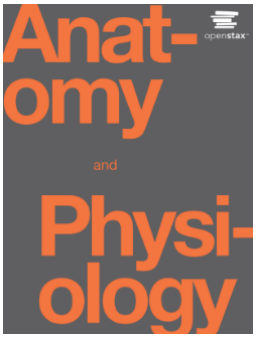


Student Study Guide with Test Questions

G215-C: Anatomy and Physiology - Part III

by Kelly A. Young

Anatomy and Physiology - Part III delves into the respiratory, digestive (including metabolism and nutrition), urinary systems in unit 5 (chapters 22-26). Unit 6 offering a look into the nervous, endocrine system control and regulation. Unit 6 (chapters 27 & 28) peer into the reproductive system and development of a child in utero.

Please feel free to ask questions about the material in the Natural Health category of The Learning Center, in our Student Discussion Group.

Select the best answer(s) from the text.

Unit 5: Chapter 22

1. (True or False) Although oxygen is a critical need for cells, it is actually the accumulation of carbon dioxide that primarily drives your need to breathe.
    A. True
    B. False

NOTE: Page 1034. Inflammation of the upper respiratory tract can be caused by inhaling irritants but is commonly due to infection. Such infections are usually caused by viruses that lower the resistance of the respiratory tract to other infections. This allows bacteria to invade the tissues.

2. The major organs of the respiratory system function primarily to provide oxygen to body tissues for: (*select all that apply*)
    A. Cellular Respiration
    B. Removal of Carbon Dioxide
    C. Helps maintain acid-base balance
    D. Running
    E. Sensing odors
    F. Growing
    G. Speech production
    H. Straining

3. (True or False) The purpose of the paranasal sinuses are to cool and humidify incoming air.
    A. True
    B. False

4. (True or False) Cold air slows the movement of the cilia, resulting in accumulation of mucus that may in turn lead to a runny nose during cold weather, capillaries located just beneath the nasal epithelium warm the air by convection, and serous and mucus-producing cells also secrete the lysozyme enzyme and proteins called defensins, which have antibacterial properties.
    A. True
    B. False

5. The function of the pharyngeal tonsil (also called an adenoid) is not well understood. However, we know the following to be true: (*select all that apply*)
    A. It contains a rich supply of lymphocytes
    B. It is larger in adults than in children
    C. The ciliated epithelium is its cover which traps and destroys invading pathogens that enter during inhalation
    D. All of the above

6. (True or False) The main function of the bronchi, like other conducting zone structures, is to provide a passageway for air to move into and out of each lung. In addition, the mucous membrane traps debris and pathogens.
    A. True
    B. False

NOTE: Pages 1044-1045. Pulmonary emphysema usually develops as a result of long-term inflammatory conditions or irritation of the airways. On microscopic examination, the lung tissue is full of large, irregular cavities created by the destruction of alveolar walls.

Asthma is a common inflammatory disease of the airways associated with episodes of reversible over-reactivity of the airway smooth muscle. In Get Healthy Now, Professor Null explains a milk allergy's changing symptoms: "Even if the symptoms are not the same, the underlying allergy may be. A child who has suffered milk-associated asthma, for instance, may have severe acne as a teenager. The milk allergy is still there, but its symptoms have moved to a different organ system, often misleading the patient and physician into thinking that the original allergy has been outgrown." According to Alternative Medicine, up to half of all infants may be sensitive to cows' milk. As a result, symptoms of an underlying milk allergy may start as early as infancy, only manifested as eczema, a symptom that may remain later on in childhood and adulthood. Furthermore, in addition to asthma and eczema, an underlying milk allergy may manifest as bronchitis, sinusitis, autoimmune disorders, frequent colds and ear infections and even behavioral problems.

"Epidemiologic studies suggest that children with asthma may breathe easier if they are exposed to fewer pesticides at home and at school. And parents and school administrators may breathe easier knowing that they are not harming the children's developing nervous systems." -Dr. Ruth Etzel, MD, PhD, George Washington University School of Public Health and Health Services

"Glyphosate is one of the most commonly used pesticides on lawns and landscapes. Exposure to glyphosate can cause asthma-like symptoms and breathing difficulty. Undisclosed, or proprietary, ingredients (called "inert ingredients") in Round-up®, a common formulation of glyphosate, have been linked to pneumonia and damage to the mucous membrane tissue and the upper respiratory tract." https://www.beyondpesticides.org/assets/media/documents/children/asthma/AsthmaBrochureCited.pdf

NOTE: Page 1048. There are over 4,000 chemical compounds in cigarette smoke. From carcinogens and toxic metals, to radioactive heavy metals and poisons. Approximately 70 of these chemicals are known to cause cancer.

NOTE: Page 1057. Morphine.

In laboratory studies it was found that "morphine can directly boost tumor-cell proliferation and inhibit the immune response. The researchers found that opiates also promote angiogenesis, the growth of new blood vessels, and decrease barrier function--effects that may exacerbate diseases involving vascular leakiness including acute lung injury in experimental models. In a surgical setting, decreased barrier function may make it easier for tumors to invade tissue and spread to distant sites. Increased angiogenesis helps cancers thrive in a new site." Common pain relief medication may encourage cancer growth https://www.sciencedaily.com/releases/2009/11/091118143209.htm

7. The pulmonary artery carries _____ into the lungs from the heart, where it branches and eventually becomes the capillary network composed of pulmonary capillaries. These pulmonary capillaries create the respiratory membrane with the alveoli. As the blood is pumped through this capillary network, gas exchange occurs.
    A. Plasma
    B. Deoxygenated Blood
    C. Oxygenated Blood
    D. Lymph

8. (True or False) Oxygen is not toxic to anaerobic bacteria.
    A. True
    B. False

9. Factors that influence oxygen-hemoglobin blood saturation are: (*select all that apply*)
    A. Partial pressure of oxygen and hemoglobin saturation
    B. High Temperatures
    C. Certain hormones that affect BPG (2,3-bisphosphglycerate) production
    D. Blood pH

10. (True or False) It is more difficult for a body to achieve the same level of oxygen saturation at high altitude than at low altitude, due to lower atmospheric pressure.
    A. True
    B. False

11. (True or False) Major growth and maturation of the respiratory system occurs from week 24 until term, however, the development of the respiratory system begins at about week 4 of gestation. By week 28, enough alveoli have matured that a baby born prematurely at this time can usually breathe on its own.
    A. True
    B. False

NOTE: Page 1073. Cystic fibrosis is one of the most common genetic diseases affecting 1 in 2,300 babies. It is estimated that almost 5% of people carry the abnormal recessive gene which must be present in both parents to cause the disease.

