Solutions

2.1

- Anergy or deletion – tolerance.

2.2

- B7 (dendritic) – CD28 (T cell) ✓.

2.3

- CD4 (TH) via CD40L–CD40 contact ✓.

3.1

- Protein alone gives signal 1 without PRR-driven B7 – tolerance or a weak response.
- Without adjuvant: little/no antibody, possible anergy ✓.
- Quiet self-presentation never carries B7, so self-reactive clones are tolerised – autoimmunity needs danger to license them.

3.2

- CD40L (CD154) on T cells, missing – X-linked.
- No CD40 signal: B cells cannot switch (IgM piles) → pyogenic (encapsulated) infections; macrophages are not activated → opportunists (Pneumocystis, Cryptosporidium).
- X-linked recessive: mother carrier, half of sons affected ✓.