

Case 3

- seventy-four year old man
- presented with fracture of the right humerus
- admitted to investigate cause of fall
- found to be intermittently confused
- x-ray showed “left lobe pneumonia”

Case 3

Past medical history

- hypertension
- alcoholic fatty liver

Progress

- coffee-ground vomiting
- developed acute renal impairment, a cough and shortness of breath
- chest x-ray showed left lower lobe pneumonia

Case 3

External examination

- very extensive bruising of the right arm, from shoulder to wrist; clear mobility of the lower third of the humerus
- extensive bleeding associated with needle puncture marks
- two bruises just above the nose

Case 3

Internal examination

- ✿ cardiovascular system
 - ✿ atheroma in the carotid and basilar arteries, with minimal stenosis, and no thrombus
 - ✿ aorta shows extensive atheroma
 - ✿ moderate concentric hypertrophy of left ventricle
 - ✿ patchy coronary arteries; critical stenosis in the anterior descending branch

Case 3

Internal examination

- ✿ bronchi
 - ✿ copious mucus, but no pus
- ✿ lungs
 - ✿ firm and fibrous texture
 - ✿ pus exudes from the right middle lobe

Case 3

Internal examination

✿ liver

- ✿ reticular pattern, consistent with right heart failure

✿ kidneys

- ✿ coarsely granular external surfaces, consistent with systemic hypertension
- ✿ definition of cortex and medulla within normal limits

