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Leptospirosis

When To Think and What To Do

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Synonyms

- Mud / Swamp fever
- Japanese 7 day fever
- Rice Field Fever
- Spirochete Jaundice
- Canicola Fever
- Leptospiral Jaundice
- Autumn Fever
- Swineherd’s Disease

Over View

- Most common, underdiagnosed zoonosis
- India - cases are reported from Kerala, Tamil Nadu, AP, Karnataka, Maharashtra, Gujarat & Andamans.
- Source - Animals (rodents and domestic animals)

Epidemiological factors

- Contaminated environment, Rainfall
- High risk groups, endemic in all states of India
- First description by Weil in 1886

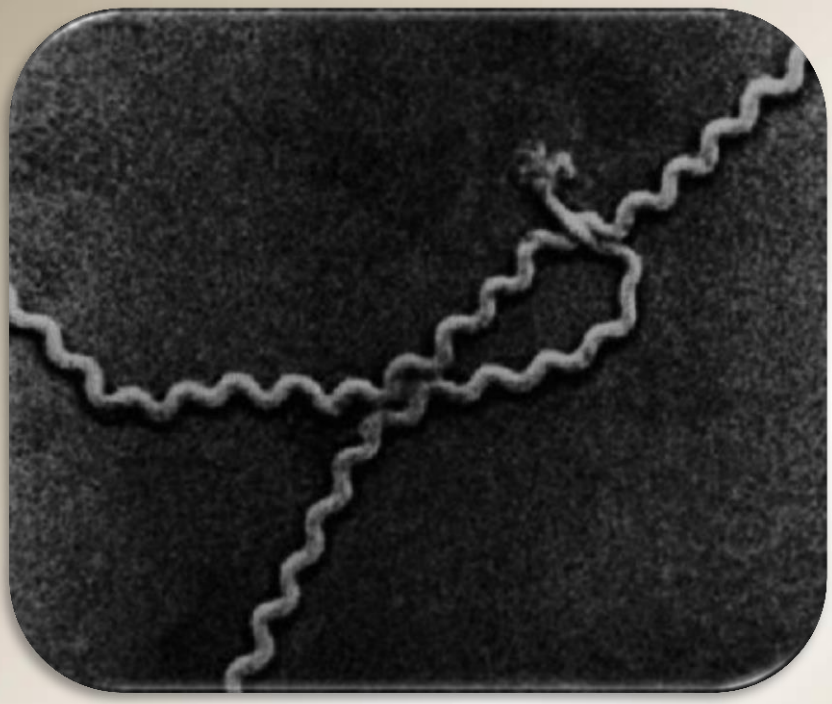
Over View continued

- Rural > Urban
- Male > Female (10 : 1)
- Clinical Features –mild to severe life threatening
- Mimics many common febrile illnesses
- Diagnosis - difficult to confirm
- Treatment – effective, if started early (<5 days)
- Not to be confused with rat bite fever (SM)

The Causative Bacterium

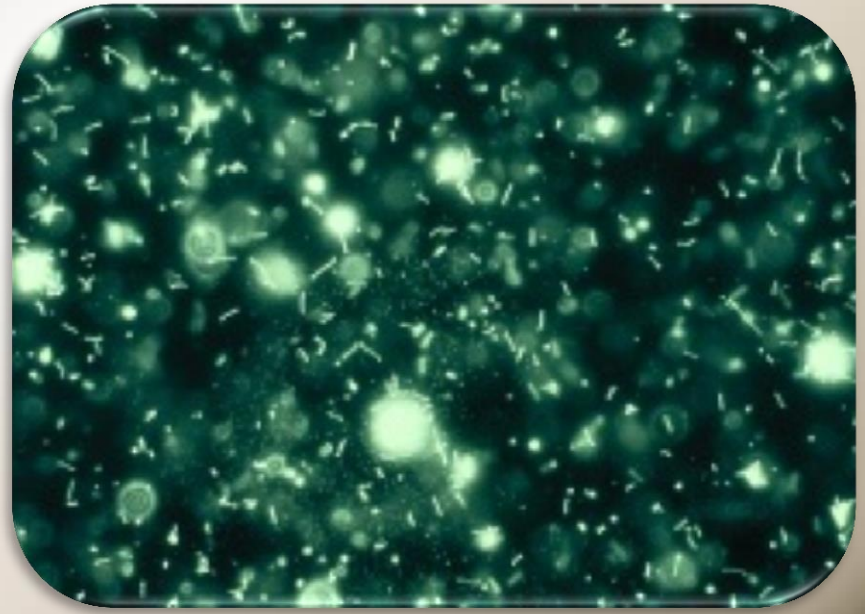
- Order Spirochaetales – Treponema, Borrelia, Leptospira
- Family – Leptospiraceae, susceptible to heat, cl, acid
- Genus – Leptospira, 26 serogroups, 250 serovars
- interrogans, biflex, ictero hemorrhagica, hebdomidis
- Corkscrew shaped, delicate, flexible spirochete, Gram -ve
- 6 to 20 μ long & 0.1 μ thick, coiled, flagellate, actively motile

Leptospira under the Microscope



Long, Thin, Highly Coiled

Dark Field Microscopy FL



Epidemiology

- Rainfall; Contaminated environment
- Poor Sanitation; Inadequate drainage facilities
- Presence of rodents, cattle & stray dogs
- Walking/ working bare foot poses high risk
- Difficult to pinpoint the source of infection
- Any person can get infected, if exposed to contaminated environment

