Hey Clinical Problem Solvers! This is Jasmine Saeedian, 4th year medical student at Western Michigan University Homer Stryker MD School of Medicine! I'm so excited to talk to you about our new schema describing an approach to Diabetes Insipidus.

Let's get started!

First off, let's set the stage. Diabetes insipidus is a condition that causes polyuria, which means the body makes too much urine. In the case of diabetes insipidus, the problem is specifically due to a problem making or responding to "anti-diuretic hormone" or ADH. ADH, also known as vasopressin, is made in the posterior pituitary and helps balance the amount of fluid in the body by keeping water in. Normally, ADH acts on the collecting ducts of the nephron to concentrate urine by increasing water reabsorption.

There are 2 kinds of diabetes insipidus: Central diabetes insipidus, where the posterior pituitary doesn't make enough anti-diuretic hormone to keep the amount of fluid in balance. And nephrogenic diabetes insipidus, where the body makes enough anti-diuretic hormone, but the kidneys don't respond to it. There are some findings that are similar among both forms. These include: Urine specific gravity < 1.006, Urine osmolality < 300 mOsm/kg, Serum osmolality > 290 mOsm/kg, and hyperosmotic volume contraction.

When diabetes insipidus (which I'll now be referring to as 'DI') is suspected, the next step is to administer ADH, to see how the body responds and determine if this is a central or nephrogenic issue.

If there is no response to ADH, meaning if there's a minimal change in urine osmolality, this leads us to nephrogenic diabetes insipidus. Even though there is normal ADH secretion in the body, there is renal resistance or a defect in renal concentrating ability, due to varying degrees of renal resistance to ADH's water-retaining effect. There are a few different etiologies for nephrogenic DI, so let's walk through them!

Electrolyte imbalance, specifically hypercalcemia above 11 milliequivalents/liter and hypokalemia below 3 milliequivalents/liter, can precipitate nephrogenic DI.

Medications can also insight nephrogenic DI. More commonly, loop diuretics and chronic lithium use, are associated with nephrogenic DI. More rarely, amphotericin, gentamicin, and tetracyclines can also precipitate nephrogenic DI. Drug-induced nephrogenic DI is typically reversible, at least partially.

Interstitial disease like sickle cell can also nephrogenic DI, as microinfarcts of the medulla from sickling erythrocytes are thought to cause ischemia and distortion of the vasa recta, affecting urine osmolality.

Other notable causes of nephrogenic DI include familial causes, which means there's an inherited defect in the ADH receptor or aquaporin receptor, as well as cold diuresis.

While there are many causes of nephrogenic DI, the causes that are most likely to create a defect severe enough to produce polyuria are use of loop diuretics, hypercalcemia, and lithium.

Treatment for nephrogenic DI will vary depending on the inciting cause, but some options include hydrochlorothiazide, indomethacin, amiloride, and avoidance of the offending agent.

Now that we've learned about nephrogenic diabetes insipidus, where the body is producing ADH but kidney is unable to respond lets learn about the case where the posteriopituitary is unable to produce ADH, central diabetes insipidus. In central diabetes insipidus, the body makes concentrated urine as a response to ADH administration. This means that for some reason, the body has stopped releasing ADH from the pituitary gland; but it can respond to ADH if it is available, and you'd see a change greater than 50% in the urine osmolality. Some common situations that can lead to this are trauma, surgeries, or subarachnoid hemorrhage which might damage the pituitary directly or through hypoperfusion. Other etiologies include familial causes, complication from pregnancy (such as Sheehan syndrome), or any other causes of hypopituitarism, such as idiopathic or autoimmune causes.

Since the issue with central DI is a lack of ADH, we would treat by supplementing with desmopressin.
We covered a lot, so let's do a quick summary: the posterior pituitary makes ADH, which normally helps increase water absorption. You get central DI if you can't make ADH in the brain, or you get nephrogenic DI if you can't recognize it at the kidney. In either case, you get polyuria with urine that is very dilute so we'd treat with hydration and appropriate medical agents depending on the cause, which we'd know based on results of the water deprivation test and administration of an ADH analog.

That's all I have right now. If you're interesting in thinking of diabetes insipidus in the grander *scheme* of things.. check out the schema video on polyuria to learn more!

Otherwise, thanks for listening! I hope you enjoyed this schema and learned something exciting!