

FIRST SEMESTER (CLINICAL ENZYMOLOGY)



ENZYMES OF CLINICAL SIGNIFICANCE: CK & LDH

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four Stage

المرحلة الرابعة

محاضرة رقم 9

الجانب النظري

Lecture No. 9

Theoretical

تدريسي المادة : م. م احمد صبوري ساجت

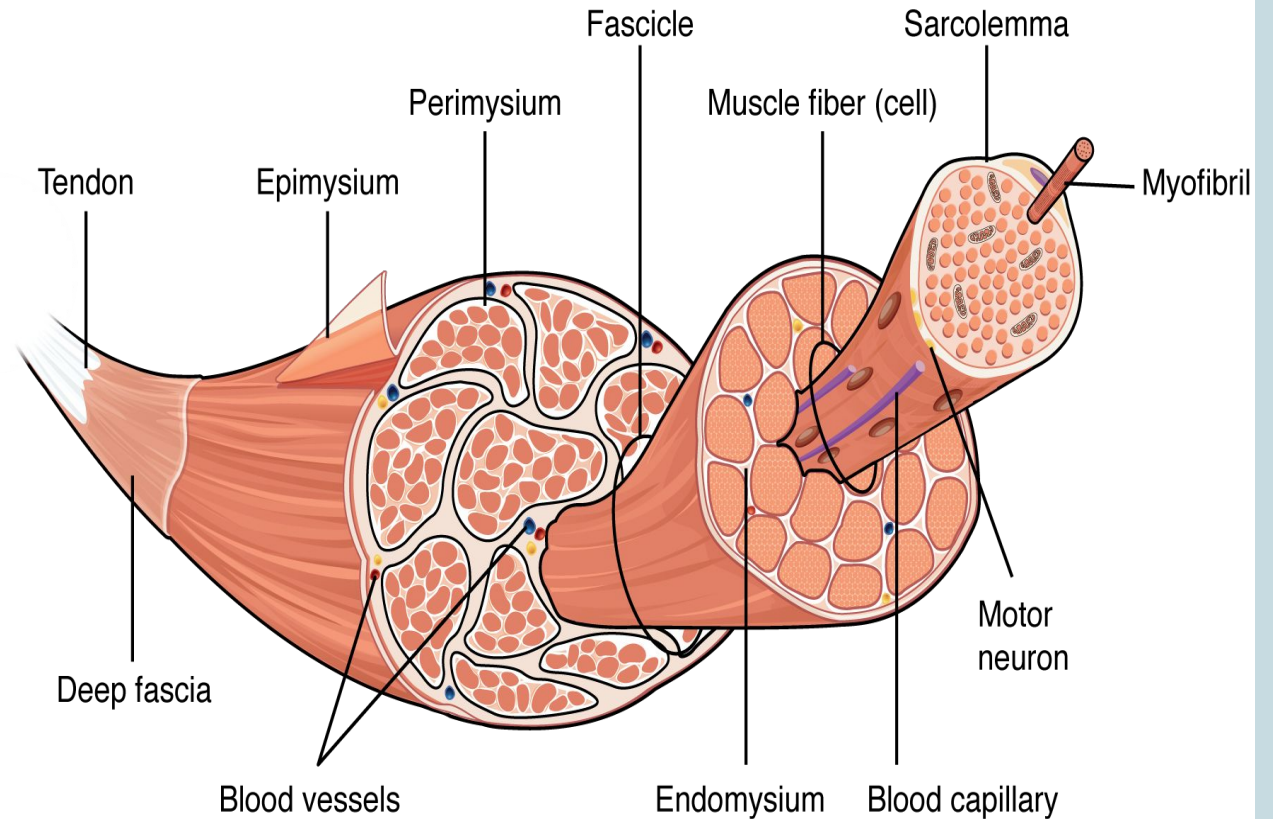
INTRODUCTION TO ENZYMES IN CLINICAL DIAGNOSIS

- Enzymes act as biological markers for tissue damage.
- Increased serum levels indicate cell injury or necrosis.
- CK and LDH evaluate muscle, cardiac, and hepatic function.



CREATININE KINASE (CK) OVERVIEW

- Catalyzes conversion of creatine + ATP → phosphocreatine + ADP.
- Found mainly in skeletal muscle, heart, and brain.
- Marker for muscle injury and myocardial infarction (MI).

