PIPADOR REVISION

MRCOG Part 1 Revision Notes

Proteins: Sources

BIOCHEMISTRY • LECTURE 222

VISUAL EXAMINATION REVISION NOTES

2026 Edition

222

MRCOG PART 1 REVISION NOTES | BIOCHEMISTRY

Proteins: Sources

Dietary protein and quality, digestion and turnover, nitrogen balance, pregnancy and lactation requirements, malnutrition

0.75 g/kg/d	+ 6 g/day	+ 11 g/day	≈ 925 g
Adult protein RNI (≈ 45 g/day women)	Pregnancy increment (UK)	Lactation (0–6 months)	Protein accrued in pregnancy

■ **KEY FACTS: Learning objectives**

- Describe dietary sources of protein and protein quality.
- Describe protein digestion, absorption and turnover, and nitrogen balance.
- Describe protein requirements in pregnancy, lactation and vegetarian/vegan diets, and protein-energy malnutrition.

222.1 Dietary sources and quality

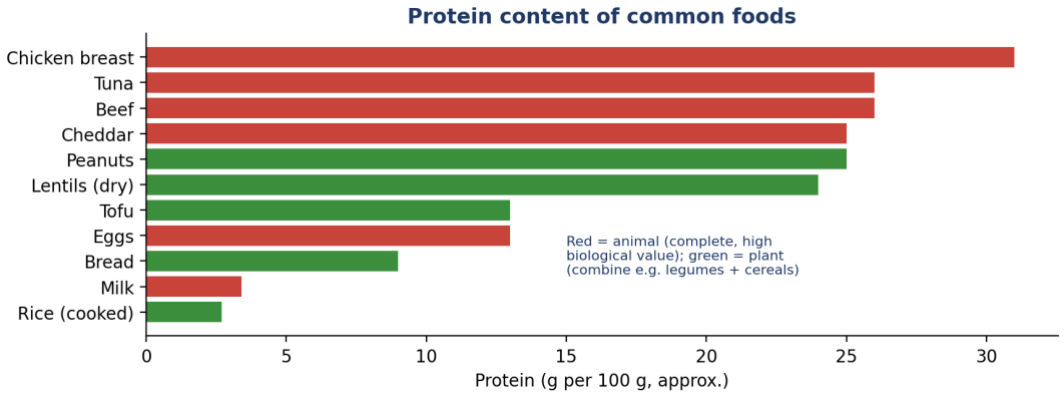


Figure 222.1 — Protein content of common foods

Concept	Explanation
Complete (high-quality) protein	Contains all essential amino acids in proportions close to human needs — meat, fish, eggs, dairy, soya, quinoa
Limiting amino acid	The essential amino acid in shortest supply: lysine in cereals, methionine in legumes
Complementation	Combining plant proteins (beans + rice/bread; hummus + pitta) supplies all essential amino acids
Protein quality scores	Biological value, PDCAAS/DIAAS — digestibility × amino acid profile; egg/milk score highest

222.2 Digestion, absorption and turnover

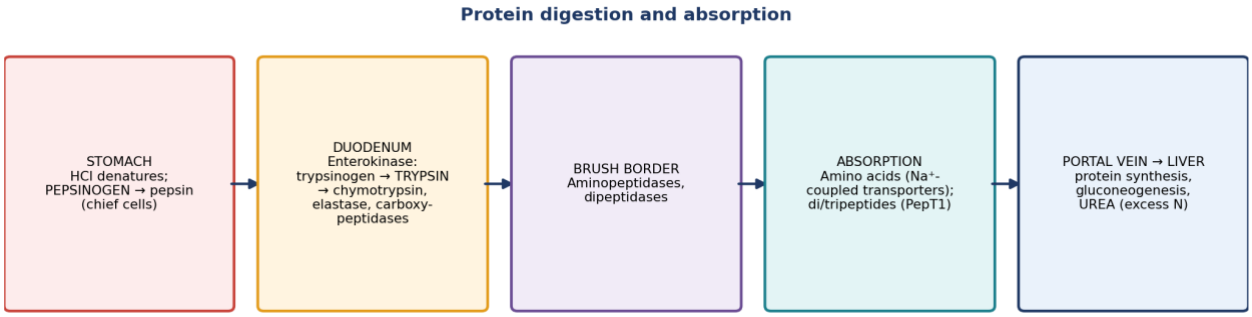


Figure 222.2 — Protein digestion and absorption

- **Protein turnover** ≈ 300 g/day — far exceeds intake (≈ 70–100 g); most amino acids are recycled. There is **no protein store** — excess is oxidised (N → urea, carbon → glucose/fat/energy).
- **Nitrogen balance** = N intake − N losses (urea, faeces, skin): **positive** in growth, **pregnancy**, lactation, recovery; **negative** in starvation, catabolic illness, surgery, burns, sepsis, **hyperemesis**, steroids.
- Neonates absorb some intact proteins (immunoglobulins in colostrum via gut 'closure' window — limited in humans).

222.3 Requirements in pregnancy and lactation

Situation	Key points
Pregnancy	≈ 925 g protein accrued (fetus ≈ 440 g, placenta ≈ 100 g, uterus, breasts, blood volume); most in 2nd/3rd trimesters. UK RNI +6 g/day (≈ 51 g/day); most UK diets exceed this
Maternal adaptations	↓ Urea synthesis and ↓ amino acid oxidation (nitrogen conservation) — plasma urea falls; ↓ plasma amino acids; active placental transport (system A) keeps fetal levels > maternal
Lactation	Milk protein ≈ 8–12 g/day — RNI +11 g/day (0–6 months)
Vegetarian / vegan	Adequate with variety and complementation (legumes, soya, nuts, grains); attention to B_{12}, iron, iodine, DHA (Lecture 139)
Balanced protein–energy supplements	↓ FGR/stillbirth in undernourished populations; high-protein supplements may harm (↑ SGA)
Adolescents, twins	Higher requirements

222.4 Protein-energy malnutrition

	Marasmus	Kwashiorkor
Deficit	Overall energy (and protein)	Predominantly protein relative to energy; oxidative stress, infection
Features	Severe wasting, no oedema, 'old man' face	Oedema (↓ albumin), fatty liver, skin/hair changes, irritability
Albumin	Near normal	Low

Refeeding syndrome risk when feeding malnourished patients (hypophosphataemia — Lecture 138). Albumin is a poor nutritional marker in pregnancy and inflammation (falls physiologically).

222.5 Must-know summary

■ EXAM TIP

- Animal and soya proteins are complete; cereals limited in **lysine**, legumes in **methionine** — complement them.
- Pepsin (stomach), trypsin activated by **enterokinase**; amino acids/di-tripeptides absorbed; no protein store.
- Positive N balance in pregnancy; **urea falls** (N conservation); placental active amino acid transport.
- RNI 0.75 g/kg/day; +6 g pregnancy, +11 g lactation.

■ MNEMONIC / MEMORY AID

'Cereals Lack Lysine; Legumes Lack Methionine'.