Hello students,

this module is a part of Unit 10 enzymes.

Module name is cofactors and isoenzymes.

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The module comprises of concept of cofactors,

coenzymes and isoenzymes.

By the end of the module,

students will be able to understand

the concept of cofactors,

differentiate between

cofactors and coenzymes.

Describe the concept of isoenzymes

and cite some examples of isoenzymes.

Many enzymes need non protein

moieties that can enhance catalysis.

Simple protein enzymes are

composed of a polypeptide chain

which is made up of protein only.

So simple protein enzymes are

comprising of protein only,

whereas conjugated enzymes include

a protein as well as a non protein

part and this non protein part

of a conjugated enzyme is called

as a cofactor while the protein

part is referred to as a coenzyme.

Therefore, the cofactor,

along with its coenzyme is known as apoenzyme. Thus only the combination

of Apoenzyme,

along with its cofactor is

functional or operative.

That is,

holoenzyme is the operative form of enzyme.

Cofactor is a nonprotein chemical

compound or metallic ion that is required

for an enzyme activity as a catalyst.

Thus it will be right to call them

as helper molecules that assist in

increasing the rate of enzyme catalysis.

So cofactors are divided into two types,

that is activators and coenzymes

activators are the inorganic ions

whereas coenzymes are complex organic

molecules or metallo organic molecules

coenzymes are further divided into two types,

that is prosthetic groups and Co substrates.

Many minerals required by all organisms are

essential because they act as cofactors.

Now, the activator refers

to inorganic cofactor,

which may be a calcium ion, magnesium,

iron, manganese ion, and so on.

Some essential ions,

which are called as activator ions,

bind reversibly and participate

in the substrate binding to

the active site of the enzyme.

This activator ions form coordination

bonds with specific sidechain

at active site with substrate.

They may form one or more coordination

bonds with the substrate and act

in forming a stronger bond between

the substrate and the enzyme.

Some common ions,

which act as activator ions are zinc ion,

magnesium ion, copper ion,

iron, ion and cobalt.

Coenzymes based on their

functionality are of two types,

that is group transferring or

electron transferring. group

transferring coenzymes transfer

groups from one substrate to another.

For example, coenzyme A is involved

in the transfer of acyl group from

one substrate to another substrate,

whereas electron transferring coenzymes

are mostly involved in redox reactions.

For example coenzymes such as.

NAD, NADH2, FAD and FADH2 help in electron transport.

Coenzymes are mostly derived from vitamins

and are further classified into two types.

That is, prosthetic groups and Co substrates.

Prosthetic groups,

some cofactors bind to the enzyme protein

that is the apoenzyme very tightly,

which may be non covalently or covalently

and thus permanently and thus such

groups are called as prosthetic groups.

Prosthetic groups remain bound to the enzyme

during the course of the reaction and they

mainly participate in redox reactions.

Like the ionic amino acid

residues of the active site,

a prosthetic group has to return

to its original form during

the entire catalytic event or.

If they fail to do so, the holoenzyme

will not remain catalytically active.

Example, heme is a prosthetic group

present in enzyme cytochrome oxidase.

The second type of Co enzyme

known as Co substrates.

They are transiently, bound to the protein.

That means they can be separated

from the apoenzyme Co substrates.

Thus may be released from a protein

at some point and then rebind later

during the process of catalysis.

Co substrates are often altered during the

reaction and dissociate from the active site.

It's additional structure is

regenerated in a subsequent reaction

catalyzed by another enzyme,

and those post substrate can help

in or catalysis of the next reaction

recycled repeatedly within the cell.

This coenzymes,

unlike an ordinary substrate whose product

typically undergoes further transformation.

Coenzymes usually function as

transient carriers or space of

specific functional groups.

They transfer or carry functional group

from one substrate to another substrate,

helping in catalysis.

Both the prosthetic groups and Co

substrates are a part of the active

site of enzymes and have the same

function that is to facilitate the

reaction of enzymes and proteins.

Coenzymes also supply reactive

groups that are not available on the

side chain of amino acid residues

of active site of the enzyme.

Hi, so enzymes are the multiple forms of

an enzyme catalyzing the same reaction.

They also known as isozymes.

Enzyme variants that are the products of

different genes and represent different look.

I are described as isozymes Aurizon, zaps.

One good example of a enzyme that

is commonly found in all living

cells is elected dehydrogenase.

Every weighted as LDH,

LDH enzyme catalyzes the interconversion

of elected that is lactic acid

to pyruvate or pyruvic acid.

As it converts NAD +2 NADH and BEC.

LDH is a tetramer of subunits, usually oligo.

Merrick tetramer of subunits.

LDH of muscle and LDH of heart,

protein encoded by the LDA

and HLB genes respectively.

The LDHH&LDHM subunits can give

rest to five possible tetramers

of elected dehydrogenase enzyme.

This tetramers, maybe H4,

made up of all edge subunits or M4,

which will be made up of all M subunits,

or they can be mixed to drummers like H3M

made up of three H and one M subunit,

or H2M2 and M3.

Consequently, this.

Tetramers give five distinct isozymes

named as L DH1L2L3L4 and L DH5.

This five isoforms of selected dehydrogenase

enzyme are enzymatically similar,

but they show different tissue

distribution in the body.

This table provides the isozymes and the

constituent subunits that form the Isaac.

The elected dehydrogenase isoenzymes

have a diagnostic importance.

Also,

this Isoenzyme said immense

value in the diagnosis of mostly

heart and liver disorders.

In healthy individuals,

that is in the normal serum,

the activity of LDH 2 is

higher than that of LDH one,

and in case of myocardial infarction that

is the heart attack in common name LDH,

one is much greater than two and

this happens within 12 to 24 hours

after the infection has started.

The increased activity of LDH

5 in the serum is usually an

indicator of hepatic diseases.

These are my references. Thank you.