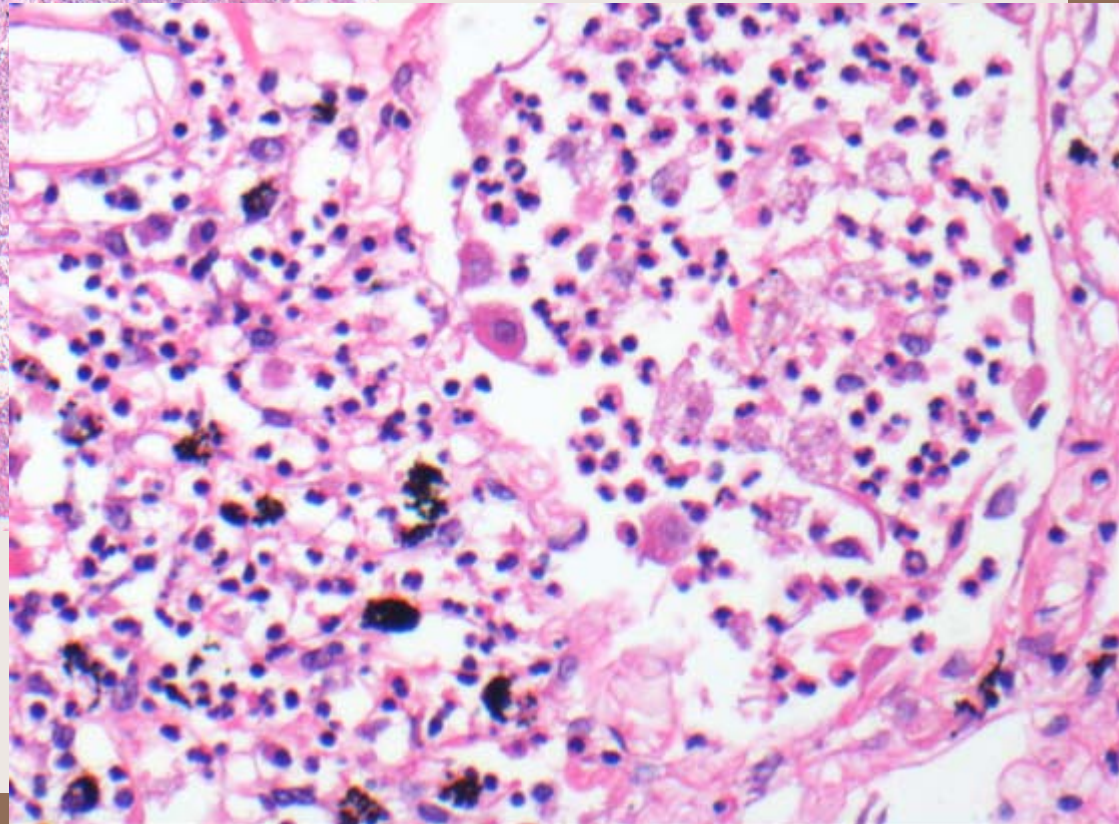
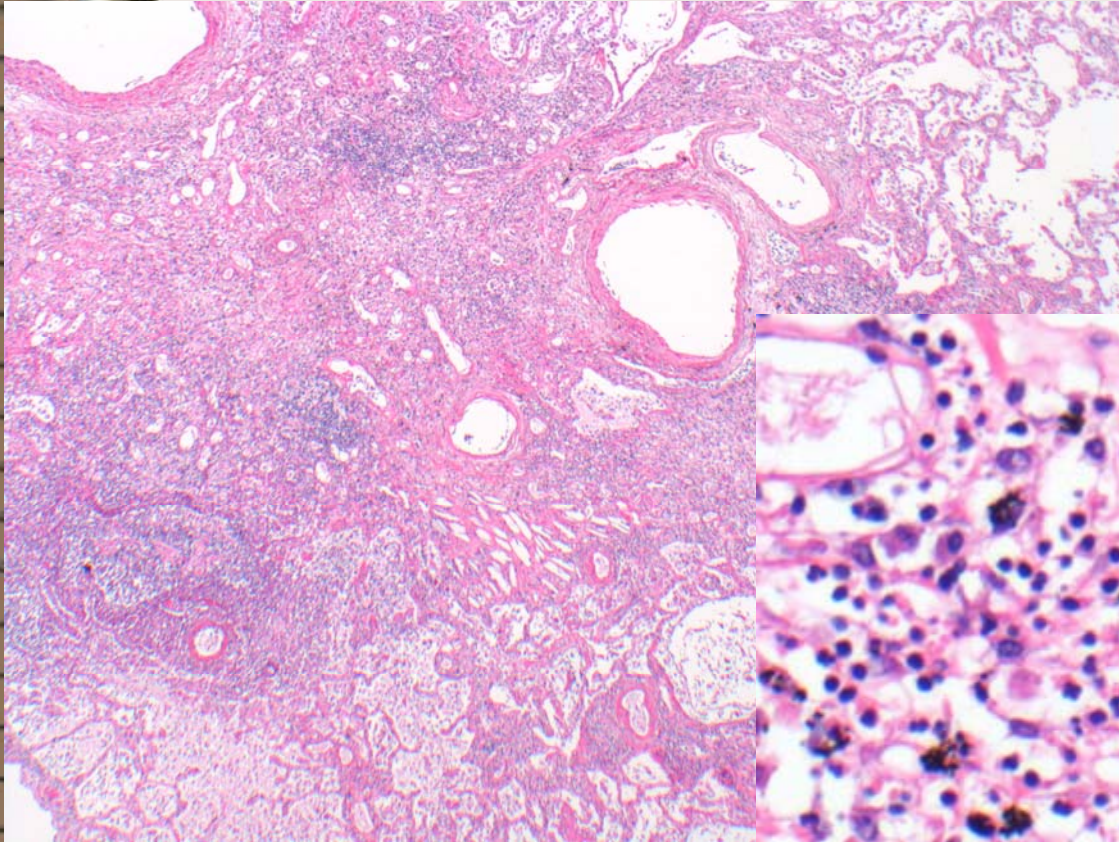
✿ spleen

