

Exercise walk-through

7.7

Immunodeficiency and transplantation

University Medicine

Immunodeficiency: the organism names the arm

- 1 **Map** Neutrophils → abscesses/catalase-positive/fungi; C5–9 → Neisseria; T cells (SCID, HIV) → opportunists; B cells (XLA) → encapsulated, from ~6 months.
- 2 **Clocks** Onset age localises: T defects from birth; B defects when maternal IgG wanes; **neutrophil** defects neonatal abscesses.
- 3 **Transplant** Hyperacute = **antibody** (minutes), acute = T cells (days), chronic = scarring (months); immunosuppressives turn 7.3 signals down (calcineurin → IL-2).

Immunodeficiency - figure

the organism names the failed arm

neutrophil defect	abscesses; catalase+ bacteria, fungi
complement C5-9	Neisseria meningitis
T-cell defect (SCID, HIV)	Pneumocystis, Candida, viruses, mycobacteria
B-cell defect (XLA)	encapsulated bacteria, from ~6 months rejection clock: antibody (min) → T cells (days) → scarring (months)

Defect-to-infection map plus the rejection clock.

Check yourself

- First cells at a breach? (Neutrophils, 30–60 min.)
- T cells see antigen only as —? (Peptide in MHC.)
- Herd threshold for measles? (~92–95 %.)
- The day-3 eczematous reaction type? (IV - T cells.)

Exercises 2.1-2.3

2.1 Recurrent Neisseria → which deficiency? [3]

2.2 At what age does X-linked agammaglobulinaemia typically present, and why? [3]

2.3 Which rejection type occurs minutes after reperfusion? [3]

Exercises 2.1-2.3

2.1 Recurrent Neisseria → which deficiency? [3]

2.1

- Complement C5-9 ✓.
-

2.2 At what age does X-linked agammaglobulinaemia typically present, and why? [3]

2.2

- ~6 months: maternal IgG protection wanes ✓.
-

2.3 Which rejection type occurs minutes after reperfusion? [3]

2.3

- Hyperacute (pre-formed antibody) ✓.

Exercise 3.1

3.1 A 7-month-old has had three episodes of pneumonia with encapsulated organisms since 5 months (fictional).

Localise the defect (B-cell arm; absent tonsils suggest no B cells). Explain the timing (maternal IgG waned ~6 months). State the confirmatory tests and the therapy. [7]

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3.1

- B-cell arm failure (XLA pattern): no plasma cells → no IgG.
- Timing: placental IgG protected until ~5–6 months ✓.
- Confirm: immunoglobulins (all low), B-cell count (absent CD19/20); treat with replacement immunoglobulin.

Exercise 3.2

3.2 A renal transplant shows a rising creatinine at day 12 with biopsy T-cell infiltrate (fictional acute rejection).

Classify the rejection and the mechanism (T-cell mediated, days–weeks). Name one immunosuppressive and the 7.3 signal it turns down. State what a creatinine creeping up over MONTHS with proteinuria would indicate (chronic). [7]

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3.2

- Acute cellular rejection: recipient T cells recognise allo-MHC, infiltrate and destroy tubules.
- Calcineurin inhibitor (tacrolimus/ciclosporin) blocks IL-2 transcription – the co-stimulatory signal's product.
- Months of creeping dysfunction with proteinuria = chronic rejection (antibody + vascular scarring) ✓.