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DEPARTMENT=

NUTRITION

Q1=what are carbohydrates? what is their role in our body.

CARBOHYDRATES:

DEFINITION:-

Carbohydrates

are defined as the poly,hydroxy aldehydes or poly hydroxy ketones or the molecules which yields these compounds on hydrolysis.

DERIVATION OF THE

TERM CARBOHY-DRATES:

The term ‘carbohydrate’ is derived from a French term ‘hydrate de carbone’

Carbohydrates are the organic compound of carbon,hydrogen and oxygen.Carbohydrates are macronutrients and are one of the three main ways by which our body obtains its

energy. They are called carbo-hydrates as they comprise of carbon, hydrogen, and oxygen at their chemical level.They are also called the “hydrates of carbon”. Carbohydrates are

essential nutrients which include sugars, fibers, and starch. They are found in grains, vegetables, fruits, and in milk and other dairy products. They are the basic food

groups which play an impor-
tant role in a healthy life.The
food containing carbohydrates
are converted into glucose
during the process of diges-
tion by the digestive sys-

tem.Our body utilizes this sugar as a source of energy for the cells, organs, and tissues. The extra amount of energy is stored in our muscles and liver for further requirement.

GENERAL FOR-MULA:

$Cn(H_2O)n$

EXAMPLES OF CARBOHY-DRATES: Following are the important examples of

carbohydrates:

- Glucose
- Galactose
- Maltose
- Fructose
- Sucrose

- Lactose
- Starch

- Cellulose
- Chitin

ROLE OF CARBOHY-DRATES IN OUR

BODY:-

Carbohydrates are an essential part of our diet. Most

importantly, they provide the energy for the most obvi-ous functions of our

body, such as moving or thinking, but also for the 'background' functions

that most of the time we do not even notice. During digestion, carbohy-

drates that consist of more than one sugar get broken down into their

monosaccharides by digestive enzymes, and then get directly absorbed causing

a glycaemic response.The body uses glucose directly as energy source

in muscle, brain and other cells.Carbo-hydrates also play an important role in

the structure and function of our cells, tissues and organs.

CHIEF SOURCE OF ENERGY:-

Glucose is used as an immediate source of energy for the sicks and sportsman.

BLOOD CLOT-TING FACTOR:-

Oligosaccharides are involved in the formation of secreted proteins like antibodies and

blood clotting factor.

USED AS DRUGS:-

Certain carbohydrates

derivatives are used as drugs like cardicglyco-sides\antibodies.

FOR PROMOT-

ING THE DI-GESTIVE TRACT:-

cellulose has no food value but it is used as a roughage in our diet for promoting the peri-staltic motion of diges-

tive tract.

MOLECULAR

RECOGNIZA-TION:-

The receptors on the cell membrane are the complexes of carbohydrates with cer-

tain proteins.The re-
ceptors are involved in
molecular targetting.

SYNTHESIS OF OTHER SUBSTANCE:-

Degradation products used for the synthesis of other substances such as fatty acids, cholesterol and amino acids etc etc.

FUEL OF LIFE:-

carbohydrates provide a main role in the produc-

tion of energy for the performance of vital activities in living organisms thats why they are

known as fuel of life.

CARBOHYDRATES AS ENERGY SOURCE AND

THEIR STORAGE:-

Carbohydrates broken down to mainly glucose are

the source of energy for our body, as cells in our brain, muscle and all other

tissues directly use monosaccharides for their energy needs. Depending

on the type,Starch and sugars are the main energy-providing carbohydrates.

Monosaccharides are directly absorbed by the small intestine into the

bloodstream, where they are transported to the cells in need. Several hormones,

including insulin and glucagon, are also part of the digestive system.

They maintain our blood sugar levels by removing or adding glucose to

the blood stream as needed.The brain and the red blood cells are especially

dependent on glu-
cose as energy
source.For this rea-
son that our blood

glucose must be constantly maintained at an optimum level. Approx-

imately 130 g of glu-
cose are needed per
day to cover the en-

ergy needs of the adult brain alone.

THE GLYCEMIC RESPONSE AND

GLYCEMIC IN-DEX:-

When we eat a carbohydrate-con-

taining food, blood glucose level rises and then decreases, a process known

known as the gly-
caemic response. It
reflects the rate of
digestion and ab-

sorption of glucose, as well as the effects of insulin in normalising the blood glu-

cose level. The type of the sugars that form the carbohydrate; e.g. fructose

has a lower gly-
caemic response
than glucose, and
sucrose has a lower

glycaemic response than maltose

The structure of the molecule; e.g. a

starch with more branches is more easily broken down by enzymes and

therefore more readily digestible than others.

