

ANSWER KEY WITH EXPLANATIONS FOR CHAPTER 9

Skill Drill Answers

SD 9.1: Drug Class Matching

1. **A** — Fluoxetine is an SSRI
 2. **B** — Venlafaxine is an SNRI
 3. **C** — Amitriptyline is a TCA
 4. **D** — Phenelzine is an MAOI
 5. **E** — Bupropion is atypical (NDRI)
 6. **A** — Sertraline is an SSRI
 7. **B** — Duloxetine is an SNRI
 8. **E** — Mirtazapine is atypical
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SD 9.2: True/False with Correction

1. **F** — SSRIs require 2-4 WEEKS for therapeutic effects.
 2. **T** — Benzodiazepines increase GABA-A channel opening frequency.
 3. **F** — MAOIs + SSRIs cause serotonin syndrome; this combination is CONTRAINDICATED.
 4. **F** — Bupropion has MINIMAL sexual dysfunction compared to SSRIs.
 5. **F** — Buspirone requires 2-4 WEEKS for effect; it does not provide immediate relief.
 6. **T** — TCAs are dangerous in overdose due to cardiac arrhythmias.
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SD 9.3: Fill in the Blank

1. **serotonin (SERT)**

2. **monoamine (serotonin, norepinephrine, dopamine)**
 3. **hypertensive**
 4. **flumazenil**
 5. **seizure**
 6. **discontinuation**
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SD 9.4: Mechanism Classification

1. **A** — Escitalopram blocks SERT only
 2. **B** — Duloxetine blocks SERT + NET
 3. **E** — Diazepam enhances GABA-A
 4. **D** — Bupropion blocks DAT + NET
 5. **C** — Tranylecypromine inhibits MAO
 6. **B** — Amitriptyline blocks SERT + NET (plus receptor antagonism)
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SD 9.5: Adverse Effect Matching

1. **C** — MAOIs cause hypertensive crisis with tyramine
 2. **B** — TCAs cause cardiac toxicity in overdose
 3. **D** — Bupropion lowers seizure threshold
 4. **A** — SSRIs most commonly cause sexual dysfunction
 5. **E** — Mirtazapine causes weight gain and sedation (H1 blockade)
 6. **F** — Benzodiazepines cause dependence and withdrawal seizures
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SD 9.6: Rapid Recall

1. **SSRIs**
2. **GABA-A**
3. **Buspirone**
4. **Fluoxetine**
5. **Flumazenil**

6. Sedation (and weight gain)

SD 9.7: Complete the Sentence

1. **frequency**
 2. **weeks**
 3. **short**
 4. **2-week**
 5. **loss**
 6. **tachycardia**
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SD 9.8: TCA Receptor Blockade Effects

1. **B** — Muscarinic blockade causes anticholinergic effects
 2. **C** — Alpha-1 blockade causes orthostatic hypotension
 3. **A** — H1 blockade causes sedation and weight gain
 4. **D** — Sodium channel blockade causes cardiac arrhythmias
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SD 9.9: Benzodiazepine Duration Sorting

1. **L** — Diazepam is long-acting
 2. **S** — Triazolam is short-acting
 3. **I** — Lorazepam is intermediate-acting
 4. **L** — Clonazepam is long-acting
 5. **S** — Midazolam is short-acting
 6. **I** — Alprazolam is intermediate-acting
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SD 9.10: Drug Interaction Identification

1. **D** — SSRI + MAOI causes serotonin syndrome
2. **S** — SSRI + benzodiazepine is generally safe
3. **D** — MAOI + aged cheese causes hypertensive crisis

4. **S** — Buspirone + alcohol is generally safe (no interaction)
 5. **D** — MAOI + meperidine causes serotonin syndrome
 6. **S** — SSRI + buspirone is generally safe
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SD 9.11: Clinical Indication Matching

1. **D** — Mirtazapine for depression with insomnia and appetite loss
 2. **C** — Bupropion for depression plus smoking cessation
 3. **B** — Duloxetine for depression plus neuropathic pain
 4. **F** — Diazepam for alcohol withdrawal
 5. **E** — Trazodone (low dose) for insomnia
 6. **A** — Fluoxetine for depression plus OCD
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SD 9.12: Serotonin Syndrome Recognition

1. **SS** — Hyperreflexia and clonus are features of serotonin syndrome
2. **NMS** — "Lead pipe" rigidity is a feature of NMS
3. **SS** — Rapid onset (hours) is typical of serotonin syndrome
4. **NMS** — Slow onset (days) is typical of NMS
5. **SS** — Serotonin syndrome is caused by serotonergic drugs
6. **NMS** — NMS is caused by dopamine antagonists

Case Study Answers

Case 9.1: SSRI Selection and Monitoring

Question 1. SSRIs are effective for both depression and anxiety disorders, treating both conditions with one medication. They are safe in overdose (important given suicidal ideation), well-tolerated, and have once-daily dosing that supports adherence. They lack the cardiac toxicity of TCAs and dietary restrictions of MAOIs.

Question 2. The physician should warn that SSRIs may initially worsen anxiety and cause side effects (nausea, insomnia) before improving symptoms. Patients should not expect benefit for 2-4 weeks. Starting at a low dose can minimize initial side effects.

