Study Questions

Choose the ONE best answer.

29.1 A 12-year-old girl with a childhood history of asthma complained of cough, dyspnea, and wheezing after visiting a riding stable. Her symptoms became so severe that her parents brought her to the emergency room. Which of the following is the most appropriate drug to rapidly reverse her bronchoconstriction?

A. Inhaled fluticasone.
B. Inhaled beclomethasone.
C. Inhaled albuterol.
D. Intravenous propranolol.
E. Oral theophylline.

Correct answer = C. Inhalation of a rapid-acting β_2 agonist, such as albuterol, usually provides immediate bronchodilation. An acute asthmatic crisis often requires intravenous corticosteroids, such as methylprednisolone. Inhaled beclomethasone and fluticasone treat chronic airway inflammation but will not provide any immediate effect. Propranolol is a nonselective β-blocker and would aggravate the patient's bronchoconstriction. Theophylline has been largely replaced with β_2 agonists and is no longer recommended for acute bronchospasm.

29.2 A 9-year-old girl has severe asthma, which required three hospitalizations in the last year. She is now receiving therapy that has greatly reduced the frequency of these severe attacks. Which of the following therapies is most likely responsible for this benefit?

A. Inhaled albuterol.
B. Inhaled ipratropium.
C. Inhaled fluticasone.
D. Oral theophylline.
E. Oral zafirlukast.

Correct answer = C. Administration of a corticosteroid directly to the lung significantly reduces the frequency of severe asthma attacks. This benefit is accomplished with minimal risk of the severe systemic adverse effects of oral corticosteroid therapy. Albuterol is used only to treat acute asthmatic episodes. The other agents may reduce the severity of attacks, but not to the same degree or consistency as fluticasone (or other corticosteroids).

29.3 A 68-year-old male has COPD with moderate airway obstruction. Despite using salmeterol twice daily as prescribed, he reports continued symptoms of shortness of breath with mild exertion. Which one of the following agents would be an appropriate addition to his current therapy?

A. Systemic corticosteroids.
B. Albuterol.
C. Tiotropium.
D. Roflumilast.
E. Theophylline.

Correct answer = C. The addition of an anticholinergic bronchodilator to the LABA salmeterol would be appropriate and provide additional therapeutic benefit. Systemic corticosteroids are used to treat exacerbations in patients with COPD, but not recommended for chronic use. The addition of a SABA (albuterol) is less likely to provide additional benefit since the patient is already using medication with the same mechanism of action. Roflumilast is not indicated as the patient only has moderate airway obstruction. Theophylline is an oral bronchodilator that is beneficial to some patients with stable COPD. However, because of its toxic potential, its use is not routinely recommended.

29.4 A 58-year-old female ceramics worker with a COPD exacerbation has recently been discharged from the hospital. This is the third hospitalization in the past year for this condition, although the patient reports only mild symptoms in between exacerbations. The patient is currently still on the same drug regimen prior to her admission of salmeterol inhalation twice daily and tiotropium inhalation once daily. Her current FEV_1 is below 60%. Which of the following would be an appropriate change in her medication regimen?

A. Chronic systemic corticosteroids.
B. Discontinue the tiotropium.
C. Discontinue the salmeterol.
D. Change the salmeterol to a combination product that includes both a LABA and an inhaled corticosteroid (for example, salmeterol/fluticasone DPI).
E. Theophylline.

Correct answer = D. The addition of an inhaled corticosteroid may provide additional benefit since the patient has significant airway obstruction and frequent exacerbations requiring hospitalization. Systemic corticosteroids are used on a short-term basis to treat exacerbations in patients with COPD but are not recommended for chronic use. It is not routinely recommended to discontinue a long-acting bronchodilator unless the patient experiences an adverse effect or experiences no therapeutic benefit. In this case, the patient reports only mild symptoms in between exacerbations, suggesting she may be benefiting from both bronchodilators. Theophylline is an oral bronchodilator that is beneficial to some patients with stable COPD. However, because of its toxic potential, its use is not routinely recommended.

