

## Psychopharmacology

Robert M. Millay RN, MSN Ed  
Psychiatric Technician Programs  
Napa Valley College

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## Important Neurotransmitters

- Acetylcholine
- Dopamine
- GABA (gamma-aminobutyric acid)
- Glutamate
- Norepinephrine
- Serotonin

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## Acetylcholine

### Receptors:

- Nicotine
- Muscarine
  - Memory
  - Anticholinergic side effects

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### Dopamine

**Receptors:**

- Nigrostriatal: Movement
- Mesolimbic: Pleasure, delusions/hallucinations
- Mesocortical: Mediates positive and negative symptoms, cognitive side effects
- Tuberoinfundibular: Prolactin release

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### Glutamate –v-GABA

- Excitatory neurotransmitter

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### Serotonin & Norepinephrine

- Inhibitory catecholamine
- Mediates:
  - Cognitive effects
  - Emotions, including panic
  - Memory and anxiety
  - Violence and aggression
  - Sexual function
  - Sleep-wake cycles

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**Drug-Related Variables**

- Mode/mechanism of action
- Dosage form
- Bioavailability
- Onset, peak, duration of action
- Serum, half-life
- Elimination method
- Side effects/toxicities
- Cost

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**Client-Related Variables**

- Diagnosis
- Other disease states
- Age
- Weight
- Anticholinergic susceptibility
- History of side effects
- Previous response
- Compliance
- Financial/insurance
- Support system

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**Antipsychotics**

**Typical**

- Block D<sub>2</sub> receptors
- Differ in potency and side effects

**Atypical**

- Differ in mode of action, side effect, potency
- Fewer...
- Greater efficacy with negative symptoms...
- Lower potential to increase...

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Symptom Dimensions of Psychosis

Positive symptoms related to overactive dopamine neurons in mesolimbic pathway

- Examples:
  - 1
  - 2
  - 3
  - 4
- Relieved by typical antipsychotics
  - Response...

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Symptom Dimensions of Psychosis, cont'd.

Negative symptoms...

Examples:

- 1
- 2
- 3
- 4
- 5
- 6
- 7

- Best treated with atypical antipsychotics
  - Response: slow

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Symptom Dimensions of Psychosis, cont'd.

Cognitive function impairment

- Examples:
  - 1
  - 2
  - 3
  - 4
- Atypical antipsychotics may improve...

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Symptom Dimensions of Psychosis, cont'd.

**Aggressive symptoms**

- Examples:
  - 1
  - 2
  - 3
  - 4
  - 5
- Treated with typical antipsychotics
  - Response:...

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Symptom Dimensions of Psychosis, cont'd.

**Depressive/anxious symptoms**

- Examples:
  - 1
  - 2
  - 3
  - 4
  - 5

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**Goals of Therapy**

- Enable client to:
  - Return to normal daily functions
  - Provide self-care
- Minimize side effects:
  - Use lowest possible dose
  - Manage side effects

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**Absorption and Distribution**

**Absorption**

- Well absorbed by GI tract
- Influenced by:
  - 1
  - 2
  - 3
  - 4

**Distribution**

- Depends on route of administration
  - IM: greater...

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**Metabolism, Excretion, and Serum Level Monitoring**

**Metabolism**

- Half-life:...
- Metabolized...

**Excretion**

- Via kidneys

**Serum level monitoring**

- Not routinely useful

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**First-Line Treatment**

- Olanzapine (Zyprexa) 10-20 mg daily
- Risperidone (Risperdal) 4-6 mg daily
- Quetiapine (Seroquel) 300-400 mg daily
- Ziprasidone (Geodon) 120-180 mg daily
- Aripiprazole (Abilify) 10-30 mg daily

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Adverse Side Effects Related to D<sub>2</sub> Blockade: High-Potency Typical Antipsychotics

Extrapyramidal Side Effects (EPS)

- Dystonia
  - IM diphenhydramine or benztropine
  - Best practice...
- Pseudoparkinsonism
  - Change to low-potency drug
  - Oral antiparkinsonism drug
- Akathisia
  - Decrease antipsychotic dose
  - Propranolol (Inderal)
- Tardive dyskinesia
  - First...
  - Change to atypical antipsychotic

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Adverse Effects Related to Cholinergic Blockade: Low-Potency Typical Antipsychotics

- Atropine-like side effects
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
- Treatment: supportive measures

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Adverse Side Effects Related to Alpha<sub>1</sub> Blockade: Low-Potency Typical Antipsychotics

- Orthostatic hypotension
- Reflex tachycardia
- Dysrhythmias, palpitations
- QT interval changes

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Adverse Effects Related to Histamine<sub>1</sub> Blockade: Clozapine, Olanzapine, Low-Potency Typical Antipsychotics

- Sedation
- Weight gain

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Adverse Effects Related to Serotonin<sub>2</sub> Blockade