Unit 5: Chapter 23

12. (True or False) The intestinal veins deliver blood directly to the heart, nutrients and all.
    A. True
    B. False

13. (True or False) The alimentary canal is also known as the gastrointestinal (GI) tract.
    A. True
    B. False

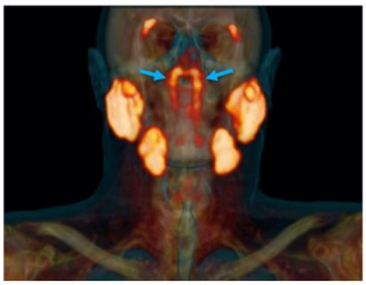
NOTE: Page 1090. One pair of cranial nerves (vagus nerves) supplies most of the alimentary canal and the accessory organs. Sacral nerves supply the most distal part of the tract. The effects of parasympathetic stimulation increase muscular activity, especially peristalsis.

14. The processes of digestion include six of the following activities: (*select all that apply*)
    A. Trepidation
    B. Ingestion
    C. Propulsion
    D. Digestion (mechanical or physical)
    E. Digestion (chemical)
    F. Installation
    G. Absorption
    H. Defecation

15. Age-related pathologies that affect the digestive organs include:
    A. Hiatal Hernia
    B. Gastritis
    C. Peptic Ulcers
    D. All of the above

16. (True or False) Saliva is essentially (95.5 percent) water. The remaining 4.5 percent is a complex mixture of ions, glycoproteins, enzymes, growth factors, and waste products. Perhaps the most important ingredient in saliva from the perspective of digestion is the enzyme salivary amylase, which initiates the breakdown of carbohydrates.
    A. True
    B. False

NOTE: Brand new research published October, 2020



(Valstar et al., Radiotherapy and Oncology, 2020)

The tubarial glands (The Netherlands Cancer Institute)

The tubarial glands structure, indicated by blue arrows, alongside other major salivary glands in orange.

Scientists Just Discovered a Mysterious Organ Lurking in The Centre of The Human Head

Medical researchers have made a surprise anatomical discovery, finding what looks to be a mysterious set of salivary glands hidden inside the human head – which somehow have been missed by scientists for centuries up until now. This "unknown entity" was identified by accident by doctors in the Netherlands, who were examining prostate cancer patients with an advanced type of scan called PSMA PET/CT. When paired with injections of radioactive glucose, this diagnostic tool highlights tumours in the body.

In this case, however, it showed up something else entirely, nestled in the rear of the nasopharynx, and quite the long-time lurker. "People have three sets of large salivary glands, but not there," explains radiation oncologist Wouter Vogel from the Netherlands Cancer Institute. "As far as we knew, the only salivary or mucous glands in the nasopharynx are microscopically small, and up to 1,000 are evenly spread out throughout the mucosa. So, imagine our surprise when we found these."

Salivary glands are what produce the saliva essential for our digestive system to function, with the bulk of the fluid produced by the three major salivary glands, known as the parotid, submandibular, and sublingual glands. There are approximately 1,000 minor salivary glands too, situated throughout the oral cavity and the aerodigestive tract, but these are generally too small to be seen without a microscope.

The new discovery made by Vogel's team is much larger, showing what appears to be a previously overlooked pair of glands – ostensibly the fourth set of major salivary glands – located behind the nose and above the palate, close to the centre of the human head. "The two new areas that lit up turned out to have other characteristics of salivary glands as well," says first author of the study, oral surgeon Matthijs Valstar from the University of Amsterdam. "We call them tubarial glands, referring to their anatomical location [above the torus tubarius]."

These tubarial glands were seen to exist in the PSMA PET/CT scans of all the 100 patients examined in the study, and physical investigations of two cadavers – one male and one female – also showed the mysterious bilateral structure, revealing macroscopically visible draining duct openings towards the nasopharyngeal wall. "To our knowledge, this structure did not fit prior anatomical descriptions," the researchers explain in their paper. "It was hypothesised that it could contain a large number of seromucous acini, with a physiological role for nasopharynx/oropharynx lubrication and swallowing."

As for how the glands haven't previously been identified, the researchers suggest the structures are found at a poorly accessible anatomical location under the skull base, making them hard to make out endoscopically. It's possible duct openings could have been noticed, they say, but might not have been noticed for what they are, being part of a larger gland system. Additionally, it's only the newer PSMA-PET/CT imaging techniques that would be able to detect the structure as a salivary gland, going beyond the visualisation capabilities of technologies like ultrasound, CT, and MRI scans.

While the team concedes that additional research on a larger, more diverse cohort will be needed to validate their findings, they say the discovery gives us another target to avoid during radiation treatments for patients with cancer, as salivary glands are highly susceptible to damage from the therapy. Preliminary data – based on a retrospective analysis of 723 patients who underwent radiation treatment – seem to support the conclusion radiation delivered to the tubarial glands region results in greater complications for patients afterwards: a result that not only could benefit future oncology, but also seems to strengthen the case that these mysterious, overlooked structures really are salivary glands.

"It seems like they may be onto something," pathologist Valerie Fitzhugh from Rutgers University, who wasn't involved with the study, told *The New York Times*. "If it's real, it could change the way we look at disease in this region." The findings are reported in *Radiotherapy and Oncology*.

https://www.sciencealert.com/chance-discovery-reveals-mysterious-organ-lurking-in-human-head-missed-for-centuries

17. (True or False) The stomach dumps all of its food into the small intestine at one time.
    A. True
    B. False

18. The purpose of the mucosa of the stomach is to: (*select all that apply*)
    A. Block gastric juice from penetrating the stomach's underling tissue layers
    B. Allow powerful gastric enzymes to digest protein without harming the stomach
    C. Form a physical barrier that contains bicarbonate ions which neutralize acid
    D. Protect the stomach from self-digestion

NOTE: Page 1109. Functions in the stomach include the preparation of iron for absorption further along the tract – the acid environment of the stomach solubilizes iron salts, which is essential before iron can be absorbed.

Intrinsic factor (a glycoprotein secreted by the parietal cells that reside within the gastric glands of the stomach) binds to vitamin B12. Once bound, intrinsic factor and B12 travel to the ilium of the small intestine to be absorbed into the bloodstream. Vitamin B12 is needed for red blood cells to form and grow. Some people do not produce enough intrinsic factor or have a condition that destroys it.

19. Which is the primary digestive organ in the body?
    A. Mouth
    B. Stomach
    C. Small Intestine
    D. Large Intestine

NOTE: Page 1114. The small intestine is continuous with the stomach at the pyloric sphincter. The small intestine is a litter over 5 meters (almost 16 ½ feet!) long and leads into the large intestine at the ileocecal valve.

