifically benzo (a) pyrene) in food for 10 days (short term exposure) caused birth defects. Mice exposed to 923 ppm of benzo (a) pyrene in food for months caused problems in the liver and blood.
http://www.epa.gov/osw/hazard/wastemin/minimize/factshts/pahs.pdf

1. Pesticides—Insecticides: organophosphates

2. Polychlorinated Biphenyls (PCBs)

B. Food Toxicants.

1. Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies

2. Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives

3. Food Coloring Dyes. FD&C Blue No. 1, Red No. 40, Yellow No. 5, and Yellow No. 6 are common additives to food. Pick TWO of these and discuss what is known about the effect on health and name one alternative to using the dye, comparing financial costs and effect on health.

Red No. 40 is also known as Allura Red AC Dye. It is a coloring agent of chemicals and substances that impact color including soluable dyes and insoluable pigments. They are used in inks, paints, and as indicators and reagents. As a food coloring agent, is it natural or synthetic dye used to color agents in processed foods. Rats were fed a diet containing 5.19% of Allura Red. It was observed that 0.1% and 29% of the intact dye was excreted in the urine and feces respectively. In later studies, rats and dogs were pretreated daily with nonradioactive Allura Red. Subsequently, the animals were dosed with the 35S labelled compound and studied for up to 72 hours for excretion and distribution patterns of the color. Both species showed limited absorption of the compound with the major route of excretion being via the feces. In the dog 92-95% of the recovered radioactivity appeared in the feces within 72 hours while in the rat 76-92% of the recovered radioactivity appeared in the feces within this time period. Urinary recoveries of the color in rats and dogs, respectively varied between 5.7 and 19.8% and 2.7 and 3.6%. After sacrifice, significant retention of radioactivity was located in the intestinal contents of both species and in the washed intestines of the rats. This was thought to be due to adhesion of the compound to the intestinal wall, since the total carcass and viscera of these animals contained <0.4% of the administered dose. Several metabolites, possibly resulting from azo-reduction in the gastrointestinal tract (two identified as aromatic amines, p-cresidine sulfonic acid being the major one), were also found in the feces and urine. Finally, significant retention in the washed intestines of rat was observed, probably due to adhesion to the intestinal wall. Cresidinesulfonic acid was found to be the major metabolite of Allura Red in the urine of these two species, whereas the parent compound was not measurable. In addition, two other unidentifiable metabolites were found in the urine of the rats. In the rat fecal extracts, cresidinesulfonic acid was a major metabolite along with two unknowns and the parent compound. The dog fecal sample revealed an identical metabolite pattern as seen in the rat, and in addition, a third unknown was discovered. One of the urinary unknowns demonstrated an Rf value which was identical to that of the one of the fecal unknowns suggesting that they were one and the same. The other unknowns exhibited distinctive Rf values which indicated that these metabolites were different. It has been postulated that azo reduction by gut flora of the dye will yield the two components of the parent compound: 2-methoxy-5-methyl-aniline-4-sulfonic acid (cresidine-4-sulfonic acid) and 1-amino-2-naphthol-6-sulfonic acid. It appears that negligible quantities of intact Red are absorbed and excreted in the urine, and that the major portion of the color is excreted as metabolites in the feces. Allowable tolerances of these residues of FD&C Red No. 40 are exempted from the requirement of a tolerance when used as a dye, coloring agent (limits: not to exceed 0.002% by weight of pesticide formulation) in accordance with good agricultural practices as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops or to raw agricultural commodities after harvest. FD&C Red No. 40 is exempted from the requirement of a tolerance when used as a dye, coloring agent (limits: for seed treatment use only; not to exceed 2% by weight of the pesticide formulation) in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only. FDA requires all batches of this color additive when used in

foods shall meet the specifications, uses and restrictions, and labeling regulations contained in 21 CFR Part 74 and be certified in accordance with regulations in 21 CFR Part 80. All batches of this color additive when used in drugs shall meet the specifications, uses and restrictions, and labeling regulations contained in 21 CFR Part 74 and be certified in accordance with regulations in 21 CFR Part 80. All batches of this color additive when used in cosmetics shall meet the specifications, uses and restrictions, and labeling regulations contained in 21 CFR Part 74 and be certified in accordance with regulations in 21 CFR Part 80. In an interaction study, the color and its alumina lake were applied to the subjects volvar forearms (200 subjects) as an aqueous solution for 10 alternate days, for 24-hr periods, followed by a 14-day rest period. Challenge batches were then applied under occlusion to fresh skin sites on the subjects scapular backs for 24 hours. The color did not produce either irritation or allergic responses during the induction phase nor contact dermatitis in the challenge period. Allura Red and its lake were evaluated on sites under occlusion for five 48-hr, alternate-day periods. These sites had been previously irradiated for 5 min with Xenon light which had been filtered through a window-glass equivalent to limit the exposure to non-erythema-producing, long-wave radiation. A 10-day rest period followed this induction exposure, and then the color was applied to fresh skin sites, irradiated for 5 min with Xenon and subsequently removed and the sites were evaluated. Allura Red was shown not to produce photosensitization on the 25 subjects studied.
http://pubchem.ncbi.nlm.nih.gov/compound/6093299

Yellow No. 5 is also known as Tartrazine. It is a yellow colored food coloring, Tartrazine has E number 102 and is a very popular synthetic food dye. It is, also known as lemon yellow azo dye, a common food coloring that is used in a number of countries across the world. The color is also used with Brilliant Blue FCF and E142 Green S to produce different shades of blue and green. Apart from being a yellow 5 food coloring agent (fd&c yellow no 5 lake), tartrazine also finds uses in many other applications like medicinal capsules and syrups, cold, stored beverages, pudding, ice creams and other bakery products. Among other industries using tartrazine – the lemon yellow azo dye in cosmetics like soaps, shampoos, creams, etc. Tartrazine is a useful synthetic yellow food coloring. It finds used beyond the food industry as well. Tartrazine uses in the food industry are numerous though. The uses of tartrazine across the various industries. Confectionery products like cakes, cake mixes, puddings, pastries, jams, jellies, custards commonly use tartrazine yellow food coloring. Packed and canned foods like breakfast cereals, chips, packaged drinks and snacks like pies and puddings, candies and carbonated beverages also contain tartrazine. Pickles, rice, soups, cereals, yogurt, noodles, ice creams are some other foods that have tartrazine coloring content. It is found in cosmetics and beauty products like shampoos, conditioners, soaps, creams, moisturizers, hand sanitizers, etc. It is also use as synthetic yellow dye in medications like syrups, capsules, vitamins, etc. Even though tartrazine is used in so many commonly sold food products, it is not free of ill effects. Tartrazine causes a number of allergies, side effects and intolerance reaction. People with asthma and aspirin intolerances are majorly prone to the tartrazine allergies and harmful reactions. Symptoms that mark tartrazine allergies are indigestion, anxiety, migraine, clinical depression, weakness, patches on skin, sleeping disorders, vision disorders, etc. Tartrazine yellow 5 dye has also been responsible for hyperactivity in kids and associated with cases of thyroid cancer. Although tartrazine is mostly harmful, but sensitivity to its intolerance reactions might vary from individual to individual.
http://www.foodadditivesworld.com/articles/tartrazine.html

