



# Working of Anaesthetic Drugs in the Brain

[Source: TH](#)

## Why in News?

Recent research provides new clues into the **mechanism of general anaesthesia** suggesting that these drugs might act primarily on specific brain areas responsible for keeping us alert and awake.

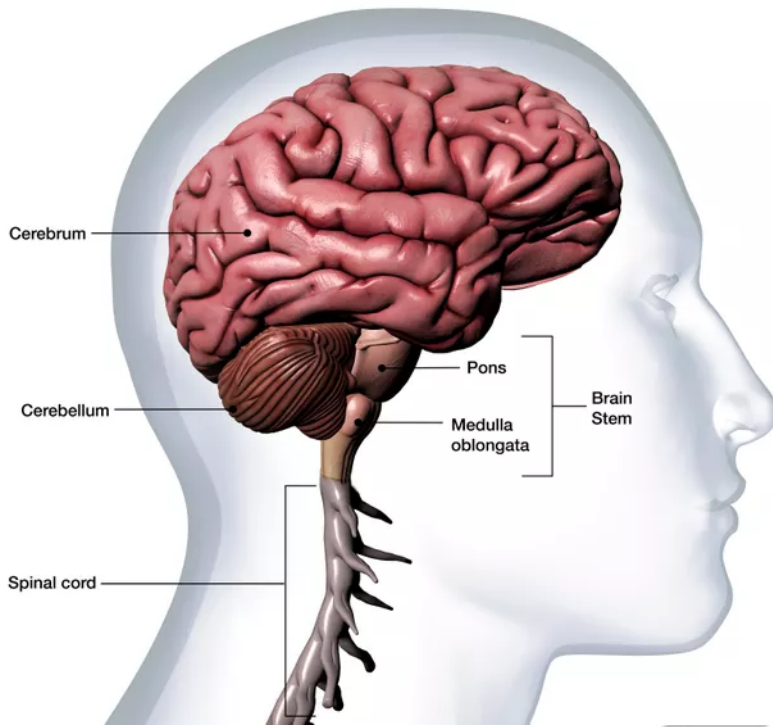
## How do Anaesthetic Drugs Work Inside the Brain?

- The [general anaesthetic drugs](#) have been a cornerstone of modern medicine for over 180 years. Still, there is no thorough understanding of their precise working in the brain.
- The human brain has around **86 billion neurons**, broadly categorised as **excitatory (keeping us awake)** and **inhibitory (regulating excitatory neurons)**.
  - These **work in balance to control consciousness**. Sleep involves **inhibitory neurons silencing excitatory neurons**.
- General anaesthesia mimics sleep by **directly silencing excitatory neurons**, effectively putting us to sleep for surgery.
- **Recent Research Findings:** The study identified **differences in protein expression** between excitatory and inhibitory neurons. These differences may explain why only excitatory communication is disrupted by anaesthesia.
  - Future research aims to identify the [specific protein](#) variation that makes excitatory neurons more susceptible.

## What are the Key Facts About the Human Brain?

- The human brain is the **command centre** for the [human nervous system](#).
- It receives signals from the body's sensory organs and outputs information to the muscles.
- The [human brain](#) has the same basic structure as other mammal brains but is **larger in relation to body size** than the brains of many other mammals, such as dolphins, whales and elephants.

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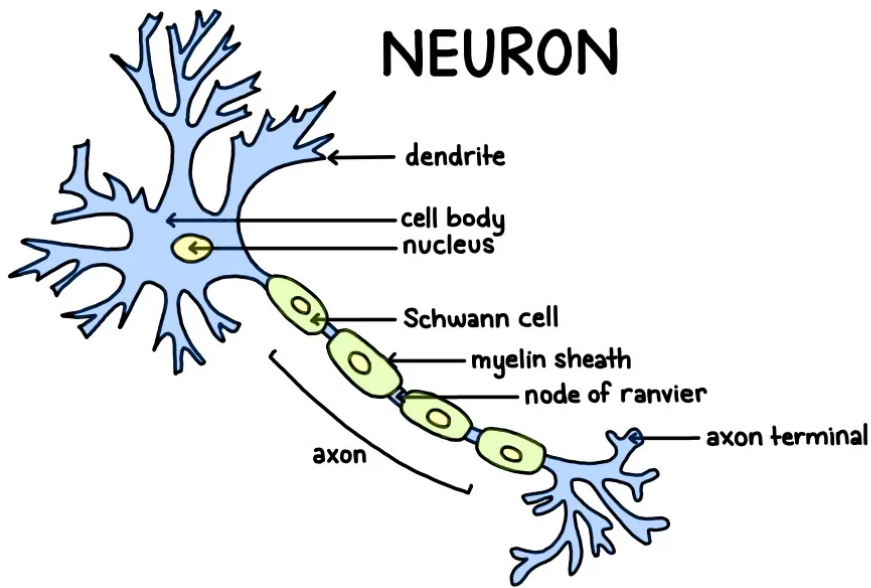


Parts of the Brain	Description	Key Functions
<b>Cerebrum (Largest Part)</b>	Divided into 2 hemispheres	Thought, planning, memory, emotion, movement, and sensory processing.
<b>Thalamus</b>	Relay centre of the brain	To relay motor and sensory signals to the cerebral cortex. It also regulates sleep, alertness, and wakefulness.
<b>Hypothalamus</b>	Connects the nervous system to the endocrine system.	Keeps the body in a stable state called homeostasis
<b>Brainstem</b>	Connects the brain to the spinal cord and controls vital functions.	Relays information between the brain & body.  Controls heart rate, breathing, & consciousness (sleep/wake cycles).  <b>Sub-Parts:</b> Midbrain, Pons and Medulla oblongata.
<b>Cerebellum</b>	Major structure of the hindbrain.	Coordination, balance, and possibly some cognitive functions.
<b>Cerebrospinal Fluid (CSF)</b>	Clear, colourless, watery brain fluid	Cushioning & Waste Removal

### About Neuron:

- Neurons are the **fundamental building blocks** of the nervous system, responsible for **transmitting information** throughout the body.
- **Parts:** They consist of three main parts:
  - **Cell body (soma):** Contains the **nucleus** and controls the neuron's functions.

- **Dendrites:** Branching extensions that **receive signals** from other neurons.
- **Axon:** A long, slender fibre that **transmits signals to other neurons**, muscles, or glands. Some axons are covered by a fatty sheath called **myelin**, which speeds up signal transmission.



## UPSC Civil Services Examination, Previous Year Questions (PYQs)

### Prelims

**Q. What is the Cas9 protein that is often mentioned in the news? (2019)**

- (a) A molecular scissors used in targeted gene editing
- (b) A biosensor used in the accurate detection of pathogens in patients
- (c) A gene that makes plants pest-resistant
- (d) A herbicidal substance synthesised in genetically modified crops

**Ans: (a)**