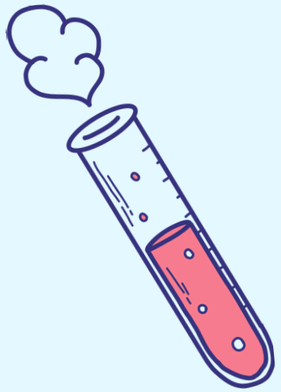
CLINICAL SIGNIFICANCE OF ENZYME ASSAYS

SECOND STAGE

DR.RASHAD AL - TUUAMAH
MEDICAL BIOCHEMISTRY



BLOOD PLASMA ENZYME LEVELS IN DISEASE STATES :-

WHILE MOST ENZYMES OPERATE

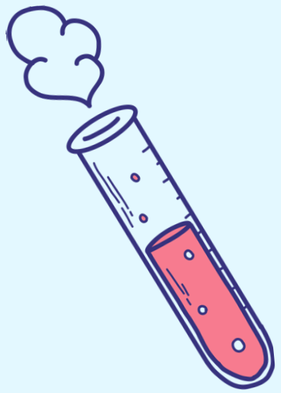
INTRACELLULARLY, SOME ARE SECRETED INTO BLOOD PLASMA, INCLUDING ZYMOGENS FROM THE LIVER THAT PARTICIPATE IN COAGULATION

ENZYMES RELEASED FROM CELLS DURING NORMAL TURNOVER TYPICALLY REMAIN INTRACELLULAR, AND ELEVATED PLASMA LEVELS

OF THESE ENZYMES CAN SIGNAL TISSUE DAMAGE EXCEEDING NORMAL CELLULAR TURNOVER.

TISSUE DAMAGE FROM DISEASES OFTEN LEADS TO CELL LYSIS, RELEASING INTRACELLULAR ENZYMES INTO THE BLOODSTREAM

WHERE THEIR ELEVATED LEVELS ARE ROUTINELY MEASURED FOR DIAGNOSTIC PURPOSES. THE CONCENTRATION OF THESE ENZYMES

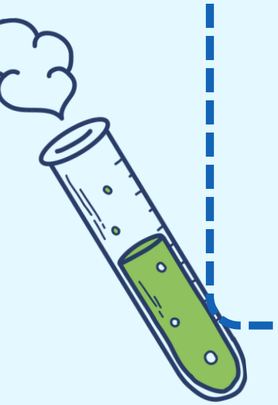


CORRELATES WITH THE EXTENT OF TISSUE INJURY, AIDING IN THE ASSESSMENT OF DAMAGE, THERAPEUTIC RESPONSE, AND PATIENT PROGNOSIS.

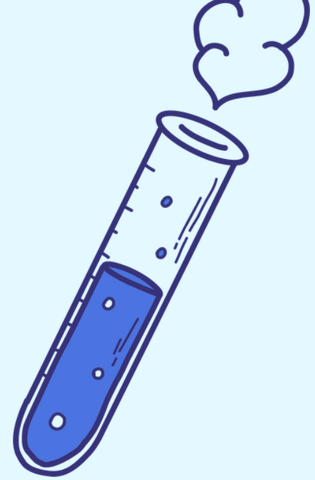
PLASMA ENZYMES AS DIAGNOSTIC TOOLS

certain enzymes exhibit high ACTIVITY in SPECIFIC tissues, making their elevated levels in blood plasma indicative of tissue

DAMAGE. for instance, ALANINE AMINOTRANSFERASE (ALT) is predominantly found in the LIVER



PRESENCE IN PLASMA SUGGESTS HEPATIC INJURY, WHICH IS ASSESSED IN LIVER FUNCTION



TESTS. CONVERSELY, ENZYMES WITH BROADER TISSUE DISTRIBUTION OFFER LESS

SPECIFIC INSIGHTS INTO THE LOCATION OF CELLULAR DAMAGE, LIMITING THEIR DIAGNOSTIC UTILITY

ISOENZYMES

ISOENZYMES are VARIANT forms of an enzyme that catalyze the same reaction but differ in their AMINO ACID SEQUENCES, leading to distinct PHYSICAL properties. for example, LACTATE

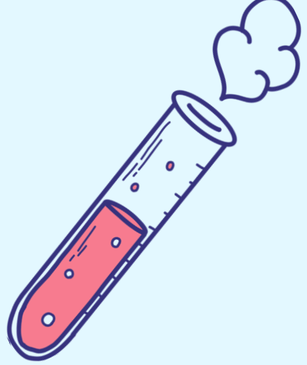
DEHYDROGENASE (LDH) has five isoforms (LD1-5), with specific distributions in tissues such as LD5 in LIVER and skeletal muscle, LD2 in red blood cells, and LD1 in MYOCARDIAL tissue.

the unique patterns of ISOENZYMES in blood plasma can help identify the site of tissue DAMAGE, as their levels fluctuate under various disease conditions.

