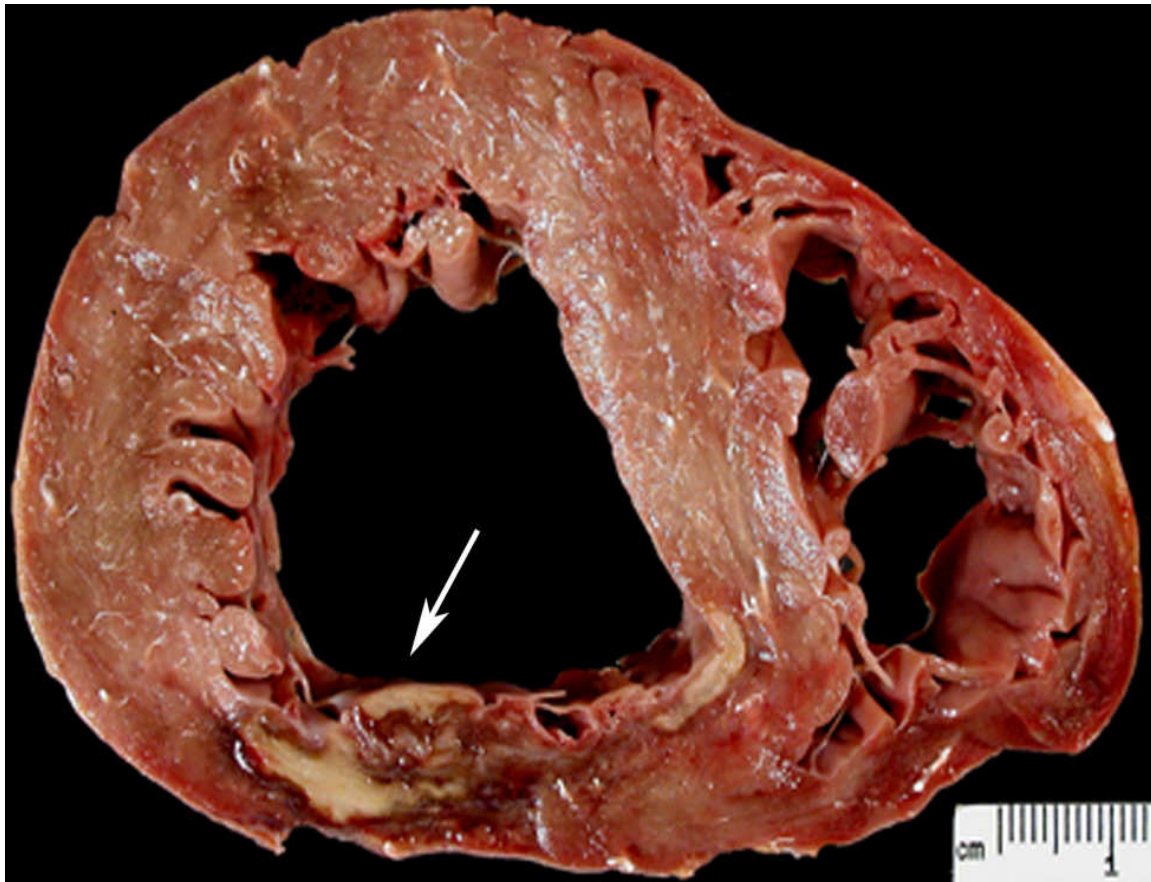


Coagulative Necrosis of Myocardium

Dr Rodney Itaki

Division of Pathology

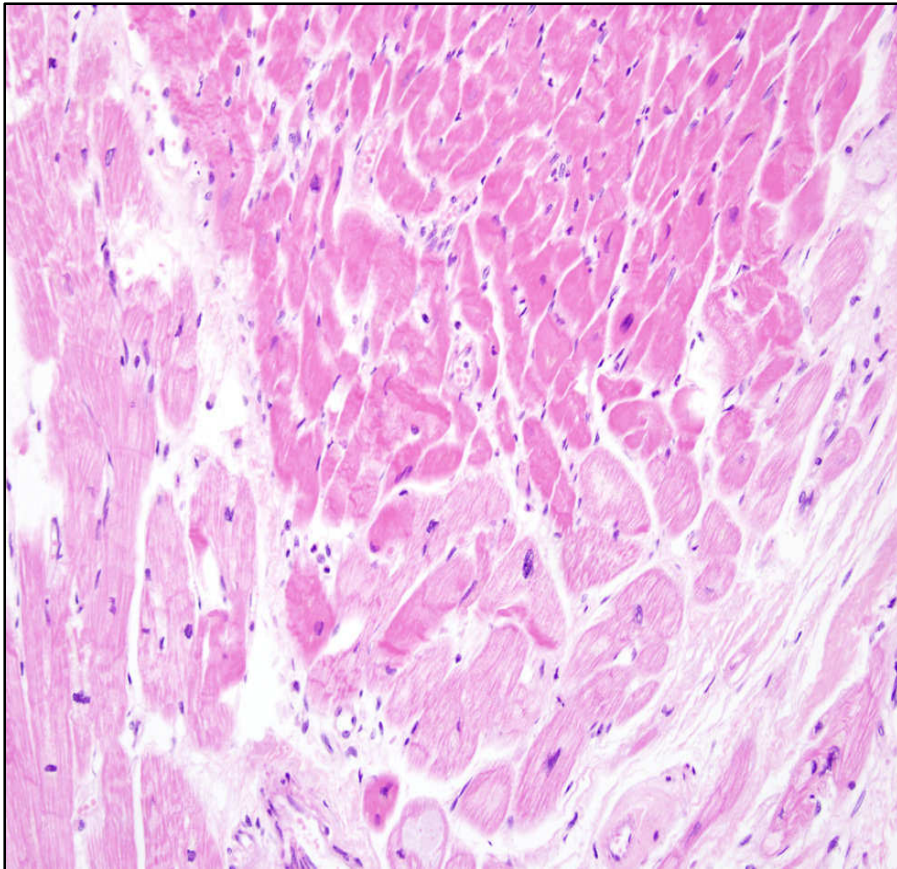
Coagulative Necrosis



- **Gross pathology:**
- 3 day old infarct:
- Yellow necrosis surrounded by hyperemic borders.
