

**It is recommended that you consult a physiology and a microanatomy resource to refresh your knowledge on these topics, however, you do not need to outline them and they will not be explicitly examined per se but rather assumed and incorporated into discussion and exam questions pertaining to renal disease and dysfunction.**

## **Review of renal structure and function**

Gross anatomy of the kidneys and urinary tract

Anatomy of the renal circulation

Segmental organization of the nephron

- Glomerular ultrastructure

- Juxtaglomerular apparatus

- Differentiated morphological and functional features of individual tubular segments

Topographical organization of the kidney in cross-section

Mechanisms of urine production

- Determinants of glomerular filtration

  - Autoregulation of renal blood flow and GFR

  - Concept of clearance as estimates of renal blood flow and GFR

  - Tubuloglomerular feedback

- Electrolyte and solute transport in the nephron

  - Glomerulotubular balance

- Concentration and dilution of the urine

  - Countercurrent mechanisms, osmol gradients and antidiuretic hormone

  - Free water clearance

Roles of the kidney in maintaining systemic homeostasis

- Body fluid compartments and composition

- Volume regulation (sodium balance)

- Osmoregulation (water balance)

- Regulation of body potassium, calcium, magnesium and phosphate

- Blood pressure control

  - Pressure diuresis and pressure natriuresis

  - Renin-angiotensin-aldosterone

- Acid-base regulation

Endocrine functions of the kidney

- Erythropoietin production

- Vitamin D activation