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: Usually used in constipation to eliminate the bowels. Excessive use can lead to dependency as well as kidney damage, damage to the large intestines which can cause bloating, diarrhea, constipation, and with straining the bowels it can result in hemorrhoids. Excessive use can lead to potentially fatal fluid and electrolyte imbalances as well as intestinal paralysis, IBS(irritable bowel syndrome), pancreatitis, renal failure, diarrhea and other problems. Chronic use causes the colonic tissues to get worn out over time and not be able to expel feces due to long-term stimulation. A common finding is a brown pigments deposited in the intestinal tissue known as melanosis coli. Some safe an effective ways to eliminated the bowels include; chiropractic adjustments to the pelvis, concentrating on the sacrum, dietary fiber like green leafy vegetables (kale, swiss chard, etc.), fruits, bran, nuts, beans, saline solutions, and exercise.

15

2. Antacids

3. Anticonvulsants

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives to

1. Lipstick: lead acetate

2. Antiperspirants: aluminum chlorohydrate

3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

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
(b) Discuss alternative therapies, including those in chiropractic medicine

Flibanserin is classified as a 5-HT serotonin receptor agonist and a dopamine D4 rector partial agonist. It is a Non-Hormonal agent that in essence increases dopamine and noradrenalin while reducing Serotonin in the brain. The benefits of it being Non-Hormonal are that it will not have the problems associated with other hormonal treatments such as negative altered mood. Side effects that were reported by some of the users where usually low to moderate. These where dizziness, anxiety, fatigue, dry mouth, insomnia, nausea. Not everyone who partook in the study had any of these but there were more occasions of these being reported compared to the placebo group and due to the fact that this compound is fairly new, there have not been nor could there have been any long term studies on side effects. Alternative therapies can include chiropractic adjustments to areas of the spine that are directly related to the reproductive system, which is the

sacral area. Over all, spinal adjustments along with eating healthy and thinking healthy, can help improve sexual desire as well as many other things. Acupuncture, massage, herbal supplements like ginseng can also help boost the sex drive.

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME Mackenzie Kolt

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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)
2. Pesticides—Insecticides: organophosphates
3. Polychlorinated Biphenyls (PCBs)

2) Pesticides might be found predominately in food, water, and in the air.

Acute toxicity of organophosphates includes a slogan called DUMBELS=diarrhea, urination, miosis (pinpoint pupils), bronchospasm, emesis (vomiting), lacrimation (tearing), salivation. This occurs with acute toxicity. Recovery may take weeks, death can ensure if no treatment in under 24 hours. Chronic toxicity of organophosphates can include induced delayed neuropathy for

select organo's however it primarily will cause motor paralysis,it will also have a generalized malaise symptomology similar to influenza.

A specific organophosphate class are Organochlorines and in particular dichlorodiphenyltrichloroethane (DDT). It is either stimulatory or inhibitory interfereing with potassium and calcium absorption. It is poorly absorbed in the skin however, it has a long half life which has made it dangerous and is a very stable compound which is why it has been banned. It requires a Phase I dechlorination/demethylation reaction and a phase 2 glutathione reaction. Acute toxicity specifically includes the CNS with headaches, dizziness, tremors, convulsions. While chronic toxicity includes memory loss, personality changes, and low sperm count.

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B. Food Toxicants.

1. Heterocyclic amines (HCAs) can form when meat is cooked often at charring temperatures. Find one compound in this class, discuss how it is formed in cooking and sources of exposure, and discuss effects of chronic toxicity, either in humans or animal studies

2. Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives

3. Food Coloring Dyes. FD&C Blue No. 1, Red No. 40, Yellow No. 5, and Yellow No. 6 are common additives to food. Pick TWO of these and discuss what is known about the effect on health and name one alternative to using the dye, comparing financial costs and effect on health.

3_ Blue No. 1 can effect health by people with moderate asthma to have allergic reactions to the compound. It has a poor intestinal absorption only about 5% and has cause serious complications when absorbed through other modalities such as enteral feeding tubes. The recommended safety limit is 0.1 mg/day per kg body weight. It is put into the feeding solutions to track aspirates and secretions in the gastric area, and trachea. It has been found to cause metabolic acidosis and refractory shock possibly leading to death in these patients. It may cause irritation to the eyes, digestive tract, and skin, however there is no substantial research saying it has chronic health effects. Blue berries and red cabbage are good alternatives for blue food dye.

Red No. 40 can stimulate allergic reactions, and also some contaminants can be carcinogenic but that is yet to be determined. It is banned in several countries within Europe, however claimed to be safe by the FDA in America. There has been weak associations with ADHD and red no 40. This is more likely to be an environmental trigger to pre existing genetics. There are links it may cause cancer especially in the immune system. Overall the Jury is out on whether it is something we should be concerned about. Good alternatives are cherry juice, paprika, turmeric, beet juice.

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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
2. Antacids
3. Anticonvulsants

Antacids are used for heartburn/indigestion. They effect your digestion by causing indigestion and lack of absorption if they contain magnesium. They can cause poor absorption of calcium and can lead to weaker bones in some individuals. They can cause constipation with the brands that contain calcium or aluminum, and in select cases these can cause kidney stones. It can cause hypercalcemia by way of milk-akali syndrome by over absorption of types that contain calcium. Some reports have indicated that due to lower stomach acid being produced it can lead to certain proteins being improperly digested in the stomach, not only does this lead to indigestion but can also lead to allergic reactions to the indigested proteins by way of IgE sensitization. A natural solution is to use apple cider vinegar with digestion, and use a lower alkaline diet, by means of eating less protein and more veggies, and fruit. This will promote less acid production in the stomach and lead to less heartburn. It is important to avoid high sugary, and high saturated fat meals, as they will promote heartburn as well. Exercise is another key step in managing heartburn as excess stomach fat can lead to pressure on your stomach and cause acid to reflux up in the esophagus. Wear looser clothing, drink herbal tea after meals, don't lay down within 3 hours post meal. All of these will help manage heartburn effectively.

You can do either D or E below

D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure and discuss alternatives to

1. Lipstick: lead acetate
2. Antiperspirants: aluminum chlorohydrate
3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

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
(b) Discuss alternative therapies, including those in chiropractic medicine

2) Antiperspirant aluminum cholorhydrate ($Al_2Cl(OH)_5$) is used as a coagulant within the antiperspirants and is also used in flocculation of water treatment. The exposure that gets talked about more commonly is in commercial antiperspirants. Acute toxicity could be nausea, vomiting, sweating, malaise, irritation to the skin, rash, and swelling. If exposed for a long time controversy is in the science as there are some reports that have indicated

that it may be correlated with breast cancer, Alzheimer's, and kidney dysfunction. These studies however are critiqued for being flawed literature. The amount of exposure is so minimal that is currently considered negligible. However if it is causing irritation to the skin in the armpit a different style of deodorant is recommended. Alternatives coud be using baking soda, homemade remedies online, using essential oils, showering regularly to prevent a build up(using no product). More research needs to be done to really see the effect of toxicity in the long run with aluminum chlorohydrate.