- Weight gain
- GI upset
- Sexual dysfunction

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Neuroleptic Malignant Syndrome

- ↓ Level of consciousness
- ↑ Muscle tone
- Autonomic dysfunction
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
- Myoglobinuria

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**Treatment of NMS**

- Discontinue antipsychotics
- Hydrate
- Acetaminophen
- Heparin
  
- Management of arrhythmias
- Dantrolene
- Dopaminergics
  - Bromocriptine, amantadine

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**Other Side Effects**

- Photosensitivity
- Poikilothermia
- Galactorrhea
- Gynecomastia

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**Depot Medication**

- Fluphenazine decanoate
  - Intramuscularly or subcutaneously
- Haloperidol decanoate
  - Intramuscularly

**Administration Pointers**

- Inspect solution.
- Use dry syringe and needle.
- Do not exceed 3 ml per site.

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**Atypical Antipsychotic: Clozapine**

- High receptor affinity for D<sub>4</sub> and 5HT<sub>2</sub>
- Reserved for refractory illness
- Risk: Agranulocytosis
- Side effects
  - Anticholinergic, extrapyramidal
  - NMS
  - Tachycardia, postural hypotension
  - Weight gain
  - Hypersalivation
  - Fever, seizures

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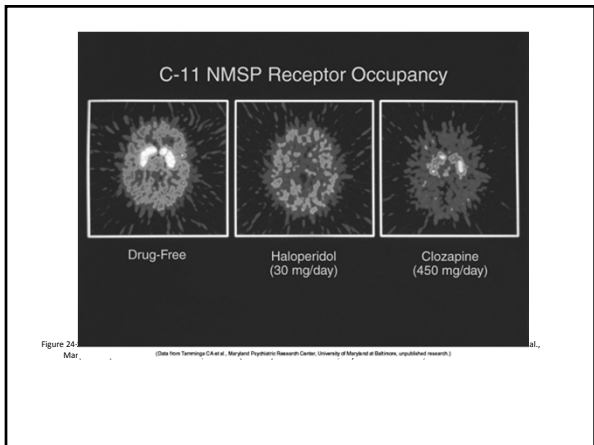
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**Other Atypical Antipsychotics**

- Invega (paliperidone)
- Latuda (lurasidone)
- Risperidone (Risperdal)
- Olanzapine (Zyprexa)
- Quetiapine (Seroquel)
- Ziprasidone (Geodon)

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### Antidepressants

- Selective serotonin reuptake inhibitors (SSRIs)
- Selective norepinephrine reuptake inhibitors (SNRIs)
- Tricyclic antidepressants
- Monoamine oxidase inhibitors

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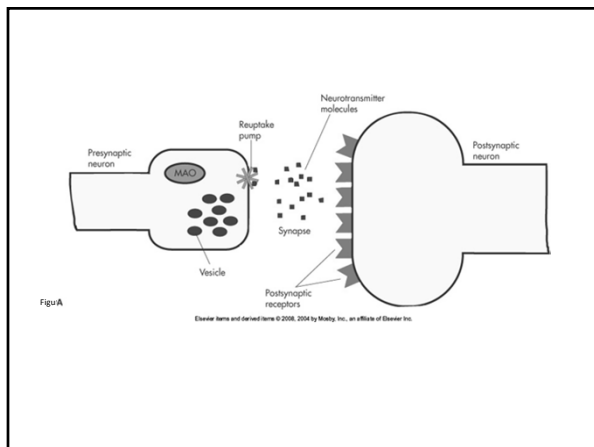
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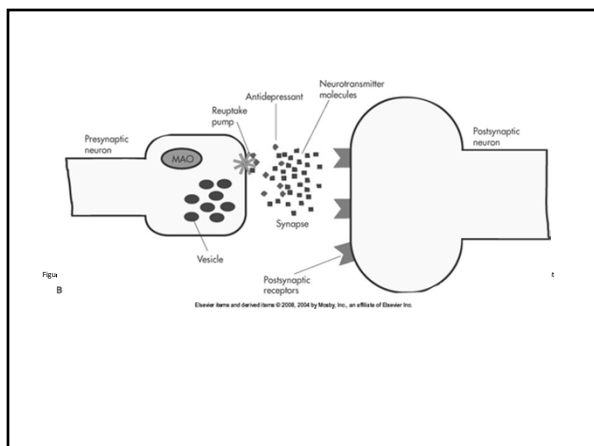
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Selective Serotonin Reuptake Inhibitors (SSRIs)

Approved for depression, panic, OCD, PTSD, bulimia nervosa, social phobia

- Citalopram (Celexa)
- Escitalopram (Lexapro)
- Fluvoxamine (Luvox)
- Paroxetine (Paxil)
- Sertraline (Zoloft)