29.5 A 32-year-old male with a history of opioid addiction presents with symptoms of an upper respiratory system infection for the past 5 days. It is determined to be viral in nature, and no treatment of the underlying infection is appropriate. Which of the following is appropriate symptomatic treatment for this patient's cough?

A. Guaifenesin/dextromethorphan.
B. Guaifenesin/codeine.
C. Cromolyn.
D. Benzonatate.
E. Montelukast.

Correct answer = D. Benzonatate suppresses the cough reflex through peripheral action and has no abuse potential. Dextromethorphan, an opioid derivative, and codeine, an opioid, both have abuse potential. Neither cromolyn nor montelukast is indicated for cough suppression.

29.6 Due to its anti-inflammatory mechanism of action, which of the following medications requires regular administration for the treatment of asthma?

A. Tiotropium MDI.
B. Salmeterol DPI.
C. Mometasone DPI.
D. Albuterol MDI.

Correct answer = C. Inhaled corticosteroids have direct anti-inflammatory properties on the airways and require regular dosing to be effective. Tiotropium is recommended for the treatment of COPD, not asthma. Salmeterol and albuterol are both bronchodilators but do not have anti-inflammatory properties.

29.7 All of the following are preferred antihistamines for the management of allergic rhinitis except:

A. Chlorpheniramine.
B. Fexofenadine.
C. Loratadine.
D. Cetirizine.
E. Intranasal azelastine.

Correct answer = A. Chlorpheniramine is a first-generation antihistamine and is usually not a preferred treatment due to its increased risk of adverse effects of sedation, performance impairment, and other anticholinergic effects. All of the other agents are second-generation antihistamines and are generally better tolerated, making them preferred treatments for allergic rhinitis.

29.8 Which of the following medications inhibits the action of 5-lipoxygenase and consequently the action of leukotriene B_4 and the cysteinyl leukotrienes?

A. Cromolyn.
B. Zafirlukast.
C. Zileuton.
D. Montelukast.
E. Theophylline.

Correct answer = C. Zileuton is the only 5-lipoxygenase inhibitor available. While zafirlukast and montelukast both inhibit the effects of leukotrienes, they do so by blocking the receptor itself. Cromolyn inhibits mast cell degranulation and the release of histamine. Theophylline is a bronchodilator that has no effect on leukotrienes.

29.9 Which of the following describes appropriate inhaler technique for a dry powder inhaler?

A. Inhale slowly and deeply just before and throughout actuation of the inhaler.
B. Use a large-volume chamber (spacer) to decrease deposition of drug in the mouth caused by improper inhaler technique.
C. Inhale quickly and deeply to optimize drug delivery to the lungs.
D. Rinse mouth in a "swish-and-spit" method with water prior to inhaler use to decrease the chance of adverse events.

Correct answer = C. "Quick and deep" inhalation is required for effective use of a DPI. Inhaling "slowly and deeply" and the use of a spacer describe techniques associated with an MDI, not DPI. Mouth rinsing may be appropriate for either type of inhaler if the medication being administered is an inhaled corticosteroid, but this should always be done following inhaler use, not prior to use.

29.10 Which of the following categories of allergic rhinitis medications is most likely to be associated with rhinitis medicamentosa (rebound nasal congestion) with prolonged use?

A. Intranasal corticosteroid.
B. Intranasal decongestant.
C. Leukotriene antagonist.
D. Oral antihistamine.

Correct answer = B. Intranasal decongestants should be used no longer than 3 days due to the risk of rebound nasal congestion (rhinitis medicamentosa). For this reason, the α-adrenergic agents have no place in the long-term treatment of allergic rhinitis.

Study Questions

Choose the ONE best answer.

30.1 A 43-year-old heavy machine operator complains of seasonal allergies. Which one of the following medications would be most appropriate for management of his allergy symptoms?

A. Cyclizine.
B. Doxylamine.
C. Hydroxyzine.
D. Fexofenadine.

Correct answer = D. The use of first-generation H_1 antihistamines is contraindicated in the treatment of pilots and others who must remain alert. Because of its lower potential to induce drowsiness, fexofenadine may be recommended for individuals working in jobs in which wakefulness is critical.