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1)Antiperspirants Facts About Cancer, Aluminum, Alzheimer's, and More. (n.d.). Retrieved from http://www.webmd.com/skin-problems-and-treatments/features/antiperspirant-facts-safety?page=4

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6)MSDS Blue. (n.d.). Retrieved from http://quantum.esu.edu/~scady/MSDS/fdcblue1.pdf

Natalie Hanson
Pathology 438
Spring 2015

Final Examination

A. Environmental Toxicants: Pesticides/Insecticides: organophosphates

Organophosphate (OP) compounds are a diverse group of chemicals used in both domestic and industrial settings. OPs include insecticides, nerve gases, ophthalmic agents, and antihelmintics. Organic phosphate insecticides include malathion, parathion, diazinon, fenthion, dichlorvos, chlorpyrifos, and Ethiopia. Exposure to OPs is possible via intentional and unintentional contaminated food sources. In addition, massive organophosphate intoxication from suicidal and accidental events led to the discovery of the mechanism of their action. No clinical effects of chronic low-level organophosphate exposure from a food source have been shown, however, advancements in risk assessment and preparedness are ongoing.

Organophosphates can be absorbed cutaneously, ingested, inhaled, or injected. The toxicokinectics or primary mechanism of action of OP pesticides is inhibition of acetylcholinesterase (AChE) which breaks down acetylcholine (ACh) into choline and acetic acid. ACh is found in the CNS, the PNS, the NMS junction, and the RBCs. Once AChE becomes inactivated, ACh accumulates throughout the nervous system resulting in overstimulation of muscarinic and nicotinic receptors. Clinical effects are manifest via activation of the autonomic and central nervous system and nicotinic receptors in skeletal muscle. Toxicodynamic effects of OP exposure/toxicity are manifold. The muscarinic effects include bradycardia, hypotension, severe respiratory distress, nausea, vomiting, and blurred vision to name a few. The nicotinic effects include but are not limited to, muscle fascinations, cramping, and weakness. The CNS effects include anxiety, restlessness, confusion, ataxia, tremors, and seizures.

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Katz, Kenneth D. *Organophosphate Toxicity.* January 27, 2015. Medscape. *emedicine.medscape.com*

B. Food Toxicants: Sulfur dioxide (SO2)

Sulfur dioxide is added to wine for protection from oxidation and microbial spoilage. Sulfur dioxide is highly reactive and roughly half the compound is bound up immediately after addition. The remainder of the SO2 is free SO2 with a very small portion remaining as molecular. The molecular SO2 is what gives protection to microbes. The quantity of sulfur dioxide added depends on pH of the wine, temperature of the wine, condition of the fruit at crush, and the type of wine being produced. Current scientific evidence links short term exposure to an array of adverse effects including bronchioconstriction and increased asthma symptoms. Although sulfites don't cause a true allergic reaction, sulphide sensitive people may experience a flushed face, rash, red itchy skin, headaches, anxiety, distress, weakness, vomiting.

It's one of the just efficient additives used in winemaking, however, due to health concerns and a recent growth of consumer interest in wine with less additives, it's use is a huge field of debate and discussion of reduction in its use and/or alternatives are a hot topic. Methods to minimize its

use include a chemical and physical component. On the chemical side, phenolic compounds also have an antiseptic and antioxidant properties that SO2 has. However, a high concentration is needed in order to achieve its antiseptic properties. Another one is dimethyl dicarbonate (DMDC) which has been preposed to replace SO2 in winemaking. It's very effective against the yeast but not so much the bacteria. On the physical side, ultrasound has been considered as a promising alternative to conventional thermal treatments. It has a very high antiseptic quality, as well as a good ability to preserve wines.

Luiz. *The use (or not) of sulfur dioxide in wine making.* January 9, 2013. thewinehub.com 15

Pozo-Bayon, Angeles. *Wine features related to safety and consumer health: an integrated perspective.* Instituto de Fermentaciones Industriales (CSIC). digital.csis.es

C. Drug-Nutrient Interactions: Anticonvulsants

Anticonvulsant drugs help control seizures. Phenytoin (Dilantin), phenobarbital and primidone may cause diarrhea and a decrease in appetite. This can decrease the availability of many nutrients. These drugs also increase the use of vitamin D in the body. This means that less vitamin D is available for its critical function such as calcium absorption. Some anticonvulsants also interact with vitamin B9, folic acid. When drug therapy is started, folic acid levels decrease. My suggestion is supplementation with vitamin D and either folic acid alone (which should be monitored by a doctor) or a vitamin B complex.

Bobroff, Linda B. *Food/Drug and Drug/Nutrient Interactions: What you should know about your medications.* May, 2009. University of Florida. edis.ifas.ufl.edu. 15

Personal Care Products: lipstick: lead acetate.

Lead is a mineral that occurs naturally in the earth. There are traces of lead in the food we eat and the water we drink, however, usually the traces are much too small to be detected in our bodies. But if exposures are too high, lead can cause serious problems. How we are exposed also plays a big role.

There is lead acetate in hair dyes, lipsticks, and some shampoos. According to the federal laws enforced by the FDA, cosmetic companies are responsible for ensuring the safety of their products. Unless there is a color additive, the FDA does not require ingredients in beauty aids to be approved before going on the market. Every time we apply lipstick to our lips and then re-apply during then day , we are ingesting lead and even more importantly/harmful is lead getting into your bloodstream through the skin of your lips. Lead is a proven neurotoxin that can cause learning, language, and behavioral problems. The state of California recognizes lead acetate as a developmental and reproductive toxicant. There are a number of natural and organic mineral makeups available today. Lead acetate can and should be avoided with all of the "green" options. 14

Pathology 438 Final Examination

Marisa Sum
15 June 2015

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**

There are three different types of laxatives: osmotic laxatives, stimulant laxatives, and bulk-forming laxatives and they each affect nutrient absorption in different ways. (F, 2013) Osmotic laxatives have ionic properties that pull fluid into the intestines to loosen blockages and move the stool out of the body, as diarrhea. Side effects to taking these laxatives are dehydration and nutrient malabsorption because the food does not get properly broken down and absorbed since it is being flushed out. This can cause electrolyte imbalance and physical discomfort from cramping and bloating. Stimulant laxatives contain chemicals and herbs that are meant to stimulate peristalsis in the intestines which helps the fecal matter move along the tract. However, the chemicals in these laxatives are questionable and long term use can irritate and scar the intestinal walls which can lead to further damage and dysfunction of the intestines. Bulk forming laxatives are usually made of dead fiber cells which absorb water and other material in the intestines to form a larger stool mass. This can either result in blocking up the bowels further or stimulate the intestines to want to push it out. Some of the ingredients in bulk forming laxatives can also cause irritation. Overall, laxatives are not meant for long term use, but they are good at doing what they are made for, which is to clear intestinal blockages. All laxatives can decrease nutrient absorption because they prevent the body from fully metabolizing the food matter and can cause a lot of irritation in the bowels, which can lead to chronic bowel problems and malabsorption. This puts a lot of stress on the body which can even encourage fat storage and food intolerances. Fatigue and decreased integrity of the immune system can result from irritated intestines. If a person is experiencing a lot of constipation, laxatives are good to use for symptomatic relief but these symptoms should be understood that there is something going on metabolically or physiologically that needs to be addressed.