- Arrow points to a transmural infarct

Ref: Medscape

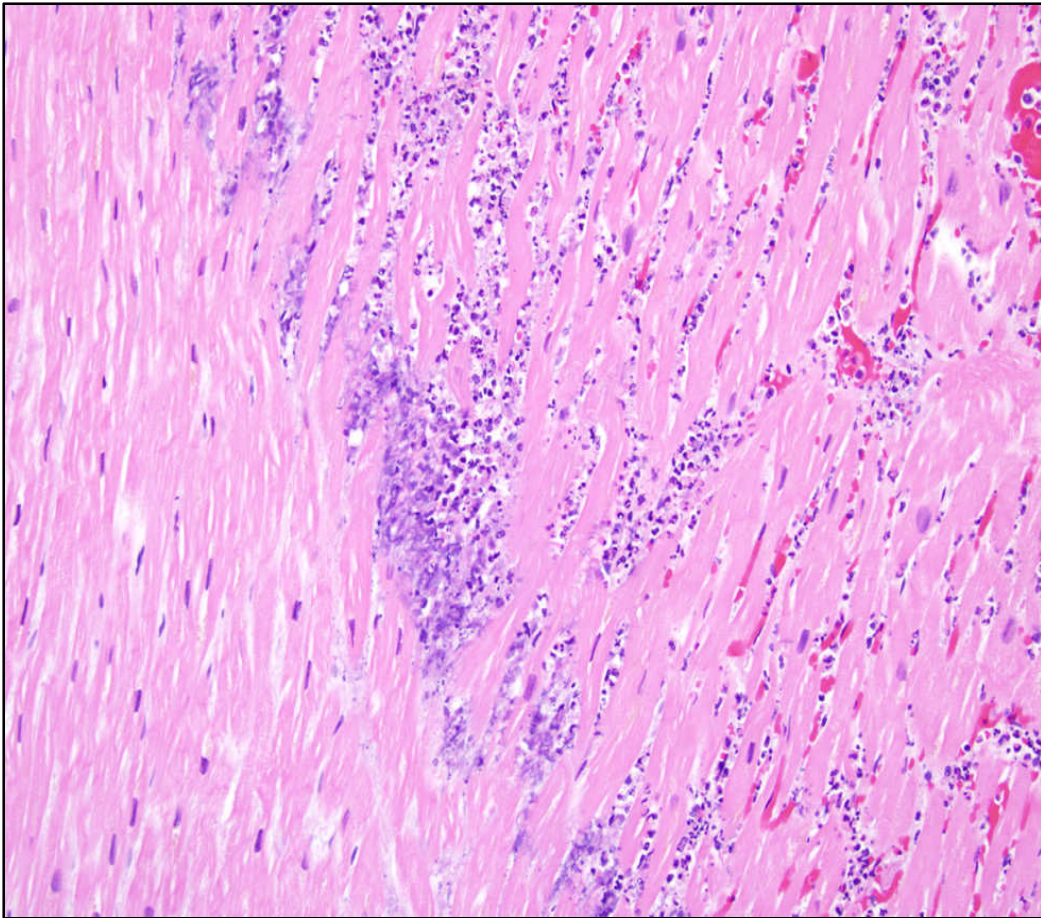
Coagulative Necrosis



- Hypereosinophilia (above) with intense pink cytoplasm
- No inflammation (12-24 hours) between border of normal and necrotic myocardial fibres