Risk Groups

Occupational exposure

- Farmers – Rice, Sugarcane, Vegetables, Cattle, Pigs
- Sewerage workers; Abattoirs, Butchers
- Vetenarians, Lab staff, Miners, Soldiers
- Fishermen – Inland (not on the sea)

Recreational activities

- Swimming, Sailing, Marathon runners, Gardening

Reservoirs of Infection

- Rodents
  - (Rattus rattus, Rattus norvegicus, Mus musculus)
- Dogs
- Wild animals
- Domesticated animals
- Caged game animals
- Leptospira are excreted in the urine

Modes of Transmission

1. **Direct contact with urine or tissue of infected animal**

   Through skin abrasions, intact mucus membrane

2. **Indirect contact**

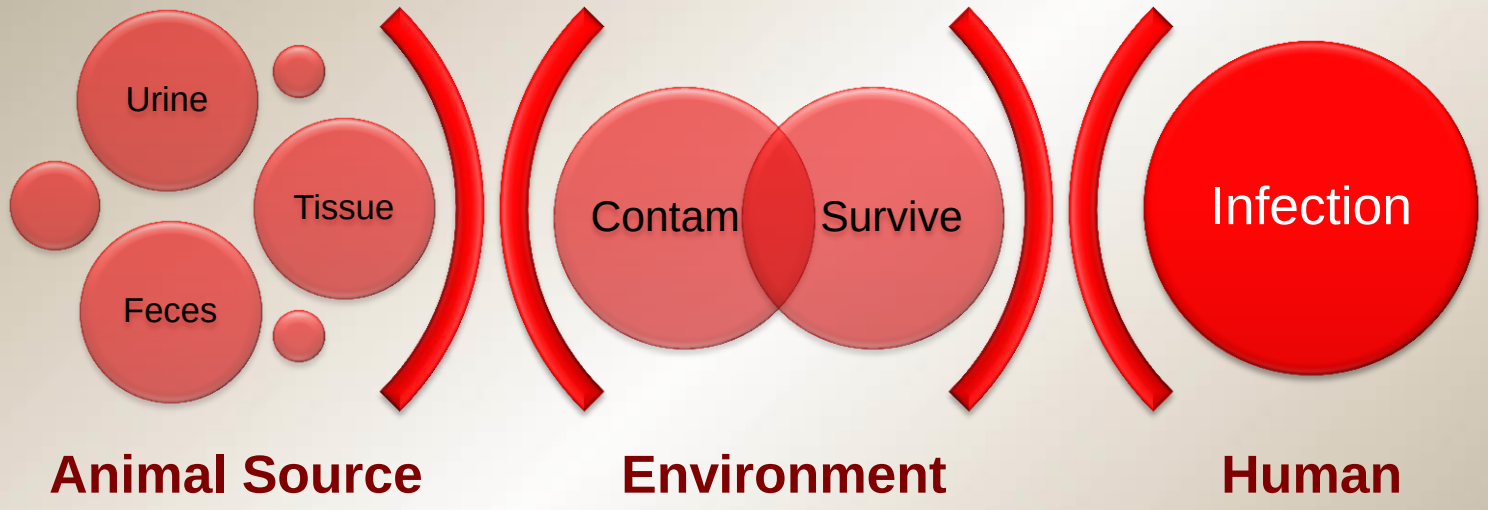
   Broken skin with infected soil, water or vegetation

