

Solutions

2.1

- Thymus and marrow.

2.2

- FOXP3 ✓.

2.3

- Streptococcal infection (antibodies cross-reacting with heart and joint).

3.1

- FOXP3 failure: no functional Treg – the peripheral filter is gone.
- Barrier surfaces (skin, gut) host abundant self-reactive and commensal-reactive clones held by active suppression: they fail first ✓.
- X-linked; treatment direction = immune suppression $\pm$ bone-marrow transplant (restores Treg lineage).

3.2

- Low-positive ANA: 5–15 % of healthy adults – not diagnostic ✓.
- Suspicion: high titer + patterns (anti-dsDNA, anti-Sm for SLE, with corresponding clinical criteria).
- 30–50 % identical-twin concordance: HLA sets thresholds; the trigger is environmental/stochastic ✓.