20. (True or False) People with lactose intolerance exhale hydrogen.
    A. True
    B. False

21. (True or False) The large intestine is actually shorter in length than the small intestine. However, it is called large because it is twice the diameter (about 3") of the small intestine.
    A. True
    B. False

NOTE: The large intestine is heavily colonized by certain types of bacteria, which synthesize vitamin K and folic acid. They include Escherichia coli, Enterobacter aerogenes, Streptococcus faecalis, and Clostridium perfringens. These microbes are commensals, i.e. normally harmless, in humans. However, they may become pathogenic if transferred to another part of the body.

The average human digestive tract contains as many as 1,000 species of microorganisms. Most of the organisms are either harmless or helpful under normal, balanced circumstances. If something upsets the balance of these organisms in the digestive tract harmless bacteria can grow out of control and lead to illness. Antibiotic drugs taken to treat an infection, destroys either some or most of the normal, helpful bacteria. Without enough normal and helpful bacteria, C. difficile (C diff) can quickly grow out

of control. The antibiotics that most often lead to C. difficile infections include fluoroquinolones, cephalosporins, clindamycin and penicillins. Once established, C. difficile produces toxins that attack the lining of the intestine.

TEXT HIGHLIGHT: "In diarrheal illness, **the appendix may serve as a bacterial reservoir to repopulate* the enteric bacteria** for those surviving the initial phases of the illness. Moreover, its twisted anatomy provides a haven for the accumulation and multiplication of enteric bacteria."

*"*Individuals without an appendix were four times more likely to have a recurrence of Clostridium difficile,* exactly as Parker's hypothesis predicted. Recurrence in individuals with their appendix intact occurred in 11% of cases. Recurrence in individuals without their appendix occurred in 48% of cases." Your Appendix Could Save Your Life

22. The hepatic artery delivers oxygenated blood from the heart to the liver. The hepatic portal vein delivers partially deoxygenated blood containing nutrients absorbed from the small intestine and actually supplies more oxygen to the liver than do the much smaller hepatic arteries. In addition to nutrients, _____ are also absorbed.
    A. Cellular Wastes
    B. Hormones
    C. Lymphocytes
    D. Drugs and Toxins

NOTES:
Hepatitis A was previously known as "infectious hepatitis" and affects mainly children, causing a mild illness. Antibodies develop and confer lifelong immunity after recovery.

Hepatitis B is a virus that enters the blood and is spread by contaminated blood and blood products. The virus is also spread by body fluids and from infected mother to fetus.

MayoClinic 2016 - "Most people infected with hepatitis B as adults recover fully, even if their signs and symptoms are severe." National Vaccine Information Center - "As of March 2012, there was a total of 66,654 hepatitis B vaccine- related adverse events reported to the federal Vaccine Adverse Events Reporting System (VAERS), including reports of headache, irritability, extreme fatigue, brain inflammation, convulsions, rheumatoid arthritis, optic neuritis, multiple sclerosis, lupus, Guillain Barre Syndrome (GBS) and neuropathy."

Most reactions never get reported to the VAERS because the doctors and/or parents don't understand that the vaccine could have been the issue. Hep B is given to babies immediately after birth so who can say if they were "born that way" or if it was the Hep B shot? The infant also has no ability to communicate headaches or joint aches and extreme fatigue.

Hepatitis C is prevalent in IV drug users and the infection is very frequently asymptomatic as a carrier state occurs.

TEXT HIGHLIGHTS: Page 1126. "Bile is a mixture secreted by the liver to **accomplish the emulsification of lipids** in the small intestine. …Bile salts act as **emulsifying agents**, so they are also important for the **absorption of digested lipids**."

NOTE: In other words, bile salts make cholesterol and fatty acids soluble, enabling both these and the fat-soluble vitamins (A, D, E, K) to be readily absorbed. Oil (fats) and water do not mix. An emulsifier works to reduce the size of fat globules, which then increases their surface area. An amazing organ, this liver…

Bile is needed for absorption of fat-soluble vitamins in the small intestine.

Gallstone predisposing factors include: changes in the composition of bile that effect solubility of its constituents. Phosphatidylcholine (PC) is considered to be the main cholesterol solubilizer in bile. It is needed to convert cholesterol to bile acids. Phosphatidylcholine is a fat molecule that contains the essential nutrient choline. Foods that contain choline and/or phosphatidylcholine are eggs, meat, fish, broccoli, almonds, walnuts, peanuts, cashews, Brussels sprouts, avocados, kidney beans and navy beans.

NOTE: Page 1128. Distributed throughout the pancreas gland are groups of specialized cells called the pancreatic islets (islets of Langerhans). The islets have no ducts so the hormones diffuse directly into the blood. The function of the exocrine pancreas is to produce pancreatic juice containing enzymes that digest carbohydrates, proteins and fats. Pancreatic juice functions: Trypsinogen and chymotrypsinogen are inactive enzyme precursors activated by enterokinase, an enzyme in the microvilli, which converts them into the active proteolytic enzymes (that break down protein) trypsin and chymotrypsin.

The endocrine pancreas secretes the hormones insulin and glucagon, which are principally concerned with control of blood glucose levels.

NOTE: Page 1134. Malabsorption of nutrients and water from the intestines is not a disease in itself, but the result of abnormal changes in one or more of the following: villi in the small intestine, digestion of food (enzymes), absorption or transport of nutrients from the small intestine (remember, the villi are responsible for absorption and transport).

TEXT HIGHLIGHTS: Page 1136. "A chylomicron, is a water-soluble lipoprotein which is **too big to pass through the basement membranes of blood capillaries**. Instead, chylomicrons **enter the large pores of lacteals**. The lacteals come together to form the lymphatic vessels. The chylomicrons are transported in the lymphatic vessels and empty through the thoracic duct **into the subclavian vein of the circulatory system**. Once in the bloodstream, the enzyme lipoprotein lipase breaks down the triglycerides of the chylomicrons into free fatty acids and glycerol. These breakdown products then pass through capillary walls to be used for energy by cells or stored in adipose tissue as fat."

23. Fats (lipids) are not simply absorbed directly into the blood stream from the small intestines as are many nutrients. Which body system transports lipoproteins (fat proteins) from the digestive system?
    A. The Circulatory System
    B. The Endocrine System
    C. The Lymphatic System
    D. All of the above

NOTE: Fats provide the most concentrated source of chemical energy and heat. They transport and store fat-soluble vitamins A, D, E, and K. They form the myelin sheaths and are needed to form steroid hormones.

24. (True or False) Since women experience significant iron loss during menstruation, they have around twice the iron transport proteins in their intestinal epithelial cells as do men.
    A. True
    B. False

TEXT HIGHLIGHTS: Page 1137-8. "The **small intestine absorbs the vitamins that occur naturally in food and supplements**. **Fat-soluble vitamins (A, D, E, and K) are absorbed along with dietary lipids** in micelles* via simple diffusion. This is why you are advised to eat some fatty foods when you take fat-soluble vitamin supplements. Most water-soluble vitamins (including most B vitamins and vitamin C) also are absorbed by simple diffusion. An exception is vitamin B12, which is a very large molecule. Intrinsic factor secreted in the stomach binds to vitamin B12, preventing its digestion and creating a complex that binds to mucosal receptors in the terminal ileum, where it is taken up by endocytosis."

