

## Diabetes Insipidus

### What is diabetes insipidus?

Diabetes insipidus (DI) is a rare disease that causes frequent urination. The large volume of urine is diluted, mostly water. To make up for lost water, a person with DI may feel the need to drink large amounts and is likely to urinate frequently, even at night, which can disrupt sleep and, on occasion, cause bedwetting. Because of the excretion of abnormally large volumes of dilute urine, people with DI may quickly become dehydrated if they do not drink enough water. Children with DI may be irritable or listless and may have fever, vomiting, or diarrhea. Milder forms of DI can be managed by drinking enough water, usually between 2 and 2.5 liters a day. DI severe enough to endanger a person's health is rare.

### What is the difference between diabetes insipidus and diabetes mellitus?

DI should not be confused with diabetes mellitus (DM), which results from insulin deficiency or resistance leading to high blood glucose, also called blood sugar. DI and DM are unrelated,

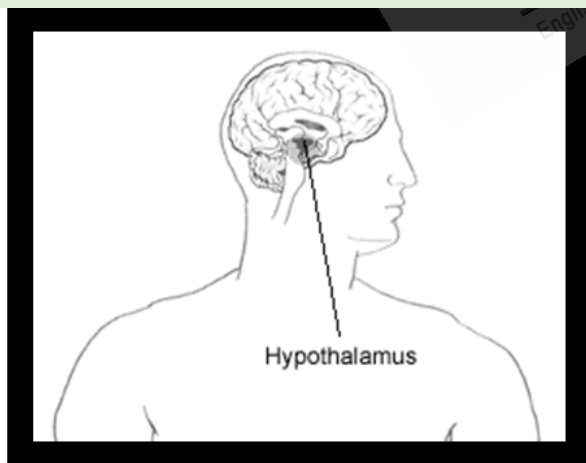
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The hypothalamus makes antidiuretic hormone (ADH), which directs the kidneys to make less urine.

To keep the volume and composition of body fluids balanced, the rate of fluid intake is governed by thirst, and the rate of excretion is governed by the production of antidiuretic hormone (ADH), also called vasopressin. This hormone is made in the hypothalamus, a small gland located in the brain. ADH is stored in the nearby pituitary gland and released into the bloodstream when necessary. When ADH reaches the kidneys, it directs them to concentrate the urine by reabsorbing some of the filtered water to the bloodstream and therefore make less urine. DI occurs when this precise system for regulating the kidneys' handling of fluids is disrupted.

### **What are the types of diabetes insipidus?**

#### ***Central DI***

The most common form of serious DI, central DI, results from damage to the pituitary gland, which disrupts the normal storage and release of ADH. Damage to the pituitary gland can be caused by different diseases as well as by head injuries, neurosurgery, or genetic disorders. To treat the ADH deficiency that results from any kind of damage to the hypothalamus or pituitary, a synthetic hormone called desmopressin can be taken by an injection, a nasal spray, or a pill.

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drug called amiloride. The combination of furozide and amiloride is sold under the brand name Moduretic. Again, with this combination of drugs, one should drink fluids only when thirsty and not at other times.

#### ***Dipsogenic DI***

Dipsogenic DI is caused by a defect in or damage to the thirst mechanism, which is located in the hypothalamus. This defect results in an abnormal increase in thirst and fluid intake that suppresses ADH secretion and increases urine output. Desmopressin or other drugs should not be used to treat dipsogenic DI because they may decrease urine output but not thirst and fluid intake. This fluid overload can lead to water intoxication, a condition that lowers the concentration of sodium in the blood and can seriously damage the brain. Scientists have not yet found an effective treatment for dipsogenic DI.

#### ***Gestational DI***

Gestational DI occurs only during pregnancy and results when an enzyme made by the placenta destroys ADH in the mother. The placenta is the system of blood vessels and other tissue that develops with the fetus. The placenta allows exchange of nutrients and waste products between mother and fetus.

Most cases of gestational DI can be treated with desmopressin. In rare cases, however, an abnormality in the thirst mechanism causes gestational DI, and desmopressin should not be used.

### **How is diabetes insipidus diagnosed?**

Because DM is more common and because DM and DI have similar symptoms, a health care provider may suspect that a patient with DI has DM. But testing should make the diagnosis clear.

A doctor must determine which type of DI is involved before proper treatment can begin.

Diagnosis is based on a series of tests, including urinalysis and a fluid deprivation test.

Urinalysis is the physical and chemical examination of urine. The urine of a person with DI will be less concentrated. Therefore, the salt and waste concentrations are low and the amount of water excreted is high. A physician evaluates the concentration of urine by measuring how many particles are in a kilogram of water or by comparing the weight of the urine with an equal volume of distilled water.

A fluid deprivation test helps determine whether DI is caused by one of the following:

- excessive intake of fluid
- a defect in ADH production
- a defect in the kidneys' response to ADH

This test measures changes in body weight, urine output, and urine composition when fluids are withheld. Sometimes measuring blood levels of ADH during this test is also necessary.

In some patients, a magnetic resonance imaging (MRI) of the brain may be necessary as well.

### **Points to Remember**

- Diabetes insipidus (DI) is a rare disease that causes frequent urination and excessive thirst.
- DI is not related to diabetes mellitus (DM).
- Central DI is caused by damage to the pituitary gland and is treated with a synthetic hormone called desmopressin, which prevents water excretion.
- Nephrogenic DI is caused by drugs or kidney disease and is treated with hydrochlorothiazide (HCTZ), indomethacin, or a combination of HCTZ and amiloride.
- Scientists have not yet discovered an effective treatment for dipsogenic DI, which is caused by a defect in the thirst mechanism.
- Most forms of gestational DI can be treated with desmopressin.
- A doctor must determine which type of DI is involved before proper treatment can begin.

Reference:

<http://kidney.niddk.nih.gov>