Question 3. Antidepressants carry a black box warning for increased suicidality in young adults, especially in the first weeks of treatment. Energy may improve before mood, potentially enabling suicidal patients to act on their thoughts. Close monitoring ensures early detection of worsening symptoms.

Question 4. Bupropion would be an appropriate alternative because it rarely causes sexual dysfunction. It also promotes weight loss and has activating properties. However, it does not treat anxiety as effectively as SSRIs, so her anxiety symptoms would need monitoring.

Case 9.2: Serotonin Syndrome

Question 1. Phenelzine is an MAOI that blocks serotonin metabolism. Dextromethorphan inhibits serotonin reuptake. Combined, they cause massive serotonin accumulation and receptor overstimulation, producing serotonin syndrome.

Question 2. The three categories are: (1) Mental status changes—patient is agitated; (2) Autonomic instability—tachycardia, hypertension, hyperthermia, diaphoresis; (3) Neuromuscular abnormalities—hyperreflexia, clonus, tremor. This patient demonstrates all three.

Question 3. Immediate management includes discontinuing all serotonergic drugs, supportive care (IV fluids, cooling for hyperthermia, benzodiazepines for agitation), and cyproheptadine (serotonin antagonist) in severe cases. Most cases resolve within 24-72 hours with supportive care.

Question 4. A 2-week washout period is required after stopping phenelzine before starting an SSRI. MAOIs irreversibly inhibit MAO; new enzyme must be synthesized (takes about 2 weeks). Starting an SSRI too soon risks serotonin syndrome.

Diagram/Table Exercise Answers

DT 9.1: Antidepressant Mechanism Diagram

1. Site 1 (SERT blockade only): **SSRIs**
 2. Site 2 (NET blockade): Also affected by **TCAs and SNRIs**
 3. Site 3 (MAO inhibition): **MAOIs**
 4. Site 4 (Both SERT + NET blockade): **SNRIs (and TCAs)**
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DT 9.2: GABA-A Receptor and Benzodiazepines

1. GABA-A receptors are permeable to: **Chloride (Cl⁻)**
2. Benzodiazepines bind to a **different** site than GABA.

3. Benzodiazepines increase the **frequency** of channel opening.
4. GABA **must** be present for benzodiazepines to work.

DT 9.3: Antidepressant Comparison Table

Drug Class	Mechanism	Key Advantages	Key Disadvantages
SSRIs	Block SERT	Safe in overdose	Sexual dysfunction
SNRIs	Block SERT + NET	Also treats pain	Hypertension
TCAs	Block SERT + NET + receptor antagonism	Effective for pain	Dangerous in overdose (cardiac)
MAOIs	Block MAO enzyme	Highly effective	Drug/food interactions
Bupropion	Block DAT + NET	No sexual dysfunction	Lowers seizure threshold

DT 9.4: Anxiolytic Comparison Table

Drug	Mechanism	Onset	Dependence Risk	Best Use
Diazepam	GABA-A enhancement	Fast	High	Acute anxiety
Buspirone	5-HT _{1A} partial agonist	Slow (weeks)	None	Chronic GAD
SSRIs	SERT blockade	Slow (weeks)	None	Chronic anxiety disorders
Lorazepam	GABA-A enhancement	Fast	High	Panic attacks

Multiple-Choice Question Answers

Question 1. Answer: C

SSRIs are first-line for depression due to efficacy, tolerability, and safety.

Question 2. Answer: B

Benzodiazepines increase the frequency of GABA-A channel opening; barbiturates increase duration.

Question 3. Answer: D

Bupropion is associated with weight loss; mirtazapine, paroxetine, and amitriptyline cause weight gain.

Question 4. Answer: B

Tyramine releases norepinephrine. Without MAO to degrade it, massive NE release causes hypertensive crisis.

Question 5. Answer: C

Triazolam is ultra-short-acting; diazepam and clonazepam are long-acting.

Question 6. Answer: D

Fluoxetine's long half-life (2-6 days) provides built-in tapering, minimizing discontinuation symptoms.

Question 7. Answer: C

Duloxetine (SNRI) is approved for both depression and diabetic peripheral neuropathy.

Question 8. Answer: C

Muscarinic (cholinergic) receptor blockade causes anticholinergic side effects.

Question 9. Answer: C

Buspirone has no dependence potential, unlike benzodiazepines.

Question 10. Answer: C

Paroxetine has the shortest half-life among common SSRIs, causing more discontinuation symptoms.

Question 11. Answer: B

Phenelzine (MAOI) + dextromethorphan (serotonergic) causes serotonin syndrome.

Question 12. Answer: C

The delay reflects neuroplastic adaptations including autoreceptor desensitization, BDNF upregulation, and synaptic remodeling.

Question 13. Answer: C

Bupropion rarely causes sexual dysfunction because it affects dopamine/norepinephrine, not serotonin.

Question 14. Answer: B

Flumazenil may precipitate withdrawal seizures in benzodiazepine-dependent patients.

Question 15. Answer: C

Abrupt benzodiazepine discontinuation after chronic use can cause life-threatening seizures.

Question 16. Answer: C

Mirtazapine's H1 antagonism causes weight gain and sedation—useful for depressed patients with insomnia and poor appetite.