DIRECTIONS (Questions 157 through 251): Each of the numbered items or incomplete statements in this section is followed by answers or by completions of the statement. Select the ONE lettered answer or completion that is BEST in each case.

157. A 36-year-old man with a history of seizures is scheduled to undergo surgery for a hernia. You are asked to select a general anesthetic agent for this surgical event. The most appropriate choice is
(A) enflurane
(B) nitrous oxide
(C) propofol
(D) sevoflurane
(E) thiopental

158. The pharmacodynamic mechanism of action of general anesthetic agents is most likely related to
(A) depression of spontaneous and evoked neuronal activity
(B) hypopolarization of neurotransmitter-gated ion channels
(C) increased duration of opening of nicotinic receptor-activated cation channels
(D) inhibition of gamma-aminobutyric acid A (GABA_A) receptor chloride ion channels
(E) their oil/water partition coefficient

159. Which of the following general anesthetic agents has the shortest induction time?
(A) diethyl ether
(B) halothane
(C) isoflurane
(D) methoxyflurane
(E) nitrous oxide

160. The stage of general anesthesia characterized by breath holding, retching, and irregular respiration is scheduled to undergo surgery for a hernia.
(A) stage I
(B) stage II
(C) stage III
(D) stage IV
(E) stage V
161. Concerns about toxicity with general anesthetic agents may most likely be related to
(A) a high incidence of malignant hyperthermia
(B) increased blood flow to the liver
(C) metabolism of general anesthetic agents
(D) storage in fat depots
(E) their carcinogenicity

162. The administration of an intravenous (IV) is expected
(A) to have a slow (5 to 10 min) and smooth induction
(B) to cause tissue necrosis following extravasation
(C) to provide excellent analgesia
(D) to stimulate respiration
(E) to prevent laryngospasm

163. The anesthetic agent halothane
(A) decreases catecholamine-induced arrhythmias
(B) depresses the heart rate during anesthesia
(C) has an irritant effect on the tracheo-bronchial tree
(D) reduces stroke volume of the heart and decreases systemic blood pressure
(E) stimulates the sympathetic nervous system

164. The most appropriate agent for a patient with minimal circulatory reserve is
(A) diazepam
(B) halothane
(C) morphine
(D) nitrous oxide
(E) propofol

165. The side effect of propofol that is of concern is
(A) a feeling of impending doom following its use
(B) its cumulative effects causing delayed arousal
(C) its propensity to cause postoperative vomiting
(D) its slow recovery
(E) the production of acidosis in children

166. The action of which of the following IV anesthetics can be reversed by flumazenil?
(A) etomidate
(B) fentanyl
(C) ketamine
(D) midazolam
(E) thiopental
167. General anesthetic-induced liver toxicity
(A) does not occur with halogenated agents
(B) is increased in compounds that are not metabolized
(C) occurs in the range of one in 1,000
(D) tends to occur in obese patients having multiple exposures to halothane
(E) usually resolves rapidly if specific antidotes are administered with the onset of toxicity

168. In the clinical use of general anesthetic agents
(A) chloroform is a stable agent for cardiovascular surgery
(B) diethyl ether is still highly regarded and widely used
(C) methoxyflurane is reserved for long anesthetic procedures
(D) nitrous oxide is widely used because of its low toxicity and high potency
(E) the concept of “balanced anesthesia” is usually employed.

169. The term general anesthesia refers to
(A) amnesia and loss of consciousness produced by ketamine
(B) analgesia produced by inhalational agents
(C) loss of consciousness and reflexes, analgesia, and skeletal muscle relaxation by inhaled agents
(D) the profound analgesia and loss of cooperation when IV opioids are administered
(E) the use of a general group of drugs to produce loss of consciousness while minimizing potential harmful effects

170. Local anesthetic action
(A) is usually very acidic and requires bicarbonate to activate it
(B) is dependent on metabolism to an active
(C) requires binding at the extracellular sur
(D) requires that agents have both lipophilicity and hydrophilicity
(E) results from agents that maintain nerves in the depolarized state

171. Nerves that are most sensitive to local anesthetic blockade are
(A) type A alpha proprioceptive fibers
(B) type A beta touch or pressure fibers
(C) type A delta pain or temperature
(D) type B preganglionic autonomic fibers
(E) type A gamma muscle spindles

172. Which of the following statements is true regarding blockade of fibers by local anesthetics?
(A) Fibers carrying touch are blocked before fibers carrying pain sensation.
(B) In fibers of the same diameter, unmyelinated fibers are blocked before myelinated fibers.
(C) Large myelinated fibers are blocked before small unmyelinated fibers.
(D) Motor fibers are blocked before pain fibers.
(E) Small fibers are blocked before large-diameter fibers.

173. Local anesthetic toxicity
(A) can be terminated by hypercapnia
(B) is decreased by administering compounds intravenously
(C) is due to progressive stimulation of cortical areas of the central nervous system (CNS)
(D) may be preceded by nystagmus when agents are administered intravenously
(E) occurs with progressive sedation and coma

174. Which of the following statements is true regarding allergic responses to local anesthetic agents?
(A) Allergic responses occur after administration of amides.
(B) Allergic responses occur after administration of esters.
(C) It is the metabolite of the amide structure that confers allergic response.
(D) The metabolite of the ester is responsible for allergic responses.

175. Which of the following statements is true regarding blockade of sodium channels?
(A) Lidocaine acts to block the channels from the outside of the membrane.
(B) Procaine blocks sodium channels by keeping the channels open.
(C) Saxitoxin blocks channels in a manner similar to procaine.
(D) Scorpion venoms act on the sodium channel to block sodium entry.
(E) Tetrodotoxin blocks sodium channels by binding near the extracellular surface.

176. Which of the following drugs is most effective in treating absence seizures?
(A) carbamazepine
(B) ethosuximide
(C) gabapentin
(D) phenobarbital
(E) phenytoin

177. Which of the following drugs exerts its antiseizure activity mainly as a result of interference with ion conductance through sodium channels, which results in inhibition of high-frequency repetitive firing of neurons?
(A) carbamazepine
(B) clonazepam
(C) ethosuximide
(D) gabapentin
(E) phenobarbital

178. Vaiproate is effective in treating which of the following types of seizures?
(A) absence
179. Which of the following anticonvulsant drugs has been most associated with an idiosyncratic hepatotoxicity that is severe and has resulted in deaths, particularly in children?
(A) carbamazepine
(B) ethosuximide
(C) phenytoin
(D) primidone
(E) vaproate

180. Which of the following drugs probably exerts its antiseizure activity as a result of interference with conductance through calcium channels?
(A) carbamazepine
(B) ethosuximide
(C) lamotrigine
(D) phenytoin
(E) primidone

