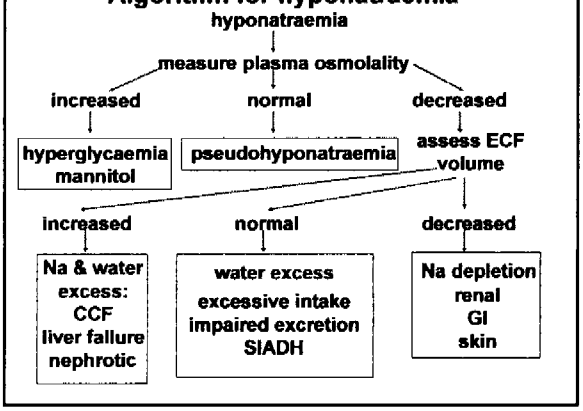
Hyponatraemia

Algorithm for hyponatraemia

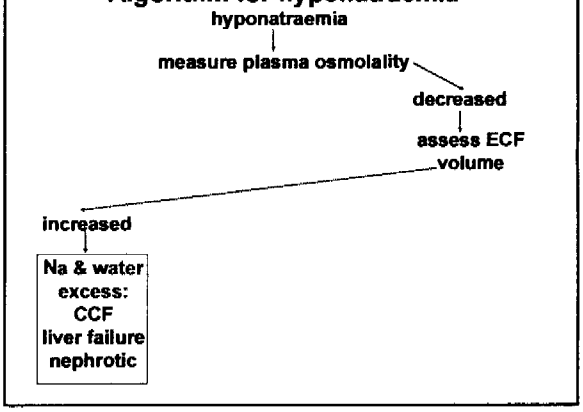


A 42-year-old man with chronic hepatitis B presented with jaundice, peripheral oedema and ascites. He was on no medication.

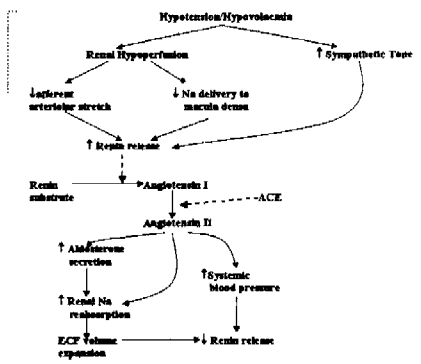
Plasma		**Ref. Range**
Na	**119 mmol/L**	**135-145**
K	**2.4 mmol/L**	**3.5-5.0**
Urea	**2.3 mmol/L**	**2.5-8.0**
Creat	**100 µmol/L**	**75-130**
Osmol	**260 mmol/kg**	**275-295**

Urine	
Na	**<10 mmol/L**
K	**65 mmol/L**
osmol	**654 mmol/kg**

Algorithm for hyponatraemia



Renin-angiotensin system



Renin-angiotensin system

- Renin -> angiotensin -> aldosterone
- Activated by reduced IVV
  - Na depletion
  - haemorrhage
  - oedematous states
- Causes renal Na retention
- Simple test to ascertain R/A/A status :
  - measure plasma & urine Na
  - if urine < 10 mmol/L suggests R/A/A active

A 42-year-old man was admitted for an elective operation.
His serum sample was noted by the laboratory to be turbid.

Plasma		Reference Range
Na	120	135-145 mmol/L
K	3.6	3.5-5.0 mmol/L
Cr	90	75-150 μmol/L
Urea	4.7	2.5-7.0 mmol/L
glucose	5.1	3.6-6.5 mmol/L
osmolality	286	275-295 mmol/kg

Calculated osmolarity = 2x [Na] + [urea] + [glucose]

A 42-year-old man was admitted for an elective operation.
His serum sample was noted by the laboratory to be turbid.

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Na	120	135-145 mmol/L
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Urea	4.7	2.5-7.0 mmol/L
glucose	5.1	3.6-6.5 mmol/L
osmolality	286	275-295 mmol/kg

Calculated osmolarity = 250 mmol/L

Algorithm for hyponatraemia

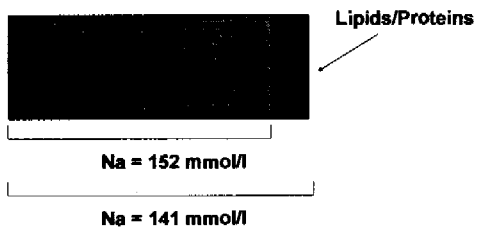
hyponatraemia
↓
measure plasma osmolality
↓
normal
↓
pseudohyponatraemia

