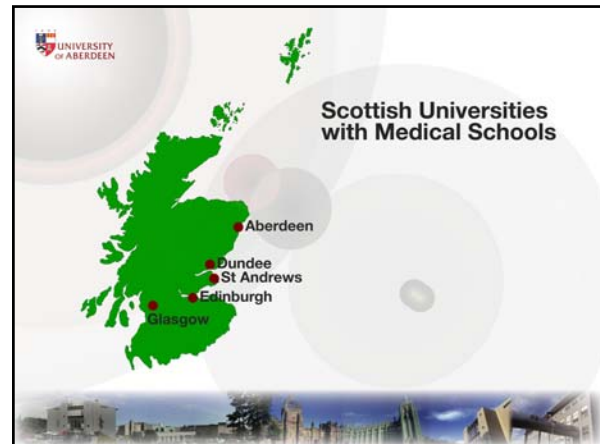


Urinary System 1 Introduction

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In next three weeks, pathology of

- Urinary system*
- Male reproductive system*
- Nervous system

* major diseases of the prostate to be covered in Urinary system

Urinary system lectures

1. Introduction
2. Tumours of the kidney, urinary tract and prostate
3. Glomerular diseases 1
4. Glomerular diseases 2
5. Congenital & cystic kidney diseases, urinary calculi and urinary obstruction
6. Diseases of renal tubules and interstitium

Probably in that order!

URINARY SYSTEM

What do the kidneys do?

What the kidneys do

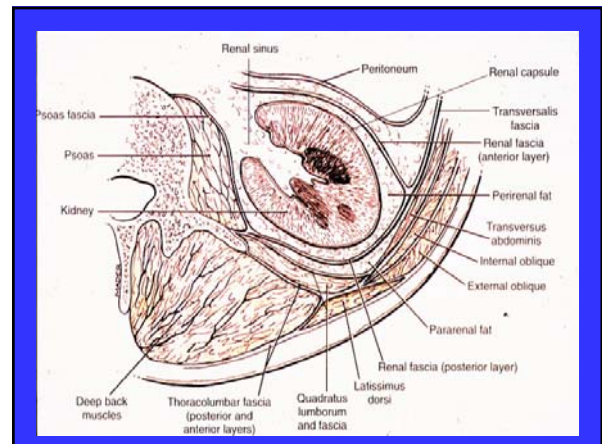
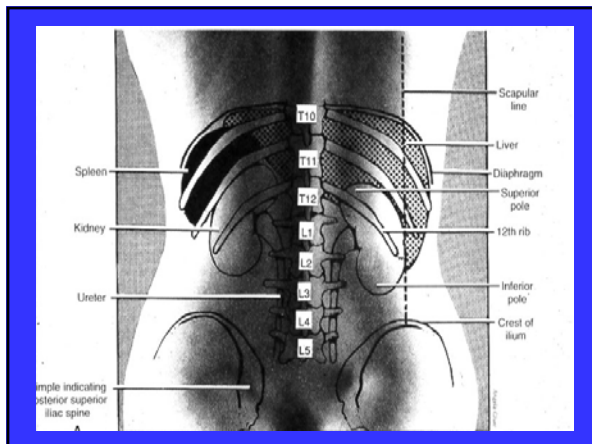
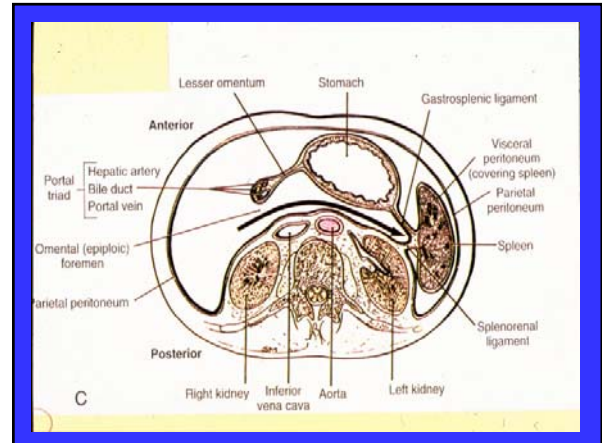
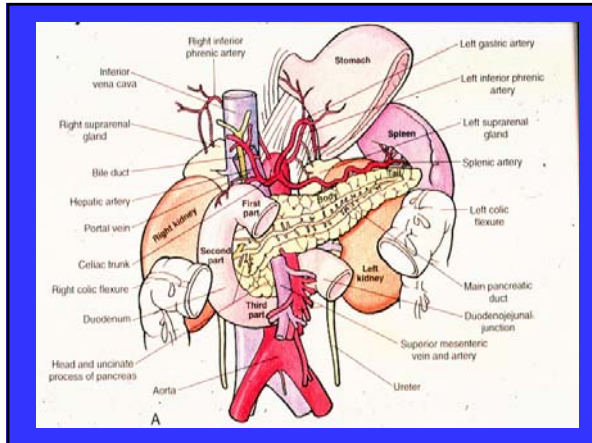
- remove most water-soluble wastes from body
- help regulate salt & water balance
- help regulate acid-base balance
- act like endocrine organs in terms of
 - regulation of blood pressure
 - control of intestinal Ca^{++} absorption
 - red cell production