   Ingestion of contaminated food & water

3. **Droplet infection**

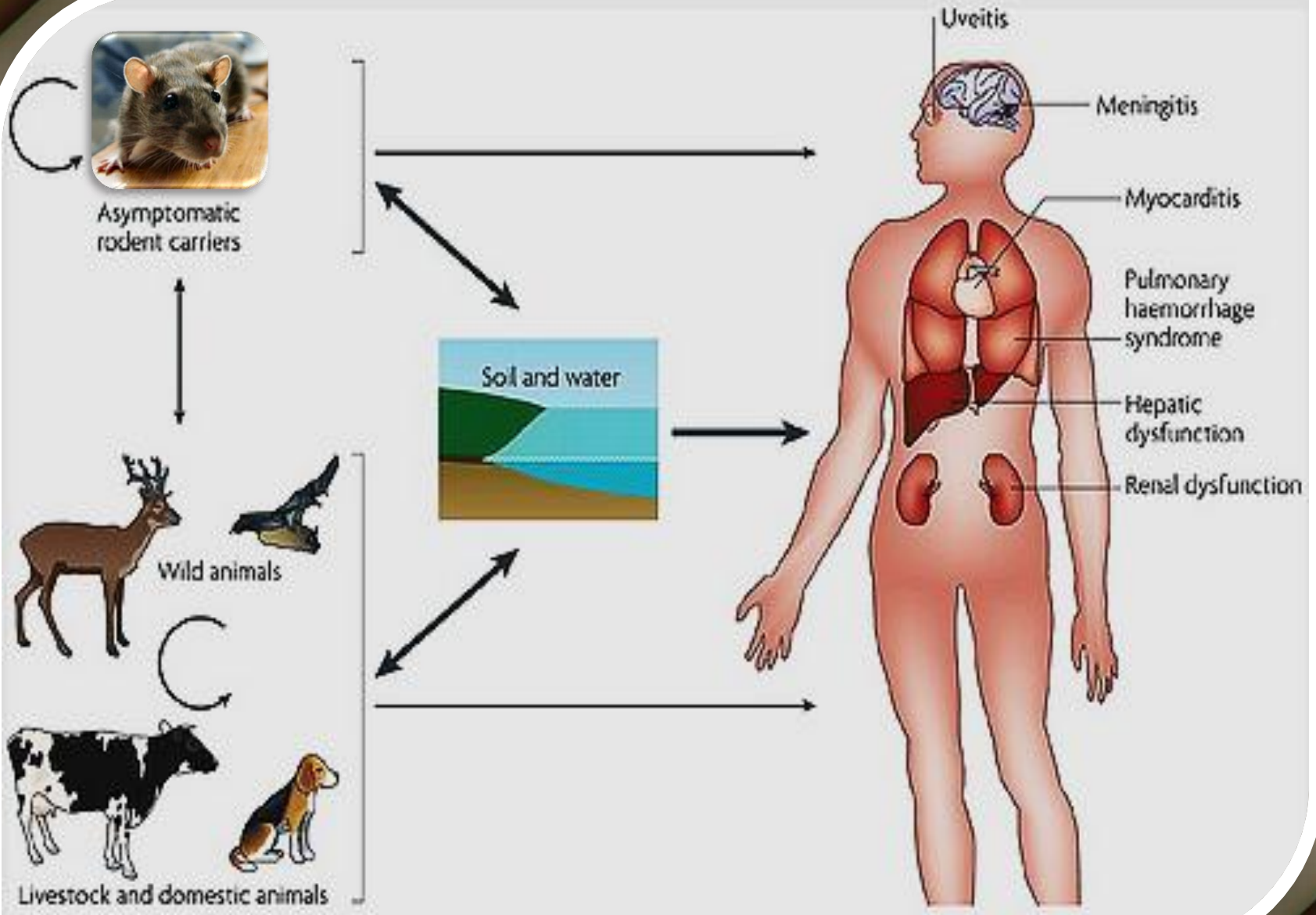
   Inhalation of droplets of infected urine

Transmission



Human infection is accidental

No human to human transmission


Asymptomatic rodent carriers
Soil and water
Wild animals
Livestock and domestic animals
Uveitis
Meningitis
Myocarditis
Pulmonary haemorrhage syndrome
Hepatic dysfunction
Renal dysfunction

