Solutions Manual for Applied Pathophysiology for the Advanced Practice Nurse 2nd Dlugasch

CHAPTER 1

APPLICATION TO PRACTICE (p. 21)

Scenario 1: A 40-year-old woman has a cervical cytology report with the following findings: atypical squamous cells of undetermined significance. Choose the tissue level the findings refer to:

a. Epithelial
b. Connective
c. Muscle
d. Neural

Answer: a

Rationale: The outer part of the cervix, similar to other orifices that open to the outside, is lined with epithelial tissue. Specifically, the cervix is lined with thin, flat cells termed *squamous cells*, which are a type of epithelial tissue. Other types of epithelial cells shape types are cuboidal and columnar.

Scenario 2: A 55-year-old woman would like to get hyaluronic injection fillers for her "laugh lines." Choose the tissue level the injections are administered in:

a. Epithelial
b. Connective
c. Muscle
d. Neural

Answer: b

Rationale: The "laugh lines" are the nasolabial folds that extend from the edge of the nose to the corner of the mouth, and hyaluronic acid is a component of connective tissue matrix. Generally, fillers are administered into the connective tissue layer, which is a supporting structure located in many parts of the body, such as the nasolabial fold, that can deepen, thin, or sag with aging.

Scenario 3: A 40-year-old man is diagnosed with a glioblastoma. Choose the tissue level the disease is affecting:

a. Epithelial
b. Connective
c. Muscle
d. Neural

Answer: d

Rationale: A glioblastoma is part of neural tissue. Neuroglial (glial) cells are a type of neural cells that function in a supporting role.

Scenario 4: A 72-year-old woman has a cystoscopy/biopsy report with the following findings: transitional cell carcinoma of the bladder. Choose the tissue level the disease is affecting:

a. Epithelial
b. Connective
c. Muscle
d. Neural

Answer: a

Rationale: The lining of the bladder consists of urothelium comprised of transitional epithelial cells. Transitional epithelial cells line the inside of many organs.

APPLICATION TO PRACTICE (p. 23)

Review and interpret the following endometrial biopsy reports that were completed for two women with postmenopausal bleeding.

Report 1: Atrophic Endometrium

The findings of this report reveal that the cells in the lining of the endometrium have decreased in size and number. Because the woman is postmenopausal, a likely cause of the atrophy is loss of endocrine function (e.g., reduced estrogen) that occurs after menopause. Other causes of atrophy include disuse, denervation, endocrine hypofunction, inadequate nutrition, and ischemia.

Report 2: Atypical Adenomatous Hyperplasia

The findings of this report reveal that the cells in the endometrial lining have mutated into a different size, shape, and appearance. Atypical hyperplasia, also known as dysplasia, typically has cells that are regarded as precancerous. Therefore, this report raises suspicion for a pathologic condition such as uterine cancer.

Review and interpret the following esophageal biopsy reports that were done for two people with history of persistent gastroesophageal reflux disease despite therapy.

Report 1: Low-grade dysplasia

Dysplasia refers to cells that have mutated into a different size, shape, and appearance. Dysplastic changes are often implicated as precancerous cells. Therefore, this report is consistent with the presence of precancerous cells of the esophagus.

Report 2: Intestinal metaplasia

Metaplasia refers to adult cells being replaced by a cell type that is less mature. This is often initiated by chronic irritation and inflammation. In this case, the most likely cause of this cellular change is the persistent gastroesophageal reflux that has caused chronic irritation and inflammation of the esophagus. The cells can become cancerous if the stimulus is not removed.

APPLICATION TO PRACTICE (p. 44)

Case 1: Mary and John want to have a second child. They have a 10-year-old with Down syndrome, and they have questions about the risk of having a second child with Down syndrome. Explain the risks for the development of Down syndrome and the recurrence risk in a second pregnancy.