ISOENZYME QUATERNARY STRUCTURE

ISOENZYMES, SUCH AS LACTATE DEHYDROGENASE (LDH) AND CREATINE KINASE (CK), COMPRISE DIFFERENT SUBUNIT

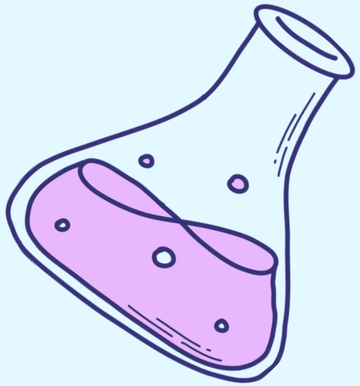
COMBINATIONS. LDH HAS FIVE TETRAMERIC FORMS (LD1 TO LD5), VARYING FROM HHHH TO MMMM, WHILE CK CONSISTS OF THREE DIMERIC



ISOENZYMES (CK1, CK2, CK3) FORMED FROM B AND M SUBUNITS. EACH ISOENZYME EXHIBITS

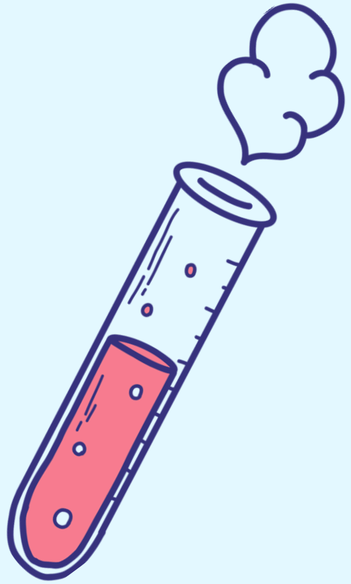
DISTINCT ELECTROPHORETIC MOBILITIES, WITH CK1 PREDOMINANTLY FOUND IN THE

BRAIN AND CK3 IN SKELETAL MUSCLE, WHILE CK MB IS SPECIFIC TO CARDIAC TISSUE.



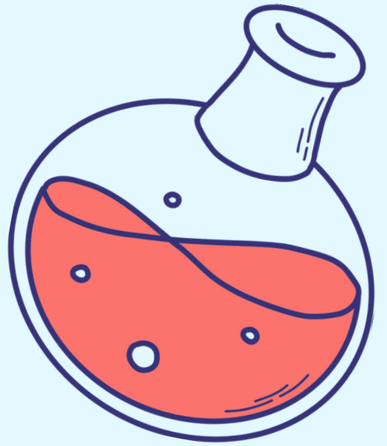
HISTORICAL USE IN DIAGNOSIS OF MYOCARDIAL INFARCTION
THE MEASUREMENT OF CARDIAC-SPECIFIC

ISOENZYMES, PARTICULARLY CK MB, WAS CRUCIAL FOR DIAGNOSING MYOCARDIAL



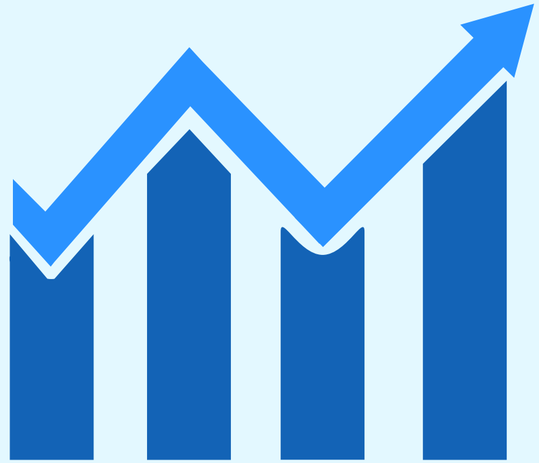
INFARCTION (MI) BEFORE THE INTRODUCTION OF TROPONIN TESTS.

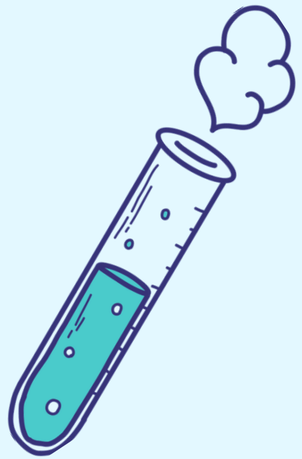
CK MB IS PREDOMINANTLY FOUND IN MYOCARDIAL TISSUE, AND ITS PRESENCE IN BLOOD PLASMA



INDICATES HEART MUSCLE DAMAGE, TYPICALLY APPEARING 4 TO 8 HOURS AFTER CHEST PAIN

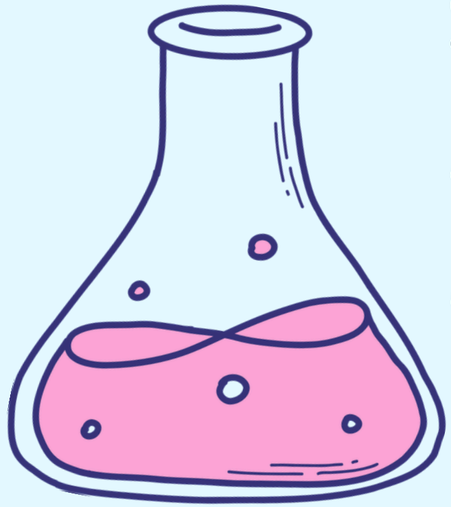
ONSET, PEAKING AROUND 24 HOURS, AND RETURNING TO BASELINE WITHIN 48 TO 72 HOURS.





CLINICAL APPLICATION: DIAGNOSTIC USE OF TROPONINS

TROPONINS T (TNT) AND I (TNI) ARE REGULATORY PROTEINS RELEASED INTO PLASMA FOLLOWING CARDIAC DAMAGE, SERVING AS HIGHLY SENSITIVE AND SPECIFIC MARKERS FOR MYOCARDIAL INFARCTION (MI)



THANK YOU

Presented by Aaron Loeb