Natural History

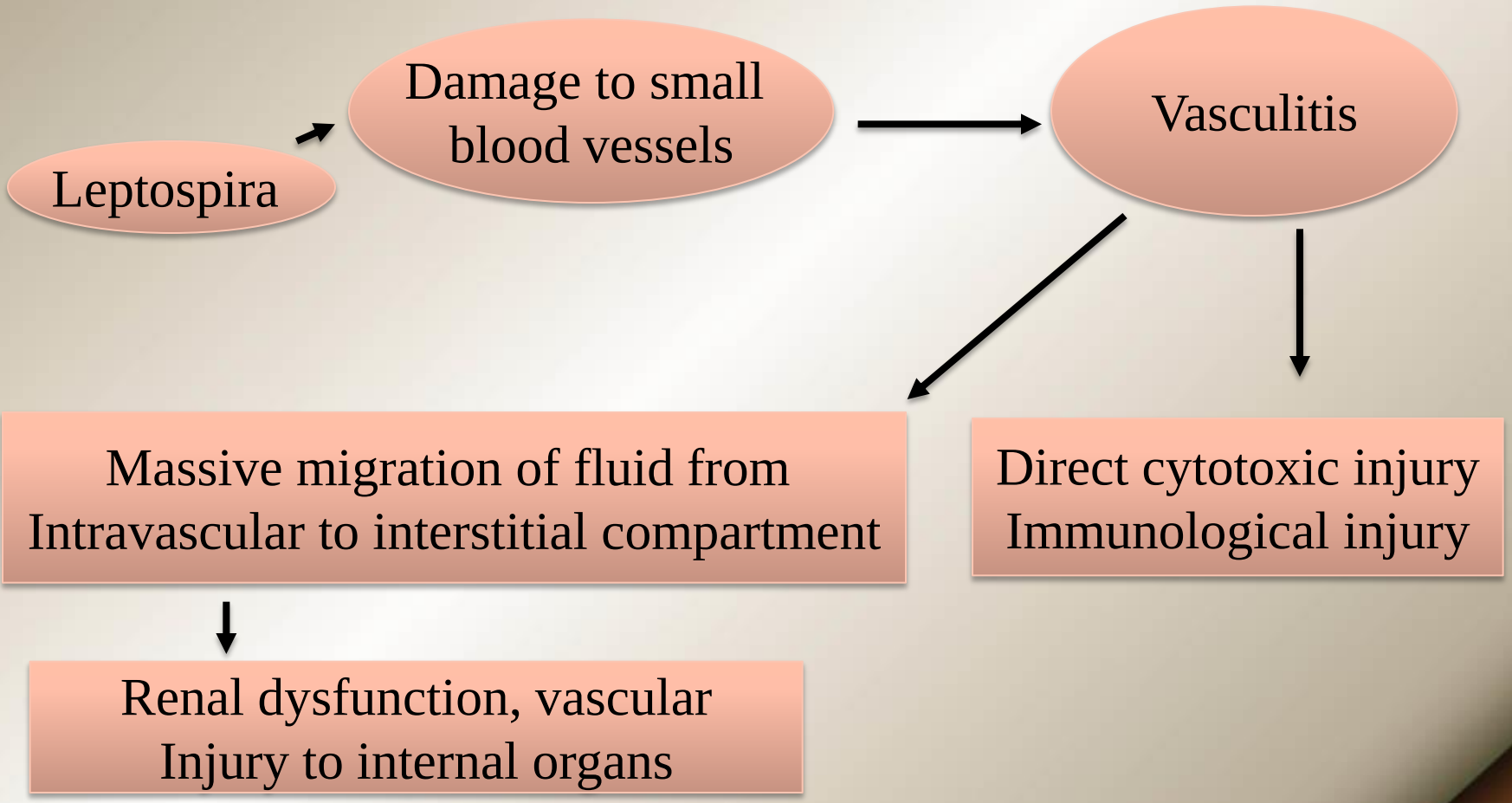
Animal source - Exposure - Infection

Overt Clinical Illness	Inapparent
Anicteric	Icteric
Recovery	Fatality

No carrier

Dead end

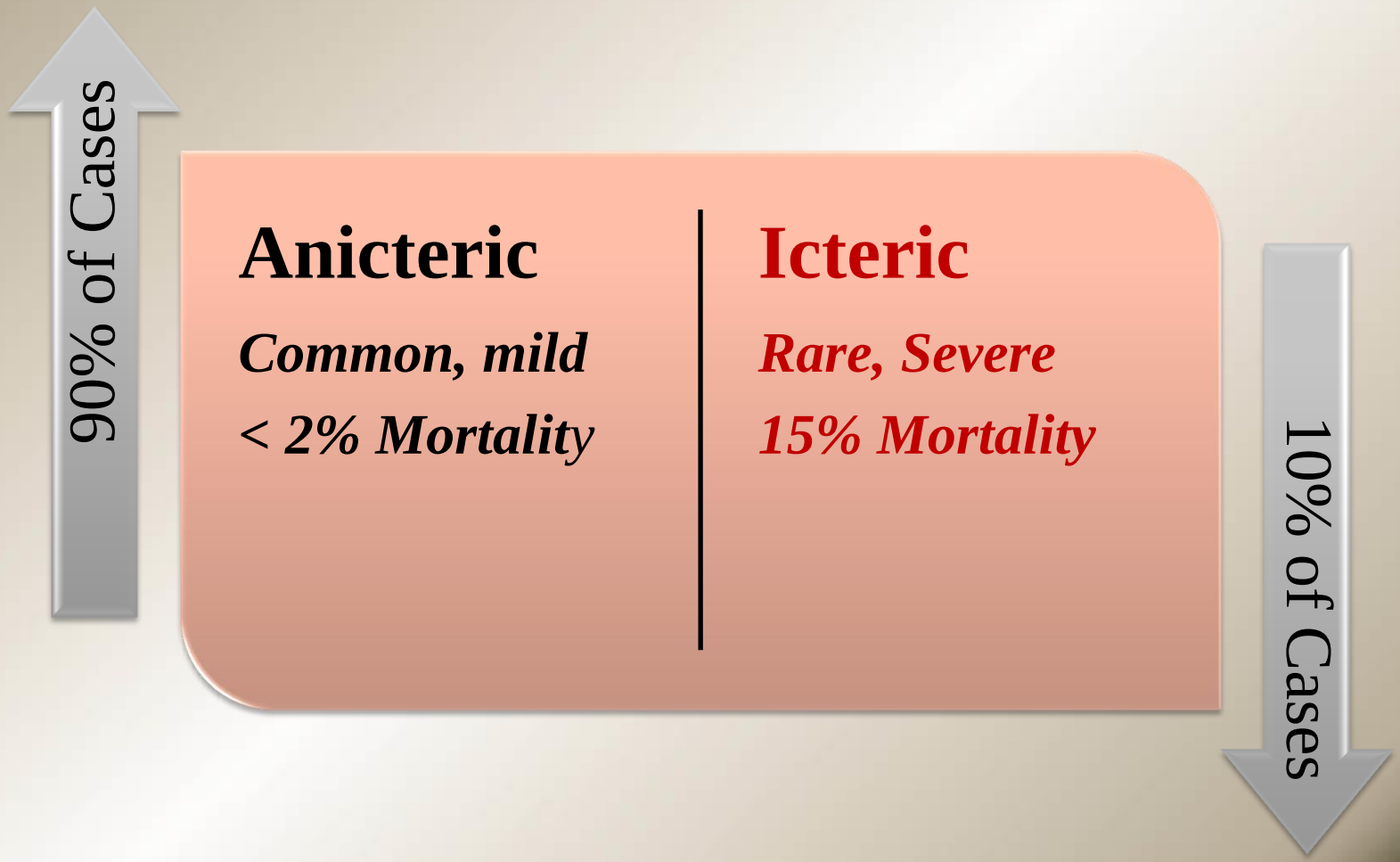
Pathogenesis of Severe Disease



Clinical Illnesses

Types	Anicteric (common 95% recover)
	Icteric (Weil's Syndrome) (rare, fatal)
	Hepato-renal syndrome
	Hemorrhagic syndrome with ARF
	Atypical pneumonia syndrome
	Aseptic meningo-encephalitis
	Myocarditis, Chronic uveitis