181. What is the most likely mechanism of the antiseizure activity of phenytoin?
(A) enhancement of the accumulation of GABA by inhibiting its biotransformation into tissues
(B) enhancement of the accumulation of GABA by inhibition of GABA uptake into tissues
(C) enhancement of the inhibitory effects of GABA by interaction with the GABA_A receptor
(D) interference with ion conductance through low-threshold calcium channels
(E) interference with ion conductance through sodium channels

182. Which of the following drugs is (are) eliminated from the body mainly by excretion of the unchanged drug(s) in the urine?
phenobarbital
(A) carbamazepine
(B) gabapentin
(C) phenobarbital
(D) phenytoin
(E) all of the above

183. Which of the following drugs is most associated with gingival hyperplasia?
(A) carbamazepine
(B) ethosuximide
(C) phenobarbital
184. Of the adverse reactions listed below, which is the most common dose-related effect observed during antiseizure therapy with carbamazepine?
(A) diplopia
(B) drowsiness
(C) hepatic dysfunction
(D) renal toxicity
(E) skin rashes

185. Which of the following drugs is most readily metabolized to phenobarbital in the body?
(A) carbamazepine
(B) clonazepam
(C) phenytoin
(D) primidone
(E) valproate

186. Valproate is known to inhibit the biotransformation of which of the following drugs?
(A) carbamazepine
(B) phenobarbital
(C) phenytoin
(D) all of the above
(E) none of the above

187. Which of the following agents is most effective in stopping attacks of generalize tonic-clonic status epilepticus?
(A) carbamazepine
(B) diazepam
(C) gabapentin
(D) phenobarbital
(E) phenytoin

188. Which of the following drugs is contraindicated in patients with a history of acute intermittent porphyria, variegate porphyria, hereditary coproporphyria, or symptomatic porphyria?
(A) carbamazepine
(B) ethosuximide
(C) phenobarbital
(D) phenytoin
(E) valproate
189. In the progressive depression of the CNS, the correct sequence is
(A) anesthesia-hypnosis-sedation-coma-death
(B) coma-hypnosis-sedation-coma-death
(C) hypnosis-sedation-anesthesia-coma-death
(D) hypnosis-sedation-anesthesia-sedation-coma-death
(E) sedation-hypnosis-anesthesia-coma-death

190. The distinction between an ideal sedative and an ideal hypnotic drug is
(A) sedative agents cause greater depression of the CNS than hypnotic agents
(B) sedative agents produce a reduction in cognitive functions while hypnotic agents do not
(C) sedative agents produce a reduction of anxiety while hypnotic drugs produce restful sleep
(D) sedative agents produce a state from which the person is easily aroused while hypnotic agents produce a trancelike state
(E) there is little difference between the two; it is just a matter of dose, especially with the benzodiazepines

191. Which of the following agents differs significantly in its pharmacologic actions?
(A) diazepam
(B) glutethimide
(C) meprobamate
(D) pentobarbital

192. A 60-year-old man in good health comes to you complaining of daytime sleepiness. On taking a history you find that he is being treated for insomnia with a benzodiazepine, chlordiazepoxide. The most likely explanation for this problem is
(A) circulation time is reduced and the effects are due to a reduction in blood flow
(B) he has liver disease and his microsomal oxidase system is not functioning well
(C) his phase II reactions are suppressed due to kidney failure
(D) the chlordiazepoxide is being metabolized to an active compound
(E) this is a normal and expected process for a 60-year-old man--he is just aging

193. Sedative hypnotic agents are noted for causing enzyme induction. Which of the following agents is least likely to cause enzyme induction?
(A) ethanol
(B) lorazepam
(C) meprobamate
(D) pentobarbital
(E) phenobarbital

194. A patient comes to your office complaining of daytime sleepiness. On questioning you find that he has been taking a benzodiazepine in order to go to sleep...
at night. He is in the process of discontinuing the use of this agent but needs some assistance for the next week. The most appropriate agent to prescribe is
(A) alprazolam
(B) flurazepam
(C) lorazepam
(D) quazepam
(E) triazolam

195. A 24-year-old woman arrives in the emergency department (ED) accompanied by her roommate. The roommate states that the patient has been using drugs for sleeping and thinks that an overdose was taken. You administer flumazenil and she recovers. Three hours later you return to find her in a hypnotic state. The most reasonable explanation for this is
(A) an overdose of flumazenil was given and she is experiencing the effects of the overdose
(B) another antagonist should be administered
(C) flumazenil does not reverse the effects observed
(D) she is experiencing the effects of other drugs (polypharmacy)
(E) the half-life of flumazenil is short

196. The clinical advantages of using benzodiazepines is based on
(A) active metabolites are not formed
(B) the fact that they are effective with ethanol
(C) they are rapidly eliminated from the body
(D) they have a high therapeutic index
(E) very little amnesia is experienced

197. Benzodiazepines are noted for having a long duration of action. This is often due to the biotransformation to active metabolites. Which of the following agents is NOT metabolized to an active compound?
(A) chiorazepate
(B) chioridiazepoxide
(C) diazepam
(D) lorazepam
(E) prazepam

198. A 17-year-old female high school student is brought by friends to the ED in a state of acute ethanol intoxication. They state that she has been vomiting profusely. One of the most important approaches to management is to administer
(A) glucose
(B) phosphate
(C) potassium
(D) sodium
199. Naltrexone has been administered to alcoholics with the result that their desire for the use of alcohol decreased. In these studies, which of the following was observed?
(A) Individuals given disulfiram suffered liver damage if naltrexone was added.
(B) Individuals who relapsed were unable to control their drinking.
(C) Naltrexone alone caused opioid receptor responses when patients drank alcohol.
(D) Patients resisted drinking, but once they started they drank more.
(E) The subjective high was increased when alcohol was ingested in the presence of naltrexone.

200. The management of methanol intoxication involves all of the following EXCEPT
(A) administration of folic acid
(B) administration of IV ethanol
(C) alkalinization with bicarbonate
(D) hemodialysis
(E) use of activated charcoal

201. The toxicity of methanol is mainly due to
(A) carbon dioxide
(B) conversion to ethanol
(C) formaldehyde
(D) formic acid
(E) methanol itself

202. Treatment of alcohol withdrawal should NOT include
(A) maintaining potassium and magnesium balance
(B) phenothiazines
(C) short-acting benzodiazepines in patients with liver disease
(D) the use of long-acting benzodiazepines
(E) thiamine administration

203. Your patient is concerned that his wife may be pregnant and they routinely have large parties at their home, where considerable amounts of alcohol are consumed by all present. He wonders if the child he suspects is on the way will suffer from a condition he has heard about called fetal alcohol syndrome. He wants to know what signs he should look for in the child once it is born. You tell him that fetal alcohol syndrome is characterized by
(A) a flattened face
(B) accelerated body growth
(C) an enlarged head
(D) major joint anomalies
(E) usually occurs only if drinking occurred late in pregnancy
204. The use of blood alcohol concentrations has both clinical and legal implications. Blood alcohol levels that cause emesis are
(A) 50 to 100 mg/dL
(B) 100 to 200 mg/dL
(C) 200 to 300 mg/dL
(D) 300 to 400 mg/dL
(E) > 500 mg/dL

