

Water Deprivation Protocol – Biochemistry Departments City Hospital

Indications

Investigation of suspected cranial or nephrogenic diabetes insipidus and primary polydipsia.

Contraindications

Other causes of polydipsia and polyuria (diabetes mellitus, hypoadrenalism, hypercalcaemia, hypokalaemia, chronic renal failure, therapy with carbamazepine, chlorpropamide or lithium. Also exclude urinary tract infections as a cause.

Test is not indicated if there is evidence for the ability to concentrate urine (spot urine osmolality >750 mOsm/kg).

Principle of test

Water restriction in the normal individual results in secretion of (Anti-diuretic hormone) ADH by the posterior pituitary in order to reclaim water from the distal renal tubules. Failure of this mechanism results in a rise in plasma osmolality due to water loss and a dilute urine of low osmolality. The two causes are a failure of ADH secretion and insensitivity of the renal tubules to ADH. Synthetic ADH (DDAVP) may be administered to distinguish between the two.

Side effects

Patients with high suspicion of DI or with true DI should be monitored throughout the test as they may become severely water depleted during the test. **Precaution do not fluid restrict until the test commences.**

Requirements

- Accurate weighing scales
- Appropriate measuring vessel for urine volumes
- Blood pressure monitoring equipment

Procedure

Baseline investigations before commencing fluid restriction:

- Weigh the subject and calculate 95% of initial body weight.
- Take baseline urine for electrolytes and osmolality
- Baseline blood for osmolality, UE and glucose
- Check and record blood pressure

Commence fluid restriction

- Check patient weight, urine volume, urine osmolality, urine electrolytes, blood UE and osmolality **Hourly**
- **Record the information in the chart provided.**

Fluid restriction should be stopped if:

- **There is a fall in weight >5%**
- **Plasma osmolality increases > 300 mosm/kg**
- **Urine osmolality increases > 650 mosm/kg**

Proceed to DDAVP test if urine osmolality rises by <30 mosm/kg over 3 successive urine samples or if the urine osmolality fails to increase >650 mosm/kg after 8 hours of fluid restriction

DDAVP test

Procedure

- Administer DDAVP 2ug i.m or 20ug intranasally
- Continue checking the patient weight, urine volume, urine osmolality, urine electrolytes, blood UE and osmolality **Hourly**
- Should the patient require fluids, do not allow the intake to exceed the total volume of urine produced over the fluid restriction period. Encourage the patient to drink small amounts (not the full amount in one drink)
- The patient is allowed food (a light snack such as toast is recommended)

Fluid restriction should be stopped if:

- There is a fall in weight >5%
- Plasma osmolality increases > 300 mosm/kg
- Urine osmolality increases > 750 mosm/kg

Interpretation of Water deprivation test

Post dehydration Osmolality (mOsm/kg)		Post DDAVP Osmolality (mOsm/kg)	Diagnosis
Plasma	Urine	Urine	
283-293	>750	>750	Normal
>293	<300	<300	Nephrogenic diabetes insipidus
>293	<300	>750	Cranial diabetes insipidus
<293	300-750	<750	Chronic polydipsia
<293	300-750	>750	Partial nephrogenic DI or primary polydipsia

Reference:

1. Barth J, Butler GE, Hammond P. Biochemical investigations in laboratory medicine. ACB Venture publications. 2001
2. Marshall JW, Bangert SK. Clinical Biochemistry, Metabolic and Clinical Aspects. Churchill Livingstone. 1995

Water deprivation chart

Name:				Weight:			
Date:				95% of body weight:			
RXK:				Blood pressure:			
Time	Weight	BP	Urine volume	Urine Osm	Serum sodium	Serum Osm	Comments
							Baseline results 0 mins