Clinical Presentation



Anicteric Presentation

Leptospiremic Phase

Initial

- Fever, Myalgia
- Severe head ache
- Conjunctival suffusion
- Abd. pain, Epistaxis

Immune Phase

Subsequent

- Mild fever
- Meningism
- Uveitis
- I.P: 5 to 14 days (21days)

Icteric Leptospirosis

LIVER

Jaundice – Occurs in 4-6 days (2 - 9 days)

Serum Bilirubin – Markedly ⇑ (20-40 mg/dl)

SGOT / SGPT – Mild elevation

Hepatocellular necrosis / Intra hepatic cholestasis

Death - Not due to Liver Disease

Icteric Leptospirosis

KIDNEYS – Mild to Severe

Urinalysis : Hematuria / Pyuria / Proteinuria

Renal Failure: Pre renal azotemia, ATN / AIN

Oliguric / Non Oliguric

Mechanism

Nephrotoxicity – Endotoxin, (Direct)

Bacterial migration, Toxic Metabolites

Hypoperfusion – Hypotension, Fluid loss/ Fluid shift

G.I. Bleed, Myocarditis

Hemorrhagic Manifestations

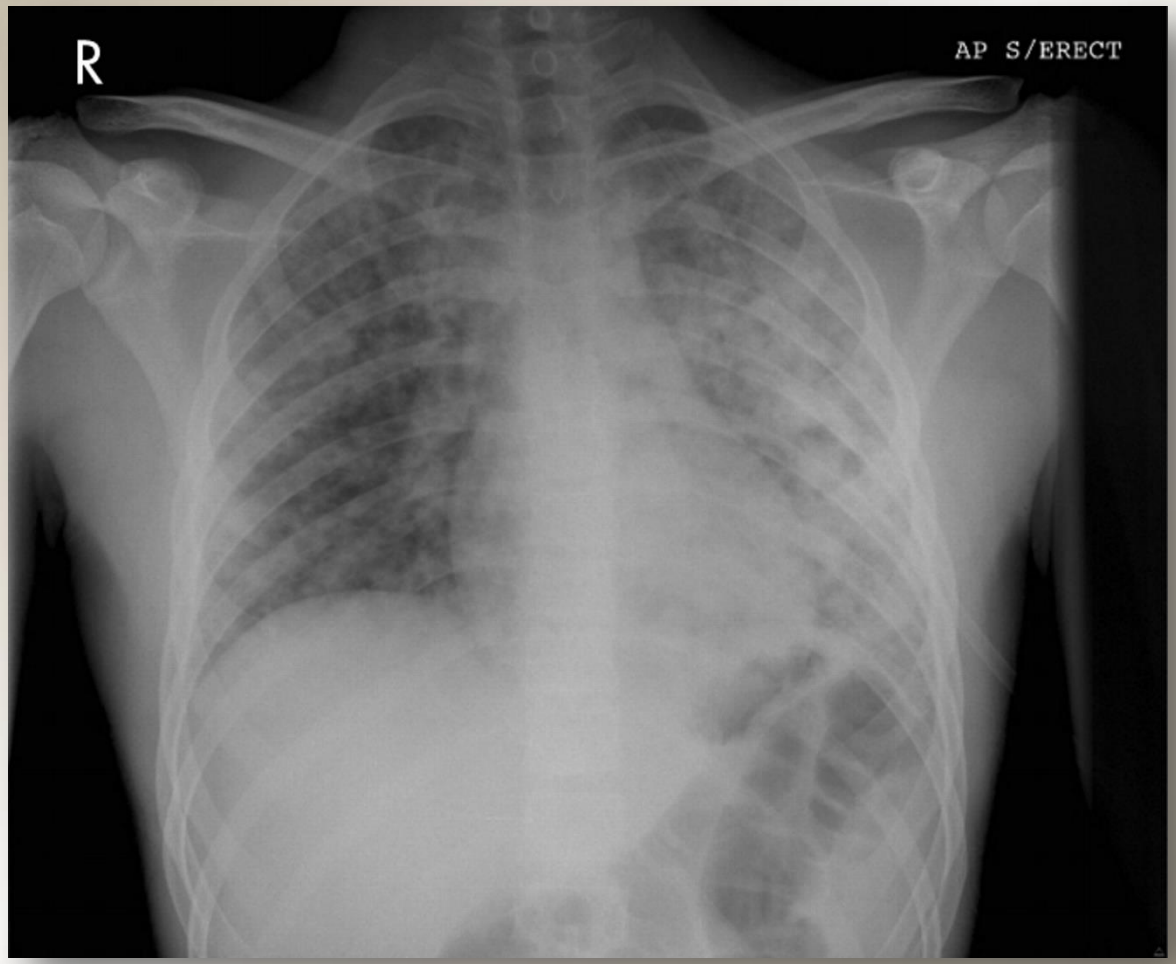
Hemorrhagic Fever - Vascular injury

- Respiratory, Alimentary, Renal & Genital tracts
- More common in Icteric & with Renal Failure
- Reported in Korea, Andaman's & Brazil