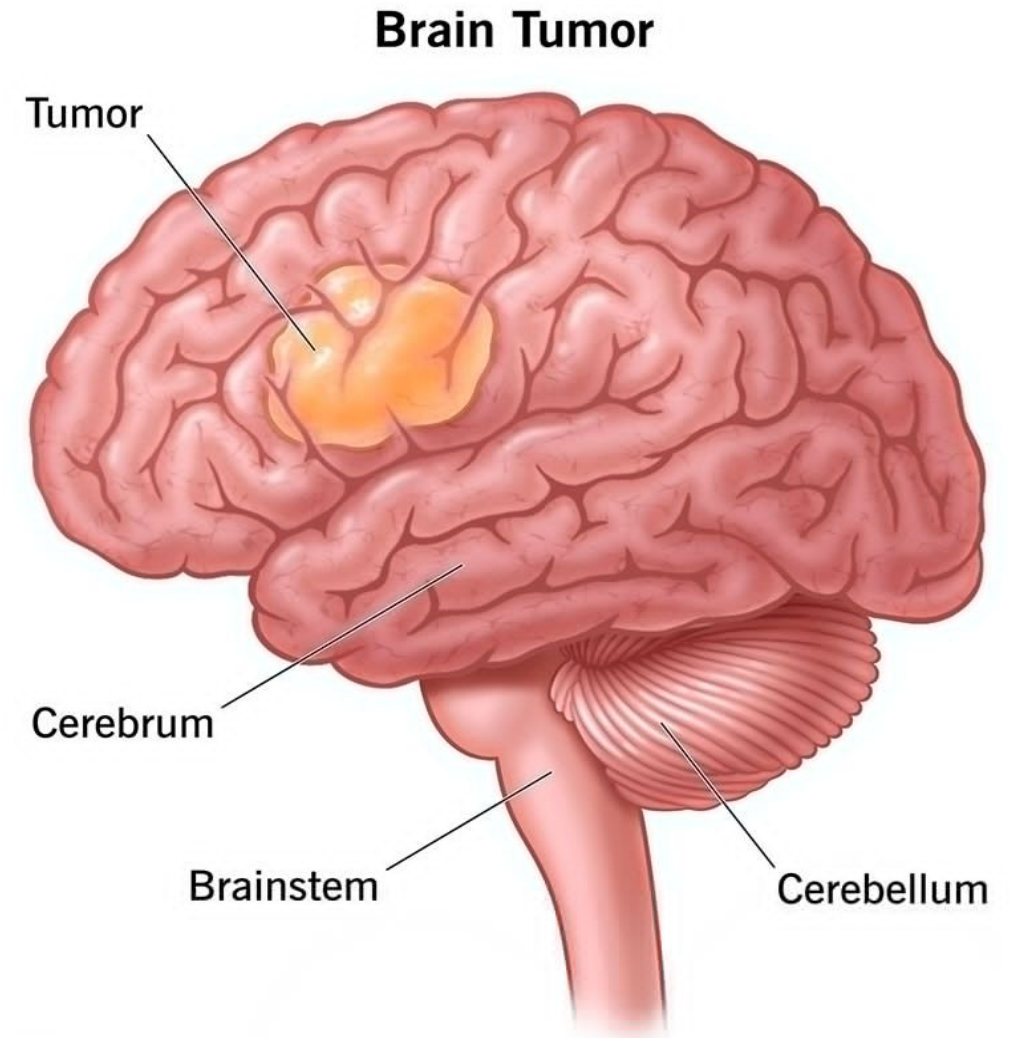


CK Isoenzymes

CK-MM: Skeletal muscle —
Muscle disorders

CK-MB: Cardiac muscle —
Myocardial infarction

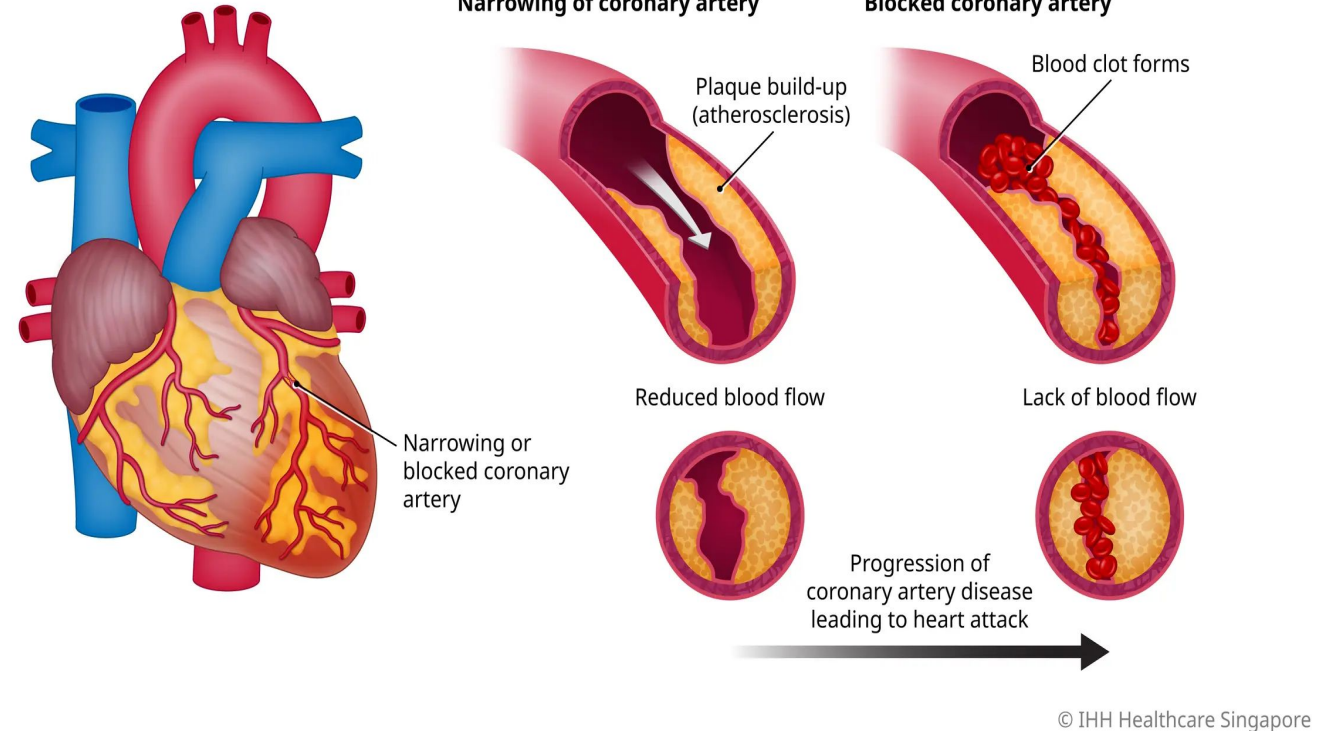
CK-BB: Brain — CNS injury,
tumors



CLINICAL

SIGNIFICANCE OF CK

- CK-MB $\uparrow \rightarrow$ Acute myocardial infarction
- CK-MM $\uparrow \rightarrow$ Muscular dystrophy, trauma, exercise
- CK-BB $\uparrow \rightarrow$ Stroke, brain injury, malignancy