Most cases of Down syndrome are a result of nondisjunction of the maternal egg (up to 95% of cases) and to a lesser extent paternal sperm cell nondisjunction. Nondisjunction occurs as a random event during cell division. Although most Down syndrome cases are not hereditary, some translocations can be passed on to offspring. Those individuals with a stable translocation can be unaffected yet they can pass down the stable abnormal translocation to an offspring. In the offspring, the once-stable translocation can become unstable and result in Down syndrome.

The risk of having a second child with Down syndrome is dependent on why the couple's first child had Down syndrome. If the case was random, then the risk is not higher, but if the case is a result of the parent having a translocation, then the risk is higher. Other factors to consider in terms of risk of a child being born with Down syndrome are maternal age, possibly paternal age, and exposure to environmental teratogens.

Case 2: A 5-year-old boy was just diagnosed with red–green color blindness. His parents are concerned and want clarification regarding how their son got this disorder because they have a daughter who does not have the disorder. Answer the following questions his parents have about the new diagnosis.

1. **How is red–green color blindness inherited?**
2. **Why does our daughter not have this disorder?**

Red–green color blindness is an X-linked recessive disorder. Fathers do not pass on X chromosomes to their sons, only to their daughters; fathers pass Y chromosomes to their sons. Mothers, however, pass X chromosomes to both daughters and sons. In the case of red–green color blindness, a mother will usually be a carrier (i.e., has defect but is unaffected by the

disorder) and pass the defective X chromosome to her son. If a father is affected and has a daughter, then his daughter will become a carrier. A mother who is a carrier will pass on the defective X chromosome 50% of the time. Therefore, 50% of males will be affected and 50% will not, and 50% of daughters will be carriers and 50% will not be carriers. Although not common, daughters can be affected if the mother is a carrier and the father is affected.

Case 3: Draw a Punnett square for cystic fibrosis (both parents are carriers) and Marfan syndrome (one parent is affected and one is unaffected) and discuss the gender distribution and risks of being a carrier or being affected. Discuss risks for subsequent births.

Cystic fibrosis inheritance follows an autosomal recessive pattern. Both parents are heterozygous carriers and the Punnett square demonstrates that in this scenario 50% of offspring will be carriers, 25% will be normal, and 25% will have cystic fibrosis. Subsequent births have the same risks.

Carrier Parent Heterozygous	**Carrier Parent Heterozygous**		
		A	a
	A	AA Homozygous normal	Aa Heterozygous carrier
	a	Aa Heterozygous carrier	aa Homozygous affected

Marfan syndrome inheritance follows an autosomal dominant pattern. In this scenario, one parent is affected (heterozygous) and one is unaffected (homozygous). The Punnett square demonstrates that 50% are affected and 50% are normal. Subsequent births have the same risks.

Affected Parent Heterozygous	**Normal Parent Homozygous**		
		a	a
	A	Aa Heterozygous affected	Aa Heterozygous affected
	a	Aa Homozygous normal	aa Homozygous normal

CHAPTER 2

APPLICATION TO PRACTICE (p. 63)

Various pharmacotherapeutics are used in the treatment of the clinical manifestations of the inflammatory response. Given the following scenario, describe which mediators and/or components of the inflammatory response are targeted by the medications listed.

Scenario: A 20-year-old woman diagnosed with asthma is taking an inhaled beta-2 agonist (albuterol) as needed, an inhaled glucocorticoid (fluticasone) every day, and a selective leukotriene receptor antagonist (montelukast) orally every day. She states that her asthma is worse when she exercises, so she is prescribed a mast cell stabilizer (cromolyn) inhaler.

Albuterol is a beta-2 agonist that acts on beta-2 adrenergic receptors. It causes bronchial smooth muscle relaxation and inhibits the release of mediators particularly from mast cells.

Fluticasone is a glucocorticoid that inhibits initial inflammatory events such as vasodilation, vascular permeability, and leukocyte emigration. It reduces inflammatory cells and the various cytokines they produce. Glucocorticoids increase beta-2 receptors on airway smooth muscle and reduce mucus gland secretions.