*Micelles are temporary combinations of bile salt, fatty acids, monoglycerides, and other fat-soluble substances such as vitamins and cholesterol. The micelles are water soluble and enable the lipid digestion products to be transported to the small intestinal surface for absorption.

Most minerals are absorbed in the small intestine without regard to need, except for Iron and calcium which are absorbed in the duodenum and only in the amounts that meet the body's current requirements.

Unit 5: Chapter 24

25. (True or False) Metabolism is always the same without regard to age, gender, activity level, fuel consumption, or lean body mass.
    A. True
    B. False

NOTE: Page 1150. "The reactions governing the **breakdown of food to obtain energy are called catabolic reactions**. Conversely, **anabolic reactions** use the energy produced by catabolic reactions to **synthesize larger molecules from smaller ones**, such as when the body forms proteins by stringing together amino acids."

Amino acids, which are basically broken-down proteins, are used for: growth and repair of body cells and tissues; synthesis of enzymes, plasma proteins, antibodies and some hormones; and provision of energy when there is not enough carbohydrate in the diet and fat stores are depleted. Proteins, in the form of amino acids, are potential fuel molecules that are used by the body only when other energy sources are low, e.g. starvation. To supply the amino acids for use as fuel, in extreme situations, the body breaks down muscle, its main protein source.

Metabolism constitutes all the chemical reactions that occur in the body, using nutrients to provide energy by chemical oxidation of nutrients, making new or replacement body substances. Metabolic pathways are switched on and off by hormones, providing control of metabolism and meeting individual requirements.

Catabolism is the breaking down of large into small molecules which releases chemical energy, then stored as adenosine triphosphate (ATP) and heat. Stored ATP can then be used for the anabolic processes of building and rebuilding.

Anabolism builds (synthesizes) which requires energy by chemical oxidation of nutrients, which then makes new or replacement body substances.

26. (True or False) The energy from ATP drives all bodily functions, such as contracting muscles, maintaining the electrical potential of nerve cells, and absorbing food in the gastrointestinal tract.
    A. True
    B. False

NOTE: There is a main theme within the list of functions of digestible carbohydrates: energy and heat. Carbohydrate in excess of that required to maintain the blood glucose level and glycogen stores in the tissues is converted to fat and stored in the fat depots.

NOTE: P1162. The Krebs cycle is enzyme-catalyzed reactions in living cells which are the final series of reactions of the aerobic metabolism of carbohydrates, proteins, and fatty acids, and by which carbon dioxide is produced, oxygen is reduced, and ATP is formed.

27. The liver can synthesize glucose to maintain the minimum levels needed in the blood. Which organ mentioned in the text requires glucose as an energy source?
    A. The Heart
    B. The Brain
    C. The Kidneys
    D. The Pancreas

NOTE: P1166. The liver stores the substances: glycogen, fat-soluble vitamins A, D, E, K, iron, copper, and B12 (not a complete list).

28. Which type of enzymes are most helpful in breaking down fats after they are emulsified by bile salts?
    A. Protease Enzymes
    B. Cellulase Enzymes
    C. Pancreatic Enzymes
    D. Amylase Enzymes

NOTE: P1170. The enzyme lipase converts fats to fatty acids and glycerol. To aid the action of lipase, bile salts emulsify fats (reduce the size of globules, thus increasing their surface area).

TEXT HIGHLIGHTS: Page 1172. “Organs that have classically been thought to be dependent solely on glucose, such as **the brain, can actually use ketones as an alternative energy source**.”

NOTE: Page 1175. Hydrochloric acid (HCL) kills ingested microbes and provides the acid environment needed for effective digestion of pepsins. Pepsinogens are activated to pepsins by HCL and by pepsins already present in the stomach. These enzymes begin the digestion of proteins, breaking them into smaller molecules.

NOTE: Page 1176. The liver removes the nitrogenous portion from the amino acids not required for the formation of new protein; urea is formed from this nitrogenous portion which is excreted in urine. Nucleic acids (genetic material) are broken down to form uric acid which is also excreted in the urine.

29. The hypothalamus in the brain is the master switch that works as a thermostat to regulate the body's core temperature. If the temperature is too high, the hypothalamus can initiate several processes to lower it. Which of the following processes are initiated by the hypothalamus to adjust the body's core temperature? (*Select all that apply*)
    A. Increasing the circulation of the blood
    B. Initiation of sweating
    C. Shivering
    D. None of the above

30. (True or False) The B vitamins play the largest role of any vitamins in metabolism.
    A. True
    B. False

NOTE: The charts on pages 1189 thru 1193 are beneficial. Keep in mind that the RDAs are typically low (although that is not an excuse to use mega doses), and modern foods do not contain the nutrients they used to:

> "A landmark study on the topic by Donald Davis and his team of researchers from the University of Texas (UT) at Austin's Department of Chemistry and Biochemistry was published in December 2004 in the *Journal of the American College of Nutrition*. They studied U.S. Department of Agriculture nutritional data from both 1950 and 1999 for 43 different vegetables and fruits, finding "reliable declines" in the amount of protein, calcium, phosphorus, iron, riboflavin (vitamin B2) and vitamin C over the past half century. Davis and his colleagues chalk up this declining nutritional content to the preponderance of agricultural practices designed to improve traits (size, growth rate, pest resistance) other than nutrition."
> Warning: Food is not Enough Anymore By Dr. Kneale https://globalnutritionalhealing.com/warning-food-is-not-enough/

The following are some brief notes about the function of specific nutrients.

Vitamins:

Vitamin A The first sign of deficiency is night blindness.

The Vitamin B complex is a group of water-soluble vitamins that promote activity of enzymes involved in the chemical breakdown (catabolism) of nutrients to release energy.

Vitamins B6, B12 and Folate function as important cofactors for enzymes involved in estrogen detoxification; thus, **decreased levels of B vitamins can lead to increased levels of circulating estrogens**.

Vitamin B1 is thiamin and it is essential for the complete aerobic release of energy from carbohydrates. Deficiency causes beriberi which includes the symptoms of polyneuritis, causing degeneration of motor, sensory and some autonomic nerves.

Note: Neuritis is the inflammation of one or more nerves. The characteristic symptoms of neuritis include pain and tenderness; impaired sensation, strength, and reflexes. Your autonomic nervous system is the part of your nervous system that controls involuntary actions, such as the beating of your heart and the widening or narrowing of your blood vessels. When something goes wrong in this system, it can cause serious problems, including: blood pressure and heart problems, trouble with breathing and swallowing, and erectile dysfunction in men.