GUT FUNC-

TION AND DI-

ETARY FIBRE:-

Although small intestine is unable to

digest dietary fibre , fibres helps to ensure good gut function by increasing the physi-

cal bulk in the bowel, and stimulating the intestinal transit. Once the indigestible

carbohydrates pass into the large intestine, some types of fibre such as

gums,pectins and oligosaccharides are broken down by the gut microflora. This

increases the overall mass in the bowel and has a beneficial effect on the make-up

of our gut microflora.

FORMATION OF BACTERIAL WASTE:-

It also leads to formation of bacterial waste products, like the short-chain fatty

acids, which are released in the colon with beneficial effects on our health.

SPARING PRO-TEINS:-

In a situation where there is not enough glu-

cose to meet the body's needs, glucose is synthesized from amino acids. Because there is no storage molecule of

amino acids, this process requires the de-struction of proteins .The presence of glucose spares the

breakdown of proteins from being used to make glucose needed by the body.

Q2=What are the impact of deficit and excess intake of carbohydrates?

CARBOHY-DRATES:-

carbohydrates

are a rich food
and a great
source of ener-

gy.Carbohy-
drates are a large
family of differ-

ent carbon,hy-
drogen and oxy-
gen and thats are

found in food
that the body can
consume break-

down,absorb
and metabolised
for energy.

Some carbohy-
drates are good
while some car-

bohydrates are bad.
Good carbohy-

drates are:

- low or moder-
ate in calories.

- High in nutri-
ents.
- High in natural-

ly occurring fi-
bre.
- Low in sodium.

- Low in saturated fats.

- Very low in cholesterol and trans fats.

Bad carbohydrates are:

- High in calories.
- Full refined

sugar like corn syrup, white sugars etc.

- High in refined grains.
- Low in fibre.

- High in sodium.

-Sometimes high in saturated fats.

- Some times

high in choles-
terol and trans
fat.

EXCESS CAR-BOHYDRATE INTAKE:-

Excess carbohydrate in-take places a

large metabolic load on the body. When the body

constantly has high levels of blood sugars to

deal with over time, this leads to weight gain,

poor metabolic health and an increased risk of

heart disease. Simple carbohydrates such as

sugar increases the risk of obesity.

STRESS-ING THE HEART:

Too much sugar in your bloodstream can

damage our
artery walls,
which leads to

added inflammation.

our arteries carry oxygen-rich blood to your

heart. Inflamma-
tion is a risk fac-
tor for coronary

artery narrowing, which makes it difficult for blood

to make it to
your heart.

“Having high blood sugar levels increases your

risk for heart dis-
ease,"
carbohy-

drates defi-

ciency:

Carbohy-

drates is the fuel
of life so without
sufficient fuel the

body gets no energy.So without sufficient glucose

the central ner-
vous system suf-
fers which may

cause dizziness or mental or physical weak-

ness.A deficiency of glucose or low blood sugar is

called hypogly-
caemia.

SYMPTOMS:

some people also experience problems with low

carbohydrate diet including: nausea,dizziness,

constipation,leth
argy,dehydra-
tion,bad

breath,loss of appetite.

DISEASES

CAUSED BY THE DEFI-CIENCY OF

CARBOHY-DRATES:

Ketosis,excessive breakdown of proteins,fatigue

and a decreased energy level as well as reduced

fibre intake.

Q3=what are the important function

of protein in our body?Illustrate the chemical structure of protein.

PROTEINS:-

DERIVATION:

The term protein is derived from a Greek word

“proteious” which means “prime or chief”

proteins are of primary importance

as food source.pro-
teins are complex ni-
trogenous com-
pounds.proteins are

the macromolecules form by 20 amino acids.

FUNCTIONS OF PRO-TEINS:-

1- GROWTH AND MAINTENANCE:

Proteins helps in the maintenance

and growth of tis-
sues.The need of
proteins in our body
is dependent upon

our health and activity level.

2- CAUSE BIOCHEMICAL RE-

ACTION:

Enzymes are proteins in nature.The structure of

enzymes allow them combine with other molecules inside the cell called the sub-

strate which catalyse reaction to our metabolism.

