

Exercise walk-through

7.1

Innate immunity

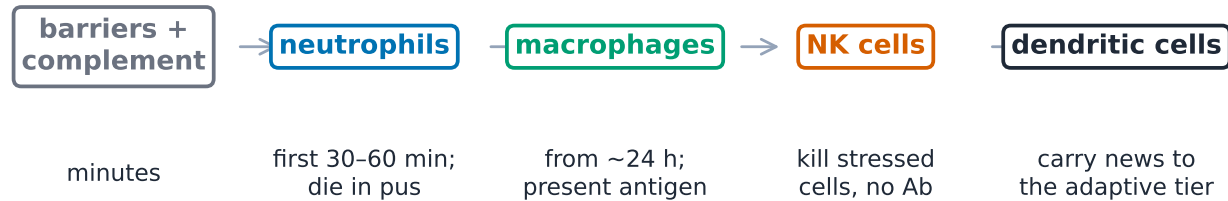
University Medicine

Innate immunity: the fast tier

- 1 **Map** Barriers → **complement** → neutrophils (30–60 min, die in pus) → macrophages (~24 h, present) → NK → dendritic cells (the courier).
- 2 **Receptors** PRRs are fixed germline receptors: fast, generic, no memory - but dendritic **co-stimulation** teaches the adaptive tier.
- 3 **Numbers** Neutrophils 50–70% of white cells; marrow reserve $\sim 10^{11}$ sustaining $\sim 10^9$ /min; febrile neutropenia ($< 0.5 \times 10^9$ /L) is an emergency.

Innate immunity - figure

fast, generic, no memory — but it teaches



PRRs are fixed germline receptors: no gene rearrangement

Each innate cell with its job and timeline.

Exercises 2.1-2.3

2.1 Which cell carries innate news to the adaptive tier? [3]

2.2 Give the neutrophil arrival and peak times. [3]

2.3 Why do NK cells belong to innate immunity? [3]

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2.1 Which cell carries innate news to the adaptive tier? [3]

2.1

- The dendritic cell.
-

2.2 Give the neutrophil arrival and peak times. [3]

2.2

- Arrival 30–60 min; peak ~6 h ✓.
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2.3 Why do NK cells belong to innate immunity? [3]

2.3

- No rearranged receptor: germline recognition of stressed cells.

Exercise 3.1

3.1 A patient on chemotherapy has a temperature of 38.6 °C with neutrophils $0.3 \times 10^9/\text{L}$ (fictional).

Explain why this is an emergency within hours (first tier gone, adaptive too slow). State the immediate management principle. Explain why the usual localising signs may be BLUNTED. [7]

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3.1

- Neutrophils are the first tier; without them bacteria spread unchecked while the adaptive response needs days.
- Immediate broad-spectrum antibiotics after cultures – minutes matter.
- Neutrophils generate much of the inflammatory localisation (pus, margins): signs are blunted despite bacteraemia.

Exercise 3.2

3.2 A splenectomised patient (fictional) asks about infection risk.

Explain which arms of innate-style clearance the spleen supported (opsonised-cell filtering). Predict the organisms (encapsulated). State the standard prophylaxis and its rationale.

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3.2

- The spleen filters opsonised bacteria from blood (macrophage-rich pulp) – an innate-style clearance organ.
- Encapsulated organisms (pneumococcus, meningococcus, Hib) evade complement alone
- Vaccination (pneumococcal, meningococcal, Hib) plus penicillin prophylaxis: antibodies restore opsonisation for the missing filter.