Vitamin B2 (riboflavin) is involved with carbohydrate and protein metabolism, especially in the eyes and skin. Deficiency leads to cracking of the skin, commonly around the mouth and inflammation of the tongue.

Vitamin B3 is niacin which is associated with energy- releasing reactions in cells

Vitamin B5, Pantothenic acid is associated with amino acid metabolism. No deficiency diseases have been identified.

> "Pantothenic acid is a component of coenzyme A (CoA), an essential coenzyme in a variety of reactions that sustain life… The synthesis of essential fats, cholesterol, and steroid hormones requires CoA, as does the synthesis of the neurotransmitter, acetylcholine, and the hormone, melatonin. Heme, a component of hemoglobin, requires a CoA-containing compound for its synthesis. Metabolism of a number of drugs and toxins by the liver requires CoA ." - Linus Pauling Institute Micronutrient Information Center, 2016, lpi.oregonstate.edu

Vitamin B6, pyridoxine, is associated with amino acid metabolism.

Note: Vitamin B6 helps the body make several neurotransmitters. It is needed for normal brain development and function, and helps the body make the hormones serotonin, norepinephrine, and melatonin. Your body needs B6 in order to absorb vitamin B12 and to make red blood cells and cells of the immune system.

Vitamin B7, biotin is synthesized by microbes in the intestine and it is associated with the metabolism of carbohydrates, lipids, and some amino acids.

> Biotin Deficiency: "Symptoms include hair loss, dry scaly skin, cracking in the corners of the mouth, swollen and painful tongue that is magenta in color, dry eyes, loss of appetite, fatigue, insomnia, and depression. People who have been on parenteral nutrition -- nutrition given through an IV -- for a long period of time, those taking antiseizure medication or antibiotics long-term, and people with conditions like Crohn's disease that make it hard to absorb nutrients are more likely to be deficient in biotin." - University of Maryland Medical Center, 2016

Vitamin B9, folate (Folic acid) is essential for DNA synthesis, and when lacking, mitosis (cell division) is impaired. Deficiency at conception and during early pregnancy is linked to an increased incidence of spin bifida.

Note: Folic acid is crucial for brain function and it plays an important role in mental and emotional health. Folic acid also works with vitamin B12 to help make red blood cells and it helps iron work properly in the body. Folic acid, B6, B12 and other nutrients control blood levels of the amino acid homocysteine (homocysteine is an amino acid and breakdown product of protein metabolism).

Vitamin B12 is essential for DNA synthesis, and deficiency leads to megaloblastic anemia. It is also required for the formation of maintenance of myelin, the fatty substance that surrounds and protects some nerves. Deficiency of B12 causes irreversible damage such as peripheral neuropathy and/or subacute spinal cord degeneration. The presence of intrinsic factor* in the stomach is essential for vitamin B12 absorption, and deficiency is usually associated with insufficient intrinsic factor.

*Upon secretion, intrinsic factor binds to vitamin B12 in the stomach for adequate absorption in the small intestine.

Note: The most common cause of vitamin B12 deficiency is inadequate absorption. The most common reasons for inadequate absorption are:

- Overgrowth of bacteria, Candida, or parasites in the small intestine
- Malabsorption conditions (inflammatory bowel disease, celiac disease, etc.)
- Surgery that removes the part of the small intestine where vitamin B12 is absorbed
- Drugs such as antacids (Tums, Prilosec, Omeprazole, Nexium, Prevacid, etc.)
- Metformin (used to reduce blood sugar levels in diabetics)
- Decreased stomach acidity (common among older people - over 50)

NOTE: Crohn's disease is a chronic inflammatory condition of the alimentary tract. There is chronic patchy inflammation with edema of the full thickness of the intestinal wall, causing partial obstruction of the lumen, sometimes described as skip lesions. The question we need to ask is: why are the bowels inflamed or irritated? Common causes include wheat, corn, milk, soy, Candida/fungus/mold, parasites, imbalance between harmful and beneficial bacteria, pesticides/chemicals, sugar, and lack of nutrients.

Vitamin C is easily destroyed by heat, aging, chopping, salting, and drying. The daily requirement (to avoid the disease scurvy!) is 40 mg and after (2-4*) or (4-6*) months deficiency becomes apparent. (*Depends on book edition) The question to ask is are we avoiding disease only or are we building health? Each individual is different.

Note: The teeth and gums are an important reflection of health and they require the same minerals and vitamins as our bones. Bleeding gums, excess tartar, loose teeth, receding gums, infections, dying pulp, and cavities are primarily the result of inadequate nutrients. Periodontal disease symptoms include swollen gums, bright red or purplish gums, bleeding gums, gums that feel tender when touched, gums that pull away from the teeth (recede), new spaces developing between the teeth, pus between the teeth and gums, loose teeth, a change in the "bite" – the way the teeth fit together. These symptoms are also common in the stages of scurvy which is a deficiency of vitamin C.

Chronic gingivitis is a common inflammatory condition that occurs in response to accumulation of bacterial plaque around the teeth. It causes bleeding gums and gradually destroys the tissues that support the teeth, which eventually loosen and may fall out.

Vitamin D regulates calcium and phosphate metabolism/absorption.

Vitamin E is a group of eight tocopherols. As an antioxidant it protects membrane lipids from being destroyed in oxidative reactions.

Douglas C. Hall, M.D., in the article 'Vitamin E and Magnesium?' states that "Low serum vitamin E is associated with elevated estrogen levels, and may negatively affect estrogen detoxification. Women with PMS have experienced improvements of their symptoms when given supplemental vitamin E. Magnesium promotes estrogen detoxification by promoting methylation and glucuronidation, key estrogen detoxification pathways. Ovarian hormones influence magnesium levels, triggering decreases at certain times during the menstrual cycle as well as altering the calcium to magnesium ratio. These cyclical changes can produce many of the well-known symptoms of PMS in women who are deficient in magnesium and/or calcium".

Vitamin K is synthesized in the large intestine by bacteria and significant amounts are absorbed. It is required by the liver for the production of prothrombin and factors VII, IX, and X, all essential for the clotting of blood.

Macro Minerals:

Calcium is involved in blood clotting, nerve, and muscle function.

Magnesium is required in over 300 cellular processes, calcium absorption, and as a potassium antagonist.

Potassium is the most common intracellular cation and is involved in many chemical activities inside cells including muscle concentration, transmission of nerve impulses and maintenance of water and electrolyte balance.

Phosphates The phosphate minerals contain phosphorus and oxygen in a 1:4 ratio and are an essential part of nucleic acids (DNA and RNA), cell membranes, and energy storage molecules inside cells (such as adenosine triphosphate ATP). Although this mineral class is large (with almost 700 known species), most of its members are quite rare. It plays a crucial role in the bones, muscles, kidneys, and blood vessel health along with the cells in your body. Along with calcium, phosphorus helps build bones.