205. The ingestion of alcohol resulting in blood concentrations of 100 mg/dL may result in
(A) depletion of the liver of lipids
(B) greater intoxication in men than women
(C) premature labor
(D) ultrastructural heart damage
(E) vasoconstriction

206. The primary pathway for metabolism of ethanol involves
(A) alcohol dehydrogenase
(B) alcohol oxidase
(C) aldehyde dehydrogenase
(D) carbonic anhydrase
(E) microsomal ethanol oxidizing system (MEOS)

207. The effectiveness of levodopa
(A) is blocked by inhibiting dopa-decarboxylase
(B) can be prolonged by administering a catechol-O-methyltransferase (COMT) inhibitor
(C) is improved by administering centrally acting dopa decarboxylase inhibitors?
(D) is increased by administering levodopa in combination with dopa
(E) inhibits the action of monoamine oxidase (MAO)

208. The use of antimuscarinic drugs in Parkinson’s disease
(A) is most effective in eliminating the bradykinesia associated with the disease
(B) is most effective if large doses are administered initially
(C) leads to excessive salivation
(D) may be contraindicated in patients taking tricyclic antidepressants (TCAs)
(E) often causes urinary urgency

209. Dopaminergic therapy in the management of parkinsonian patients
(A) appears to be most effective in patients who do not respond well to levodopa
(B) is best managed initially with a nonergot dopamine agonist
(C) is easily managed with ergot derivatives as first-line agents
(D) is ineffective once on-off phenomena begin to occur
(E) results in the conversion of the agonist to compounds that block transport into the CNS

210. Gastrointestinal side effects of levodopa
(A) are mainly due to local irritation of the stomach and small intestine
(B) are reduced by administering phenothiazines as antiemetics
(C) can be minimized by taking the drug in one morning dose rather than divided doses
(D) occur in about 80% of patients when taken without a peripheral decarboxylase inhibitor
(E) should not be managed with antacids since these compounds reduce the effectiveness of levodopa

211. Side effects of levodopa therapy include
(A) accentuation of on-off phenomena if dietary intake of protein is reduced
(B) arrhythmias serious enough to discontinue the drug in most patients with heart disease
(C) behavioral effects, which are more common in patients on levodopa alone
(D) chorea, which can be successfully treated with pharmacologic agents
(E) dyskinesia, which tends to be more common in patients on concomitant decarboxylase inhibitor therapy

212. The pharmacotherapy of Parkinson’s disease constant motion?
(A) is best managed by administering low doses and gradually increasing the dose
(B) relieves all clinical features of the disease except the bradykinesia
(C) should include attention to dosing with meals to decrease irritation
(D) with a dopamine agonist tends to increase the fluctuations seen with levodopa
(E) with levodopa results in 80 to 90% of patients responding very well

213. Which of the following statements is true regarding a drug-induced parkinsonian-like tremor?
(A) MPTP (1-methyl-4-phenyl-1,2,5,6-tetrahydropyridine) may be effective in relieving this type of drug-induced tremor.
(B) Phenothiazines are noted for causing
(C) Stimulation of dopamine receptors due to reserpine-induced depletion is mechanism of this effect.
(D) The tremor induced by most drug therapy is not reversible.
(E) This type of side effect responds well to levodopa therapy.

214. Which of the following agents owes most of its antipsychotic activity to an active metabolite of the parent drug?
(A) clozapine
(B) haloperidol
(C) loxapine
215. Which of the following side effects of antipsychotic agents is characterized by feelings of restlessness and a compelling need to be in constant motion?
(A) acute dystonia  
(B) akathisia  
(C) neuroleptic malignant syndrome (NMS)  
(D) parkinsonism  
(E) tardive dyskinesia

216. Extrapyramidal side effects of antipsychotic agents are most likely due to the blockade of which of the following types of receptors?
(A) adrenergic alpha1  
(B) cholinergic M1  
(C) dopaminergic D2  
(D) GABA  
(E) serotonergic 5-HT2

217. Blockade of which of the following types of receptors is most closely related to the antipsychotic effects of antipsychotic agents?
(A) adrenergic alpha1  
(B) adrenergic alpha2  
(C) dopaminergic D1  
(D) dopaminergic D2  
(E) muscarinic M1

218. Which of the following conditions is most likely to be a troubling adverse reaction to phenothiazines?
(A) cardiac arrhythmias  
(B) hepatic dysfunction  
(C) megaloblastic anemia  
(D) orthostatic hypotension  
(E) thrombocytopenia

219. Which of the following neurological reactions to antipsychotic agents is rare but potentially fatal, and its manifestations may include a coarse tremor, catatonia, hyperthermia, stupor, and unstable pulse and blood pressure?
(A) acute dystonia  
(B) akathisia  
(C) neuroleptic malignant syndrome (NMS)  
(D) parkinsonism  
(E) tardive dyskinesia
220. Which of the following neurological side effects of antipsychotic agents may manifest soon after administration of the drug as facial grimacing, torsion of the neck or back due to muscle spasm, spasm of tongue muscles, or abnormal eye movements?
(A) acute dystonia
(B) akathisia
(C) NMS
(D) parkinsonism
(E) tardive dyskinesia

221. Which of the following antipsychotic agents has the greatest potential of producing bone marrow suppression or agranulocytosis in patients?
(A) clozapine
(B) haloperidol
(C) molindone
(D) olanzapine
(E) risperidone

222. Which of the following processes or enzyme activities is not inhibited by lithium ions?
(A) calcium-activated, phospholipid-dependent protein kinase C (PKC) activity
(B) inositol monophosphatase activity
(C) release of dopamine from nerve terminals
(D) release of norepinephrine from nerve terminals
(E) release of serotonin from nerve terminals

223. Which of the following agents has the smallest therapeutic index in terms of its potential for producing serious concentration-dependent toxic reactions?
(A) haloperidol
(B) lithium
(C) lorazepam
(D) olanzapine
(E) quetiapine

224. Which of the following agents has the best evidence supporting its effectiveness for long-term prevention of recurrences of mania and bipolar depression?
(A) carbamazepine
(B) lithium
(C) lorazepam
(D) risperidone
(E) valproate

225. Which of the following antipsychotic agents has the least potential for producing extrapyramidal side effects in patients?
(A) clozapine
(B) haloperidol
(C) molindone
(D) pimozide
(E) risperidone

226. In treating depressed individuals, the generally accepted principle is to
(A) employ other agents to reduce the sideeffects
(B) intervene with a large dose and continue until relief is observed
(C) recognize that there is a standard dose that should not be exceeded
(D) start with a large dose and allow tolerance to develop
(E) start with a small dose and continue until relief or the maximum tolerated dose is reached

227. In considering the antidepressant drug classes, which class has the greatest potential to cause death if taken in excessive quantities?
(A) MAO inhibitors (MAOIs)
(B) second-generation drugs
(C) selective serotonin reuptake inhibitors (SSRIs)
(D) third-generation drugs
(E) TCAs

