

# Traumatic Brain Injury:

## Effects on the Endocrine System

### WHAT IS TRAUMATIC BRAIN INJURY?

Traumatic brain injury, also called TBI, is sudden damage to the brain. It happens when the head hits something violently or is hit again and again, or when an object goes through the skull and into the brain. Causes include

- Falls
- Motor vehicle accidents
- Violence, such as gunshot wounds, child abuse, or beatings
- Injuries from sports or during combat (such as explosions)

### DID YOU KNOW?

The hypothalamus and the pituitary gland are like orchestra conductors. Their job is to tell other endocrine glands throughout the body to make the hormones that affect and protect every aspect of your health.

### DEFINITIONS

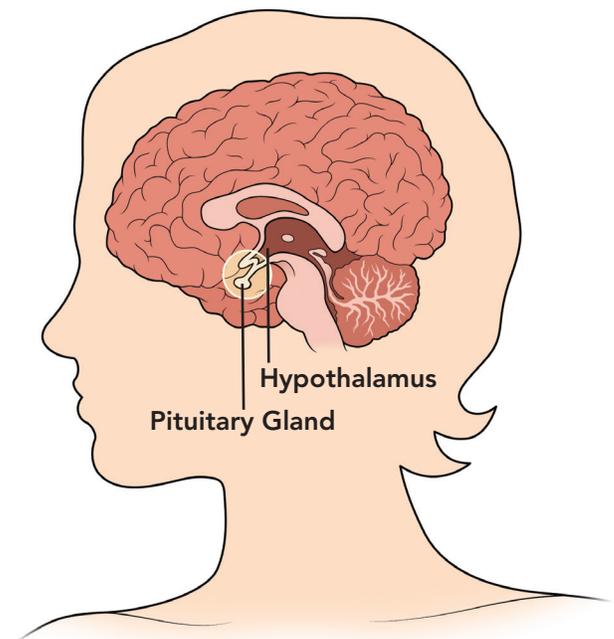
- **Hypothalamus:** a part of the brain that controls the release of hormones made by the pituitary gland
- **Pituitary gland:** located at the base of the brain, it's called the "master gland" because it makes hormones that tell other glands (such as the thyroid or adrenal glands) to make other kinds of hormones
- **Thyroid gland:** found in the neck, it makes thyroid hormones, which control metabolism; helps the heart, muscles, and other organs work properly
- **Adrenal glands:** one located on top of each kidney, they make cortisol, which helps the body cope with stress, illness, and injury

### WHAT IS THE ENDOCRINE SYSTEM?

Your endocrine system includes glands and organs that make and release hormones, which are chemicals that help your body work properly. They control growth, sexual development, how your body uses and stores energy (metabolism), how it deals with illness, and more. You need proper types and amounts of hormones to feel well.

### HOW CAN TBI AFFECT THE ENDOCRINE SYSTEM?

Two important parts of the endocrine system—the pituitary gland and the hypothalamus—are located in or near the brain. TBI can injure them, causing hormone problems. A person with TBI may have hormone problems right away or months or even years after the injury.



## SOME HORMONES MADE BY THE PITUITARY GLAND AND WHAT THEY DO

<b>ACTH (adrenocorticotropin)</b>	Tells the adrenal glands to make cortisol (the “stress” hormone).
<b>ADH (antidiuretic hormone)</b>	Helps control the amount of water in the body.
<b>FSH (follicle-stimulating hormone) and LH (luteinizing hormone)</b>	Help ovaries and testes (testicles) work properly.
<b>GH (growth hormone)</b>	In kids, helps them grow taller, increases muscle, and decreases body fat. In adults, helps metabolism. Helps keep muscle and bone healthy.
<b>Prolactin</b>	Starts breast milk production after childbirth; can affect sex hormones.
<b>TSH (thyroid-stimulating hormone)</b>	Tells the thyroid gland to make thyroid hormones.

## WHAT HORMONE PROBLEMS CAN HAPPEN WITH TBI?

Someone with TBI can have one or more problems, depending on the injury. Problems that often occur soon after TBI include

- Adrenal insufficiency: when the adrenal glands don’t make enough hormones; results in fatigue, weight loss, low blood pressure, vomiting, and dehydration. Adrenal insufficiency can be life-threatening if not treated.
- Diabetes insipidus: when the pituitary doesn’t make enough ADH; results in frequent urination and extreme thirst.
- Hyponatremia: when certain hormone problems upset the balance of salt and water in the body; can result in headache, fatigue, vomiting, confusion, and convulsions.

Problems that may occur later and their symptoms include

- Hypothyroidism (not enough thyroid hormone): fatigue, constipation, weight gain, irregular menstrual periods, cold intolerance
- Hypogonadism (not enough sex hormones): in women, a stop in menstruation and loss of body hair; in men, sexual dysfunction, breast enlargement, loss of body hair, and muscle loss
- Growth hormone deficiency (not enough growth hormone): in adults, increased fat, loss of muscle and bone, and decreased energy; in kids, growth problems
- Hyperprolactinemia (too much prolactin): irregular menstrual periods, nipple discharge, and erectile dysfunction

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The Hormone Health Network offers free, online resources based on the most advanced clinical and scientific knowledge from The Endocrine Society ([www.endo-society.org](http://www.endo-society.org)). The Network’s goal is to move patients from educated to engaged, from informed to active partners in their health care. This fact sheet is also available in Spanish at [www.hormone.org/Spanish](http://www.hormone.org/Spanish).

**Traumatic Brain Injury: Effects on the Endocrine System Fact Sheet**

## HOW ARE TBI-RELATED HORMONE PROBLEMS DIAGNOSED?

Your doctor will ask about your medical history and do a physical exam. Blood tests are done to check your hormone levels. You may have an MRI to look at the pituitary gland and check for tumors, cysts, or other problems.

## WHAT IS THE TREATMENT FOR TBI-RELATED HORMONE PROBLEMS?

Often, you will take hormones to replace what’s missing (called hormone therapy). Other problems require various treatments, such as treating hyponatremia by cutting back on fluid intake, getting an IV (through a vein) salt solution, and taking medicines.

## WHAT’S THE LONG-TERM OUTLOOK FOR TBI-RELATED HORMONE PROBLEMS?

The outlook depends on the type of problem and how severe it is. Some endocrine problems may be temporary and disappear within a year after TBI. Hormone therapy is a very important part of treatment. It can restore your health, relieve symptoms, and improve your quality of life. In some cases, it can save your life.

## Questions to ask your doctor

- What specific hormones are affected by my injury and how can they be replaced?
- Will treatment relieve my symptoms?
- How long will I need treatment?
- What are the risks and benefits of the treatment?
- How will I know whether my hormone function is returning on its own?
- How often will I need to be checked?
- Will the dose of hormones change as I get older?

## RESOURCES

- Find-an-Endocrinologist: [www.hormone.org](http://www.hormone.org) or call 1-800-HORMONE (1-800-467-6663)
- Hormone Health Network information about pituitary gland disorders: [www.hormone.org/Pituitary/overview.cfm](http://www.hormone.org/Pituitary/overview.cfm)
- Mayo Clinic information about TBI: [www.mayoclinic.com/health/traumatic-brain-injury/DS00552](http://www.mayoclinic.com/health/traumatic-brain-injury/DS00552)
- National Institutes of Health information about TBI: [www.ninds.nih.gov/disorders/tbi/tbi.htm](http://www.ninds.nih.gov/disorders/tbi/tbi.htm)



[www.hormone.org](http://www.hormone.org)