Does it matter if you "lose" a kidney?

If you were to take a biopsy from the kidney using a needle,

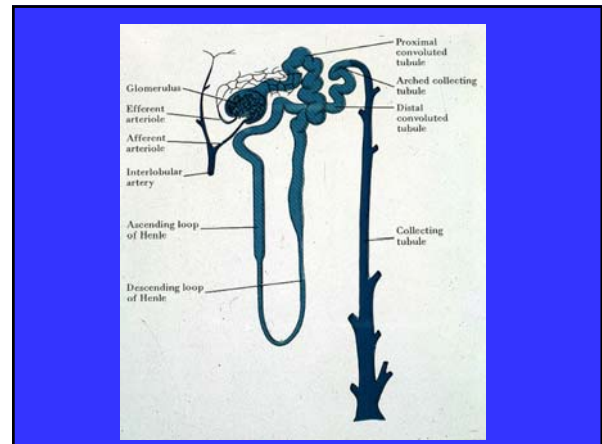
1) would you do it from the front or the back?

2) which kidney would you sample?



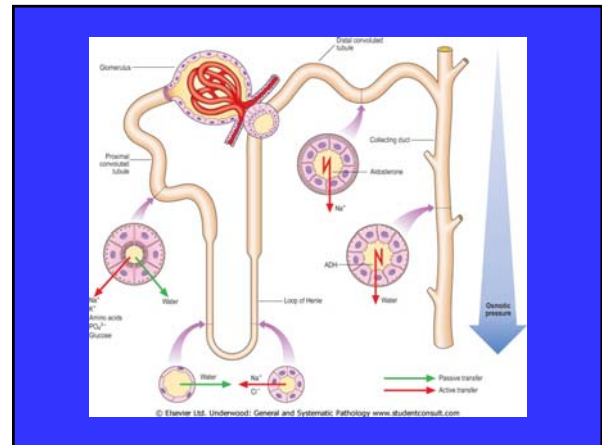
180 L of glomerular filtrate is produced every 24 hours.

Why aren't we always urinating?

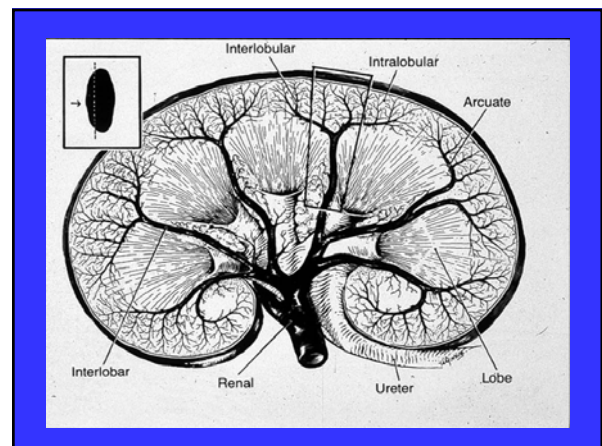


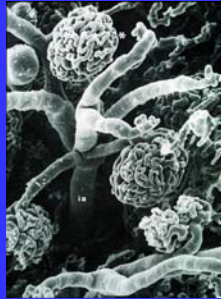
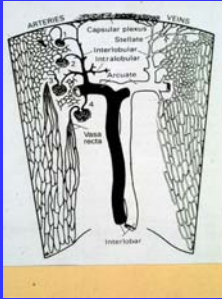
Urine production

- glomerular filtration of blood
 - dependent on capillary hydrostatic pressure
 - ultrafiltrate, virtually protein free
- tubular modification of glomerular filtrate
 - PCT – max. reabsorption of water & Na⁺ etc
 - loop of Henle – countercurrent mechanism
 - DCT – final regulation of ionic composition, as site for action of aldosterone
 - collecting tubule – site for action of ADH

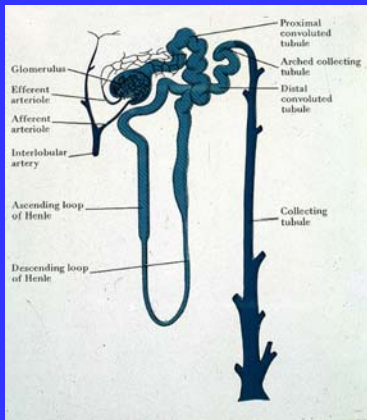


In "shock" (when blood pressure drops very fast to low levels), what will happen to urine volume?

