# **Rickettsial Diseases**

* *Rickettsia* are small, obligate intracellular Gram-negative coccobacilli
* Transmitted by arthropod vectors (ticks, lice, fleas, mites). NB humans main host in R***. prowazekii***
* They are divided into three groups:
* **Spotted Fever Group (SFG)**
* **Typhus Group**
* **Scrub Typhus** (caused by *Orientia tsutsugamushi*, closely related, often included with rickettsial diseases).

## **I. Pathogenesis & General Clinical Features**

* **Target cells:** Primarily **vascular endothelial cells**, causing endothelial injury, vasculitis, microvascular leakage → rash, oedema, organ dysfunction.
* **Common features (incubation 5–10 days):**
  + Fever, headache, malaise, myalgia, nausea, vomiting.
  + **Rash:** maculopapular, petechial, or vesicular; distribution varies by disease.
  + **Eschar:** dark necrotic scab at bite site, typical in SFG and scrub typhus.
* **Complications (severe disease):** pneumonitis, myocarditis, meningoencephalitis, renal/hepatic failure, DIC.

## **II. Spotted Fever Group (SFG)**

Over 20 species cause human disease. Transmission mainly by hard ticks, occasionally mites or fleas.

**Key species and diseases**

* *R. rickettsii* – Rocky Mountain Spotted Fever (RMSF, Americas).
* *R. conorii* – Mediterranean Spotted Fever (Southern Europe, Africa, Middle East).
* *R. africae* – African Tick Bite Fever (sub-Saharan Africa, Caribbean).
* *R. akari* – Rickettsialpox (urban rodents, mites; NY, Europe, Korea, SA).
* *R. australis* – Queensland tick typhus (Australia).
* *R. sibirica* – North Asian tick typhus.
* *R. slovaca, R. raoultii* – Tick-borne lymphadenopathy (TIBOLA/SENLAT).
* *R. felis* – Flea-borne spotted fever (global).

### **Clinical Presentation**

* **Rocky Mountain Spotted Fever (RMSF, *R. rickettsii*)**
  + Severe, life-threatening; untreated CFR up to 20–80%.
  + Sudden fever, headache, myalgia, abdo pain.
  + **Rash:** starts wrists/ankles → centripetal spread; may involve palms/soles; evolves to petechiae. Absent in 5–17%.
  + Complications: gangrene, encephalitis, ARDS, renal failure, neurologic sequelae.
* **Mediterranean Spotted Fever (*R. conorii*)**
  + Fever, rash, tender lymphadenopathy.
  + **Eschar in ~70%.** Less severe than RMSF, but severe disease possible.
* **African Tick Bite Fever (*R. africae*)**
  + Usually mild. Fever, myalgia, headache, lymphadenopathy.
  + Multiple eschars common. Rash scant or vesicular.
* **Rickettsialpox (*R. akari*)**
  + Mild, self-limiting.
  + Fever, malaise, conjunctivitis, hepatitis.
  + **Eschar at mite bite site** precedes a vesicular rash resembling chickenpox. No palm/sole involvement.
* **TIBOLA/SENLAT (e.g. *R. slovaca*)**
  + **Scalp eschar + tender cervical lymphadenopathy.** Rash uncommon.

### **Diagnosis**

* **Clinical suspicion** crucial
* **PCR** (blood, eschar, biopsy).
* **IHC / DFA** on skin biopsy.
* **Serology (IFA, ELISA)** retrospective confirmation; cross-reactivity common.
* **Culture** possible but restricted to reference labs.

### **Treatment**

* **Doxycycline** 100 mg twice daily (7–10).
* **Children/pregnancy:** doxycycline still recommended if severe.
* **Alternatives:** chloramphenicol (historical; less effective, safety concerns); macrolides (e.g. azithromycin) in mild disease or pregnancy.
* **Prevention:** tick avoidance (repellents, clothing). No licensed vaccines.

## **III. Typhus Group**

* **Epidemic (louse-borne) typhus** – *R. prowazekii*
* **Endemic (murine) typhus** – *R. typhi*

### **Epidemiology & Transmission**

* **Epidemic typhus (*R. prowazekii*)**
  + Vector: body louse (*Pediculus humanus corporis*).
  + Reservoir: humans; also flying squirrels in N. America.
  + Outbreaks in poverty, conflict, refugee settings.
  + **Brill–Zinsser disease:** recrudescence years later.
* **Murine typhus (*R. typhi*)**
  + Vector: rat fleas (*Xenopsylla cheopis*), cat fleas (via their faeces)
  + Reservoir: rodents, cats, dogs.
  + Worldwide; esp. port cities, subtropics (US, Mediterranean, Asia).

### **Clinical Features**

* **Epidemic, tick-borne typhus**
  + Sudden fever, severe headache, myalgia, delirium.
  + **Rash:** day 4–7, trunk first → centrifugal spread; spares face/palms/soles.
  + No eschar.
  + Severe cases: myocarditis, renal failure, CNS disease.
  + CFR up to 30% untreated (higher in elderly).
* **Endemic, murine typhus**
  + Milder, gradual onset.
  + Rash in ~50% (macular).
  + No eschar.
  + Complications: interstitial pneumonitis, nephritis, myocarditis, meningoencephalitis, ocular disease.
  + CFR 1–4%.

### **Diagnosis**

* Clinical suspicion.
* PCR on blood/tissue.
* IHC on biopsy.
* Serology – retrospective confirmation.

### **Treatment**

* **Doxycycline** (7 days; sometimes single dose for epidemic typhus in mass outbreaks).
* Alternatives: chloramphenicol, tetracycline.
* Ineffective: β-lactams, aminoglycosides, sulfonamides.
* **Prevention:** delousing; rodent/flea control.

## **IV. Scrub Typhus (*Orientia tsutsugamushi*)**

### **Epidemiology**

* Vector: larval trombiculid mites (chiggers).
* Reservoir: rodents; mites transmit transovarially.
* Geography: “tsutsugamushi triangle” – Asia-Pacific, northern Australia, Pacific Islands.

### **Clinical Features**

* Acute febrile illness (fever, headache, myalgia).
* **Eschar common (~50%).**
* Rash variable.
* Severe: pneumonitis, myocarditis, meningoencephalitis, multi-organ failure.
* Deafness is a characteristic feature in some cases.

### **Diagnosis**

* Clinical (fever + eschar in endemic area).
* PCR (blood, eschar swab, biopsy).
* Serology (retrospective)

### **Treatment**

* **Doxycycline** – rapid defervescence.
* **Azithromycin** – effective, esp. in pregnancy, children, doxycycline-resistant strains.
* Alternatives: chloramphenicol, rifampicin.

# **Key Exam Points (FRCPath Part 2)**

* **Rickettsiae infect endothelium → vasculitis → rash/organ involvement.**
* **SFG:** rash often centripetal, eschars common.
* **Typhus group:** no eschars; epidemic typhus has trunk-first centrifugal rash.
* **Scrub typhus:** eschar + deafness; endemic Asia-Pacific.
* **Doxycycline is the treatment of choice for ALL rickettsioses**
* **Don’t delay treatment while awaiting confirmation.**
* Diagnosis usually retrospective by serology; PCR on eschar/blood helpful acutely.