There are some alternatives to using laxatives that are safer and should be tried before turning to the pills. If a person needs a quick fix when having constipation related problems, he/she can try drinking warm water first. Balling one fist into a ball and pressing it into the abdomen while rubbing slowly from side to side, downward, can help physically move the fecal matter south to the anus. Lying on one's side rather than upright can also encourage gravity to help it along. Self colon-cleansing kits can be purchased at the store and help get things moving from the anal side. Supplementing with a little bit of fiber in a glass of water can also help move things along. Otherwise, taking the time and energy into looking at one's diet, sleep patterns, liquid intake, and stress can help improve intestinal integrity and health to prevent future impaction problems. Supplementing with probiotics daily can increase healthy "gut flora" or intestinal bacteria which can improve digestion, chyme movement and nutrient absorption too.

2. Antacids contain alkaline ions that directly neutralize acidic ions such as gastric acid (HCl). Most people take antacids to neutralize the burning pain sensation of "heartburn" which the main symptoms of gastroesophageal reflux disease (GERD). The chemical reaction of antacids on stomach acid creates a new compound which is why we can call the reaction a complexation, or complex forming, reaction. It creates a tetracycline complex with divalent cations that forms an insoluble complex. (Halloran, More Applications of Pharmacology & Toxicology: Week 4, 2015) Antacids can allow microbes to survive in the gastrointestinal tract and alter nutrient absorption. The stomach needs a low pH, or an acidic environment, to kill other microbial bacteria that are consumed with food and to properly break down the food into macronutrient particles so that they can be further broken down in the small intestine later. If a person takes antacids for acid reflux daily for more than just a few days, it can start to affect both of those purposes for the stomach acid's acidic pH.

For example, long term antacid use is linked to the formation of ulcers because the higher and more neutral pH post antacid supplementation allows heliobacter pylori bacteria, which is commonly found in our stomach, to thrive and dig a hole through the stomach lining, thus allowing the stomach acid to leak through the layers too and cause an ulcer. (Stomach, 2015) This more neutral stomach pH can allow other bacteria to survive in the stomach and cause food poisoning too. In terms of digestion, having a higher stomach acid pH improperly breaks down our food, leading to malabsorption of Vitamin B12, folate and iron. (Halloran, 2015) A deficiency in this can lead to neurological damage such as dementia and motor damage. (Jameson R. Lam, 2013) It also affects Vitamin D creation and metabolism which can lead to calcium malabsorption, which further leads to bone reabsorption problems like osteoporosis. Further, when the improperly digested food moves through the pyloric sphincter into the duodenum and small intestine, the intestine peristalsis will not be able to properly perform mechanical function due to the texture of the chyme, thus causing constipation. Finally, antacids cause urine pH to rise, which reduces kidney tubule reabsorption of salicylate. (Halloran, 2015) Alternatives to taking antacids if one is susceptible to heartburn symptoms are to eat more "alkaline foods" like dark leafy greens and avoiding food irritants or foods that cause inflammation and are more acidic, like alcohol, coffee, chocolate, sugar, and spicy food. Supplementing the diet with teaspoons of apple cider vinegar will help buffer the pH of the gastric acid and drinking water before eating can help too. Do not eat an hour before sleeping too. As a Chiropractor, I would check the integrity of the stomach organ itself, looking for any herniation of the stomach at the fundus or at the cardia. These areas are likely herniated or have muscle contraction problems if the patient has a history of vomiting - from morning sickness, eating disorders, food poisoning, or alcohol overdose. Correcting these herniation via manual adjustment to the location of injury can greatly improve proper stomach contraction function and then decrease the incidence of acid reflux symptoms.

3.Anticonvulsants

Anticonvulsants are medications that affect the brain and its chemistry to reduce the likelihood of seizures and epileptic tendencies from occurring. They are often also prescribed to people who suffer from anxiety problems. The enzyme inducors and inhibitors in these drugs related to cytochrome p450 can catabolize Vitamin D and cause hypocalcemia and thus possibly osteoporosis or osteopenia because the body will break down bone matter to regulate blood calcium levels. (Helen Valsamis, 2006)This can then further lead to an increased risk of fractures and bone density diseases.

Instead of taking anticonvulsant medication, Chiropractic adjustments, vitamins, hydration, sunlight, and rest can help. Chiropractic adjustments indirectly stimulate the vagus nerve which is a part of the parasympathetic nervous system which encourages a more restful state. Removing subluxations from the spine can also improve cerebrospinal fluid flow in the dura mater, which can improve nourishment of the brain and regulate brain chemistry. Vitamins such as B6, biotin and folinic acid all play key regulatory roles of energy metabolism. (R Kneen, 2006) Having a regular sleep cycle can help the secretion of melatonin which soothes the body at appropriate levels for proper excitation. Also, it has been found that a ketogenic diet, or a diet without carbohydrates and higher in healthy fatty acids, can help the brain function better because the brain is mostly made of cholesterol and fat.

Personal Care Products: Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives

Aluminum chlorohydrate is the active ingredient in most antiperspirants available for purchase in stores. It blocks the sweat glands from getting to the skin's surface which is what reduces underarm odor. (Antiperspirants and Breast Cancer Risk , 2014) However, some researchers speculate that the aluminum can cross into the skin where it can be stored and may change estrogen receptors of breast cells, thus increasing a risk for breast cancer if used for a long time. (Pineau A, 2014) It is noted that it is more likely to cross into the skin through a razor nick. This potential risk for chronic toxicity has a lot of people looking for safer anti-odor alternatives. There does not seem to be clear research findings that prove that the aluminum is absorbed through the skin enough to have adverse effects though. This is definitely a subject for further study.