Montelukast is a selective leukotriene receptor antagonist. It inhibits bronchoconstriction and reduces the nasal mucosa effects of leukotrienes during episodes of allergic rhinitis.

Cromolyn sodium is a mast cell stabilizer. Therefore, it inhibits mast cell degranulation. As such, this medication prevents the release of histamine and leukotrienes, thereby reducing the effects of these mediators.

APPLICATION TO PRACTICE (p. 91)

There are four major red blood cell phenotypes: A, B, O, and AB. Around 4 to 6 months after birth, the infant becomes exposed to bacterial antigens that have a similar structure to A and B antigens (i.e., molecular mimicry), and this exposure results in the development of A and B antibodies as depicted in the figure. Rhesus factor (Rh) is another antigen on the surface of RBCs. Individuals are categorized as Rh negative (Rh antigen not expressed) or Rh positive. Therefore, for each ABO group, a person is described as being A+ or A–; B+ or B–; AB+ or AB–; O+ or O–. Of the various types, A+ and O+ are the most common.

Blood typing is important prior to a transfusion, transplantation, and determining the risk of hemolytic disease in the fetus and newborn. Compatibility is important to understand. A person who is A+ will be able to give blood to people who are A+ or AB+ and receive blood from people who are A+, A–, O+, and O–.

What about the other types, who can they give blood to and who can they receive blood from? What types are considered universal recipients? What types are considered universal donors?

Think of the type of antigen that will stimulate a response if given or received and which type of antibodies are present that may react to the antigen. A good recipient has no antibodies to attack anything foreign, whereas a good donor has no antigens to stimulate a reaction.

Compatible Blood Type Donors

Blood Type	Donate Blood To	Receive Blood From
A+	A+, AB+	A+, A−, O+, O−
A-	A+, A−, AB+ AB−	A−, O−
B+	B+, AB+	B+, B−, O+, O−
B-	B+, B−, AB+, AB-	B−, O−
O+	O+, A+, B+, AB+	O+, O−
O−	Everyone (universal donor)	O−
AB+	AB+	Everyone (universal recipient)
AB−	AB+, AB−	AB−, A−, B−, O−

APPLICATION TO PRACTICE (p. 92)

Case 1:A 20-year-old woman comes in concerned that she has genital herpes as she has been having unprotected sex. She does not have any lesions but wants to be tested. An antibody test is done and the results revealed the following:

- **HSV 1 IgG type–specific antibody: <0.90 (negative)**
- **HSV 2 IgG type–specific antibody: >1.10 (positive)**

How would you explain these results to her? Can you tell if this is a recent or past infection? Can you tell how long ago she was infected?

Immunoglobulin G (IgG) responds after immunoglobulin M (IgM). Positive IgG is a marker of

long-term immunity and not acute infection. IgG will be positive for life after exposure. Therefore, in this scenario you can only determine that she has been exposed at some time in the past. You cannot determine how recently she was exposed.

Case 2: A patient arrives in the emergency department with possible anaphylaxis. An epinephrine intramuscular injection is administered. Describe the therapeutic actions of epinephrine as they apply to immune alterations in anaphylaxis.

Epinephrine has agonist effects on adrenergic receptors, thereby addressing several pathophysiologic mechanisms that occur in anaphylaxis. The action on alpha-1 adrenergic receptors results in increased vasoconstriction and decreased mucosal edema, such as in the upper airway. The action on beta adrenergic receptors results in bronchial smooth muscle relaxation (bronchodilation) and decreased mediator release from mast cells and basophils.

Activity 1: There are many kinds of fungal infections. Describe the location and most common organism for the following diagnoses.

Vulvovaginitis

Answer: Location—vulvar and vaginal area; usually caused by *Candida* species such as *Candida albicans.*

Balanitis

Answer: Location—glans penis; usually caused by *Candida* species such as *Candida albicans.*

Balanoposthitis

Answer: Location—glans penis and the prepuce; usually caused by *Candida* species such as *Candida albicans.*

Onychomycosis

Answer: Location—nail; usually caused by the dermatophyte (fungi that requires keratin for growth) *Trichophyton rubrum* or *Candida* species.