Ref: medscape

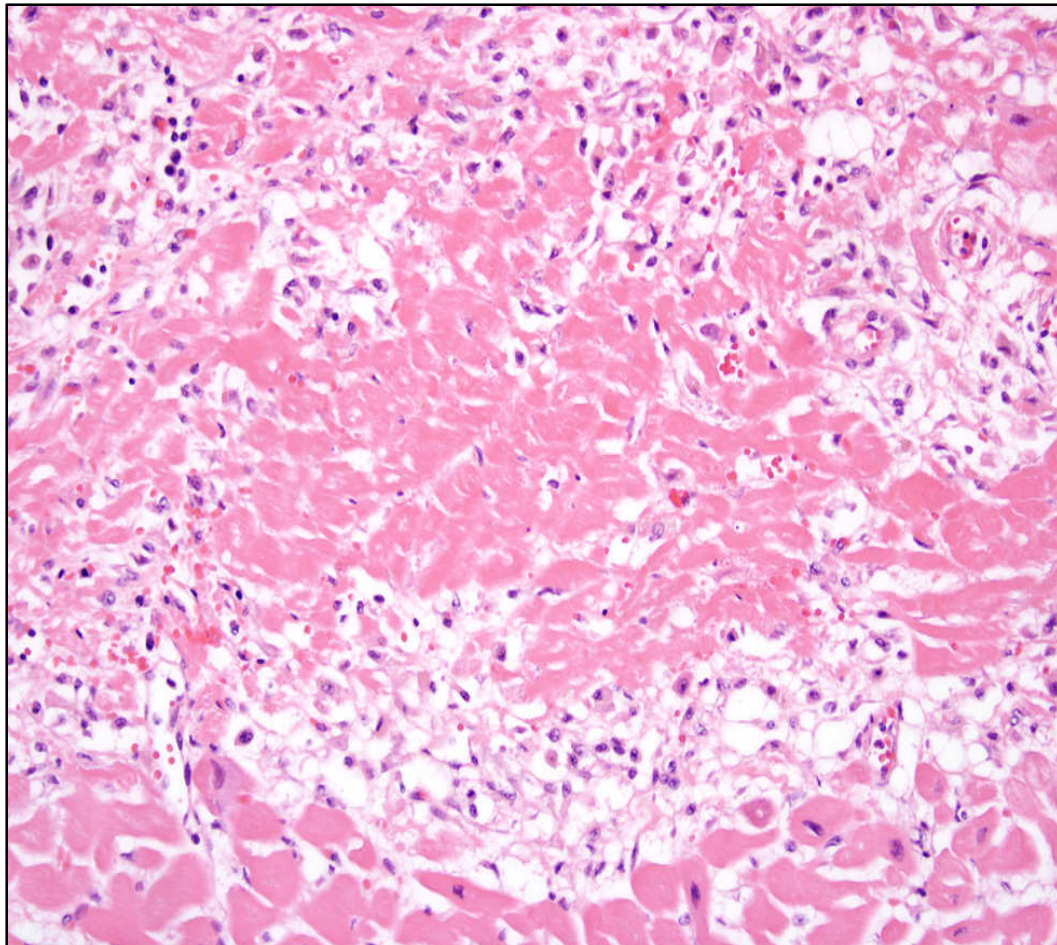
Coagulative Necrosis



- Neutrophil infiltrate at the border after 24hrs.