Safer alternatives to antiperspirant sticks that do not contain aluminum chlorohydrate are deodorant stones which are large, smooth crystals of potassium aluminum sulfate that must be wetted with water when applied. The difference between potassium alum and aluminum chlorohydrate is that potassium alum is a much larger molecule that is not thought to be absorbable through skin. (5 Deodorant Alternatives, 2015) However, if you want to completely eliminate aluminum from your armpits many companies sell natural aluminum-free sticks such as Burt's Bees, JASON, Trader Joe's Kiss My Face and several other companies all offer aluminum-free deodorant sticks. Alternatives to antiperspirant sticks are home remedies like mixing baking soda and cornstarch with a little water, citric acid from lemon juice and spritzing alcohol on the armpits.

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME: Mary Whalen

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.

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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*

2. Pesticides—Insecticides: organophosphates

Organophosphate insecticides are used worldwide. They exert their toxicity through binding covalently to acetyl cholinesterase and inhibiting it. The result is a long-lasting increase in acetylcholine at all sites where it is released. Many of these drugs are extremely toxic and were developed by the military as nerve agents. Toxicity of these agents is manifested as nicotinic and muscarinic signs and symptoms. Depending on the agent, the effects can be peripheral or affect the whole body.

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B. *Food Toxicants.*

2. Sulfur dioxide (SO2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives?

Sulphur dioxide is a chemical that is a gas at room temperature and is a toxic gas that is corrosive and blistering for the respiratory system and could cause alterations in the B1 vitamin and of some amino acids metabolism if inhaled. Although, according to the CDC ingestion of sulfur dioxide is unlikely because it is a gas at room temperature.

Sulfur dioxide is used in small amounts as a food and wine preservative. Highly sensitive asthmatic individuals can develop bronchospasm after eating foods or drinking wine preserved with sulfur dioxide or other sulfur preservatives.

With acute exposure Sulfur dioxide dissolves in the moisture on skin, eyes, and mucous membranes to form sulfurous acid, an irritant and inhibitor of mucociliary transport. Most of the inhaled sulfur dioxide is detoxified by the liver to sulfates and excreted in the urine. The bisulfite ion produced when sulfur dioxide reacts with water is likely to be the main initiator of sulphur dioxide-induced bronchoconstriction.

Chronic exposure can result in an altered sense of smell (including increased tolerance to low levels of sulfur dioxide), increased susceptibility to respiratory infections, symptoms of chronic bronchitis, and accelerated decline in pulmonary function.

All wines contain sulphur dioxide in various forms, collectively known as sulphites. Even in completely unsulphured wine it is present at concentrations of up to 10 milligrams per liter. It is in wine in a free and bound form and the amount of free form depends on the pH.

The World Health Organization fixed the daily admissible dose of SO2 to 0.7 mg per day per kg of weight. The admissible amount for a man is therefore between 42 and 56 mg per day, according to an average weight between 60 and 80 kg. If we daily drink half a bottle of wine (375 ml), we could easily absorb a higher amount of SO2. Considering the maximum total amount of SO2 consented by EU laws, i.e. 160 mg/l for red wines and 210 mg/l for white wines, SO2 amount absorbed with half a bottle of wine is 60 mg for red wines and 79 mg for white wines. (Ribereau-Gayon) If we drink half a bottle of some special wines, such as those made with dried grapes or processed with Botrytis (which could contain up to 400 mg/l sulphites), the sulphur dioxide we absorb is so much as 150 mg (which is 2.5 mg/kg for one person weighting 60 kg and 1.87 mg/kb for a person weighting 80 kg).

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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*

2. Antacids

Antacids are weak bases that react with gastric acid to form water and a salt to diminish gastric acidity. Because pepsin is inactive at pH greater than 4, antacids also reduce pepsin activity. Antacids vary widely in their chemical composition, acid-neutralizing capacity, sodium content, palatability and price. Commonly used antacids are salts of aluminum and magnesium

(aluminum hydroxide or magnesium hydroxide for example). Aluminum hydroxide tends to cause constipation whereas magnesium hydroxide tends to produce diarrhea. So preparations that combine these two compounds aid in normalizing bowel function. Some other alternatives include eating a well-balanced diet/discovering what your food sensitivities are and avoiding them, eating lots of yogurt/probiotics, and using apple cider vinegar.

Reference:

Lippincott, W. (2012). Pharmacotherapeutics for advanced practice, 3rd ed. pharmacology, 5th ed.: North american edition. (5th ed., pp. 356-357). S.l.: Wolters Kluwer Health.

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D. Personal Care Products . Select one of the product types and the named compound usually contained in it. Discuss any facts on acute and chronic toxicity through dermal exposure, and discuss alternatives

3. Shaving Lotion: find a toxicant in the shaving lotion and discuss it

Triethanolamine, often abbreviated as TEA, is a viscous organic compound that is both a tertiaryamine and a triol and is found in shaving creams. A triol is a molecule with three alcohol groups. Triethanolamine is a strong base. Triethanolamine is used primarily as an emulsifier and surfactant. It is a common ingredient in formulations used for both industrial and consumer products. The triethanolamine neutralizes fatty acids, adjusts and buffers the pH, and solubilizes oils and other ingredients that are not completely soluble in water.

Triethanolamine is a skin and respiratory toxicant. In a number of studies thriethanolamine has caused contact allergies. Animal studies have also shown Triethanolamine can cause bladder and liver cancer, as well as cell mutation in testicles. However according to the MSDS sheet for Edge® Sensitive Skin Shave Gel says that there is no known effect for chronic toxicity. Also under the acute toxicity it says that the product is safe for intended use based on the formulation, testing results, and the long history of safe consumer use.

One website lists Dr. Bronner's Shaving Gel as a good alternative to others that might have triethanolamine. Other alternatives include classic shave creams from Pacific shaving company or Hal's deluxe or classic shave soap.

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Subject: FW: Toxicology Final
From: Mitch Halloran <shalloran@lifewest.edu>
Date: 6/15/2015 13:10

To: "smhbizness@gmail.com" <smhbizness@gmail.com>

From: Rebecca Wilder [wilderrj@msn.com]
Sent: Monday, June 15, 2015 12:54 PM
To: Rebecca Wilder; Mitch Halloran
Subject: Toxicology Final

REBECCA WILDER
TOXICOLOGY FINAL
Spring 2015

A. Environmental Toxicants-
3. PCB's
The United States was producing PCB's between 1929 and 1979, when it was banned and so exposure was high. Now it is the residual exposure of those items manufactured which include the air, water and soil supply in many areas. The specific items of increased exposure include the following:

* Transformers and capacitors
* Other electrical equipment including voltage regulators, switches, reclosers, bushings, and electromagnets
* Oil used in motors and hydraulic systems
* Old electrical devices or appliances containing PCB capacitors
* Fluorescent light ballasts<http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/ballasts.htm>
* Cable insulation
* Thermal insulation material including fiberglass, felt, foam, and cork
* Adhesives and tapes
* Oil-based paint
* Caulking<http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/caulk/index.htm>
* Plastics
* Carbonless copy paper
* Floor finish

B. Food Toxicants. Food Coloring Dyes-Red 40 and Yellow 5
Price of natural food coloring kit for 3 primary colors was $15 on Amazon.com. box of 4 colors in grocery store of toxic nature about $5.
Red 40 AKA Allura Red

may act as a trigger in those who are genetically predisposed, to ADHD and food intolerances. Alternatives include products that contain paprika, beet juice, carotene, red cabbage and turmeric for coloring instead.
Yellow 6 AKA Tartrazine
is widely used in the making of potato chips, jams, candy, drinks and even pet food. It is also added to shampoo and other cosmetic products, as well as vitamins and certain medications.
Health effect include allergic reactions, such as asthma and other health problems, including blurred vision, migraines, fatigue and anxiety. It has been linked to It might also cause chromosomal damage, although this has not been properly studied or documented. Alternatives include turmeric powder, yellow carrots, lemon zest, saffron flowers, bee pollen

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C. Drug-Nutrient Interactions -Anticonvulsants

Sometimes, ketogenic diets or vagus n. stimulation are described as "anticonvulsant" therapies as well, and could be used concurrently and should be further explored as an alternative.