Sodium is the most common extracellular cation and is involved in muscle contraction, transmission of nerve impulses along axons and maintenance of water and electrolyte balance.

Trace Minerals: *(Not a complete list.)*

Iron is necessary for the oxidation of carbohydrates and the synthesis of some hormones and neurotransmitters. Iron deficiency is a relatively common condition, and causes anemia if iron stores become sufficiently depleted (deficiency exists before anemia; that is, low iron is problematic before anemia is diagnosed).

Iodine is a trace mineral found in seafoods and in vegetables grown in soil rich in iodine. In parts of the world where iodine is deficient in soil, very small quantities are added to table salt to prevent goiter (goiter is an advanced symptom of iodine deficiency).

TEXT HIGHLIGHTS: Page 1191. "**A healthy diet includes most of the minerals your body requires**, so supplements and processed foods can add potentially toxic levels of minerals."

NOTE: Common practice for determining magnesium levels is to use serum (blood) magnesium readings, however, this test does not accurately read magnesium levels in the body. The body will strive to maintain a set range of magnesium (and other minerals) in the blood at all times. When a person is deficient in magnesium, their body will remove it from the other places it is needed to sustain the range required in the blood.

…and this example is only ONE mineral! Food with sufficient nutrients MUST be grown on healthy, nutrient-dense soil. Sadly, this is no longer the case in the U.S. and in much of the world.

Unit 5: Chapter 25

31. Which of the following are NOT functions of the urinary system? (*Select all that apply.*)
    A. Cleansing the blood
    B. Maintaining the balance of fluid between blood and tissues
    C. Removing wastes from the body
    D. pH regulation
    E. Regulating blood pressure
    F. Transporting lymph throughout the body
    G. Determining the concentration of red blood cells
    H. Converting Vitamin D to its active form
    I. Regulating blood solutes (glucose, mineral salts, etc.)

NOTE: Page 1202. The urinary system plays a vital part in maintaining homeostasis of water and electrolyte concentrations within the body.

The main functions of the kidneys are: formation and secretion of urine, production and secretion of erythropoietin (the hormone that stimulates formation of red blood cells), and the production and secretion of renin, an important enzyme in the control of blood pressure.

32. (True or False) Normal urine output is greater than 2.5 liters per day.
    A. True
    B. False

NOTE: Page 1205. Renal calculi (kidney stones) form in the kidneys and bladder when urinary constituents normally in solution are precipitated. The solutes involved are usually oxalate and phosphate salts. (Precipitate = a substance deposited in solid form from a solution.)

The following is from the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). What is not listed is phosphoric acid (soda/pop) which depletes calcium and other minerals.

Calcium stones are caused by the combination of high urine calcium and alkaline urine, meaning the urine has a high pH. Uric acid stones form when the urine is persistently acidic. A diet rich in purines, substances found in animal protein, may increase uric acid in urine.

Dietary Changes to Help Prevent Kidney Stones
Drinking enough fluids each day is the best way to help prevent most types of kidney stones. Health care providers recommend that a person drink 2 to 3 liters of fluid a day. People with cystine stones may need to drink even more. Though water is best, other fluids may also help prevent kidney stones, such as citrus drinks. Recommendations based on the specific type of kidney stone include the following:

Calcium Oxalate or Calcium Phosphate Stones
- Reducing sodium
- Reducing animal protein, such as meat, eggs, and fish
- Getting enough calcium from food or taking calcium supplements with food

Uric Acid Stones
- Reducing/limiting animal protein

33. (True or False) The bladder's strength diminishes with age, but voluntary contractions of abdominal skeletal muscles can increase intra-abdominal pressure to promote more forceful bladder emptying. Such voluntary contraction is also used in forceful defecation and childbirth.
    A. True
    B. False

NOTE: These 'voluntary contractions' of the abdominal skeletal muscles are also known as Kegels. "Kegel exercise, also known as pelvic-floor exercise, involves repeatedly contracting and relaxing the muscles that form part of the pelvic floor, now sometimes colloquially referred to as the "Kegel muscles". The exercise can be performed multiple times each day, for several minutes at a time, but takes one to three months to begin to have an effect." Wikipedia

34. (True or False) The glomerular filtration rate (GFR) is the volume of filtrate formed by both kidneys each minute. Although approximately one liter of blood enters the kidneys each minute, 90 percent of it is returned to circulation by reabsorption. From the remaining 10 percent, only 1-2 liters of urine are produced per day.
    A. True
    B. False

NOTE: Page 1228.

Dan Lukaczer, ND states "In premenopausal women, the ovaries produce the estrogen estradiol (E2), which converts into estrone (E1), both of which must eventually be broken down and excreted from the body. This breakdown occurs primarily in the liver, and the excreted metabolites flow out in the bile or urine. Estradiol and estrone undergo this breakdown through a process called hydroxylation, an enzymatic activity in which the parent estrogen is transformed by the addition of a hydroxyl (OH) group at specific positions on estrogen's molecular ring. **If these estrogens are metabolized into the 2-hydroxylated estrone and estradiol, they lose much of their cell proliferative and estrogenic activity and are termed "good" estrogen metabolites.** Studies show that when 2- hydroxylation increases, the body resists cancer, and that when 2-hydroxylation decreases, cancer risk increases".

NOTE: Page 1232. Diabetic nephropathy is the result of diabetes causing damage to large and small blood vessels throughout the body. Nephropathy = kidney disease.

NOTE: Page 1233. Hormone influence on kidney function: parathyroid hormone and calcitonin hormone from the thyroid gland regulate the reabsorption of calcium and phosphate from the distal collecting tubules.

35. Familiar drinks that contain diuretic compounds are:
    A. Coffee
    B. Tea
    C. Alcohol
    D. All of the above

NOTE: Page 1234. A loss of renal function means a loss of effective vascular volume control, leading to hypotension (low blood pressure) or hypertension (high blood pressure), which can lead to stroke, heart attack, and aneurysm formation.

Dandelion leaf tea is a simple herbal diuretic. Unlike other beverages, some herbs and pharmaceuticals, dandelion leaf replaces excreted potassium, and does not deplete the body.

NOTE: Page 1258. Antidiuretic hormone (ADH) is secreted by the posterior lobe of the pituitary gland… increasing water reabsorption.

NOTE: Page 1263. Aldosterone, secreted by the adrenal cortex increases the reabsorption of sodium and water and the excretion of potassium.