Na 120 mmol/L
osmol 286 mmol/kg

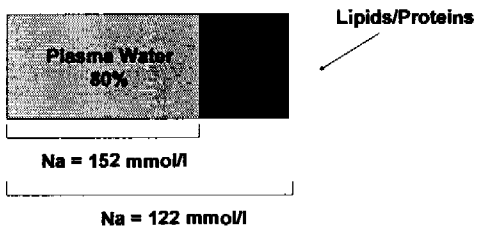
Plasma		Reference Range
Na	120	135-145 mmol/L
K	3.6	3.5-5.0 mmol/L
Cr	90	75-150 μmol/L
Urea	4.7	2.5-7.0 mmol/L
glucose	5.1	3.6-6.5 mmol/L
osmolality	286	275-295 mmol/kg
cholesterol	21	2.5-7.3 mmol/L
triglyceride	81	0.3-1.7 mmol/L

Diagnosis

Pseudohyponatraemia:
apparent hyponatraemia when plasma osmolality is normal



Pseudohyponatraemia



A 67-year-old woman with bronchiectasis was admitted to hospital with a two-week history of a productive cough with green sputum. Over the previous week, she had become confused and disoriented.
On examination her mental responses were slow. Her blood pressure was 150/80 mmHg. She was neither clinically volume depleted nor oedematous. There were bilateral widespread coarse crepitations in the lungs, but no other significant clinical abnormalities.

Plasma		Reference Range
Na	122	135-145 mmol/L
K	4.0	3.5-5.0 mmol/L
Creat	64	75-150 μmol/L
Urea	2.4	2.5-7.0 mmol/L

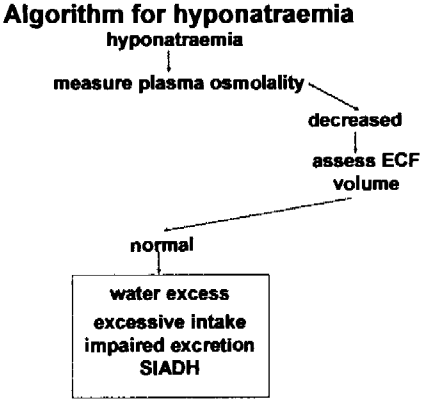
Plasma		Reference Range
Na	122	135-145 mmol/L
K	4.0	3.5-5.0 mmol/L
Cr	64	75-150 umol/L
Urea	2.4	2.5-7.0 mmol/L
glucose	5.3	3.6-6.5 mmol/L
osmolality	258	275-295 mmol/kg

calculated plasma osmolarity
= 2x [Na] + [urea] + [glucose]

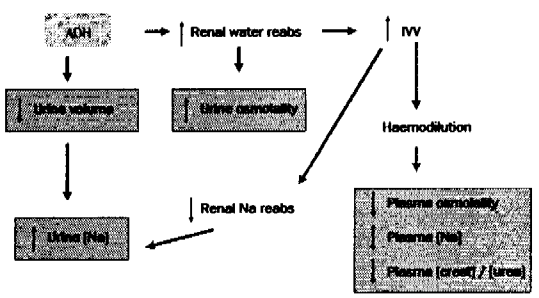
Plasma		Reference Range
Na	122	135-145 mmol/L
K	4.0	3.5-5.0 mmol/L
Cr	64	75-150 umol/L
Urea	2.4	2.5-7.0 mmol/L
glucose	5.3	3.6-6.5 mmol/L
osmolality	258	275-295 mmol/kg

calculated plasma osmolarity
= 2x [Na] + [urea] + [glucose]
= 251.7 mmol/kg

Algorithm for hyponatraemia



Hyponatraemia due to SIADH



Diagnostic features of SIADH

Inappropriate salt excretion in the presence of hyponatraemia

- decreased plasma [Na]
- decreased plasma osmolality
- inappropriately high urine osmolality (at least 1.2-2X > plasma)
- urine [Na] > 20 mmol/L
- urine volume 0.5 - 1.5 L/24 hours
- no oedema
- normal renal and adrenal function

Plasma		Reference Range
Na	122	135-145 mmol/L
K	4.0	3.5-5.0 mmol/L
Cr	64	75-150 µmol/L
Urea	2.4	2.5-7.0 mmol/L
glucose	5.3	3.6-6.5 mmol/L
osmolality	258	275-295 mmol/kg
Urine		
osmolality	560 mmol/kg	
Na	55 mmol/L	

Syndrome of Inappropriate ADH secretion (SIADH)

Causes

- malignant disease
- chest disease
- CNS disease
- drugs
- miscellaneous

bronchiectasis

Syndrome of Inappropriate ADH secretion (SIADH)

Causes

- malignant disease - **ca bronchus, kidney; brain tumour; lymphoma**
- CNS disease - **trauma, infection**
- drugs - **carbamazepine, opiates, vincristine, cyclophosphamide**
- miscellaneous - **AIP, hypothyroidism**

- Patient is dry and has been treated for CCF
- Plasma
  - –Na 120 (135-145 mmol/L)
  - –Urea 15 (3.0 - 8.0 mmol/L)
- Urine
  - –Na 50 mmol/L

Hyponatraemia due to diuretics