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Selective norepinephrine reuptake inhibitors (SNRIs)

- Cymbalta (duloxetine)
- Effexor (venlafaxine)
- Fetzima (levomilnacipran)
- Pristiq (desvenlafaxine)
- Savella (milnacipran)

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Serotonin Syndrome

- Confusion
- Hypomania
- Restlessness
- Myoclonus
- Hyperreflexia
- Diaphoresis
- Shivering
- Tremor
- Diarrhea

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**Tricyclic Antidepressants:  
Second-Line Therapy**

- Amitriptyline (Elavil)
- Clomipramine (Anafranil)
- Desipramine (Norpramin)
- Imipramine (Tofranil)
- Nortriptyline (Aventyl)
- Protriptyline (Vivactil)
- Trimipramine (Surmontil)

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**Response to Antidepressants**

Week 1

- ↓ Anxiety
- Improved sleep

Weeks 1 to 3

- ↑ Activity, self-care, sex drive
- ↑ Concentration, memory
- ↓ Psychomotor retardation

Weeks 2 to 4

- Relief of depressed mood
- ↓ Hopelessness
- Suicidal ideation subsides

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**MAOI Dietary Restrictions**

Prohibited:

- Aged cheese, ripe avocados
- Ripe figs, anchovies, bean curd
- Broad beans, yeast, liver
- Deli meats, pickled herring
- Meat extracts, fermented foods
- Chianti and sherry

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**MAOI Dietary Restrictions, cont'd.**

Moderate use:

- Beer, ale
- Wine, distilled spirits
- Cottage cheese, cream cheese
- Yogurt, sour cream
- Coffee, chocolate
- Spinach, raisins, tomatoes, eggplant

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**Other Restrictions With Use of MAOIs**

- Antiasthmatics
- Antihypertensives
- Epinephrine
- Allergy, hay fever decongestants
- Cough and cold products
- Buspirone
- Meperidine
- SSRIs
- Yohimbine

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**Hypertensive Crisis**

S/Sx:

- 1
- 2
- 3
- 4

Treatment

- Nifedipine
- Monitor vital signs

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**Other Antidepressants**

- Venlafaxine (Effexor)
- Nefazodone
- Trazodone
- Bupropion
- Mirtazapine

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**Treatment of Bipolar Disorder**

- Lithium
- Valproate
- Carbamazepine
- Oxcarbazepine
- Lamotrigine
- Gabapentin
- Topiramate
- Tiagabine
- Zonisamide
- Levetiracetam

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**Lithium Side Effects Within Therapeutic Range**

- Fine tremor
- Nausea, vomiting, diarrhea
- Mild polydipsia, polyuria
- Lethargy, muscle weakness
- Weight gain
- Increased WBC
- Acne, alopecia
- Hypothyroidism

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Lithium Side Effects: Moderate Toxicity

Lithium level >1.5 mEq/L

- Coarsening of tremor
- Worsening GI symptoms
- Confusion, slurred speech
- Sedation, lethargy

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Lithium Side Effects: Severe Toxicity

Lithium level >2.5 mEq/L

- Arrhythmias
- AB block
- Bradycardia
- Myocarditis
- Seizures
- Coma
- Death

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Generalized Anxiety Disorder

- Antidepressants
  - Venlafaxine
  - SSRIs
  - Imipramine
  - Nefazodone
  - Mirtazapine
- Benzodiazepines
  - Clonazepam
  - Lorazepam
  - Alprazolam
- Buspirone

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**Obsessive Compulsive Disorder**

- Antidepressants
  - SSRIs
  - Clomipramine
- Augmentation therapy

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**Posttraumatic Stress Disorder**

- Antidepressants
  - SSRIs
- Benzodiazepines
  - Clonazepam
- Mood stabilizers

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**Social Phobia**

- Antidepressants
  - SSRIs
- Benzodiazepines
- Gabapentin

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### Hypnotics

- Benzodiazepines
  - Triazolam (Halcion)
  - Temazepam (Restoril)
  - Flurazepam (Dalmane)
- Nonbenzodiazepines
  - Zolpidem (Ambien)
  - Zaleplon (Sonata)

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### Other Agents Used for Sleep

- Trazodone
- Chloral hydrate (Notec)
- Diphenhydramine (Benadryl)
- Melatonin (Circadian)
- Herbal products
  - Kava-kava
  - Valerian
- Barbiturates

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### Acute Agitation and Aggression

- Antipsychotics
  - Haloperidol
  - Ziprasidone
  - Quetiapine
  - Risperidone
  - Olanzapine
- Benzodiazepines
  - Lorazepam
  - Trazodone (for older adults)

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### Chronic Aggression

Schizophrenia

- Antipsychotics

Mania

- Lithium
- Valproate

Seizure disorder

- Carbamazepine
- Valproate

Older adults

- Trazodone

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