30.2 Which one of the following statements concerning H_1 antihistamines is correct?

A. Second-generation H_1 antihistamines are relatively free of adverse effects.
B. Because of the established long-term safety of first-generation H_1 antihistamines, they are the first choice for allergic rhinitis.
C. The motor coordination involved in driving an automobile is not affected by the use of first-generation H_1 antihistamines.
D. H_1 antihistamines can be used in the treatment of acute anaphylaxis.
E. Both first- and second-generation H_1 antihistamines readily penetrate the blood–brain barrier.

Correct answer = A. Second-generation H_1 antihistamines are preferred over first-generation agents because they are relatively free of adverse effects. Driving performance is adversely affected by first-generation H_1 antihistamines. Epinephrine, not antihistamine, is an acceptable treatment for acute anaphylaxis. Second-generation H_1 antihistamines penetrate the blood–brain barrier to a lesser degree than the first-generation drugs.

30.3 Which of the following medications has the most potential to significantly impair the ability to drive an automobile?

A. Diphenhydramine.
B. Levocetirizine.
C. Fexofenadine.
D. Ranitidine.

Correct answer = A. Diphenhydramine can impair operation of an automobile by causing drowsiness and by impairing accommodation. The other agents do not have this restriction.

30.4 Which of the following histamine receptor antagonists is known to enter the central nervous system readily and is known to be sedative?

A. Hydroxyzine.
B. Cetirizine.
C. Desloratadine.
D. Loratadine.
E. Fexofenadine.

Correct answer = A. Choices B, C, D, and E are all second-generation antihistamines that cross the blood–brain barrier to a much lesser extent than hydroxyzine. Hydroxyzine is the only drug that crosses the blood–brain barrier easily.

30.5 Which of the following statements about histamine receptor antagonists is MOST ACCURATE?

A. Most antihistamines have no antimuscarinic effects.
B. α-Adrenergic effects of antihistamines may cause hypertension.
C. First-generation antihistamines have no sedative side effects.
D. Because of their cholinergic properties, antihistamines may not be effective in the relief of vertigo associated with motion sickness.
E. Headache may be associated with some second-generation antihistamines.

Correct answer = E. Most first-generation antihistamines have α receptor–mediated hypotensive effects, sedative effects, and antimuscarinic (anticholinergic) effects. Second-generation antihistamines have the effects listed in option E.

30.6 A passenger sitting next to you in a plane boasts that he was a famous biochemist. He said he carboxylated a sedating antihistamine, and it is now only partially sedating and is a very well-known drug in the market. Which drug is he talking about?

A. Hydroxyzine.
B. Cetirizine.
C. Diphenhydramine.
D. Doxylamine.
E. Cyproheptadine.

Correct answer = B. Choices A, C, D, and E are first-generation antihistamines and are known to cross the blood–brain barrier. Cetirizine is the carboxylated hydroxyzine.

30.7 Which of the following is an H_1-receptor antagonist that also has serotonin receptor antagonism on the appetite center with the ability to stimulate appetite?

A. Hydroxyzine.
B. Loratadine.
C. Diphenhydramine.
D. Cetirizine.
E. Cyproheptadine.

Correct answer = E. Cyproheptadine has significant serotonin antagonism and is known to increase appetite.

30.8 Your neighbor said she used an H_1 antihistamine that was available over-the-counter (OTC), and it caused her marked drowsiness and dry mouth and she slept quite longer than usual. Which is the most possible drug that she used?

A. Loratadine.
B. Levocetirizine.
C. Diphenhydramine.
D. Fexofenadine.
E. Desloratadine.

Correct answer = C. The only first-generation drug in the list is diphenhydramine. Diphenhydramine and doxylamine, another first-generation antihistamine, are common ingredients in OTC sleep products.

30.9 A patient is going on a deep sea fishing trip and is worried about motion sickness. Which of the following would be the most appropriate?

A. Dimenhydrinate 1 hour prior to departure.
B. Desloratadine 1 hour prior to departure.
C. Doxylamine 1 hour prior to departure.
D. Meclizine at onset of symptoms.