228. Which of the following pairs of antidepressant drugs is most dangerous?
(A) MAOIs-fermented foods
(B) second-generation antidepressants-beer or wine
(C) SSRIs-indirectly acting sympathomimetic amines
(D) TCAs-alcohol
(E) tricyclics-SSRIs

229. The predominant theory that explains how antidepressants relieve depression is
(A) a general enhanced activity of serotonin
(B) depletion of adrenergic amines in the CNS
(C) reduction of the effectiveness of serotonin
(D) the amine hypothesis
(E) there is no clear relationship between serotonin and depressant or antidepressant action

230. The serotonin syndrome
(A) is characterized by hyperthermia, muscle rigidity, and changes in vital signs
(B) is due to a combination of third-generation antidepressants and non-sedating antihistamines
(C) is usually caused by a lack of serotonin in the synapse leading to myoclonus
(D) results from the combination of SSRIs and acetycholine
(E) will pass within an hour as long as the individual so afflicted maintains a prone position

231. MAOIs used to treat depression
(A) are more effective if a selective MAO-B inhibitor is used
(B) are toxic only if dopamine accumulates in the nerve endings
(C) cause irreversible blockade of MAO
(D) produce and increase in the first-pass metabolism to toxic intermediates
(E) result in the accumulation of norepinephrine but not serotonin in the synapse

232. Therapy with antidepressants
(A) might be discontinued slowly after 6 to months of therapy if this was the first episode
(B) will not be required long term in most patients suffering from depression
(C) should be continued long term if a patient responds quickly and satisfactorily to drug therapy
(D) should not exceed 1 year
(E) usually results in a major lessening of depression within 3 to 4 days

233. Which of the following peptides has the greatest affinity for mu opioid receptors?
(A) endomorphin I
(B) leu-enkephalin
(C) met-enkephalin
(D) preprodynorphin
(E) prepro-opiomelanocortin (POMC)

234. Tolerance develops to many of the effects of opioids. Two effects that do not develop or develop very little tolerance are
(A) analgesia and miosis
(B) cough suppression and respiratory depression
(C) miosis and constipation
(D) respiratory depression and analgesia
(E) sedation and euphoria

235. Patients who are ambulatory may experience
(A) an increase in the perception of pain but a decreased sensory component
(B) direct depression of cardiac contractile force development
(C) mydriasis
(D) relaxation of the biliary tract
(E) stimulation of the chemoreceptor trigger zone, resulting in vomiting

236. The phenomenon in which withdrawal of a drug results in physiologic changes is referred to as
(A) cross-tolerance
(B) direct toxicity
(C) physical dependence
(D) psychological dependence
(E) tolerance

237. Which of the following is the most rational use of morphine?
(A) IV administration for the relief of dyspnea in congestive heart failure
(B) maintaining a regular pattern of dosing at 4- to 6-hour intervals
(C) relief of sharp intermittent pain
(D) suppression of cardiovascular reflexes in surgery
(E) suppression of angiotensin-converting enzyme (ACE)-induced cough

238. The metabolism of which of the following opioid analgesics to a toxic metabolite has led to a reduction in its use?
(A) codeine
(B) dilaudid
(C) fentanyl
(D) meperidine
(E) methadone

239. For the relief of pain, morphine is most effective in
(A) patients with head injuries
(B) pregnant patients
(C) relieving constant pain
(D) treating patients with neuropathic pain
(E) relieving intermittent sharp pain

240. The pharmacodynamic process in which response to a drug requires increasingly larger doses to achieve the desired effect is referred to as
(A) abuse
(B) addiction
(C) misuse
(D) psychological dependence
(E) tolerance

241. In the early stages of alcohol consumption, college students learn to stand up slowly and not to change positions rapidly. This process
(A) behavioral tolerance
(B) functional tolerance
(C) metabolic tolerance
(D) physiologic dependence
(E) psychological dependence
242. Treatment of patients dependent on opioids (e.g., heroin, morphine) provides a challenge since the recidivism rate is very high. Methadone maintenance is effective in some patients because
(A) detoxification from methadone is easier than from other opioids
(B) it blocks the action of street drugs
(C) it provides a constant high, thus eliminating drug-seeking behavior
(D) they become dependent on methadone providing a “hold” on them
(E) they must be “clear” (drug free) before starting therapy with methadone

243. Withdrawal reactions from barbiturates and sedative hypnotics are related to the half-life of the drug. Compounds in these categories are often grouped as ultra-short, short, intermediate, or long acting. Which of the following categories presents the most difficult or most intense withdrawal process?
(A) t1/2 = <4 hours
(B) t1/2 = 8 to 24 hours
(C) t1/2 =48 to 96 hours
(D) t1/2 >= 96 hours

244. Sedative-hypnotic drugs, which include ethanol, the barbiturates, and the benzodiazepines, have similar abuse patterns. A unique phenomenon that develops in some benzodiazepine abusers is
(A) paresthesias and headaches
(B) physiologic dependence
(C) rapid withdrawal
(D) the “Mickey Finn”
(E) therapeutic dose dependence

245. CNS stimulants are common drugs of abuse. Worldwide, the most common CNS stimulant is
(A) amphetamine
(B) caffeine
(C) cocaine
(D) methamphetamine
(E) nicotine

246. In the current climate of drug abuse, young people attend parties known as raves. At these parties the drug of choice is referred to as ecstasy. This drug is a(n)
(A) Amphetamine
(B) barbiturate
(C) benzodiazepine
(D) hallucinogen
(E) nicotine derivative
247. LSD (lysergic acid diethylamide), mescaline, and psilocybin are all agents that have psychotomimetic effects. These agents
(A) are not associated with dependence or physiologic withdrawal
(B) have approximately the same potency
(C) have markedly different psychotomimetic effects
(D) lose their effectiveness if administered orally
(E) produce a great deal of tolerance

248. Treatment of hallucinogenic drug overdose with
(A) antimuscarinic agents can be managed with a direct-acting cholinergic agonist
(B) any drug in this class should be managed by tapering off the drug
(C) LSD should be managed with phenothiazines
(D) phencyclidine (PCP) can be partially managed by nasogastric suction
(E) PCP is best managed by alkalinization of the urine

249. All of the following are true about inhalant drugs of abuse EXCEPT
(A) amyl nitrite is associated with wide-spread and life-threatening methemoglobinemia
(B) chloroform has been associated with demyelination of white matter in chronic users
(C) fluorocarbons may cause sudden death due to ventricular arrhythmias
(D) the principle users of these agents are teenage boys of lower socioeconomic groups
(E) these agents are widely available as industrial solvents

250. Steroid dependence
(A) does not result in a withdrawal syndrome when drugs are discontinued
(B) is rather easily detected by routine laboratory screening
(C) may express itself as increased aggression
(D) results from the euphoria these drugs produce
(E) while considered negative may result in elevation of high-density lipoprotein (HDL) and reduction in low-density lipoprotein (LDL) cholesterol

251. Marijuana
(A) can be classified with the amphetamines since its effects mimic this drug class
(B) consists of three active cannabinoids: cannabidiol, tetrahydrocannabinol (THC), and cannabiol
(C) has had effective use as a bronchodilator in the management of chronic obstructive pulmonary disease (COPD) and bronchial asthma
(D) is a substitute for alcohol in those who regularly use this agent
(E) is most effectively used for treating nausea and vomiting if taken prophylactically

DIRECTIONS (Questions 252 through 283): Each group of questions in this section consists of groups of lettered headings followed by lists of numbered words or
phrases. For each numbered word or phrase, select the ONE lettered heading that is most closely associated with it. Each lettered heading may be selected once, more than once, or not at all.