- ✿ diffluent

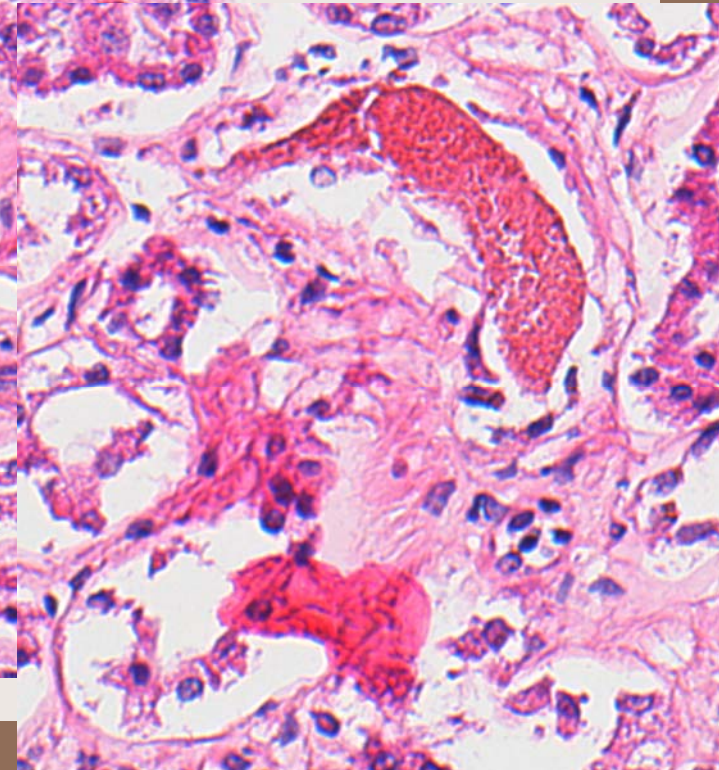
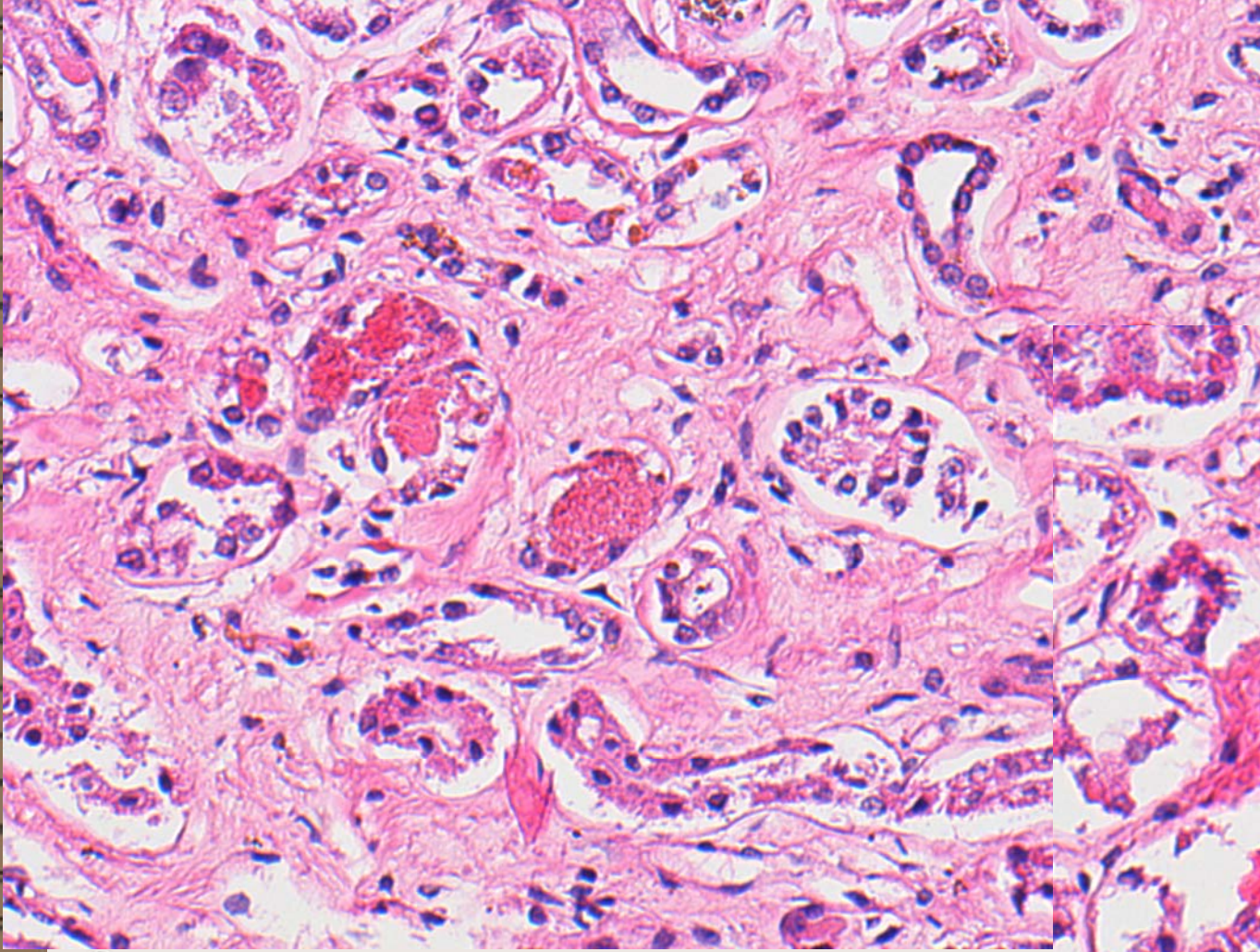
✿ lymph nodes