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D. Personal Care Products-Shaving Lotion
Contains soaps and perfumes, propane, isobutane, and other ingredients. Generally skin irritation in the form or allergies arise, but can include the following symptoms: blurred vision, breathing difficulty, burning pain in the throat, burns to the eye, diarrhea or vomiting, stomach pain, and rash. Alternatives include baby oil, coconut oil, aloe vera gel

15

Shea Lindsay
Toxicology Final
Spring 2015

C: Laxatives-

Laxatives are not well understood because of the complexity of the human GI system, but there are a few functions that are generally known.

1. Fluid retention in colonic contents thereby increasing bulk
2. Direct and indirect effects on the colonic mucosa to decrease net absorption of water and NaCl
3. Increase of intestinal motility

The two classes of laxatives that cause for the most concern are the ones that decease absorption of water and NaCl and the increased intestinal motility. These can cause nausea, diarrhea (causing further dehydration), abdominal pain and cramping, electrolyte disturbances, and decreased colonic innervation.

The main concern for short-term symptoms is electrolyte imbalance and dehydration. The easy solution would be to have the patient supplement with electrolytes before and after taking a laxative with plenty of water. Because there is so much nutrient absorption happening in the small intestines and complexity of the GI tract, there may also be other nutrient imbalances due to decreased absorption from increases in motility. This decreases the amount of time that food is in the body, which decreases the amount of time for the nutrients to be absorbed. It is difficult to say what a patient should supplement in this case unless blood work is done to find out a specific deficiency.

When having a patient who has to take laxatives, the first question I would ask is why are they taking them. Some may suffer from chronic constipation while others may take them for weight management. The first thing would be to educate the patient on the side effects and risks of these medications. Then I would educate them on what normal GI function looks like and that there must be an underlying reason why there is dysfunction. The most efficient route to take would be to do a full stool analysis to look if there were any underlying infection such as H. Pylori or Candida, what the bacterial make up looks like, and if there is an excess of any specific nutrients that are not being absorbed. From there, they can either go on a natural regimen to get rid of infection, improve bacterial variety and quantity, and improve their diet in order to begin gut healing. All of these things should improve function, decrease toxicity to the body, decrease body weight, and improve energy with out the use of drugs.

Reference

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D: 2: Antiperspirants: aluminum chlorohydrate

Studies have shown that healthy skin absorbs 10.5 micrograms of aluminum a day in antiperspirants which is over the safe 8.6 micrograms recommended for a 60 kg adult. The absorption rate is even higher for damaged skin, such as after shaving. This shows that antiperspirant alone exceeds the aluminum limit for an adult in a week without the considerations of aluminum ingestion from utensils, food, and toothpastes.

The aluminum salts in antiperspirants, such as the chlorohydrates form gel plugs within the sweat ducts to prevent sweat from reaching the skin surfaces temporarily. With the rising incidence of breast cancer in the upper, outer quadrant of the breast tissue, there has been a question to whether there is a link to aluminum containing antiperspirants and breast cancer. This could be connected based on the concept of decreasing sweating by blocking sweat ducts, which decreases detoxifying through our skin. As of now, there are not many studies on humans and the links of aluminum to breast cancer.

There have been studies on mice, which have shown neurotoxicity from cumulative exposure to aluminum. There have not been any studies on human subjects linking neurodegenerative diseases to aluminum.

There was not much evidence on the acute toxicity of aluminum from antiperspirants, but there are many theories on the chronic toxicity in humans. Unfortunately, this country is based on social appearance and what is acceptable. Antiperspirants help decrease unattractive sweat from under arms, especially for women. The best alternative is a natural deodorant without aluminum. The downside is that many natural alternatives do not have anti-sweating capabilities. There are also other options to decrease odor-causing bacteria from the armpits such as apple cider vinegar and water mixture, baking soda, and coconut oil. These are all natural astringents to help block odor.

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Sarah Merritt

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME _____

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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)

Answer: PAHs are largely derived from burning of various products, mostly coal, garbage, gasoline, plastics, etc. Exposure can happen through inhalation of fumes, ingestion (often through food grown in contaminated soil), and cutaneous (through air fumes, but mostly from soil contact, as well). (Agency) Once in your body some is distributed into fat cell, but the vast majority is changed into dihydrodiols and phenols and either conjugated with glucuronide and sulfates to be excreted in bile or with glutathione to become Mercaptic acid and be excreted by the kidneys. (Registry). WE all are likely to incur small levels of exposure to PAH through inhalation via our environment. Small amount do not seems to be dangerous and are excreted from our system within about a day. Chronic increased exposure seems to be related to cancer and acute exposure during pregnancy has been shown to produce birth defects in mice, such as decrease immune function and infant body weight, damage to body fluids and skin. (Agency)

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. Can wine be produced without using it? Are there are alternatives?

Answer: Sulfur Dioxide is used to preserve wine and improve the robustness of flavor. It is an odorless gas that is pumped and easily dissolved into the wine. You can make wine without adding Sulfur Dioxide, but you can't make wine without it entirely. The bacteria used to ferment wine produces about 10 parts per billion on its own. (Henderson). Wine produces without it will simply just present with a different character. Alternative methods would include accounting for the oxidation and malactic acid fermentation that will occur without addition of Sulfur Dioxide. When the gas is leaked it damages lung and respiratory tissue. It can feel "like you are being suffocated, like with pepper spray" (Groman). Inhalation doses of more than 100 ppm are considered immediately dangerous to life and health. (Registry, ToxFAQs for SulfurDioxide) long term exposure has less research behind it because most long term, sub-toxic inhalation happens with mine workers who are at risk for several others toxic loads and the risk from specifically Sulfur Dioxide cannot be adequately teased out. (Registry, ToxFAQs for SulfurDioxide).

