

18.26 Endocrine system

|                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| Hypothyroidism  | <ul style="list-style-type: none"> <li>Two types: cretinism and myxoedema</li> <li>Both types characterised by low BMR, cold-intolerance, a dry thick skin, bradycardia, hyperlipidaemia, etc.</li> <li>Cretinism furthermore associated with dwarfism and mental retardation</li> </ul>                                                                                                                                                                         |
| Hyperthyroidism | <ul style="list-style-type: none"> <li>Graves' syndrome: characterised by diffuse enlargement of thyroid, tachycardia, warm skin, sweating, nervousness, irritability, weight loss, exophthalmos, etc.</li> <li>Mostly caused by release of thyroid-stimulating immunoglobulins (TSIs)</li> <li>Secondary type caused by hyperfunctioning nodules – hyperactivity independent of excess thyrotropin or TSIs</li> <li>Atrial fibrillation not uncommon</li> </ul> |

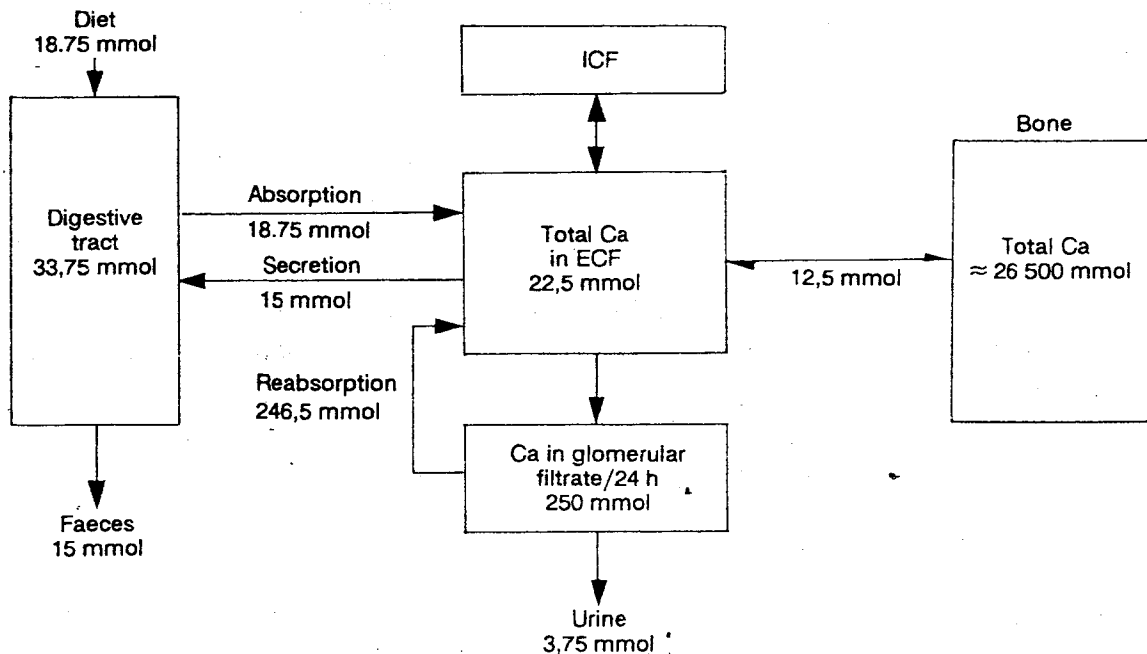
**PARATHYROID GLANDS,  
CALCITONIN, VITAMIN D**

The parathyroid glands secrete parathormone which, together with calcitonin and vitamin D, plays a major role in calcium metabolism.

The body of an average man (70 to 75 kg) contains 27,5 to 30,0 mol (1 100–1 200 g) calcium of which ≈ 99 % is present in the skeleton. Although only 0,25 mol or 11 g of the body's calcium is in the extraskelatal pool, each cell nevertheless contains some calcium. The extracellular to intracellular ratio is greater than 1 000:1.

The plasma calcium level is approximately 2,5 mmol/l (5 mEq/l or 100 mg/l), of which ≈ 50 % is ionised (free), 5 % complexed to HCO<sub>3</sub><sup>-</sup>, citrate and phosphate, and 45 % bound to plasma proteins – primarily to albumin. As the plasma pH increases, more plasma proteins are ionised, providing more protein anions to bind Ca<sup>2+</sup>.

In adults the total volume of digestive juice secreted by the GIT per day contains approximately 15 mmol (600 mg) calcium. Apart from this loss, some 3,75 mmol (150 mg) is excreted in the urine per day (fig 18.8). To maintain calcium balance, adults have to take in 18,75 mmol (750 mg) calcium per day. Pregnant and lactating women as well as growing children require more.



**Figure 18.8** Calcium metabolism in an adult ingesting 18,75 mmol (750 mg) of calcium/d. ICF = intracellular fluid; ECF - extracellular fluid; see Rasmussen in references: some prefer 25 mmol Ca/d.