Tinea capitis

Answer: Location—scalp; usually caused by dermatophytes such as *Trichophyton, Microsporum,* and *Epidermophyton.*

Tinea cruris

Answer: Location—groin; commonly known as "jock itch"; usually caused by the dermatophyte *Trichophyton rubrum.*

Tinea corporis

Answer: Location—body other than feet, groin, face, scalp, or beard hair; commonly known as "ringworm"; usually caused by the dermatophyte *Trichophyton rubrum.*

Tinea pedis

Answer: Location—feet; usually caused by the dermatophyte *Trichophyton rubrum*

Activity 2: What are the differences between gram-negative and gram-positive bacteria? Which are more pathogenic? List examples of gram-negative and gram-positive organisms.

Gram-positive bacteria have a thick peptidoglycan cell wall that retains dye during staining methods. Gram-negative bacteria have a cell wall with a thinner layer of peptidoglycan that is covered with an outer protective lipid bilayer membrane. This outer membrane makes gram-negative bacteria resistant to a wide range of antibiotics, and thus a significant cause of morbidity and mortality.

Gram-positive cocci include *Staphylococcus* and *Streptococcus.* Gram-positive bacilli include organisms such as *Bacillus, Clostridia*, *Listeria,* and *Corynebacterium.* Gram-negative bacteria include *Enterobacteriaceae* and many disease-causing species, such as *Escherichia*, *Proteus, Enterobacter, Klebsiella*, *Citrobacter*, *Yersinia*, *Shigella,* and *Salmonella.* Other gram-negative organisms include *Neisseria, Haemophilus* spp., *Helicobacter pylori,* and *Chlamydia trachomatis*.

APPLICATION TO PRACTICE (p. 103)

Case 1: Mr. Jones, a 45-year-old man, is concerned that he has HIV because he had unprotected receptive anal sex with a man. Answer the following questions:

1. Which HIV test would be conducted first?

The fourth-generation HIV-1 and HIV-2 antigen/antibody combination immunoassay should be performed first.

2. If he contracted HIV, how many days after exposure would be needed before the test would be positive?

The fourth-generation HIV-1 and HIV-2 antigen/antibody combination immunoassay is the first-line diagnostic test recommended by the CDC. It can detect HIV infection usually between 18 to 45 days after exposure. A smaller percentage of people will be reactive early (i.e., 18 days). The percentage increases with time, and 100% of people will be reactive if they contracted HIV by 45 days.

Since the time from exposure to testing positive varies, it is recommended to wait at least 18 days and, if negative, then consider repeat serial testing.

3. Would you consider offering him PEP or PrEP, and if so, why and when?

Postexposure prophylaxis (PEP) can be offered in situations after a potential high-risk exposure, as in this case. The regimen should be given as soon as possible after the incident, usually within 1 hour and no later than 72 hours after exposure.

Preexposure prophylaxis (PrEP) can be offered to individuals who have a higher risk of exposure. In this case, you would want to obtain a thorough sexual health history that includes questions such as whether he is having sex with a high number of partners or with an HIV-positive partner. You would also want to determine whether he uses condoms inconsistently and whether has had a sexually transmitted infection (STI) recently. Sharing needles or other equipment to inject drugs would also increase his risk of contracting HIV. After determining that he is at a high risk for exposure, counseling regarding behavioral modification is advised along with a discussion pertaining to PrEP.

Case 2: Mary, a 20-year-old woman, comes to the clinic complaining of unintentional weight loss and fatigue. She also states her knees and wrist are achy at times and she feels stiff in the morning for a few minutes. She also feels like her knees and wrist are a bit swollen. She has noticed a rash around her cheeks. She has the symptoms for about 1 month. She has no past medical or surgical history. She takes no medications. Her physical exam is normal except for a malar rash and mildly edematous joints with pain upon range of motion. The tentative diagnosis is SLE.

