

## Diabetes insipidus: labs

Diabetes insipidus (DI) results from lack of release or lack of response to antidiuretic hormone (ADH), referred to as central or nephrogenic DI respectively. ADH, also called arginine vasopressin (AVP), is synthesized in the hypothalamus and transported to the posterior pituitary where it gets released (along the oxytocin, the only two hormones released by the posterior pituitary). There are numerous causes for central or nephrogenic DI including idiopathic, familial/genetic, trauma, postsurgical, sarcoidosis, autoimmune, hypercalcemia, and chronic lithium ingestion. Note that this list is not exhaustive.

Given ADH's function at causing free water reabsorption in the kidney, one can expect patients with diabetes insipidus to experience significant free water loss through the urine. This results in hypotonic urine and hypertonic serum. Indeed, one typically finds **urine osmolality of <300mOsm/kg, a serum osmolality >290mOsm/kg, and a serum sodium > 50mEq/L**. Polyuria with a higher osmolality (especially >800mOsm/kg) is often due to glucose, diuretics, mannitol, sodium, or urea load.

Other causes of polyuria can include polydipsia, cerebral salt wasting (CSW), as well as situations causing an increased osmotic load to the kidneys details above (hyperglycemia, excess urea, mannitol administration). CSW can be distinguished from DI by hyponatremia and inappropriately elevated urine osmolality and sodium concentration. However, the lab findings for DI and polydipsia are quite similar. These conditions can be distinguished via a water deprivation test. Patients with polydipsia would be expected to appropriately concentrate their urine while patients with DI can't. Central and nephrogenic DI can then be distinguished with a desmopressin challenge. Patients with central DI have kidneys that still respond to ADH so they should concentrate their urine after exposure to desmopressin. Patients who have nephrogenic DI will not respond to desmopressin.

Further reading: Hui C, Khan M, Khan Suheb MZ, et al. Diabetes Insipidus. [Updated 2022 Nov 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK470458/>