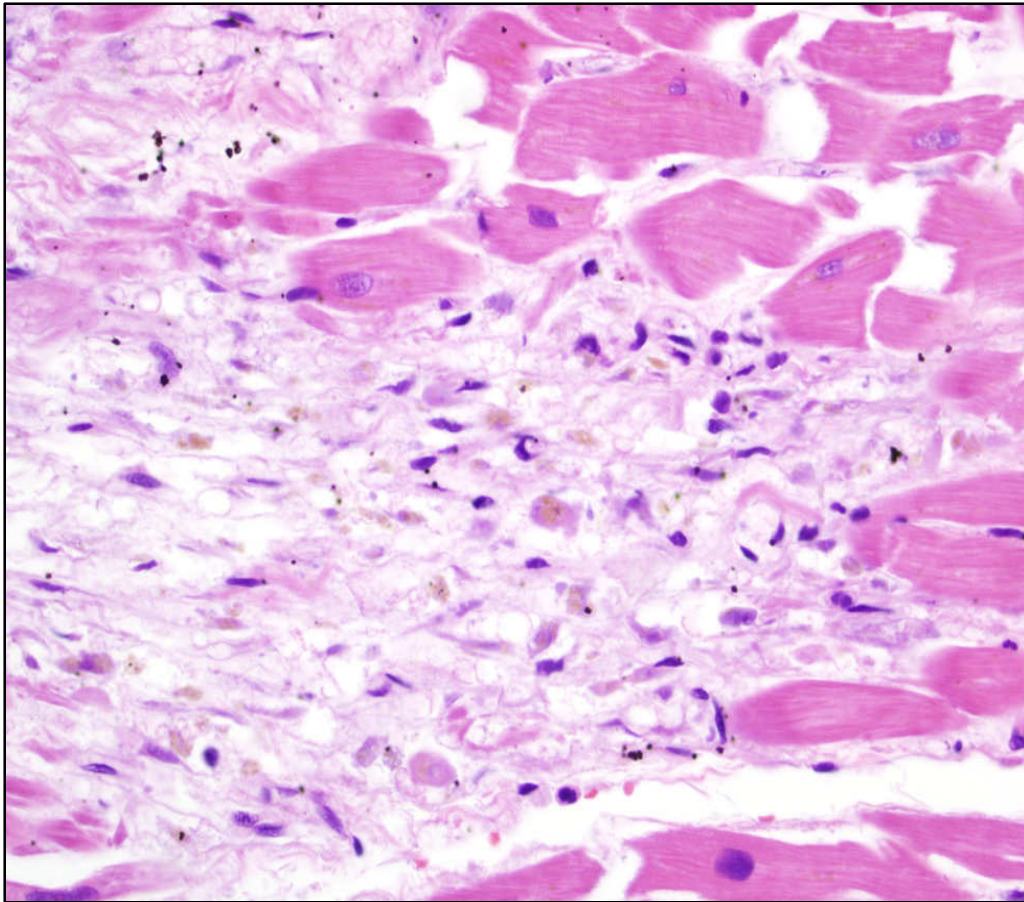
Ref: medscape

Coagulative Necrosis



- Healing myocardial infarct
- 8 days old
- Chronic inflammatory cells at border of infarcted & normal myocardial cells
- Early granulation – fibroblast without collagen deposition

