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BETHESDA, MD

# Deciphering How the Brain Represents Information in Health and Disease: Characterizing Loss of Consciousness under General Anesthesia


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## What is General Anesthesia?

A drug-induced, **reversible** condition comprised of

**Hypnosis** (loss of consciousness)

**Amnesia** (loss of memory)

**Analgesia** (loss of pain perception)

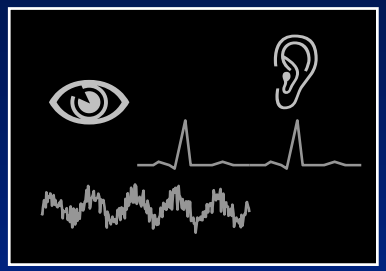
**Akinesia** (loss of movement)

and

**Stability and Control** of the cardiovascular, respiratory thermoregulatory and autonomic nervous systems.

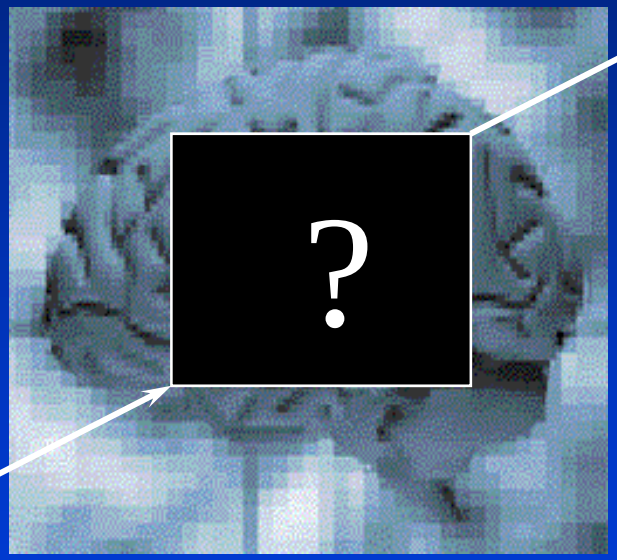
## How Drugs Cause General Anesthesia is Unknown?

# Current State of Anesthesiology Research



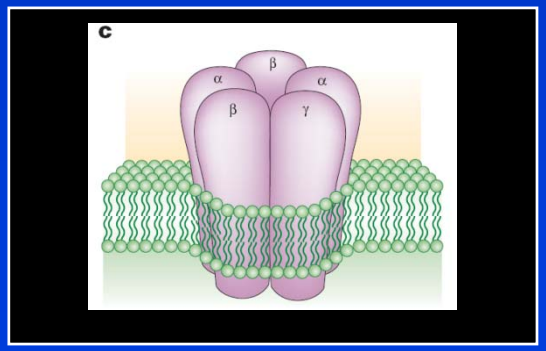
## Behavioral States

- Hypnosis
- Amnesia
- Analgesia
- Akinesia
- Homeostasis




## Specific Molecular Receptors

- GABA_A
- NMDA
- Alpha Adrenergic
- Glycine and Glutamate
- Cholinergic Receptors




## Neural Circuits

- Arousal
- Memory
- Somatosensation and Pain
- Movement
- Autonomic and Cardiovascular Control

## Anesthetic Drugs

-Amnesia (benzodiezapines, inhalational drugs)

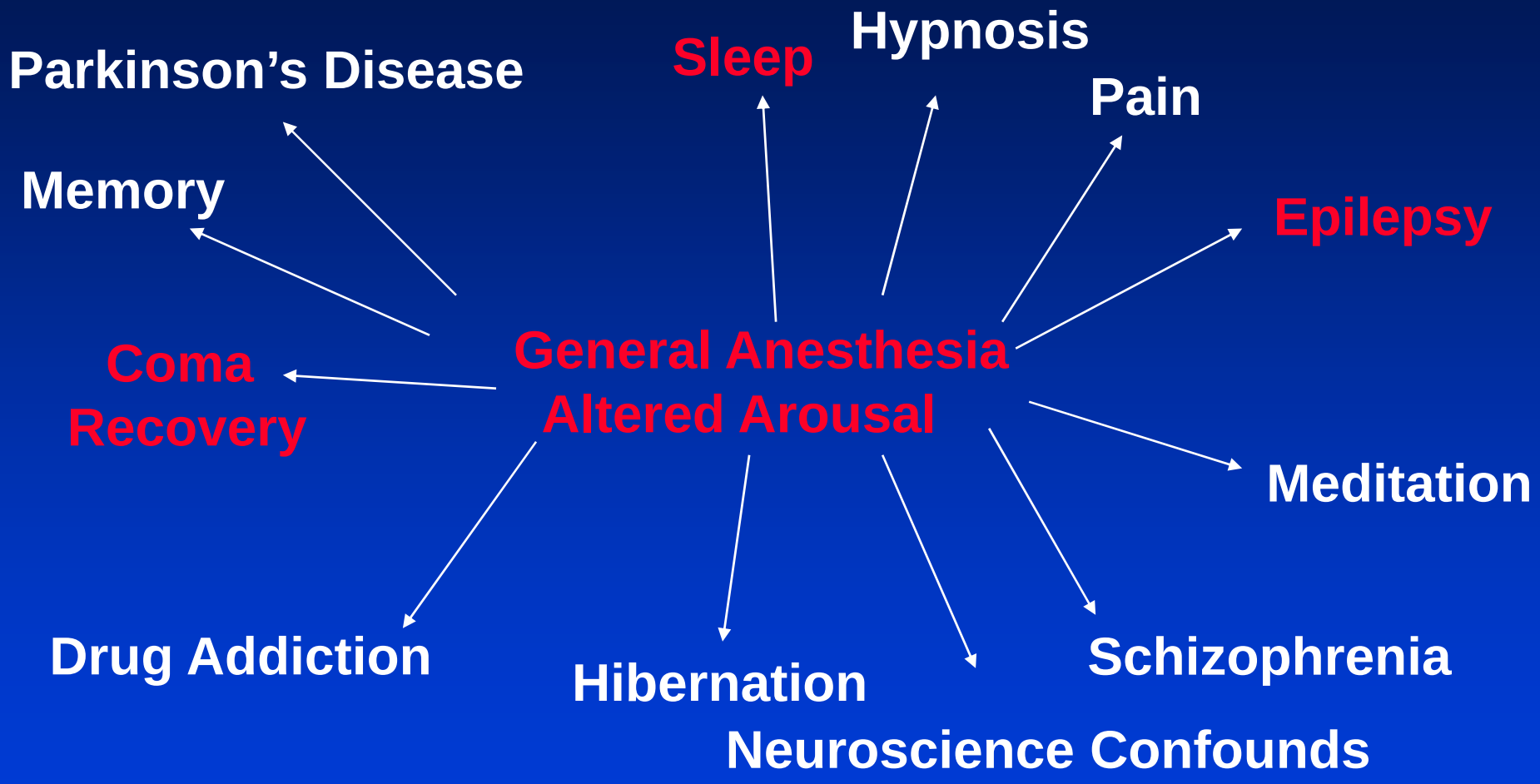
-Analgesia (opioids, inhalational drugs)

-Hypnosis (barbiturates, propofol, inhalational drugs)

-Immobility (anticholinergics, inhalational drugs)

- Hemodynamic Stability

# The Grand Challenge of General Anesthesia




**Realize Its Unique Potential as a Clinical Neuroscience Discipline**

# Specific Challenges

Human Neurophysiology Experimentation

Data Recording and Data Storage

Neural Signal Processing and Data Analysis

High-Dimensional Modeling

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