Questions 252 through 257
Match each drug with the appropriate description.
(A) benzocaine
(B) bupivacaine
(C) cocaine
(D) lidocaine
(E) procaine

252. An ester-type compound with relatively short duration of action
253. An ester local anesthetic agent with high potency and long duration of action
254. An agent reserved for topical use only
255. No vasoconstrictor is needed with this agent due to its natural structure.
256. No vasoconstrictor is used with this agent
257. A long-acting and potent amide-type local anesthetic

Questions 258 through 262
Match the appropriate item with its description.
(A) beta-carbolines
(B) BZ₁ (benzodiazepine receptor subtype 1)
(C) BZ₂
(D) duration of channel opening
(E) endozepines
(F) flumazenil
(G) frequency of channel opening
(H) pentobarbital

258. A sedative-hypnotic agent of the benzodiazepine type would be expected to act on the chloride channel to increase _______
259. Naturally occurring molecule that has affinity for benzodiazepine receptors
260. An inverse agonist
261. A benzodiazepine antagonist
262. Zaleplon and zolpidem have selectivity for this site.

Questions 263 through 269
(A) amantadine
(B) benztropine
(C) bromocriptine
(D) glutamate
(E) pramipexole
(F) selegiline
(G) tocopherol
(H) tolcapone

263. Large multicenter trials have found no evidence of benefit in treating Parkinson’s disease with this agent.
264. A dopamine agonist that is considered a nonergot derivative
265. In addition to its effectiveness in parkinsonism, it also has therapeutic efficacy in hyperprolactinemia.
266. Inhibits the metabolism of dopamine
267. An antiviral drug with effectiveness in parkinsonism
268. Effective in relieving the tremor and rigidity of parkinsonism
269. A neurotransmitter associated with parkinsonism

Questions 270 through 272
Match each agent with the appropriate description.
(A) bupropion
(B) fluoxetine
(C) imipramine
(D) phenelzine
(E) venlafaxine

270. MAOI
271. SSRI
272. TCA

Questions 273 through 276
Match each drug with the appropriate clinical description.
(A) amitriptyline
(B) bupropion
(C) desipramine
(D) fluoxetine
(E) fluvoxamine
(F) mirtazapine
(G) trazodone

273. Significant side effects include sedative and antimuscarinic action.
274. Inhibits serotonin uptake selectively with a notable absence of antimuscarinic or sedative side effects
275. Has considerable sedative action but little or no antimuscarinic side effects
276. A unique third-generation agent that does not block the amine pump for norepinephrine or serotonin

Questions 277 through 283
(A) apomorphine
(B) codeine  
(C) dextromethorphan  
(D) dilaudid  
(E) fentanyl  
(F) heroin  
(G) loperamide  
(H) methadone  
(I) morphine  
(J) naltrexone

277. Useful for treating diarrhea with minimal or no danger of producing opioid dependence
278. Used to induce vomiting
279. Used for the withdrawal of patient with opioid dependence
280. A very potent analgesic administered intravenously or by patch
281. An excellent cough suppressant devoid of opioid-induced dependence
282. May be expected to induce withdrawal when administered to an individual with opioid dependence
283. Should be administered to a patient who appears in the ED with pinpoint pupils and respiratory depression

Answers and Explanations

157.  (D) Sevoflurane is the best choice since propofol and thiopental are used for induction or short procedures. Nitrous oxide is not a complete agent. Enflurane may cause seizures and is not used in a patient with a history of epilepsy.

158.  (A) While there is correlation between anesthetic potency and lipid solubility (Meyer-Overton Principle), more recent evidence indicates that depression of neuronal activity is more probably the mechanism of action. This process results from stimulation of GABA_A receptor chloride ion channels, hyperpolarization of neurotransmitter-gated ion channels, and/or decreased duration of opening of nicotinic receptor-activated cation channels.

159.  (E) The speed of induction is inversely related to the blood:gas partition coefficient. Nitrous oxide has the lowest partition coefficient and is the agent with the fastest onset.

160.  (B) The excitement stage (II) occurs with the loss of consciousness, and general anesthetic practice is to minimize this stage. Surgical anesthesia is stage III, medullary depression is stage IV, and stage I is the stage of analgesia and amnesia.
161. (C) When a high degree of metabolism occurs, fluoride ions are released with a greater incidence of toxicity. These agents are not proven carcinogens. They decrease blood flow to the liver, and they do not produce a high degree of malignant hyperthermia. This latter condition is a relatively rare genetic disorder.

162. (B) The solution of sodium pentothal has a pH of over 10, and extravasation leads to tissue damage. It can cause laryngospasm, has a rapid (10-sec) induction period, depresses respiration, and may even be antianalgesic, causing exaggerated pain responses.

163. (B) Halothane depresses the heart but does not change systemic vascular resistance. It does not evoke a compensatory increase in sympathetic nervous system activity but does sensitize the heart to catecholamines. It does not usually cause respiratory depression.

164. (C) In individuals requiring cardiac surgery or in patients in whom circulatory reserve is minimal, opioid analgesics provide good circulatory support.

165. (E) This agent has a very fast onset of action, can be used repeatedjy, and still provides a rapid recovery. It has antiemetic properties.

166. (D) Midazolam is a benzodiazepine with a slow onset and recovery but has the advantage of having a specific antidote for reversal of its action.

167. (D) Halogenated agents like halothane have an incidence of liver toxicity of about 1:20,000, and there is no specific antidote or treatment for halothane hepatitis. Multiple exposures in obese individuals increases susceptibility. Metabolism releases toxic halogens.

168. (E) Inhaled anesthetic agents are rarely used alone because greater safety can be obtained with combinations of agents. Diethyl ether has vanished due to its explosive nature, as has methoxyflurane due to its nephrotoxicity. Nitrous oxide has very low potency, and chloroform produces fatal arrhythmias.

169. (C) The term general anesthesia refers to the production of a state in which analgesia, amnesia, loss of consciousness, inhibition of sensory and autonomic reflexes, and loss of skeletal muscle tone exists. No agent currently in use accomplishes all of these characteristics to a satisfactory level. Supplementation and combinations of agents are needed for the greatest safety and the least chance of causing harm.

