

Solutions

2.1

- C12: $12/2 - 1 = 5$ cycles; 6 acetyl-CoA.

2.2

- HDL (reverse transport).

2.3

- They do not cross the blood–brain barrier; ketones are the water-soluble substitute.

3.1

- C18: 8 cycles $\rightarrow$ 9 acetyl-CoA + 8 FADH₂ + 8 NADH.
- Yield: $9 \times 10 + 8 \times 1.5 + 8 \times 2.5 - 2 = 90 + 12 + 20 - 2 = \mathbf{120 \text{ ATP}}$ ✓.
- Per carbon: $120/18 \approx 6.7$ vs glucose $32/6 \approx 5.3$ ATP/C ✓ fat wins on reduced carbons.

3.2

- β -oxidation block: no acetyl-CoA $\rightarrow$ no ketones; no ATP from fat $\rightarrow$ gluconeogenesis unfunded $\rightarrow$ hypoglycaemia.
- Signature: low glucose WITH low ketones (plus acyl-carnitine profile on the newborn spot).
- Frequent feeds keep the body out of fasting – prevention is the therapy.