- ✿ reactive enlargement of lymph nodes

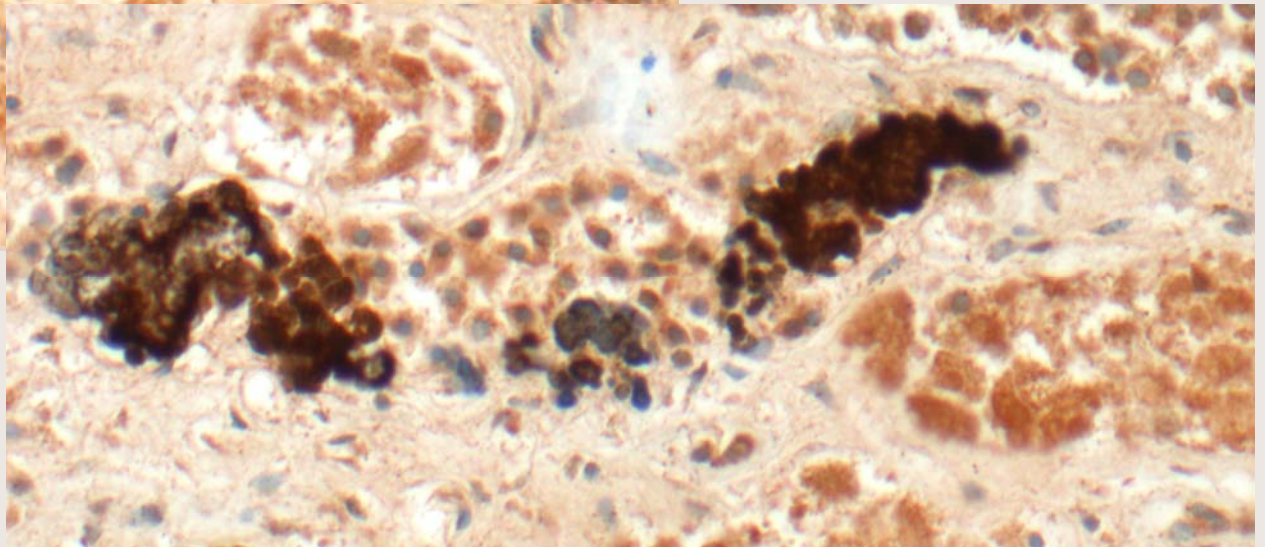
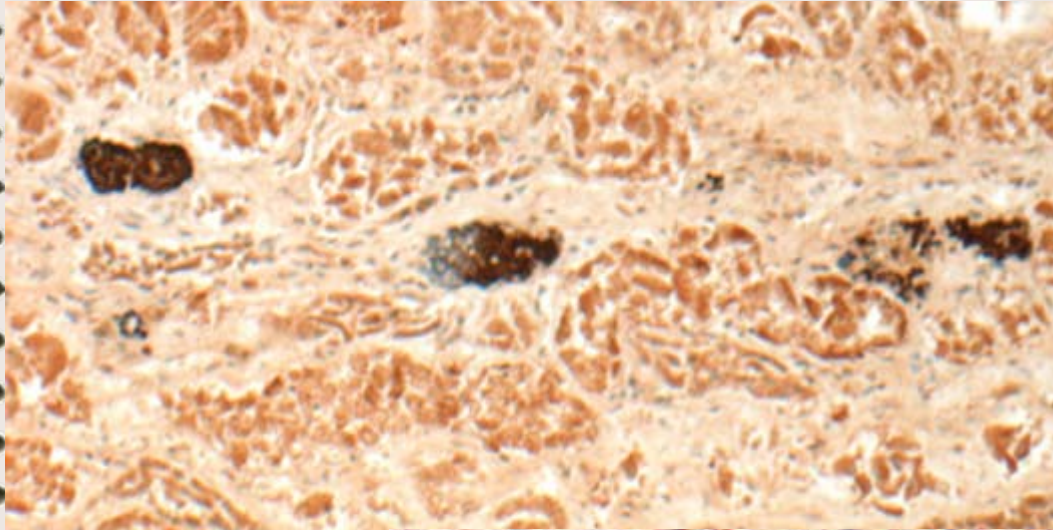
Case 3 - lung