36. (True or False) A loss of renal function means a loss of effective vascular volume control, leading to hypotension (low blood pressure) or hypertension (high blood pressure), which can lead to stroke, heart attack, and aneurysm formation.
    A. True
    B. False

Unit 5: Chapter 26

37. Which of the following statements are true: (*Select all that apply*.)
    A. Infants have approximately 75% of water in their body mass
    B. Adult men and women are approximately 50-60% water
    C. Water can go as low as 45% in the elderly
    D. The brain and kidneys are the organs with the highest proportions of water, about 80-85%
    E. The lungs and the heart each are approximately 75-80% water

38. Edema is caused by: (*Select all that apply*.)
    A. An underlying medical condition
    B. Certain "therapeutic" drugs
    C. Pregnancy
    D. Dehydration
    E. Localized injury
    F. Blood or lymphatic vessel damage

39. (True or False) To conserve water, the hypothalamus of a dehydrated person also sends signals via the sympathetic nervous system to the salivary glands in the mouth. The signals result in a decrease in watery, serous output (and an increase in stickier, thicker mucus output). These changes in secretions result in a "dry mouth" and the sensation of thirst.
    A. True
    B. False

40. Electrolytes aid in nerve excitability, endocrine secretion, membrane permeability, buffering body fluids, and controlling the movement of fluids between compartments. These ions enter the body through the digestive tract. Which of the following are considered electrolytes: (*Select all that apply*.)
    A. Phosphate
    B. Magnesium
    C. Calcium
    D. Bicarbonate
    E. Chloride
    F. Iodine
    G. Potassium
    H. Fluoride
    I. Sodium

41. (True or False) Normal arterial blood pH is restricted to a very narrow range of 6.35 to 6.45.
    A. True
    B. False

Unit 6: Chapter 27

42. (True or False) Spermatogonia cells are a type of supporting cell called a sustentacular cell, or sustentocyte, that are typically found in epithelial tissue. Spermatogonia cells secrete signaling molecules that promote sperm production and can control whether germ cells live or die. They extend physically around the germ cells from the peripheral basement membrane of the seminiferous tubules to the lumen. Tight junctions between these sustentacular cells create the **blood–testis barrier**, which **keeps bloodborne substances from reaching the germ cells** and, at the same time, **keeps surface antigens on developing germ cells from escaping into the bloodstream and prompting an autoimmune response**.
    A. True
    B. False

NOTE: Page 1286.

> "Emerging studies indicate that the microbiome can influence prostate inflammation in relation to benign prostate conditions such as prostatitis/chronic pelvic pain syndrome and benign prostatic hyperplasia, as well as in prostate cancer. We provide evidence that the **human microbiome present at multiple anatomic sites (urinary tract, gastrointestinal tract, oral cavity, etc.) may play an important role in prostate health and disease**.
>
> Conclusions: In health, the microbiome encourages homeostasis and helps educate the immune system. In dysbiosis, a systemic inflammatory state may be induced, predisposing remote anatomical sites to disease, including cancer. The microbiome's ability to affect systemic hormone levels may also be important, particularly in a disease such as prostate cancer that is dually affected by estrogen and androgen levels. Due to the complexity of the potential interconnectedness between prostate cancer and the microbiome, it is vital to further explore and understand the relationships that are involved." The microbiome in prostate inflammation and prostate cancer https://pubmed.ncbi.nlm.nih.gov/29795140/
>
> "Studies in animals suggest that inflammatory changes in the prostate microenvironment contribute to reprogramming of prostate epithelial cells, a possible step in tumour initiation. Prostatic infection, concurrent with epithelial barrier disruption, might be a key driver of an inflammatory microenvironment; the discovery of a urinary microbiome indicates a potential source of frequent exposure of the prostate to a diverse number of microorganisms. Hence, current evidence suggests that inflammation and atrophy are involved in prostate carcinogenesis and suggests a role for the microbiome in establishing an inflammatory prostate microenvironment that might promote prostate cancer development and progression." The inflammatory microenvironment and microbiome in prostate cancer development https://pubmed.ncbi.nlm.nih.gov/29089606/

43. Andropause, also called male menopause can occur in men as early as 40-50 years old due to the decline in Leydig cell activity which reduces testosterone. Which of the following are NOT symptoms that may be associated with andropause: (*Select all that apply*.)
    A. Fatigue
    B. Reduced Muscle Mass
    C. Increased Energy
    D. Anxiety and/or Depression
    E. Insomnia
    F. Renewed Desire to Vacuum & Clean
    G. Loss of Libido & Sexual Dysfunction
    H. Lowered Fertility

NOTE: Page 1293. Common pathogenic organisms that affect the vagina:

Chlamydia trachomatis causes inflammation of the female cervix. Infection may ascend through the reproductive tract and cause pelvic inflammatory disease. The same organism causes trachoma, an eye infection that is the primary cause of blindness worldwide.

Trichomonas vaginalis is a protozoa that causes acute vulvovaginitis with irritating, offensive discharge.

The yeast ***Candida albicans*** is frequently a commensal in the normal vagina and causes no problems. It is normally prevented from flourishing by vaginal acidity, but in certain circumstances it proliferates, causing candidiasis (thrush). It is actually a yeast- like fungus.

"The cells that normally keep candida in check-the NK and puffer cells, which can kill a yeast cell in 1/100th of a second, are overwhelmed, and the candida then takes over. It proliferates in the gut, penetrates the intestinal wall and is carried by the circulatory system throughout the body. **At this point, the candida becomes systemic: it infects organ and muscle tissues and compromises the entire immune system**. Once the immune system is compromised, it may no longer be able to sufficiently repel invaders. **This can result in allergies to chemicals, pollens and foods**. Also, it is believed that **toxins from candida cells and protein molecules develop an antigen/antibody reaction, which can cause even more allergic reactions**. Interestingly, immune deficiencies can be either caused by candida as well as well as result in candida." Rick Wagner, C.N., M.S.

"Candida albicans is one of the most important opportunistic pathogenic fungi. Weakening of the defense mechanisms of the host, and the ability of the microorganism to adapt to the environment prevailing in the host tissues, turn the fungus from a rather harmless saprophyte into an **aggressive pathogen**. The disease, candidiasis, ranges from light superficial infections to deep processes that endanger the life of the patient. In the establishment of the pathogenic process, the cell wall of C. albicans (as in other pathogenic fungi) plays an important role. It is the outer structure that protects the fungus from the host defense mechanisms and initiates the direct contact with the host cells by adhering to their surface. The wall also contains important antigens and other compounds that affect the homeostatic equilibrium of the host in favor of the parasite…"- www.ncbi.nlm.nih.gov/pubmed/16423067

44. (True or False) Lactic acid, in combination with other vaginal secretions, makes the vagina a self-cleansing organ. However, douching—or washing out the vagina with fluid—can disrupt the normal balance of healthy microorganisms, and actually increase a woman's risk for infections and irritation. Indeed, the American College of Obstetricians and Gynecologists recommend that women do not douche, and that they allow the vagina to maintain its normal healthy population of protective microbial flora.
    A. True
    B. False

TEXT HIGHLIGHTS: Page 1295. "Scientific research in the 1980s determined that mitochondrial DNA was maternally inherited, meaning that you can trace your mitochondrial DNA directly to your mother, her mother, and so on back through your female ancestors."