1. A complete blood count, complete chemistry profile, and what other laboratory tests can be done to evaluate for SLE?

A urinalysis may reveal casts and proteinuria. Immunologic tests for autoantibodies include antinuclear antibodies, which are usually positive for most people with SLE.

2. What laboratory findings would correlate with SLE?

- Antibodies specific to SLE include anti-double stranded DNA and anti-Smith antibodies (more specific), and these would be positive.

- Antiphospholipid antibodies are not specific to SLE but are included in the diagnostic criteria, and these would be positive.
- Low C3 and C4 complement levels or complete complement test.
- Positive direct Coombs.

3. Which clinical manifestations does Mary have that support the diagnosis of SLE?

The clinical manifestations in the scenario that support the diagnosis of SLE include unintentional weight loss and fatigue, painful and swollen joints (wrist, knees) and feeling of stiffness, and a rash around her cheeks. Clinical findings include a malar rash and mildly edematous joints with pain upon range of motion.

APPLICATION TO PRACTICE (p. 104)

Let us put the things you have learned about the body's defenses into practice. Which of the following individuals would be at highest risk for impaired immune function?

- **A 23-year-old female who weighs 5% more than her ideal body weight**
- **A 78-year-old male with poorly controlled diabetes mellitus**
- **An 89-year-old male with controlled hypertension**
- **A 45-year-old female who was recently widowed**

When considering this type of question, you start by counting things that might impair the immune system. The patient with the most risk factors is at the greatest risk. Eliminate any information that does not increase risk. For instance, being male or female does not impair immune function, so eliminate that factor from your consideration.

Let us look at each of the example patients. The 23-year-old is not in an older age range and is fairly close to her ideal body weight; she has no risk factors. The 78-year-old is assigned one risk factor for his increased age and another for his chronic disease. Go ahead and give him another risk factor because his diabetes is uncontrolled—now he has three risk factors. The 89-year-old has one risk factor for his increased age and another for having a chronic disease, but his hypertension is controlled. He has two risk factors. Finally, the 45-year-old has only one risk factor, the stress of being recently widowed. After examining all these patients, the 78-year-old male is at the most risk for impaired immune function owing to his three risk factors.

At-risk individuals and states, medications, or habits that specifically put individuals at risk for an impaired immune system include the following:

- Very young or very old age
- Poor nutrition
- Impaired skin integrity
- Circulatory issues
- Alterations in normal flora due to antibiotic therapy

- Chronic diseases, especially diabetes mellitus
- Corticosteroid therapy
- Chemotherapy
- Smoking
- Alcohol consumption
- Immunodeficiency states

The following strategies can be employed to build a healthy immune system:

- Increasing fluid intake
- Eating a well-balanced diet
- Increasing antioxidants and protein intake
- Getting adequate sleep
- Avoiding caffeine and refined sugar
- Spending time outdoors
- Reducing stress

CHAPTER 3

APPLICATION TO PRACTICE (p. 114)

Activity: Identify the part of the coagulation cascade in which the following medications have an effect, and describe the effect: low molecular-weight heparin, unfractionated heparin, vitamin K antagonists such as warfarin, direct oral anticoagulant (DOACs) such as direct thrombin inhibitors, and direct factor Xa inhibitors.

Low molecular-weight heparin binds to antithrombin and inactivates factor Xa and IIa (thrombin); however, the effects on thrombin are less than unfractionated heparin.

Unfractionated heparin binds to antithrombin, which then inhibits mainly factor Xa and IIa (thrombin).

Warfarin works on factor II (prothrombin), VII, IX, and X.

Direct factor Xa inhibitors and direct thrombin inhibitors are often referred to as DOACs, which stands for *direct oral anticoagulants*.

Direct thrombin inhibitors (e.g., dabigatran) work on thrombin IIa, which prevents cleaving of fibrinogen to fibrin.

Direct factor Xa inhibitors (e.g., rivaroxaban and apixaban) work on factor Xa, which prevents cleaving of prothrombin to thrombin.

Vitamin K is necessary for the activation of coagulation factors VII, IX, X, and prothrombin (II).