Correct answer = A. Dimenhydrinate and meclizine are both useful for preventing the symptoms of motion sickness. However, they are much more effective in preventing symptoms than treating symptoms once they have started. Therefore, they should be taken prior to expected travel/boating, etc. Desloratadine and doxylamine are not useful for motion sickness.

30.10 A patient has a severe ear infection that is associated with significant vertigo. Which of the following might be helpful?

A. Azelastine.
B. Brompheniramine.
C. Meclizine.
D. Olopatadine.

Correct answer = C. Meclizine is useful for the treatment of vertigo associated with vestibular disorders. Azelastine and olopatadine are ophthalmic or intranasal antihistamines, but they are not useful for symptoms of ear infection. Brompheniramine is a first-generation antihistamine that is mainly used for allergy symptoms.

Study Questions

Choose the ONE best answer.

41.1 A 35-year-old male, formerly a heroin abuser, has been on methadone maintenance for the last 13 months. Two weeks ago, he had a positive tuberculosis skin test (PPD test), and a chest radiograph showed evidence of right upper lobe infection. He was started on standard four-drug antimycobacterial therapy. He has come to the emergency department complaining of "withdrawal symptoms." Which of the following antimycobacterial drugs is likely to have caused this patient's acute withdrawal reaction?

A. Ethambutol.
B. Isoniazid.
C. Pyrazinamide.
D. Rifampin.
E. Streptomycin.

Correct answer = D. Rifampin is a potent inducer of cytochrome P450–dependent drug-metabolizing enzymes. The duration of action of methadone is dependent upon hepatic clearance, so enhanced drug metabolism will shorten the duration and increase the risk of withdrawal symptoms in individuals on methadone maintenance. None of the other drugs listed induce cytochrome P450 enzymes.

41.2 A 42-year-old male HIV patient was recently diagnosed with active tuberculosis. Currently, he is on a stable HIV regimen consisting of two protease inhibitors and two nucleoside reverse transcriptase inhibitors (NRTIs). What is the most appropriate regimen to use for treatment of his tuberculosis?

A. Rifampin + isoniazid + pyrazinamide + ethambutol.
B. Rifabutin + isoniazid + pyrazinamide + ethambutol.
C. Rifapentine + isoniazid + pyrazinamide + ethambutol.
D. Rifampin + moxifloxacin + pyrazinamide + ethambutol.
E. Amikacin + moxifloxacin + cycloserine + streptomycin.

Correct answer = B. Rifabutin is recommended in place of rifampin in patients coinfected with HIV, since it is a less potent inducer of CYP enzymes than rifampin. However, rifabutin is a CYP3A4 substrate and "bidirectional" interactions may result. Other medications, such as the protease inhibitors, may affect the concentration of rifabutin, requiring a dose adjustment. Answer E is incorrect as these are not first-line agents.

41.3 Which of the following is correct regarding clofazimine in the treatment of leprosy?

A. Clofazimine should not be used in patients with a deficiency in glucose-6-phosphate dehydrogenase (G6PD).
B. Peripheral neuropathy is one of the most common adverse effects seen with the drug.
C. Clofazimine may cause skin discoloration over time.
D. The risk of erythema nodosum leprosum is increased in patients given clofazimine.

Correct answer = C. Clofazimine is a phenazine dye and will cause bronzing (the skin pigment color will change color, from pink to brownish-black), especially in fair-skinned patients. This occurs in a majority of patients, and generally is not considered harmful but may take several months to years to fade after discontinuing the medication.

41.4 A 24-year-old male has returned to the clinic for his 1-month check-up after starting treatment for tuberculosis. He is receiving isoniazid, rifampin, pyrazinamide, and ethambutol. He states he feels fine, but now is having difficulty reading his morning newspaper and feels he may need to get glasses. Which of the following drugs may be causing his decline in vision?

A. Isoniazid.
B. Rifampin.
C. Pyrazinamide.
D. Ethambutol.

Correct answer = D. Optic neuritis, exhibited as a decrease in visual acuity or loss of color discrimination, is the most important side effect associated with ethambutol. Visual disturbances generally are dose related and more common in patients with reduced renal function. They are reversible (weeks to months) if ethambutol is discontinued promptly.