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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. Antacids

Answer: Antacids decrease stomach acid which decreases protein denaturing and subsequently leads to decreased absorption of proteins from food later in the GI tract which ultimately results in malnutrition on various levels. A person can deal with this most effective by dealing with the cause of heart burn directly. Most often a person's food choices are a cause. Either eating things that your body is intolerant to or agitating (such as excess alcohol or caffeine) will lead to heartburn. Until the body heals as is able to produce proper amounts of stomach acid a person can supplement food intake with proteolytic enzymes, like Bromelain, to help with food degradation until the body can do it on its own. Papaya extract can also be help at keeping symptoms at bay. B Vitamins (B12 of particular importance) are important to counter balance vitamin deficiencies. (Balch)

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D. 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
(b) Discuss alternative therapies, including those in chiropractic medicine

Answer: a) Flibanserin is thought to effective at treating female HSDD (Hypo Sexual Desire Disorder). HSDD is a mental condition wherein a female has a sexual desire under a level that is comfortable for her and is subsequently unable to reach satisfaction during engagements due to lack of desire (Pharmacueticals). Flibanserin works on NTs in the brain to do this. In region CA1 of the cortex Flibanserin inhibits firing rate, meaning cortical activation is suppressed. Flibanserin then enhances postsynaptic 5-HT reception in the CA3 region, aka the hippocampus. The hippocampus is the region of the brain which allows for better emotional reactions and connections thought to be a core component in female sexual drive and climax. Flibanserin also raises the levels of both Dopamine and Norepinephrine leading to increased excitability and related to more primal mesencephalic drive.

Essentially this medication is working to increase Mesencephalic drive and induce a perceived sense of emotional connection. This, chiropractically, can be influenced but upper cervical care by ensuring the brain stem is receiving proper input and the sympathetic/parasympathetic balance is maintaining as it should be. We know UC specific care works integrally with the mesencephalon with huge influences on Oxytocin and Orexin and by clearing the atlas make sure that the body is capable of these pathways. Also, stimulating mesencephalic pathways apart from chiropractic can be valuable. Primal activities like intense exercise, eating turkey (a valuable precursor to both serotonin and dopamine pathways), regulating cortisol/melatonin rhythms and obtaining proper sleep. Secondly, a more natural alternative outside of an outside in approach would be that actually to build a connection with your partner. Take walks, talks or whatever the woman needs to feel connected. It would also help to educate the partner that this is an important part of foreplay for her.

Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME ___Sterling Petersen_____

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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)

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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)

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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

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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.

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME: Tanner Schulze

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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. Pesticides—Insecticides: organophosphates

Exposure- There is two key exposure sites for pesticides. The first location is occupational such as agricultural workers in fields, greenhouses, pesticide industry, and exterminators. The second is the general population through the foods we eat and water we drink. However, the general population can also come across pesticides through the occupational locations as well.

Toxicokinetics- The toxicokinetics of pesticides has a large range depending on the compounds within the specific pesticide. Anthrax for example involves several complex steps. A spore is taken up by immune cells then transported to local lymph nodes, which then produce deadly toxins. These toxins spread systematically, which leads to death of the host. In other words the spores are ingested by macrophages where they then germinate within other target tissues causing high toxicity levels in these tissues/organs leading to cell death.

Toxicodynamics (acute, chronic toxicity, effects on physiology and eliciting pathologies)- Children have the greatest susceptibility to the toxic effects of pesticides. The Natural Resource Defense Council has shown higher incidences of leukemia, brain cancer and birth defects in children exposed to pesticides, which are neurotoxins. Some of the effects include pre mature birth with decreased growth, lower cognitive scores, fewer nerve cells, lower birth weight, and greater risk of Parkinson's disease. The effects of the pesticides range greatly from one pesticide to another.

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. Can wine be produced without using it? Are there are alternatives

Acute/ Chronic toxicity- In a literature review study based on acute and chronic exposure those who should be concerned with SO2 exposure are children and asthmatics (when the pollutant is of respiratory exposure). The studies expressed acute toxicity can cause postnatal somatic and behavioral alterations after maternal SO2 exposure during pregnancy. The exposure expressed a complex toxic hazard, which may alter the developmental processes in offspring. Also, chronic exposure has been link to being carcinogenic.

Can wine be produced without SO2? Yes, there are wines produced without SO2. However, SO2 is necessary for the longevity of the wine. It has an antioxidant and antimicrobial effect, which makes the wine last longer. 15

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. Antacids

Nutrient absorption- Antacids cause irritation of the gastric lining, which decreases the amount of gastric juices secreted. The gastric juices being secreted play a crucial role in the breakdown of foods into absorbable nutrients. With that being said, Antacids decrease gastric juices, which leads to a decrease in the breakdown of food. Ultimately leading to a decrease in available nutrients for absorption.

Alternative- I would not recommend an alternative drug. However, I highly recommend further investigation of the underlining need for an antacid. Commonly antacids are used to GERD. GERD is thought to be an increased amount of acidity as well as a weak esophageal sphincter. However, a change in the individual's diet which includes acidic fluids/ foods (e.g., lemon water, apple cider vinegar) will help manage the production of H. Pylori, which attributes to GERD. 15

D. 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
(b) Discuss alternative therapies, including those in chiropractic medicine

a. Flibanserin's goal is to increase dopamine and norepinephrine levels while decreasing serotonin levels. By balancing out these neurotransmitter ratios the women should experience a healthy sexual drive. The molecular compound is trifluoromethyl phenyl poperazin-1-y ethyl-1, 3-dihydro-2H-benzimidazol-2-one.

b. I recommend chiropractic adjustments (e.g., lumbo-pelvic, sacral), proper diet and exercise. With adjustments, proper diet and exercise one should be able to maintain proper hormonal balance. After the patient has these components down and if they contain to experience a decreased sex drive then I will re-evaluate and consider dietary and lifestyle changes.

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Pathology 438 Final Examination due: 15 June 2015
Spring 2015
NAME Valerie Lyon

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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)

PAHs are released when fuels are burned, things like petroleum, coal or charring meat. Soot is an example the CDC uses for a substance that contains many of these potentially carcinogenic chemicals. it has been found that the least damaging way to absorb these chemicals is via the skin becuase they are more easily excreted and therefore have less chance to do damage. Unfortunately they are everywhere and very small so they are easily inhaled and eaten without our knowledge.
Toxicokinetics: absorbed via consumption, inhalation or skin contact. They have been found to be mainly excreted in feces in animals. It may be easier to excrete PAHs after dermal exposure via sweat and urine.
When inhaled The mucus membrane absorbs PAHs and when consumed they are absorbed by the GI tract. PAHs are fat soluble and are passively diffused into the skin.

Toxicodynamics: When the PAHs are in the system they can bind to DNA strands performing mutagenesis and possibly carcinogenic issues.