APPLICATION TO PRACTICE (p. 124)

Match the case/descriptors with the most likely disorder.

Case/Descriptor

Usually presents as painless, enlarged lymph node in neck

Answer: Hodgkin lymphoma

Bence Jones proteins

Answer: Multiple myeloma

Reed-Sternberg cells

Answer: Hodgkin lymphoma

Hypercalcemia, bone pain

Answer: Multiple myeloma

One-third of cases progress to acute myelogenous leukemia

Answer: Myelodysplastic syndrome

Most will present with anemia and neutropenia.

Answer: Myelodysplastic syndrome

Lymphohistiocytic cells

Answer: Hodgkin lymphoma

Burkitt lymphoma is a type

Answer: Non-Hodgkin lymphoma

Black men are more commonly affected than White men

Answer: Multiple myeloma

Metastasis often present at diagnosis.

Answer: Multiple myeloma

APPLICATION TO PRACTICE (p. 127)

Review the case. Which type of leukemia (acute lymphocytic vs. acute myelogenous or chronic lymphocytic vs. chronic myelogenous) is most likely? Discuss the data supporting your decision.

Case

- **A 13-year-old female presents with the recent onset of fatigue, fever of 100°F, and epistaxis over the past week.**
- **She has no past medical history except for mononucleosis last year. She is generally very healthy.**

- **Physical exam findings unremarkable except for: pale conjunctiva, multiple petechiae on lower legs, and abdomen soft with hepatosplenomegaly.**
- **See lab table in the text.**

The most likely diagnoses is acute lymphoblastic leukemia (ALL), as it the most common type of hematologic cancer in children, with a median diagnosis occurring at the age of 13. Her symptoms of fatigue and pale conjunctiva are due to the anemia, and her petechiae are due to thrombocytopenia. Her fever (a B symptom) and hepatosplenomegaly are also consistent with a diagnosis of ALL. Blasts cells on peripheral smears are abnormal and ≥20%, which is consistent with leukemia.

APPLICATION TO PRACTICE (p. 132)

Case 1: Mr. Hernandez is a 59-year-old Hispanic man who presents to the clinic for an annual physical exam. He has no complaints or concerns at the visit.

- **Past medical history: hypertension**
- **Medications: lisinopril 10 mg orally every day**
- **Allergies: penicillin (causes hives)**
- **Social history: truck driver, divorced, quit smoking 5 years ago after smoking one pack per day for 20 years, drinks three to four beers per week**
- **Vital signs: temperature 98.6°F, pulse 74 beats per minute, respirations 18 breaths per minute, blood pressure 124/76 mm/Hg, body mass index 31**
- **Health maintenance: refuses the influenza shot; has never had a colonoscopy**
- **Family history: he is adopted**

His physical exam is unremarkable. Mr. Hernandez's complete metabolic profile was within normal limits and his CBC with differential revealed the following results (see table in text).

Answer the following questions based on this scenario.

- **Describe the type of anemia present (e.g., microcytic, macrocytic, normocytic) and list the results that support your decision.**

The type of anemia present is microcytic-hypochromic. The results that support this are a low hemoglobin and hematocrit. The low mean corpuscular volume makes this a microcytic anemia, The low mean corpuscular hemoglobin concentration makes this a hypochromic anemia.

- **Describe additional diagnostic tests to be ordered and explain why they will be ordered.**

Additional diagnostic tests to be ordered include serum ferritin, serum iron, transferrin saturation, and total iron binding capacity. Other tests that could be considered include fecal occult blood testing, colonoscopy, and endoscopy.

- **Describe the top two most likely diagnoses and explain why you made these choices.**

The most common cause of microcytic-hypochromic anemia iron deficiency is thalassemia. Iron deficiency anemia is a result of decreased iron consumption, absorption, or increased loss. Decreased consumption is more of a problem in developing countries, and absorption issues tend to occur with history of gastrointestinal issues or in the elderly. Another cause of iron deficiency anemia would be blood loss, and as an older male the source of the blood loss must be determined. Evaluation for gastrointestinal bleeding (usually chronic) should occur; hence, the need for additional tests such as a colonoscopy should be considered. Thalassemia is another type of microcytic anemia; if subsequent iron levels are normal, then this should be considered as a diagnosis.