Hemorrhagic Pneumonitis

- Hemoptysis / Respiratory failure
- CXR : Single/ Multiple ill defined opacities
- Occurs in 2nd week (as early as 24-48 hours)
- Reported in Korea, Andaman's & Nicaragua

Atypical Pneumonia



Cardiac Form

Cardiac manifestations

- Hemorrhagic Myocarditis
- Cardiomyopathy / Cardiac failure
- Arrhythmias, Hypotension / Death
- Atrial fibrillation / Conduction defects

ECG changes

- Non Specific ST-T changes
- Low voltage complexes

Reported in Srilanka, Barbados & Portugal

Other Manifestations

Aseptic Meningo-encephalitis

- It is rare; It occurs in the Immune phase
- CSF – proteins ⇑, lymphocytes ⇑
- Convulsions, Encephalitis, Myelitis & Polyneuropathy

Ocular manifestations

- Late complication; Conjunctival suffusion/hemorrhage
- Anterior uveitis, Iritis, Iridocyclitis, chorioretinitis
- Occurs in 2 weeks to 1 yr. (average 6 months)

Differential Diagnosis

Fever

Viral fever, Malaria, Typhus

Jaundice

Malaria, Viral hepatitis, Sepsis

Renal Failure

Malaria, Hanta virus, Sepsis

Meningitis

Bacterial / Viral causes

Hemorrhagic Fever

Dengue, Hanta virus, Typhus

Laboratory Tests

- TC / DC / ESR / Hb / Platelet count
- Serum Bilirubin / SGOT/ SGPT
- Blood Urea, Creatinine & Electrolytes
- Chest X-Ray; ECG
- **Tests for diagnosis of Leptospirosis**
  - Culture for Leptospira: Positive
  - MAT; Sero conversion or 4 fold rise/ high titer
  - ELISA / MSAT : positive
- **MAT: Microscopic agglutination test**
- **(M)SAT: Microscopic Slide Agglutination Test**

Problems in Diagnosis

Early Diagnosis (1st Week)

- No reliable test
- Delay in culture(>1 mon)
- PCR valuable but costly
- SAT / ELISA (> 5 days)
- Genus Specific

Serological Tests (2 week)

- Serovar specific - MAT
- Reliable, Current infection
- Gold Standard, Epid studies
- Complicated, DFM required
- Occur late, persist longer

Dip-S-Ticks (PanBio, Inc; Baltimore, Maryland)

Interpretation of Tests

MAT

- Antibody IgM titers of >1/80 or IgG 1/400
- ⇑ titers indicate current infection
- Declining titers indicate past infection
- To confirm, second sample is essential