170. (D) Local anesthetics require a balance between hydro- and lipophilicity in order to be soluble for injection and to penetrate to the inside of the nerve cell membrane where they block the sodium channel.
171. (D) Type B and type C fibers are the most sensitive to local anesthetic blockade. (Katzung, p. 440)

172. (E) Small fibers, which carry pain, are preferentially blocked, but in fibers of the same diameter myelinated fibers are blocked first.

173. (D) Hyperventilation or administration of oxygen is helpful in reversing the inhibition of convulsant activity of intravenously administered local anesthetic agents. A prominent sign of impending seizures may be nystagmus or circumoral numbness.

174. (D) p-Aminobenzoic acid, the metabolite of the ester structure, is responsible for the allergic response. The amides are not metabolized in the same manner.

175. (E) All of the compounds listed act on the sodium channel. The local anesthetics lidocaine and procaine bind to the intracellular side of the channel, while tetrodotoxin and saxitoxin bind extracellularly. Scorpion toxin binds in the channel and keeps it open.

176. (B) Ethosuximide is effective against absence seizures, probably as a result of its effect to reduce low-threshold calcium currents in thalamic neurons. The other drugs listed in this item—phenytoin, carbamazepine, gabapentin, and phenobarbital—are effective in treating partial seizures and, with the possible exception of gabapentin, are effective against generalized tonic-clonic seizures.

177. (A) Carbamazepine interferes with sodium conductance by prolonging the inactive state of sodium channels in a manner similar to phenytoin.

178. (E) Vaiproate has possibly the broadest spectrum of antiseizure activity of any of the currently available drugs and can be used for the treatment of all of the seizure types listed in this item.

179. (E) The risk of idiosyncratic hepatotoxicity due to valproate is greatest in children under 2 years of age and in those taking multiple medications.

180. (B) The ion channels inhibited by ethosuximide are the low-threshold calcium channels in thalamic neurons.

181. (E) Phenytoin prolongs the inactive state of sodium channels and thereby interferes with sustained high-frequency repetitive firing of action potentials.
182. (B) Gabapentin is not metabolized in the body and does not induce hepatic drug metabolizing enzymes, but rather is eliminated from the body by renal mechanisms. The other drugs listed in this item are metabolized in the liver.

183. (D) Phenytoin causes gingival hyperplasia to some degree in most patients receiving the drug.

184. (A) Diplopia and ataxia are the most common dose-related adverse reactions observed during therapy with carbamazepine. Drowsiness may occur at higher doses than usually used in antiseizure therapy. Hepatic dysfunction is unusual.

185. (D) Phenobarbital is cleared more slowly than primidone, and therefore it slowly accumulates to higher levels than the parent compound, reaching therapeutic concentrations during prolonged therapy.

186. (D) Valproate is known to inhibit the biotransformation of several drugs, including those listed in this item, resulting in higher steady-state concentrations of these drugs in the body.

187. (B) Diazepam is given intravenously to stop the attacks of generalized tonic-clonic status epilepticus, a life-threatening emergency. Some physicians prefer lorazepam, which may be somewhat longer acting. Since the antiseizure effect of the benzodiazepines does not last long, a longer-acting antiseizure agent, such as phenytoin, is usually also given to suppress seizure activity in the longer term.

188. (C) Barbiturates are absolutely contraindicated in patients with a history of any of the conditions listed in this item because these drugs enhance porphyrin synthesis.

189. (E) Continual depression of the CNS occurs in a dose-dependent manner with the older sedative-hypnotic agents like barbiturates. The benzodiazepines are safer in that they do not have a linear relationship with dose and depression.

190. (C) The goal of these widely prescribed and used agents is to produce a decrease in anxiety with no or little effect on motor or cognitive function (sedatives) or to produce a “natural” sleep-like state (hypnotics).

191. (A) Glutethimide, meprobamate, and pentobarbital are virtually indistinguishable. They all have barbiturate pharmacologic properties. The benzodiazepines (diazepam) are less apt to cause CNS depression at high doses.

192. (D) While kidney or liver disease is a possibility, it is well recognized that benzodiazepines are metabolized to active compounds that have half-lives longer than their parent compounds. This is most likely the cause of his current difficulty.
193. (B) The benzodiazepines do not alter hepatic drug-metabolizing enzymes with continued use.

194. (E) Flurazepam and quazepam are metabolized to active compounds while lorazepam has a long duration of action. Of the two remaining compounds, the shortest duration of action is with triazolam.

195. (E) The half-life of flumazenil is of the order of 1 hour (0.7 to 1.3 hours). It is necessary to monitor the patient for repeated administration of this antagonist.

196. (D) The high therapeutic index is the biggest advantage of these agents. They should not be used with ethanol, they are slowly eliminated, they are metabolized to active compounds, and amnesia is a major component of their action.

197. (D) Lorazepam is an agent that has active metabolites. It is conjugated and renally excreted. See chart in reference.

198. (B) While all of the above are possible choices, phosphate loss (exaggerated by glucose administration) may lead to poor wound healing, neurologic deficits, and increased risk of infection.

199. (A) Both naltrexone and disulfiram are hepatotoxins and should not be used concomitantly. All of the other statements provided the opposite result.

200. (E) The use of activated charcoal is ineffective in methanol intoxication.

201. (D) It is the formate derivatives that produce the toxicity.

202. (B) Phenothiazines have the potential of inducing seizures. One of the major objectives of managing alcohol withdrawal is to prevent seizures, arrhythmias, and delirium.

203. (A) The characteristics of fetal alcohol syndrome (associated with alcohol ingestion during the first trimester of pregnancy) include a flattened face, retarded body growth, microcephaly, minor joint abnormalities, and mental retardation.

204. (C) The lowest levels (50 mg/dL) are associated with sedation or a high, followed by impaired motor function (100 mg/dL), then emesis (200 mg/dL), then coma (300 mg/dL), and finally respiratory depression and death (>500 mg/dL).

205. (D) Ethanol at these levels definitely causes myocardial damage at the ultrastructural level. It also causes vasodilation, relaxation of smooth muscle
(premature labor inhibition), the deposition of fats in the liver, and greater intoxication in women than men.

206. (C) The primary pathway is the conversion of alcohol to an aldehyde.

207. (B) Selective inhibitors of COMT prolong the action of levodopa by inhibiting its peripheral metabolism. The COMT metabolite of levodopa competes with the carrier for levodopa in the CNS, and inhibiting this enzyme improves central penetration of levodopa. “On time” is increased.

208. (D) Agents like TCAs, which have considerable cholinergic side effects, may be expected to exacerbate the complications of anticholinergic side effects, including dry mouth and urinary retention. Low-dose therapy and increasing levels slowly, is most effective in improving the tremor and rigidity but has little effect on the bradykinesia.