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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. Can wine be produced without using it? Are there are alternatives

When Sulfur dioxide dissolves into a water based liquid like the mucosa of the eye or lungs it creates Sulfurous acid which has a pH of 1.5, very acidic, this can cause irritation or corrosion and also create issues with the movement and changing of the cilliary mucus. The bisulfite ion that is created can cause bronchial constriction. When this chemical gets to the GI system it can cause nausea, vomiting and abdominal pain. respiratory symptoms can include asthma like symptoms as well as pulmonary fibrosis, RADS, and bronchopneumonia with bronchiolitis. There have been studies saying that colloidal silver can be used effectively instead of sulfur dioxide as a preservative and antiseptic. Colloidal silver is a non-prescription supplement used to boost the immune system and fight illness. 11

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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. Anticonvulsants

Anticonvulsants have been linked to malabsoprtion of folic acid, vitamin D and possibly other vitamins and minerals. It has been recommended to get a folate and vitamin D supplement prescribed along with them. There are many other depletions that can happen due to anticonvulsant medications like many minerals as well. The patient may take to their GP or neurologist about a overall vitamin supplement to make up for the depletion of nutrients. The

depletion of nutrients can either happen via mal absorption or increased metabolism of the nutrient.

Ketogenic diet: A diet high in vegetables and fat with some protein that is meant to limit the amount of glucose in the body and brain. This diet forces the brain to start running off of ketone bodies that come from fat metabolism. The difference and balance in nutrients may help balance the brain's functions.

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D. 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

The manufacturer believes that it increases dopamine and norepinephrine levels in the mind and body by postsynaptically blocking certain serotonin receptors on pyramidal neurons and activating others. The goal of this chemical activity is to prevent the process stopping effect of serotonin on certain functions of the brain and body. This drug also promote activation of dopamine and norepinephrine and further prevents serotonin producing neurons from activating by reducing the amount of glutamate transmission that happens to the brain stem.

The effects of this interaction cause a better environment for the reward centers in the brain to be activated creating a more positive experience and higher desire for sexual activity.

(b) Discuss alternative therapies, including those in chiropractic medicine

Chiropractic: Women who are pre menopausal seem to be put in high stress situations in our society. Stress puts people in high sympathetic mode neurologically and that reduces sexual drive. If the chiropractic adjustment targeted the sympathetic ganglion levels (thoracic and sacral spine) this can help improve sexual desire and allow the woman to become more relaxed and allow a more parasympathetic lifestyle. This would create a better environment around the woman to be able to achieve arousal. Women may also have some sort of sexual dysfunction that can affect them differently than males so a sacrum adjustment may benefit.

Ginseng gives an energy and mood boost that may help with sexual desire and ability.
Black Cohosh can be helpful with premenstrual and premenopausal symptoms like hot flashes, night sweats and vaginal dryness.
Chasteberry may increase dopamine and progesterone levels to increase female libido.

Most alternative treatments for females with low libido involve relaxation or meditative techniques.

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Vincent Cascio
38786

A. Environmental Toxicants

1. Polyaromatic hydrocarbons (PAHs)

Exposure:

Polyaromatic hydrocarbons (PAHs) are formed from the incomplete combustion of plant or animal matter, or carbon fuels, such as coal or petroleum. Automobile exhaust, industrial emissions and smoke from burning wood, charcoal and tobacco contain high levels of PAHs

Many products contain PAH's such as mothballs, blacktop, and creosote wood preservatives and some special-purpose skin creams and anti-dandruff shampoos that contain coal tars. Grilled, smoked and charbroiled foods, especially meats, are a source of some PAH exposure [1]

Toxicokinetics/Toxicodynamics:

PAH's are known to be carcinogenic in humans and linked to, lung, skin, gastro-intestinal and bladder cancers[4]

In humans, the major routes of uptake of PAH are thought to be through:
(i) the lungs and the respiratory tract after inhalation of PAH-containing aerosols or of particulates to which a PAH, in the solid state, has become to be absorbed
(ii) the gastro-intestinal tract after ingestion of contaminated food or water
(iii) the skin as a result of contact with PAH-bearing materials.[2]

14

Owing to the high lipophilicity of this class of compounds, their bioavailability after ingestion and inhalation must be considered to be significant. Investigations have shown that (i) detectable levels of PAH occur in almost all internal organs, (ii) organs rich in adipose tissue can serve as storage depots from which the hydrocarbons are gradually released, and (iii) the gastrointestinal tract contains high levels of hydrocarbon and metabolites, even when PAH are administered by other routes, as a result of mucociliary clearance and swallowing or hepatobiliary excretion.[3]

PAH's are eliminated in feces and urine.

Sulfur dioxide (SO_2) is added to wine during its production. Discuss what is known about acute and chronic toxicity and other toxicodynamic features. Can wine be produced without using it? Are there are alternatives

Sulfur dioxide (SO_2) is added to wine to inhibit or kill unwanted yeasts or bacteria. It is also used as a preservative in foods. Sulfer dioxide is considered safe for ingestion in healthy individuals that are not asthmatic. In sensitive individuals , it can induce asthma when inhaled or ingested, even in high dilution.[5] Some anecdotal reports suggest a link between sulfites in wine and headaches, skin rashes, flushing, itching or swelling but there is no clear evidence to back this up. No studies show a link between cancer and long term exposure via ingestion.

One can limit sulfite exposure by drinking organic or sulfite free wine. This however only minimizes exposure as there is no such thing as 100% free sulfite wine. Sulfites form naturally during the fermentation process and are therefore unavoidable in wine. Naturally occurring sulfites are generated in very small amounts ranging from 6 to 40 parts per million (ppm)[6]. Wines with total SO_2 concentrations below 10 ppm do not require "contains sulfites" on the label in the US. The upper limit of total SO_2 allowed in wine in the US is 350 ppm[7] 14

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.Antacids

Antacids work by preventing, neutralizing, or counteracting acidity. Magnesia or sodium bicarbonate are two common compounds used to neutralize stomach acids. Proton pump inhibitors (PPI's) work via long lasting inhibition of acid production. Long term PPI usagecan diminish B_{12} absorption leading to pernicious anemia. Supplementation via B_{12} intramuscular injection can offset losses in gastrointestinal absorption.

Dietary changes can help to control stomach acid issues. Some foods contain enzymes to help with digestion and/or produce an alkalizing effect on the body. These include: yogurt, ginger, peppermint, wheatgrass, aloe vera juice, papaya, pineapple, and apple cider vinegar among others. 14

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

Flibanserin was developed as an antidepressant. The proposed mechanism of action is via modulation of neurotransmitters involved in the excitation and inhibition of sexual arousal. The excitatory activity is driven by dopamine and norepinephrine, while the inhibitory activity is driven by serotonin. Flibanserin, a 5-HT1A receptor agonist, D4 receptor very weak partial agonist/antagonist, and 5-HT2A receptor antagonist, may improve the balance between these neurotransmitter systems.[8]

Women receiving Flibanserin showed a 2.8-4.5 increase in reported “satisfying sexual events” per month. Studies did not show an increase in sexual desire and therefore Flibanserin has not met the agreed upon criteria for efficacy in treatment of Hypoactive Sexual Desire Disorder.

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