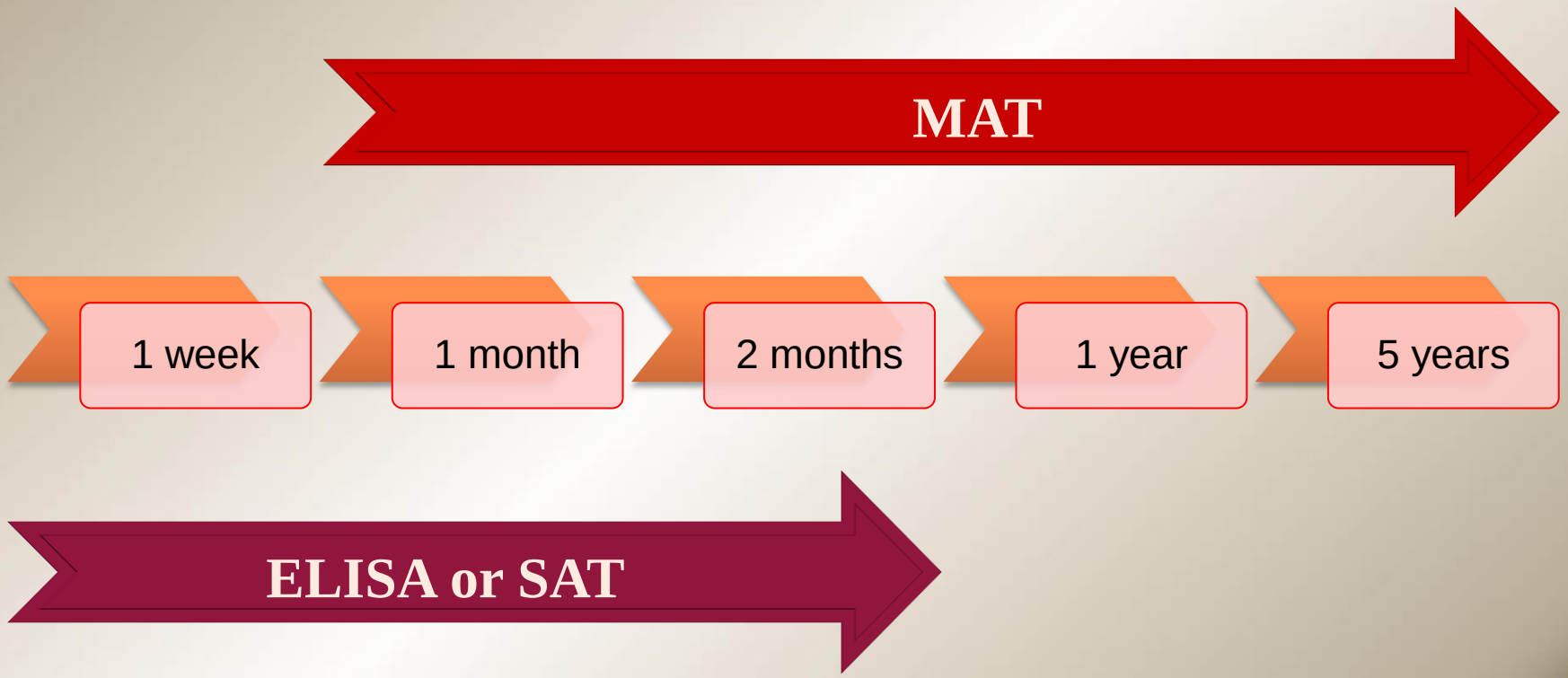
ELISA
SAT

- Valuable for Dx of current infection
- IgM antibodies alone are useful
- SAT is less specific – cross reactions

Interpretation of Tests

ELISA (IgM)	MAT	Interpretation
Positive	Positive	Current Infection
Positive	Negative	Current Infection
Negative	Positive	Past Infection
Negative	Negative	R/o Leptospirosis
Not available	Rising titers	Current Infection

Time Relationship of Tests



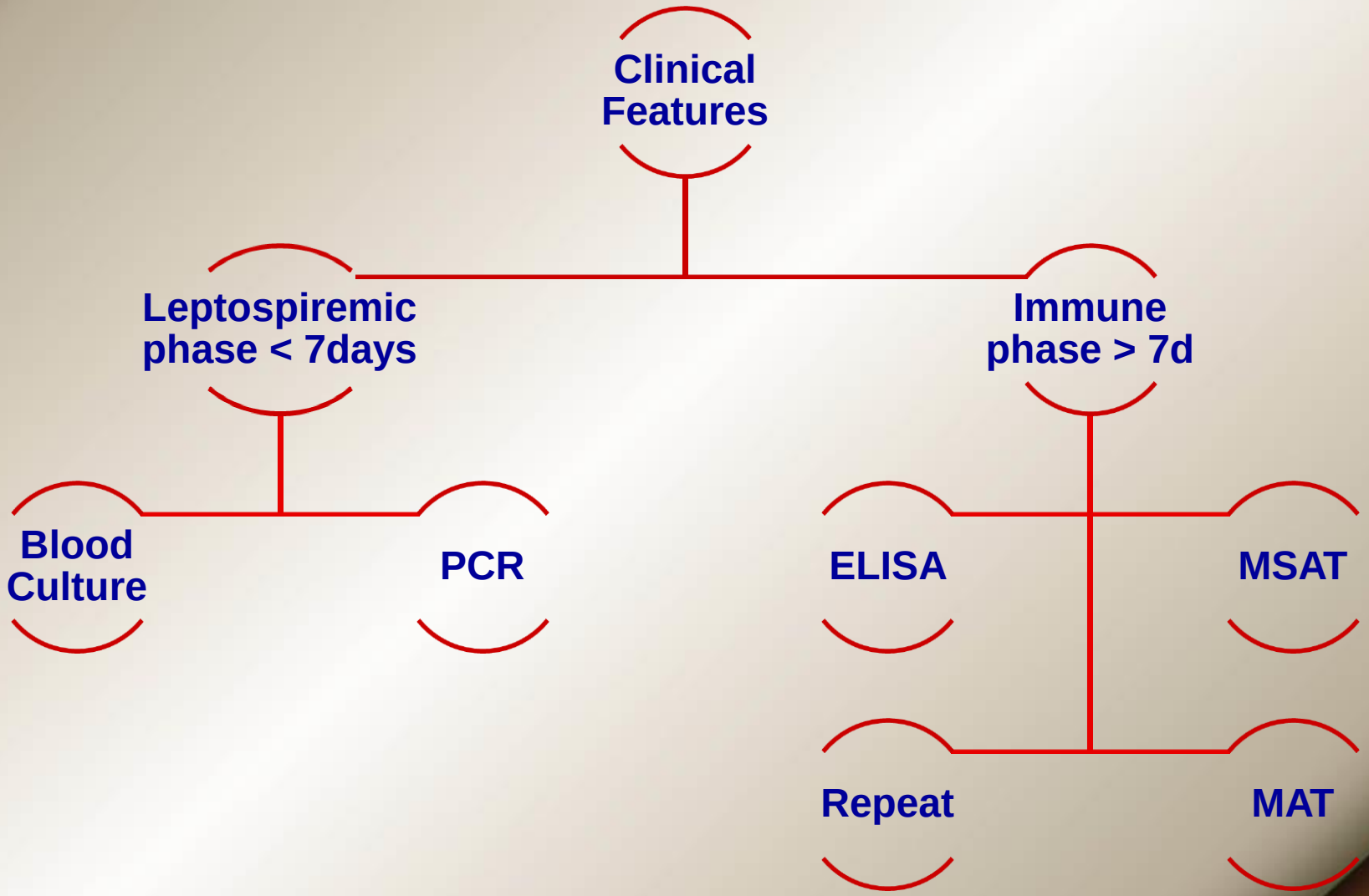
WHO Guide - Faine's Criteria

2	• Headache	5	• Rain fall
2	• Fever	4	• Contaminate H_20
2	• Temp > 39 F	1	• Animal contact
4	• Conjn. suffusion	15	• ELISA IgM + ve
4	• Meningism	15	• SAT positive
4	• Muscle pain	15	• MAT high titer
1	• Jaundice	25	• MAT rising titer
1	• Alb, ⇑ creatinine	Definite	• Culture positive

Score of 25 or more – Presumptive Diagnosis

Score of 20 to 25 – Possible case of leptospirosis

Approach to Diagnosis



Treatment

Mild-start Rx. early

Oral Treatment 7 to 10 day

- Doxycycline 100 mg b.i.d
- Amoxicillin 500 mg q.i.d
- Ampicillin 500 mg q.i.d
- Supportive treatment

Severe-start intensive Rx.