209. (B) Dopamine agonists will prolong the effectiveness of therapy when used as first-line agents and may be effective in preventing on-off sequences. They are not ergot derivatives like the older agents.

210. (D) The use of decarboxylase inhibitors reduces the gastrointestinal side effects from approximately 80% to 20%. This, along with taking the drug in divided doses or using antacids 30 to 60 minutes before taking levodopa, reduces the nausea and vomiting due to chemoreceptor trigger zone (CTZ) stimulation.

211. (E) Reduction of dietary protein reduces side effects. The arrhythmias usually do not warrant discontinuation of therapy, and the behavioral effects are more common in patients taking carbidopa. Chorea is not successfully managed with drugs.

212. (A) About one third of patients respond very well if low doses are administered, with a slow progression of the dose as needed for control. Bradykinesia is a feature, which is relieved, and the adverse effects of levodopa can be minimized by taking before meals (30 to 60 mm) or by combining it with a dopamine agonist to decrease fluctuations in response.

213. (B) The tremor induced by drugs like phenothiazines or reserpine is reversible following cessation of drug therapy. It is not reversed by levodopa, which may worsen the condition. MPTP causes severe parkinsonism.

214. (E) Thioridazine is converted in the body to mesoridazine, a major metabolite that is more potent than the parent compound.
215. (B) Akathisia typically occurs within 5 to 60 days after onset of therapy and is one of the more disturbing side effects of the antipsychotic agents. It has not yet been reproduced in animal models that might facilitate its study.

216. (C) Extrapyramidal side effects are probably caused by blockade of dopaminergic receptors in the basal ganglia. Antipsychotic agents with low potential for producing extrapyramidal effects have relatively low affinity for D2 receptors.

217. (D) There is a strong correlation between the antipsychotic potency of drugs and their ability to block D2 receptors in the limbic system of the brain. Some of the atypical antipsychotic agents also block cortical 5-HT2 receptors with high affinity.

218. (D) Orthostatic hypotension, probably caused by blockade of adrenergic alpha1 receptors, may cause syncope and falls in affected patients.

219. (C) In NMS, serum creatine kinase may be elevated and myoglobinemia may be present. Care usually consists of discontinuation of the offending drug and supportive care. Use of dantrolene or bromocriptine may also be helpful.

220. (A) Acute dystonia usually responds well to anticholinergic antiparkinsonian drugs administered parenterally.

221. (A) Bone marrow suppression and agranulocytosis have been reported for other antipsychotic agents, but they are particularly prevalent with clozapine, for which the incidence approaches 1% within several months of therapy.

222. (E) Depolarization-provoked release of serotonin from nerve terminals is not inhibited by the lithium ion and may even be increased in the limbic system. Lithium ion is known to interfere with several biological processes and enzyme activities, but its exact mechanism as a mood-stabilizing agent remains unknown.

223. (B) The therapeutic index for lithium may be as low as 2 or 3. Because of this low therapeutic index, determination of serum or plasma levels is essential during therapy. Concentrations much above the therapeutic range can cause acute intoxication characterized by gastrointestinal symptoms, tremor, ataxia, sedation, coma, and convulsions.

224. (B) Whereas all of the agents listed in this item may be useful in managing patients with mania or bipolar illness, lithium is the agent with the best evidence supporting its effectiveness as long-term therapy aimed at preventing recurrences of mania and bipolar depression.

225. (A) Clozapine has a relatively low potential for producing extrapyramidal effects, but its potential for producing blood dyscrasias is higher than other commonly used antipsychotic agents.
226. (E) Since the effective dose of antidepressants can vary widely, the common practice is to start with a low dose and increase it gradually until side effects become overwhelming or the depression lifts.

227. (E) TCAs are very dangerous, especially in patients with suicidal tendencies. Compounds should be prescribed in limited quantities or entrusted to a family member.

228. (A) It is well recognized that fermented foods and beer or wine should be avoided by patients on MAOIs.

229. (E) There are numerous theories to explain how antidepressants work; however, it appears that no clear relationship exists between serotonin and the effectiveness of antidepressants.

230. (A) The combination of an SSRI and an MAOI may result in a dangerous increase in serotonin in the synapse, producing a serotonin syndrome characterized by hyperthermia, muscle rigidity, and changes in vital signs.

231. (C) MAO-A inhibition with the older agents is irreversible and results in an accumulation of norepinephrine, serotonin, and dopamine in the synapses of neurons. Tyramine-containing foods are not metabolized by the usual first-pass process and hence enter the bloodstream, resulting in excessive release of adrenergic amines.

232. (A) The treatment of this condition depends on the history of the disease. If it is the first episode, discontinuation slowly after a 6- to 9-month treatment period is reasonable. Repetitive episodes usually require indefinite treatment.

233. (A) The endogenous opioid peptides (previously called endorphins) with the highest affinity is endomorphin I (also endomorphin II). The enkephalins have higher affinity for delta opioid receptors. Preprodynorphin and POMC are precursor proteins.

234. (C) Many of the effects of opioids develop tolerance but not constipation, miosis, convulsions, and antagonist actions.

235. (E) Opioids directly activate the CTZ. However, they produce miosis, contraction of the biliary tract, and reduction of both sensory and affective pain response while having minimal or no effect on cardiac contractile force development.

236. (C) Physical dependence accompanies the repeated use of opioids.
237. (A) While the mechanism is not understood, the use of morphine in pulmonary edema is remarkable. Morphine dosing with patient-controlled analgesia is more effective than a strict dosing pattern. This drug relieves constant pain better than sharp pain, and it does not suppress cardiovascular reflexes. Nonaddicting agents should be used to suppress cough.

238. (D) Meperidine is metabolized to normeperidine. Its accumulation results in seizures.

239. (C) Rather than sharp pain, it is constant pain, such as associated with cancer, that is most effectively relieved by morphine. Morphine is contraindicated in closed head injuries because it increases intracranial pressure. In pregnant patients it may depress the fetus or cause dependence in the fetus. Neuropathic pain is best treated with other agents.

240. (E) The term tolerance simply means that more drug is needed to achieve the same desired effect. This can be clinical effectiveness and is not necessarily linked to inappropriate use of the drug. Compensatory responses may mitigate the drug’s pharmacodynamic action.

241. (A) Behavioral tolerance is the learned ability to compensate for the effect of a drug. In this case, if alcohol inhibits locomotor activity exerting that activity in a slow manner can mask the effect of alcohol to depress motor function.

242. (D) The advantage of methadone is its long duration of action and its oral effectiveness in preventing the high from intravenous street-acquired opioids. Since the individual is dependent on the agent, the avoidance of withdrawal will bring him or her back to the treatment center for continued availability of the drug.

243. (B) The most rapidly evolving and most difficult to treat withdrawal syndrome occurs with agents that have a half-life of 8 to 28 hours (secobarbital). The short-acting compounds (thiobarbiturates) cannot be taken repeatedly, the long-acting compounds (phenobarbital) have built-in tapering, and the agents with 48- to 96-hour half-lives (flurazepam) produce a long but less severe withdrawal.

