

# Difference Between Cerebral Edema and Hydrocephalus

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## Key Difference – Cerebral Edema vs Hydrocephalus

Hydrocephalus is the excessive accumulation of CSF within the ventricular system, caused by a disturbance of formation, flow or absorption. In cerebral edema, the brain swells as a result of the pooling of [intracellular or extracellular fluid](#). Both these conditions are associated with an increase in the intracranial pressure. However, **in hydrocephalus, it is the accumulation of CSF that leads to all other clinical manifestations whereas, in cerebral edema, the CSF level remains relatively constant.** This is the key difference between cerebral edema and hydrocephalus.

## What is Hydrocephalus?

Hydrocephalus is the excessive accumulation of CSF within the ventricular system, caused by a disturbance of formation, flow or absorption. Since the skull forms an inexpandable compartment, this fluid accumulation increases the intracranial pressure while dilating the ventricles inside the brain.

Hydrocephalus with no interruption to the flow of CSF into the subarachnoid space from the ventricular system is called communicating hydrocephalus. If there are such interruptions leading to the accumulation of CSF within the ventricles, it is called the non-communicating hydrocephalus. In addition to this division, hydrocephalus is described under two categories as infantile and adult hydrocephalus in clinical medicine.

## Infantile Hydrocephalus

### Causes

- **Arnold –Chiari malformation**

This condition is most frequently associated with spina bifida and is characterized by the descent of the cerebellar [tonsils](#) into the cervical canal.

- **Stenosis of the cerebral aqueduct**

This can be due to congenital or acquired causes such as [meningitis](#) and meningeal [hemorrhages](#).

- **Dandy- Walker syndrome**

In the Dandy-Walker syndrome, the outflow foramina of the fourth ventricle is obstructed, leading to the accumulation of CSF inside the ventricle.

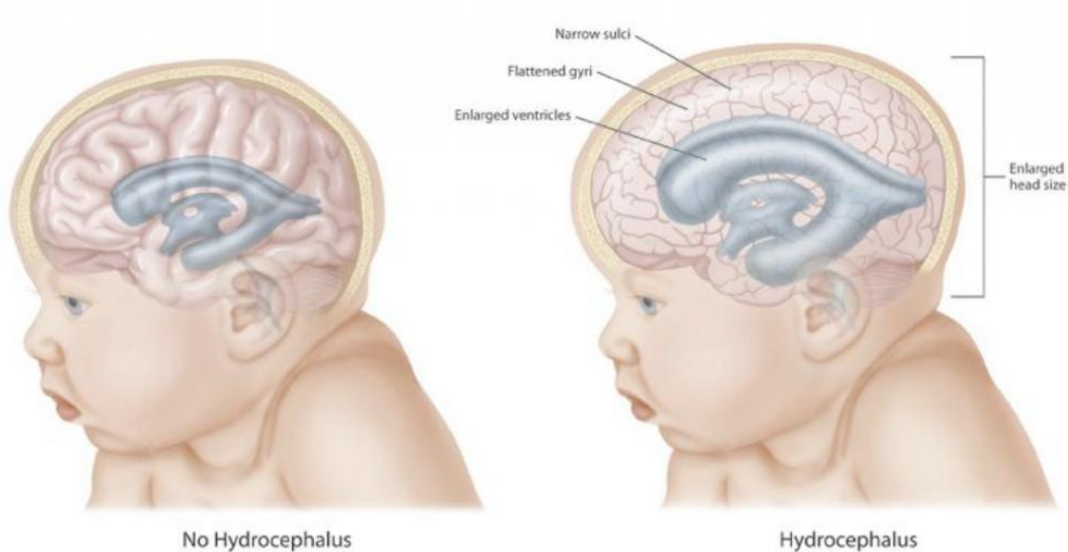


Figure 01: Hydrocephalus

## Adult Hydrocephalus

### Causes

- **Posterior fossa and brainstem tumors**

Tumors in the brainstem and posterior fossa can press into the ducts through which CSF flows, interrupting the drainage of CSF.

- Subarachnoid hemorrhages
- Third ventricle colloid cyst
- Choroid plexus papilloma

These tumors abnormally produce CSF increasing the rate of CSF production more than the rate at which it is resorbed.

## Symptoms

- In infants, the head will be abnormally enlarged
- Headache
- Cognitive impairment
- Ataxia
- Features of increased intracranial pressure such as papilledema

## Normal Pressure Hydrocephalus

This is a condition classically seen in elderly people where the lateral ventricles are abnormally dilated. The name given to this pathology is actually a misnomer because the pressure does not remain at the normal level consistently and it is possible to have occasional spikes in the intracranial pressure.

Normal pressure hydrocephalus has a unique triad of symptoms

- Urinary incontinence
- Gait apraxia
- [Dementia](#)

## Treatment

- Ventriculoperitoneal shunting is carried out to shunt the CSF out of the [cranium](#)
- Surgical resection is considered, depending on the location of the [tumor](#)
- When appropriate endoscopic third ventriculostomy can be done.

## What is Cerebral Edema?

Cerebral edema is simply the swelling of the brain. Although it looks like a trivial condition at a glance, cerebral edema is a medical emergency which can result in death if not treated immediately.

## Vasogenic Cerebral Edema

Our brain has a protective barrier called the blood brain barrier which regulates the entry of substances into the brain tissue. When there is a disruption in this barrier, various chemicals and molecules enter the intercellular spaces within the neural tissue. Similarly, a damaged blood vessel also can leak blood into the intercellular

spaces from the intravascular compartment. Swelling of the brain in this manner due to the increase in the extracellular fluid is known as the Vasogenic cerebral edema.

### Causes

- Inflammation
- Neoplasm
- Ischemic injury

### Cytotoxic Cerebral Edema

Unlike vasogenic edema, cytotoxic edema is a result of the increase in the intracellular fluid content of the brain.

### Causes

- Neuronal, glial or endothelial cell membrane injury
- [Ischemia](#)
- [Hypoxia](#)

An edematous brain has flattened gyri and narrow sulci.



Figure 02: Edema (darker areas) surrounding a secondary brain tumor.

## What are the similarities between Cerebral Edema and Hydrocephalus?

- Both hydrocephalus and cerebral edema are fatal conditions.
- In both situations, the intracranial pressure is elevated.

## What is the difference between Cerebral Edema and Hydrocephalus?

Cerebral Edema vs Hydrocephalus	
Cerebral edema is the swelling of the brain due to the accumulation of fluid.	Hydrocephalus is the excessive accumulation of CSF within the ventricular system caused by a disturbance of formation, flow or absorption.
CSF Level	
Usually, the CSF level does not change	CSF level is increased

### Summary – Cerebral Edema vs Hydrocephalus

Cerebral Edema and hydrocephalus are two fairly common conditions encountered in the clinical practice. The most noticeable difference between cerebral edema and hydrocephalus is the elevation of CSF levels. Early diagnosis of the underlying disease and proper management are extremely important to save the life of the patient.

#### References:

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2. Kumar, Parveen J., and Michael L. Clark. Kumar & Clark clinical medicine. Edinburgh: W.B. Saunders, 2009. Print.

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