IV Treatment 5 to 7 days

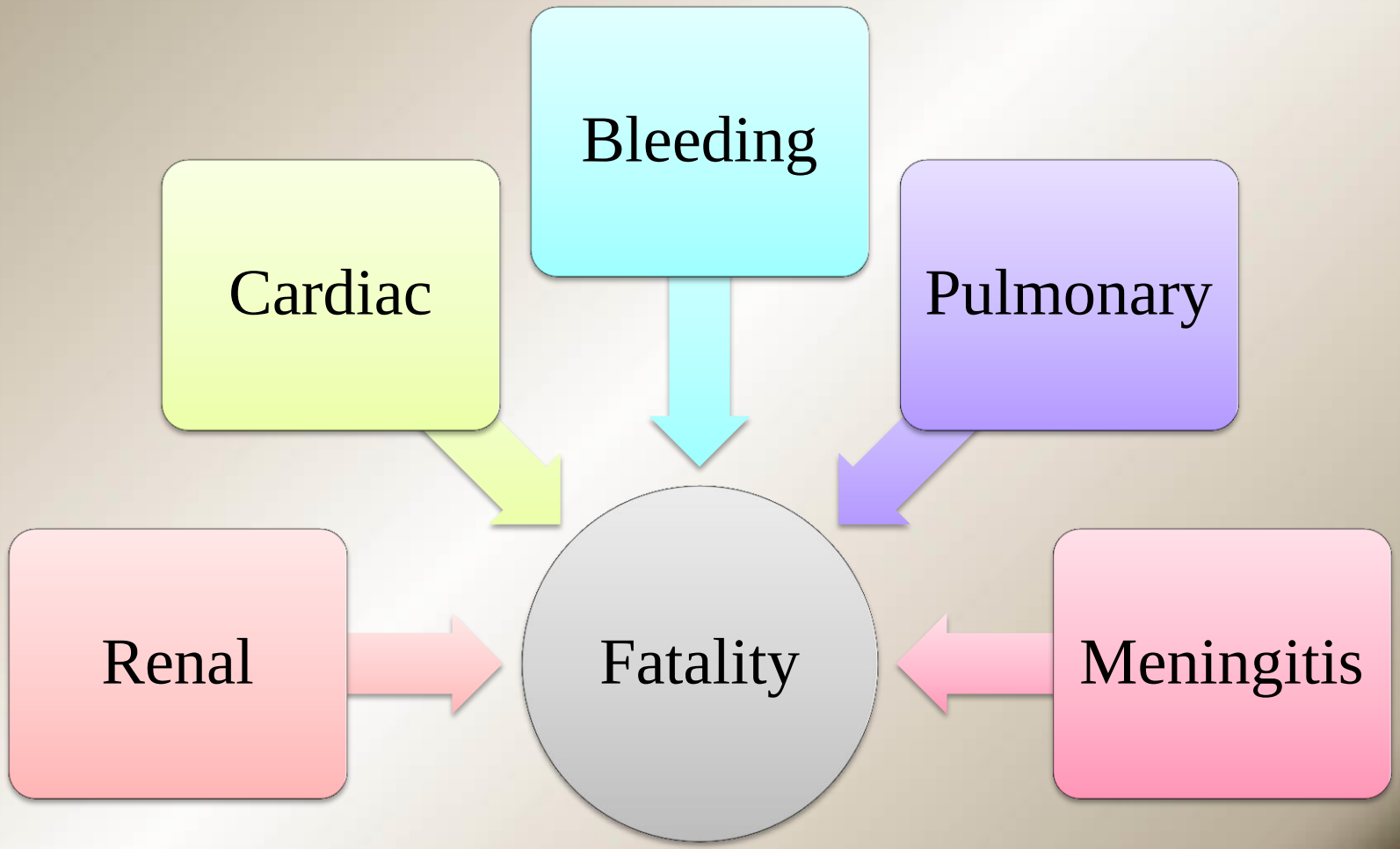
- Benzyl Penicillin 20L q.i.d
- Ampicillin 1G q.i.d
- 3rd gen Ceftriaxone 1G od
- Cefotaxime 1G t.i.d

Jarisch Herxheimer Reaction

Special Measures

- Intensive care, monitor
- Cardiac, hepatic care
- Fluid balance, bleeding
- Platelets, transfusions
- Renal function - dialysis
- CNS complications

Prognosis and Mortality



Prevention

- Prevention is difficult due to wild animal infection
- Good sanitation, Immunization of live stock
- Personal hygiene, PPE, Water treatment
- No useful human vaccines – multiple serovars
- Doxycycline 200 mg weekly for at risk groups

Thank You!