The Urinary System

BIO 105
Chapter 16

Functions of the Urinary System
1. Regulation of ECF volume, composition and osmolarity
2. Urine production
3. Blood pressure regulation
4. Acid-base regulation
5. Hormone production
6. Excretion of nitrogenous waste products
Kidneys

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- Kidneys图示展示了一些肾的结构，包括肾小球、肾单位、肾小管等。
- (a) 肾结构图示显示了肾动脉和肾小球的连接。
- (b) 肾单位结构，展示了肾小球、肾小管和集合管。
- (c) 简化的肾单位图示，展示了基本的结构成分但不包括毛细血管。

- 肾小球、肾小管和集合管的结构和功能。
- 肾单位在肾脏中的位置和作用。

(1) 一些肾单位深入到髓质。

(C) 肾单位和血液供应图示，展示了肾小球、肾小管和血液供应的结构。
Juxtaglomerular Apparatus

Nephron functions

1. Glomerular filtration
2. Tubular reabsorption
3. Tubular secretion
TABLE 16.1 Reabsorption by Nephrons of Some Substances

<table>
<thead>
<tr>
<th>Substance</th>
<th>Amount filtered per day (in liters or grams)</th>
<th>% Reabsorbed (removed from filtrate and returned to blood)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>180 L</td>
<td>99</td>
</tr>
<tr>
<td>Glucose</td>
<td>180 g</td>
<td>100</td>
</tr>
<tr>
<td>Urea</td>
<td>52 g</td>
<td>50</td>
</tr>
<tr>
<td>Creatinine</td>
<td>1.6 g</td>
<td>0</td>
</tr>
<tr>
<td>Sodium ions (Na⁺)</td>
<td>620 g</td>
<td>99</td>
</tr>
<tr>
<td>Potassium ions (K⁺)</td>
<td>30 g</td>
<td>93</td>
</tr>
<tr>
<td>Bicarbonate (HCO₃⁻)</td>
<td>275 g</td>
<td>100</td>
</tr>
</tbody>
</table>

Collecting Duct

Acid-base balance
- Regulation of H⁺/HCO₃⁻ secretion/reabsorption

Hormonal Regulation of Urine Production
- Antidiuretic hormone
- Aldosterone
- Atrial natriuretic peptide
Control of urination

- Urination is a reflex action controlled by the CNS.

- When the bladder fills to about 250ml of urine then the motor nerve impulses cause the bladder to contract and the sphincters to relax so that urination is possible.
Renal failure

- Renal failure is a decrease or complete cessation of glomerular filtration.
- Dialysis is an artificial method of cleaning the blood.