Case 3 - kidney



Case 3 – kidney, myoglobin



Case 3

Final Summary

- Active bronchopneumonia; focal pulmonary fibrosis, consistent with previous aspiration and pneumonia
- Myoglobin-rich renal tubular casts, consistent with rhabdomyolysis; history of acute renal failure
- Coronary artery atheroma with critical stenosis
- Concentric left ventricular hypertrophy; chronic hypertensive heart disease
- Minor nodular goitre

Case 3

Cause of death

Ia Renal failure secondary to rhabdomyolysis, and bronchopneumonia

Ib Fracture of the right humerus

II Coronary artery atheroma
Chronic hypertensive heart disease

Renal failure and rhabdomyolysis

- ✿ dissolution of skeletal muscle with leakage of muscle cell content
 - ✿ electrolytes
 - ✿ sarcoplasmic proteins, including myoglobin
- ✿ direct trauma or ATP depletion
- ✿ ATP depletion gives raised sarcoplasmic calcium, and thus persistent contraction
- ✿ severe rhabdomyolysis can lead to renal failure

Renal failure and rhabdomyolysis

Epidemiology

- ✿ USA: 7 to 10% of acute renal failure is caused by rhabdomyolysis
- ✿ in rhabdomyolysis, risk of renal failure is 13% to 50%
- ✿ death rate in rhabdomyolysis depends on underlying cause
 - ✿ drug abuse 3.4%
 - ✿ limb ischaemia 32%

Major causes of rhabdomyolysis

Trauma

- ✿ crush syndrome

Exertion

- ✿ strenuous exercise, seizures, alcohol withdrawal

Muscle hypoxia

- ✿ limb compression, artery occlusion

Genetic defects

- ✿ disorders of glycolysis or lipid metabolism, mitochondrial disorders, pentose phosphate disorders

Major causes of rhabdomyolysis

Infections

- ✿ influenza A and B, Coxsackievirus, EB virus, HIV, *Legionella*

Body temperature changes

- ✿ malignant hyperthermia, malignant neuroleptic syndrome, heat stroke, hypothermia

Diabetes

- ✿ hyperosmolar states, ketoacidosis

Major causes of rhabdomyolysis

Electrolyte disorders

- ✱ hypokalaemia, hypophosphataemia

Drugs and toxins

- ✱ fibrates, statins, alcohol, heroin, cocaine

Idiopathic

Mechanisms of renal failure

Exact mechanism unclear; candidates are these

- ✿ in acidic urine, ferrous ions become ferric, and release hydroxyl radicals
 - ✿ intrarenal vasoconstriction and ischaemic tubule injury
 - ✿ direct tubule injury
- ✿ tubular obstruction