244. (E) Some patients who continually use benzodiazepines do not increase the dose but will enter withdrawal if the drug is discontinued. This use is not associated with physiologic dependence, but it does produce paresthesias, weight loss, headaches, and changes in perception.

245. (B) Many people do not consider caffeine to be a drug since it comes from a natural product, but a withdrawal syndrome is recognized in heavy coffee drinkers (6 cups per day).
246. (A) Methyleneoxymethamphetamine (MDMA, ecstasy) is the drug that is in wide abuse among high school and college students. They take it with large amounts of water, and the environment is kept at a very low temperature. Methamphetamine is known as “speed”.

247. (A) These three agents, which are indistinguishable in effect, have the same effect orally or intravenously and do not produce tolerance or withdrawal. The effective doses vary 5,000-fold--LSD, 1 µg/kg; psilocybin, 250 µg/kg; mescaline, 5 to 6 mg/kg.

248. (D) Since PCP is secreted back into the stomach, nasogastric suction may be helpful. Acidification of the urine increases elimination of PCP. Phenothiazines may worsen the toxic effects of LSD. Antimuscarinic agents can be treated with indirect-acting cholinergic agonists.

249. (A) While amyl nitrite may cause an occasional instance of methemoglobinemia, very few significant adverse effects of this agent have been reported, even though it is widely abused.

250. (C) Behavioral changes (aggression, libido, mood, psychotic behavior) may result from steroid abuse, which is expensive and difficult to detect with routine laboratory tests. Those who take these compounds usually do so for bodybuilding (increase in muscle mass and strength), not for euphoria. Continued use results in unfavorable lipid profiles (increased LDL and decreased HDL).

251. (B) The three active components of marijuana begin with cannabidiol, which is metabolized to THC and on to cannabinol. The age of plants can be estimated based on the relative amounts of these cannabinoids. The drug is often taken with alcohol, it is effective as an antiemetic during nausea, and it may cause bronchoconstriction.

252. (E) Procaine is rapidly hydrolyzed by plasma cholinesterase.

253. (F) Tetracaine is about 16 times the potency of procaine, and it has a long duration of action.

254. (A) Benzocaine is reserved for surface use only.

255. (C) Cocaine blocks uptake of norepinephrine into nerve endings, prolonging its duration of action by reducing blood flow to the area.

256. (D) Lidocaine is used as a class II antiarrhythmic agent and is marketed in packages with blue marking to distinguish it from preparations containing vasoconstrictor(red package).
257. (B) Similar to tetracaine, an ester-type local anesthetic, bupivacaine, an amide, is a long-acting agent with about 16 times the potency of procaine.

258. (G) Barbiturates increase the duration of opening while benzodiazepines increase the frequency of opening of the chloride channels.

259. (E) Endozapines are nonbenzodiazepine molecules that facilitate GABA-mediated chloride channel gating.

260. (A) Agents of this type, referred to as inverse agonists, produce anxiety and seizures.

261. (F) Flumazenil selectively blocks benzodiazepine receptors analogous to naloxone and the opioid receptors. It does not reverse barbiturates, meprobamate, or ethanol.

262. (B) The receptors for benzodiazepines are heterogenous and additional molecular characterization is needed. However, selectivity for BZ1 has been demonstrated for zaleplon and zolpidem.

263. (G) The scavenger of free radicals (vitaminE, tocopherol) was suggested as a beneficial treatment to slow progression of Parkinson’s disease, but trials have not supported this hypothesis.

264. (E) Mild parkinsonism is benefited by this agonist, which has preferential affinity at D3 receptors and allows the dose of levodopa to be reduced. Pramipexole does not have the serious adverse effects associated with ergot compounds.

265. (C) This D2 agonist is effective in treating endocrinologic disorders in doses lower than used for parkinsonism.

266. (F) Selegiline is a selective inhibitor of monoamine oxidase B. It is effective in retarding the breakdown of dopamine in the brain.

267. (A) Amantadine has limited effectiveness in parkinsonism. It may be helpful in eliminating all of the unfavorable effects of parkinsonism, but benefits often do not last more than two weeks.

268. (B) Antimuscarinic agents have a considerable number of side effects and have little effect on the bradykinesia.

269. (D) Glutamate excess may be linked to parkinsonism, and studies under way are testing the effectiveness of glutamate antagonists.
270. (D) Tranylcypromine and phenelzine are MAOIs. The effectiveness of these agents persists even after the drug is eliminated from the body.

271. (B) Fluoxetine is an SSRI. It has little effect on norepinephrine but effectively inhibits the removal of serotonin from the nerve ending.

272. (C) Imipramine is named a tricyclic antidepressant because of its characteristic three-ring nucleus and the fact that it is effective in treating depression. It blocks the uptake of both norepinephrine and serotonin.

273. (A) This TCA has considerable side effects.

274. (F) Both bupropion and fluvoxamine have an absence of antimuscarinic action and sedative action. It is fluvoxamine that is a blocker of the serotonin amine pump.

275. (G) The SSRI trazodone has little or no antimuscarinic activity.

276. (F) Mirtazapine has antihistaminic and alpha2 blocking activity and causes weight gain. It has almost no sexual side effects but does cause considerable sedation.

277. (G) Both loperamide and diphenoxylate are compounds with a low likelihood for abuse because of poor solubility in the case of diphenoxylate (also combined with atropine) or inability to penetrate the brain in the case of loperamide.

278. (A) Apomorphine produces emesis by stimulating receptors in the floor of the fourth ventricle of the brain called the CTZ (chemo-trigger-receptor-zone). It is a highly vascular area where many drugs that cause nausea and vomiting act. It must be injected. Caution should be used with this compound since it causes respirator depression.

279. (H) The conversion of opioid-dependent individuals to methadone and then withdrawing them from this agent is based on the principle that the longer duration of action of methadone produces a longer but more tolerable withdrawal sequence. The drug is also effective orally.

280. (E) This group of strong opioid agonists includes sufentanil, alfentanil, remifentanil, and fentanyl. They have a greater potency and pharmacokinetics that make them effective for short-term use.

281. (C) The dextro isomer of levorphanol is essentially free of analgesic activity, respiratory depression, and addictive properties, and it produces minimal constipation. It is available in over-the-counter preparations for cough suppression.
282. (J) Naloxone, naltrexone, and nalmefene are agents with groups substituted on the nitrogen in the 17 position. This makes them have high affinity for the mu opioid-binding sites, where they compete effectively with other opioids. However, they are pure antagonists, so they do not activate the receptor. Caution needs to be exerted when using these agents because they have short half-lives and quickly wear off.

283. (J) The combination of pinpoint pupils and respiratory depression is characteristic of opioid overdose. Often, these signs are accompanied by needle marks. Pure antagonists are very effective in reversing the opioids. Caution: The duration of action of the antagonists is shorter than that of the agonists.