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| **Neurotransmitter** | **Function** | **Effect of Deficit** | **Effect of Surplus** | **Excitatory or Inhibitory/ Additional Notes** |
| **Acetylcholine (Ach)** | **Stimulates muscle contraction (skeletal and smooth); involved in**  **attention, memory, learning and general intellectual functioning** | **Alzheimer’s Disease**  Lack of muscle movement & control (paralysis) | **Severe muscle spasms** | Additional notes: Explain botulin and curare’s impact:  **Both paralyze its victims by blocking ACh receptors involved in muscle movement** |
| **Dopamine** | **Pleasurable sensations involved in voluntary movement, attention, and learning**  Stimulates hypothalamus (reward center) | **Parkinson’s Disease**  Anxiety disorders, memory problems, ADHD | Schizophrenia  Drug Addiction | **Excitatory and Inhibitory** |
| **Serotonin** | **Moods and emotional states,**  **hunger regulation of sleep and wakefulness (arousal)** | **Depression, mood disorders** | **Autism**  Mania | **Inhibitory** |
| **Norepinephrine** | **Used for arousal in the**  **flight/fight response, modulation of mood, plays a role in learning and memory retrieval** | **Mental disorders, especially depression** | Anxiety | Excitatory |
| **GABA** | **Helps to offset excitatory**  **messages and regulate daily sleep-wake cycles**  Brain’s major inhibitory  neurotransmitter | **Anxiety, seizures, tremors, and insomnia** | Sleep and eating disorders | **Inhibitory** |
| **Endorphins** | **Involved in pain perception and positive emotions Similar to opiate family of drugs**  Pleasure, reduction of stress | **Body experiences pain** | **Body may not give adequate warning about pain. Artificial highs** | **Inhibitory** |
| **Glutamate** | **Used in memory, learning,**  **movement. Helps messages cross the synapse more efficiently** |  | **Too much glutamate (and too little GABA) associated with epileptic seizures** | **Excitatory** |