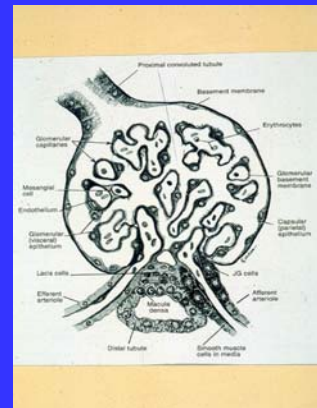
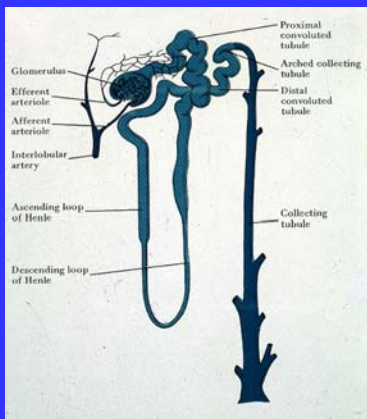




When ischaemia affects the kidneys, which will be more severely damaged – the glomeruli or the tubules?



What do you know about the relationship between the kidney and hypertension?



Kidneys and blood pressure

- kidneys help control blood pressure
 - renin-angiotensin-aldosterone system (RAAS)
 - salt and water balance
- kidney disease can cause high blood pressure
- and hypertension can damage kidneys

In someone who has damaged their spinal cord -

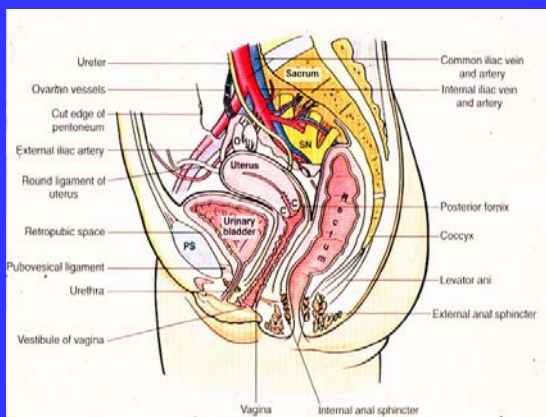
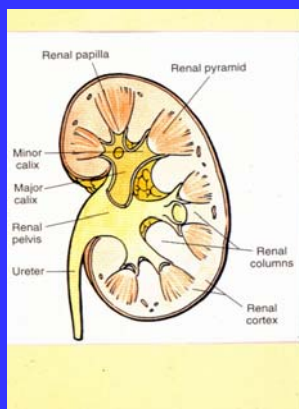
- 1) *what happens to the bladder?*
- 2) *what could you do to help?*

What's the urinary tract for?

Renal calculi ("stones") can form in the kidney or pelvi-calyceal system: they may dislodge and move.

Where do you think they might stick?

- and what will happen when they do?



Can you think of any of the ways patients might present with diseases of the urinary system?*

*- *presentation = symptoms and/or signs of a disease*

Symptoms and signs of urinary tract diseases

- proteinuria
- azotaemia, leading to uraemia
- haematuria
- urinary casts
- hypertension
- oliguria or anuria
- oedema
- polyuria
- renal/ureteric colic
- dysuria
- renal failure – acute or chronic

What might happen if kidneys both fail suddenly? (say over hours/days)
– (acute renal failure)

and what if they fail over a much longer time period?
– (chronic renal failure)

Acute renal failure

- salt and water retention most important effects
- so?

Chronic (end stage) renal failure

- uraemia – increased blood urea & creatinine
- hypertension
- bone disease
 - conversion of vit D impaired, so low intestinal absorption of calcium
- anaemia
- polyuria/nocturia

- nausea & vomiting
- GI bleeding
- itching

How might you investigate diseases of the kidney and urinary tract?

Investigations

- urinalysis
- BP measurement
- blood tests – especially “U&Es” (urea and electrolytes)
- imaging techniques
- renal biopsy
- etc