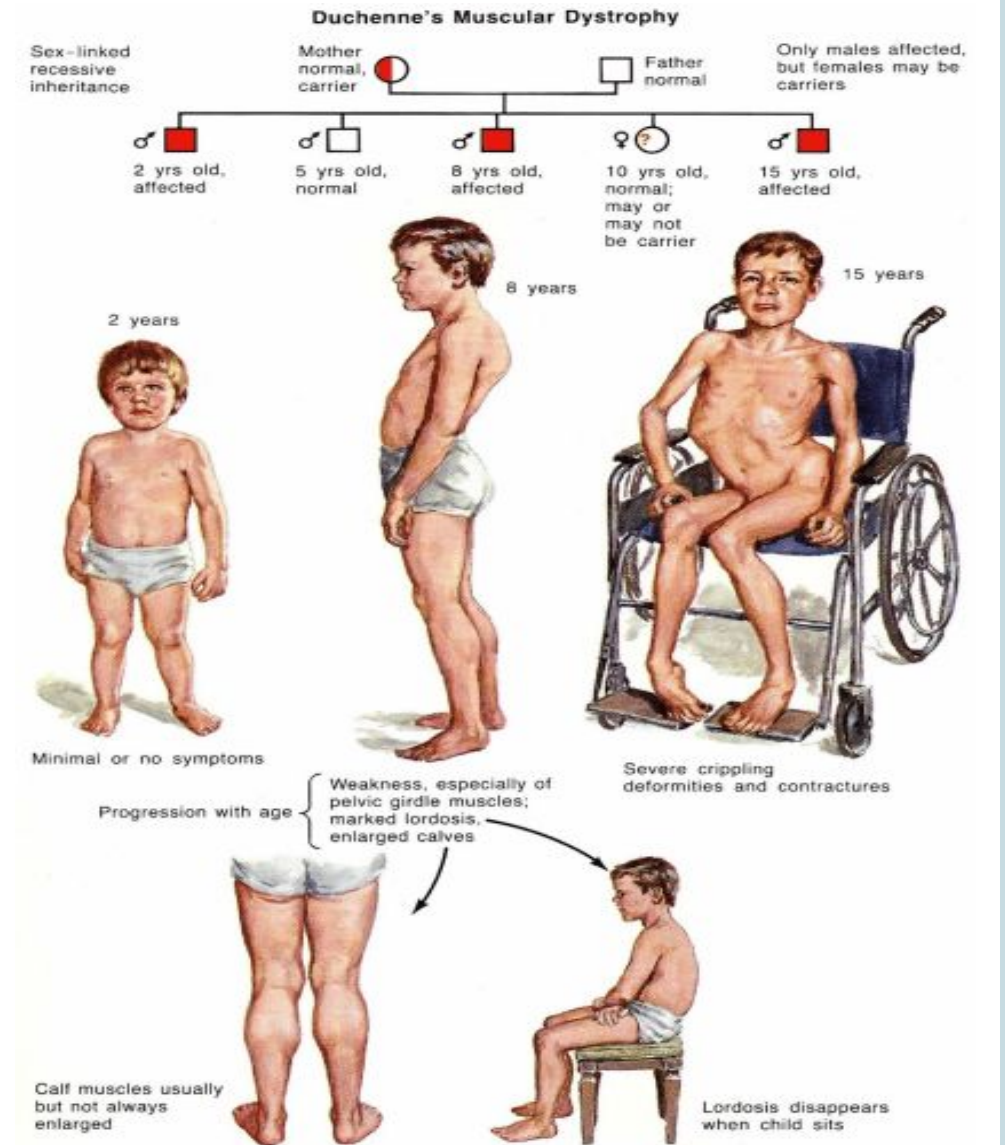


CK IN MYOCARDIAL INFARCTION

- Rises 4–6 hours after MI
- Peaks at 24 hours, normal in 2–3 days
- Used for early detection and re-infarction monitoring

CK in Skeletal Muscle Disorders

- Elevated in muscular dystrophy (Duchenne)
- Moderate rise after exercise or trauma
- Differentiates neuromuscular diseases



Lactate Dehydrogenase (LDH) Overview

- Catalyzes lactate $\leftrightarrow$ pyruvate
- Found in heart, liver, kidney, muscle, RBCs
- Useful in diagnosing tissue injury

LDH Isoenzymes

LDH-1: Heart, RBCs — MI, hemolysis

LDH-2: RES — Normal dominant form

LDH-3: Lungs — Pulmonary diseases

LDH-4: Kidney, pancreas — Renal disorders

LDH-5: Liver, muscle — Hepatic or muscle
disease

CLINICAL SIGNIFICANCE OF LDH

- LDH-1 > LDH-2 (flipped pattern) → MI

- LDH-5 ↑ → Liver or muscle disease
- Total LDH ↑ → Hemolytic anemia, malignancy, necrosis

LDH in Myocardial Infarction

- Rises 8–12 hours after MI
- Peaks at 48–72 hours, remains high up to 10 days
- Useful when CK-MB normalized

LDH IN OTHER CONDITIONS

- Liver disease: LDH-5 ↑

- Hemolysis: LDH-1 ↑ from RBC destruction
- Cancer: persistent LDH ↑
(lymphoma, testicular cancer)

COMPARISON: CK VS LDH

CK: More specific, rises 4–6h, lasts 2–3d

LDH: Less specific, rises 8–12h, lasts up to 10d

CK-MB → cardiac injury

LDH → general tissue damage

Any questions?

*Thank
You*