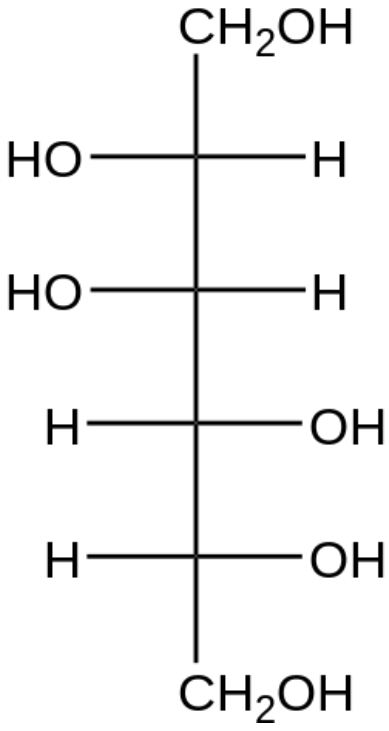
Osmotic diuretic

Osmotic diuretics are drugs that increase the excretion of water (diuresis). The proximal tubule and the descending limb of the loop of Henle are freely permeable to water. In these segments, the osmotically active osmotic diuretics, which are not reabsorbed, lead to water retention in the nephron. As a result, these substances lead to osmotic diuresis.

Examples

The main example of an osmotic diuretic is **mannitol**, which is administered as a **10-20%** solution.

Mannitol is not metabolized and undergoes glomerular filtration (within 30-60 min after administration) without significant tubular secretion or reabsorption. Since mannitol is poorly absorbed in the GIT, per os administration is avoided. If performed, it would cause severe diarrhea. Hence, mannitol is usually administered intravenously. Due to osmotic diuretic administration, accelerated tubular fluid flow (and hence less tubular epithelium contact) leads to decreased Na^+ resorption, resulting in increased natriuresis. The natriuresis is minor in comparison to the osmotic diuresis, so hypernatremia may occur.



Mannitol

Indications

Osmotic diuretics are used when increased water excretion with minimal Na^+ excretion is required. For example, it can be indicated to treat conditions associated with **impaired renal hemodynamics** or to maintain urine volume and prevent anuria, which may occur during hemolysis. Osmotic diuretics can also be prescribed to **decrease intracranial or intraocular pressure** as they reduce the rate of aqueous humor production. Finally, mannitol can be used along with loop diuretics to induce forced diuresis in intoxication (to decrease the plasma concentration of the toxin).

Contraindications

Osmotic diuretics should be avoided in patients with anuria (since no urine is produced, diuretics will not reach their typical site of action, but they will only affect other organs) or heart failure.

Side effects

- Mannitol is quickly diffusing in the extracellular fluid, which draws out water from the intracellular fluid, resulting in **dilution hyponatremia** and increased extracellular and intravascular fluid volumes.
- Common side effects include headache, nausea, and vomiting.
- Concurrent heart failure may result in acute pulmonary edema.
- High doses of mannitol without adequate water replacement may result in dehydration and **hypernatremia**.

Links

Related Articles

- Diuretics
- Renin-angiotensin-aldosterone system
- Hypertension
- Hypertensive crisis

Source

- MARTÍNKOVÁ, Jiřina – MIČUDA, Stanislav – CERMANOVÁ, Jolana. *Vybrané kapitoly z klinické farmakologie pro bakalářské studium : Kardiovaskulární systém* [online]. ©2000. [cit. 2010-07-02]. <https://www.lfhk.cuni.cz/farmakol/predn/bak/kapitoly/prednasky/kardio-bak.ppt/>.