FEB 2011
QUESTION 07

Outline the role of the kidney in body water homeostasis

Body water is regulated by volume and osmolality
- usually augment each other but in the setting of a low intrascular volume and low osmolality the body will prioritise fluid retention
- the kidney plays an integral role in both volume and osmolality regulation

Intravascular volume regulation

senses	effective circulating volume
sensors:	carotid and aortic high pressure baroreceptors, volume receptors in right atria and major veins and afferent arteriole,
the effectors:	RAAS, SNS, naturetic peptides and ADH
result:	modulate sodium excretion

Body water homeostasis refers to the overall balance of fluid intake and output.

senses:	osmolality (normal is 275-290 mOsmol)
sensor:	osmoreceptors in the hypothalamus
CPU:	: hypothalmus
effectors:	ADH and thirst
osmolality	>290 there is increased ADH release, thirst
	<275 there is decreased ADH release
result:	modulate water excretion

Anti diuretic hormone
- peptide hormone syntesised in the hypothalamus
- released from the posterior pituitary
- acts on the kidney via GPC V2 receptors
- increases the synthesis of aquaporins

The kidney plays a vital role in homeostasis via the actions of ADH
- The kidney has a large daily glomerular filtration of up to 180L per day
- The vast majority is reabsorbed (99%) via different mechanisms along the tubule (
- urine output is 1440ml/day

- CCM in the kidneys is created by the variable semi permiable membrane of the tubule lumen
- the CCM results in an concentration gradient from the cortex to medulla of 100-1400mOsmols/L

- body water homeostasis is maintained by the action of ADH on the distal tubule
- ADH inserts aquaporins which increase water reabsorption, thus the presence or absence will affect the overall output of water from the patient