Case 2: A 22-year-old man comes in because he was shaving and felt a lump on his neck. He states the lump is not painful and he noticed it about 2 weeks ago. He states he's been more tired than usual for the past few months and attributes this to his hectic schedule with work and school. He has not noticed any other changes in his health and denies other symptoms such as fever, weight loss, and difficulty swallowing. The remainder of his history is as follows:

- **Past medical and surgical history: tonsillectomy, adenoidectomy, mononucleosis**
- **Medications: none**
- **Allergies: none**
- **Social history: smokes pot two to three times a week and uses no other drugs, drinks four to five beers on weekends, denies tobacco use, business major in college, not in a relationship for the past 6 months**

A complete physical exam was done and is unremarkable except for the presence of a cervical lymph node that is 2 centimeters, rubbery, and fixed and axillary nodes. Hodgkin lymphoma is suspected.

- **What other clinical manifestations are consistent with Hodgkin lymphoma?**

In this scenario, the neck mass and fatigue raise suspicion for Hodgkin lymphoma. Other clinical manifestations that may occur with Hodgkin lymphoma include adenopathy in the supraclavicular area and a mediastinal mass on chest X-ray. The mediastinal mass may cause retrosternal chest pain, cough, and difficulty breathing. Adenopathy in other parts of the body may be present. B symptoms such as persistent fever, night sweats, and unexplained weight loss may be present. Other manifestations can include fatigue, malaise, splenomegaly, and pruritus.

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Lucie Dlugasch, Lachel Story
Additional Application to Practice Case Studies, Chapters 11 and 14
Yasmine N. Campbell DNP, CRNA, APRN, CNE

CHAPTER 11

APPLICATION TO PRACTICE

A 75-year-old Caucasian male presents to the neurology clinic accompanied by his family after experiencing a minor fall in his garden about 1 month ago. The patient went to urgent care after the fall and was referred to neurology due to complaints of loss of balance and a slight right-hand tremor at rest. The family also noticed changes in handwriting and difficulty in initiating movement.

Physical examination reveals a masked face with eyes that do not blink, finger thumb rubbing, generalized slowness in movement, difficulty getting out of a chair, and shuffling gait while ambulating. The healthcare provider suspects Parkinson disease.

Discuss the pathophysiology of Parkinson disease.

Parkinson disease is a progressive condition involving the loss and destruction of neurons in the substantia nigra and a depletion of the neurotransmitter dopamine within the brain. The substantia nigra is gray matter located in the midbrain that contains the tract that produces dopamine, which is an essential excitatory neurotransmitter involved in motivation and motor control. The lack of dopamine results in the impairment of smooth, coordinated muscle involvement

Discuss the clinical manifestations of Parkinson disease and which manifestations this patient is exhibiting. Explain why the manifestations occur.

The clinical manifestations of Parkinson disease vary depending on the degree of decreased dopamine. When 80% of dopamine cells are destroyed, movement becomes impaired. The key manifestations include tremors, rigidity, akinesia, and postural instability, also known by the acronym TRAP. The manifestations this patient is exhibiting that support Parkinson disease include balance instability, resting tremors, mood changes, handwriting changes, difficulty initiating movement, masked face, finger thumb rubbing, slowness in movement, and shuffling gait.

Explain the treatment modalities of Parkinson disease.

Patients with Parkinson disease can benefit from physical and occupational therapy and assistive devices. Deep brain stimulation is a surgical intervention for Parkinson disease. Pharmacotherapy includes anticholinergics, dopamine agonists, and monoamine oxidase-B inhibitors (MAO-B). These drugs can be given as monotherapy or combined. These medications have adverse side effects, sometimes precluding their use or requiring dosage modifications.