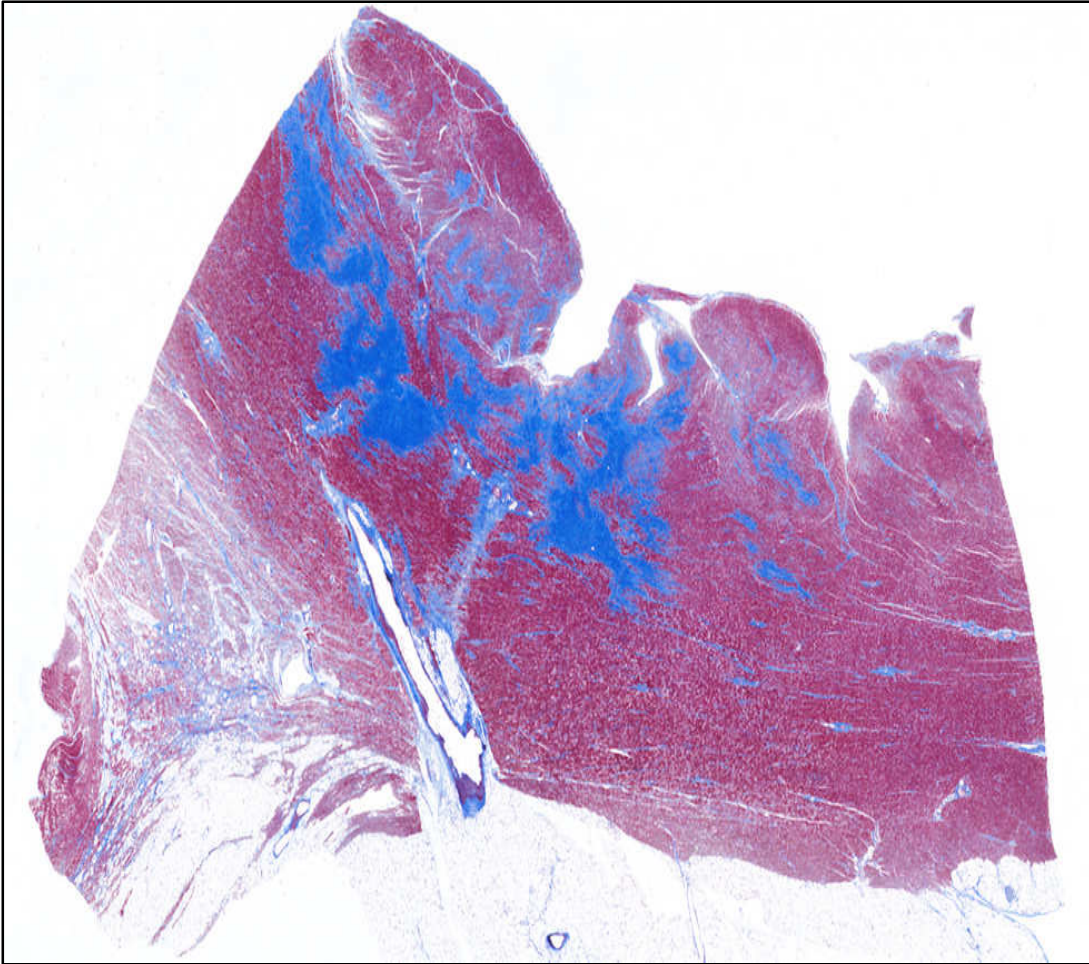
Coagulative Necrosis



- 10-14 days old.
- Chronic inflammation
- Hemosiderin-laden macrophages
- Early fibroblasts without significant collagen deposition

Ref: medscape

Coagulative Necrosis



- Old myocardial scar
- Masson trichrome stain – collagen appears blue.

Case Studies

- 63 year old man has a 2 yr hx of worsening congestive HF. A echocardiography shows mitral stenosis with left atrial dilation. A thrombus is present in the left atrium. One month later he experiences left flank pain and notes hematuria. Lab testing shows elevated serum AST.
- Which of the following patterns of tissue injury is most likely to be present?
 - Liquefactive necrosis
 - Caseous necrosis
 - Coagulative necrosis
 - Fat necrosis
 - Gangrenous necrosis

Answer

- Coagulative necrosis.
- Embolization of the thrombus led to blockage of the renal arterial branch causing acute renal infarction.
- Ischaemic injury to most internal organs – coagulative necrosis
- Liquefactive necrosis – ischaemic injury to brain & pattern in abscess formation
- Caseous necrosis – various forms of granulomatous inflammation
- Gangrenous necrosis – form of coagulative necrosis resulting from ischaemia to limbs.

- An impending myocardial infarction was successfully averted by thrombolytic therapy in a 55 yr old man.
- Which of the following biochemical events most likely occurred during the period of hypoxia?
 - Decreased hydrogen ion concentration
 - Increased in oxidative phosphorylation
 - Loss of intracellular Na & H₂O
 - Stimulation of ATP synthesis
 - Stimulation of anaerobic glycolysis & glycogenolysis

Answer

- Stimulation of anaerobic glycolysis & glycogenolysis
- Sequence of events in hypoxic cell injury:

Hypoxia results in failure of oxidative phosphorylation. This results in low ATP & increase AMP & ADP



Increase phosphofructokinase & phosphorylase activity which stimulates anaerobic glycolysis & glycogenolysis



Accumulation of lactate, decrease pH and depletion of glycogen stores. Failure of Na-K-ATPase pump (from low ATP) leading to increased cell Na & H₂O, decreased intracellular K

- A 53 year old man has had marked chest pain for the past 3 hrs. Lab findings include elevated serum creatinine kinase-MB (CK-MB). He receives thrombolytic therapy with tissue plasminogen activator. After therapy, the CK-MB further increases.
- Which of the following is the most likely biochemical basis for this observed rise in CK-MB?
 - Reduced protein synthesis
 - Increased generation of oxygen-derived free radicals
 - Increased activity of catalase
 - Reduced oxidative phosphorylation
 - Reduced calcium from endoplasmic reticulum

Answer

- Increased generation of oxygen-derived free radicals
- Reperfusion injury is clinically important in myocardial infarction and stroke. Paradoxically, oxygen that flows in with blood can be converted to free radicals by parenchymal and endothelial cells and infiltrating leukocytes. Catalase is a scavenger of free radicals. All other changes listed occur in sublethal cell injury.

END

References: Cases from Review of
Pathology, 2nd Ed.

Images from Medscape