"Inside the mitochondrion is a certain type of DNA. That's different in a way from the DNA that's in the nucleus. This DNA is small and circular. It has only 16,500 or so base pairs in it. And it encodes different proteins that are specific for the mitochondrial. Now, remember **those pathways that are within the mitochondrion for producing energy**. Some of the enzymes in those pathways, and some of the proteins that are needed to function in those pathways, are produced by the mitochondrial DNA. The **mitochondrial DNA is critically important for many of the pathways that produce energy within the mitochondria**. And if there's a defect in some of those mitochondrial DNA bases, that is to say a mutation, you will have a mitochondrial disease, which will involve the inability to produce sufficient energy in things like the muscle and the brain, and the kidney. **Mitochondrial DNA, unlike nuclear DNA, is inherited from the mother, while nuclear DNA is inherited from both parents.** So this is very helpful sometimes in determining how a person has a certain disorder in the family. Sometimes a disease will be inherited through the mother's line, as opposed to both parents. You can tell from a pedigree or a group of family history whether or not this is a mitochondrial disease because of that." - William Gahl, M.D., Ph.D. , National Human Genome Research Institute https://www.genome.gov/genetics-glossary/Mitochondrial-DNA

NOTE: Page 1302. Endometriosis is the growth of endometrial tissue outside the uterus, usually in the ovaries, uterine tubes and other pelvic structures. The ectopic tissue, like the uterine endometrium, responds to fluctuations in sex hormone levels during the menstrual cycle.

NOTE: Page 1306. The human papilloma virus (HPV) causes warts or veruccas that are spread by direct contact.

Herpes viruses include herpes zoster virus (chickenpox and shingles), herpes simplex 1 (cold sores), and herpes simplex 2 (genital herpes). Genital herpes causes genital warts that are spread by direct contact during sexual intercourse.

Excerpts from:

The Troubling Truth Behind HPV Vaccines: Prepare to be Outraged by Kendall Nelson

"The first two HPV vaccines to go to market were Merck's Gardasil vaccine in 2006 and GlaxoSmithKline's (GSK's) Cervarix in 2009. (Both are still marketed in other countries but are no longer in use in the U.S., having been replaced by Merck's Gardasil-9 vaccine in 2017.) HPV vaccines were problematic since their introduction, despite the statement on the CDC's website that "HPV vaccination gives your child safe, effective, and long-lasting protection against HPV cancers."

…A 2016 study out of Canada highlighted the under-reporting of vaccine injuries. The study looked at over one hundred ninety-five thousand girls who had received HPV vaccines. Within forty-two days of HPV vaccination, the girls experienced over twenty thousand emergency room visits (n=19,351) or hospitalizations (n=958). However, only one hundred and ninety-eight adverse events were reported.

…HPV-vaccine-associated injuries include (but are not limited to) muscle pain and weakness; encephalopathy (brain inflammation); rheumatoid arthritis; Guillain-Barré syndrome (GBS); multiple sclerosis; amyotrophic lateral sclerosis (ALS); lupus; POTS; chronic fatigue syndrome (CFS); primary ovarian failure (POV); strokes; seizures; facial paralysis; and sudden cardiac death.

…A study by researchers at the University of Texas looked at HPV vaccination data from 2007–2012. The results showed that young women twenty to twenty-six years of age who received the four-strain Gardasil vaccine were actually more likely than non-HPV-vaccinated women to be infected with high-risk nonvaccine strains of HPV ten years later.

(*…continued*)

(*…continued*)

The Troubling Truth Behind HPV Vaccines: Prepare to be Outraged by Kendall Nelson

…In 2016, concurrent with the "*Who Knew*" campaign, Merck suffered a major blow as the American College of Pediatricians (ACPeds) sounded an alarm by releasing a statement expressing concerns about a potential connection between HPV vaccines and premature ovarian failure (POF) in adolescent girls[7] Since the licensure of HPV vaccines, reports to VAERS include forty-eight cases of ovarian damage, two hundred fifty-six cases of spontaneous abortion, one hundred seventy-two cases of amenorrhea and one hundred seventy-two cases of irregular menstruation believed to be caused by HPV vaccination in the U.S. That this is cause for concern is supported by a June 2018 study in the *Journal of Toxicology and Environmental Health* that looked at a database of more than eight million American women and found a 25 percent increase in childlessness associated with HPV vaccination." https://www.westonaprice.org/health-topics/the-troubling-truth-behind-hpv-vaccines-prepare-to-be-outraged/

45. (True or False) Menopause is the cessation of the menstrual cycle that occurs as a result of the loss of ovarian follicles and the hormones that they produce. A woman is considered to have completed menopause if she has not menstruated in a full year. After that point, she is considered postmenopausal. The average age for this change is consistent worldwide at between 50 and 52 years of age, but it can normally occur in a woman's forties, or later in her fifties. Poor health, including smoking, can lead to earlier loss of fertility and earlier menopause.
    A. True
    B. False

NOTE: Page 1308. Progestins are a group of drugs (synthetic hormones) that behave like the female hormone progesterone. They have been used since the mid-1950s to treat the symptoms of endometriosis. Synthetic progesterone (progestins) increases breast cancer risk. The use of natural progesterone does not increase breast cancer risk.

46. (True or False) In both male and female embryos, the same group of cells has the potential to develop into either the male or female gonads; this tissue is considered bipotential. However, not all tissues in the reproductive tract are bipotential.
    A. True
    B. False

Unit 6: Chapter 28

47. The placenta develops throughout the embryonic period and during the first several weeks of the fetal period; placentation is complete by weeks 14–16. As a fully developed organ, the placenta provides nutrition and excretion, respiration, and endocrine function.
    A. Nutrition & Excretion
    B. Respiration
    C. Endocrine Function
    D. All of the above

48. (True or False) From a fetal perspective, the process of birth is a gentle transition.
    A. True
    B. False

49. (True or False) Cow's milk should be given to an infant as is composition is suitable and its proteins are easy for the infant to digest.
    A. True
    B. False

NOTE: Page 1362. Mutation means an inheritable defect in the normal genetic make-up of a cell (the blue print has been changed). Some mutations are by chance (mistake in copying or reading the DNA) and some are caused by external factors such as X-rays, ultraviolet light or exposure to certain chemicals.

50. (True or False) Sometimes a genetic disease is not caused by a mutation in a gene, but by the presence of an incorrect number of chromosomes.
    A. True
    B. False

~ END of PART III ~