3- ACT AS A MES-

SENGER:

Some proteins are hormones which are chemical mes-

sengers that aid communication between our cells tissues and organ.-

Some hormones in-
cludes:insulin,gluca
gon,antidiuretic
hormone,adrenocor-

tico tropic hormone.

4- PROVIDE STRUCTURE:

some proteins are fi-

brous and provide structure to cell and tissues.These proteins includes keratin

which is structural protein and found in hairs and nails,collagen which is the

structural protein of our bones,tenden,liga-ments and skin.

5- INTRA CEL-LULAR MACRO MOLECULE:

Proteins are

the most abundant intra cellular macro molecules and form more than 50% of

the dry weight of most organisms.They are present in all animals,plants,bacteria

and viruses.

6- ACT AS A CATALYST:

They act as a catalyst in the shape of enzymes as barriers such as

skins and bacterial cell wall as a protective agent in immune system.

7- ACT AS A RE-CEPTOR:

They also act as a receptors of chem-

ically transmitted in-
formational well as
as the carrier of these
information in the

form of substance known as Pheromones.

8- PERFORM VARIOUS ACTIV-ITIES:

They are also involved in the activity of the contraction and relaxation of

muscles and in the transmition of hereditity characters from parents to offsprings

in the form of genes.

9- MAINTAIN PROPER PH:

Proteins

acts as a buffer sys-
tem,helping our
body to maintain
the proper PH value

of blood and other fluids.

10- BALANCED THE FLUID:

proteins
regulate body
process to maintain
fluid balance be-

tween the blood and the surrounding tissues.Albumin and globulin are proteins

in our blood that helps to maintain body fluid balance by attracting and re-

taining water.

II- TRANSPORT AND STORE NUTRIENTS:

some proteins transport nutrients throughout our entire body while other

store them, for exam-
ple ferritin is a stor-
age protein that store
iron.

12- PROVIDE ENERGY:

protein cn serve as a valuable

energy source but only in situation of fasting , exhaustive exercise or inade-

quate calorie intake. our body uses amino acids for broken down skeletal mus-

cles if carbohydrates storage is low.

13-BUILD AND REPAIRING:

Proteins help in repairing and build the body tis-sues,allow metabolic

reactions to take place and co-ordinates body function.

14- ACT AS AN

ENERGY SOURCE:

Proteins keeps our immune system

strong, transport and store nutrients and can act as an energy source of life.

STRUCTURE OF PROTEIN:-

Proteins is the three dimensional arrangement of amino acid chain

molecules.Proteins are the polymers specifically polypeptide and formed the

sequence of amino acids.A proteins generally undergoes reversible structural

change in perform-
ing its biological
functions.Proteins
being very compli-

cated macro mole-
cules and have very
complicated struc-
ture.By chemical

composition pro-
teins are composed
of
carbon,hydrogen,ni-

trogen and oxygen.- Some proteins also contain smaller quantities of sulphur

and phosphorous.All proteins appear in any of the four dif-ferent structures.

1-PRIMARY STRUCTURE:-

Primary structure is the linear sequence of

the amino acids held together by peptide bonds in its peptide chain.The peptide

bond form the back-
bone and side chain of
amino acid residues
outside the peptide

backbone.The free -NH_2 group of the terminal amino acid is called N-terminal end

and the free -COOH end is called C-terminal end.It is a tradition to number the amino

acid from N-terminal end as No.1 towards the C-terminal end.Presence of specific

amino acids at specific number is very significant for a particular function of protein.Any

change in sequence is abnormal and may affect the functions and properties of proteins.

2-SECONDARY PROTEINS:-

Secondary proteins structure occur

when the sequence of amino acids are linked by hydrogen bonds.The alpha helix is the most common and stable con-

formation for a polypep-
tide chain.The alpha he-
lix is a spiral struc-
ture.The structure is sta-
bilised by hydrogen bond

between NH and C=O.The beta pleated sheet is almost fully extended.It stabilized by hydrogen bond between

NH and C=O group.

3-TERTIARY STRUCTURE:-

Tertiary protein

structure occurs when certain attractions are present between alpha helices and pleated sheets.The long

polypeptide chain of molecule undergoes folding and re-folding on itself and gives rises to a definite three di-

mensional structure this is called tertiary structure.This structure makes proteins rounded

and some what rigid molecule.

4- QUATER-NARY STRUC-

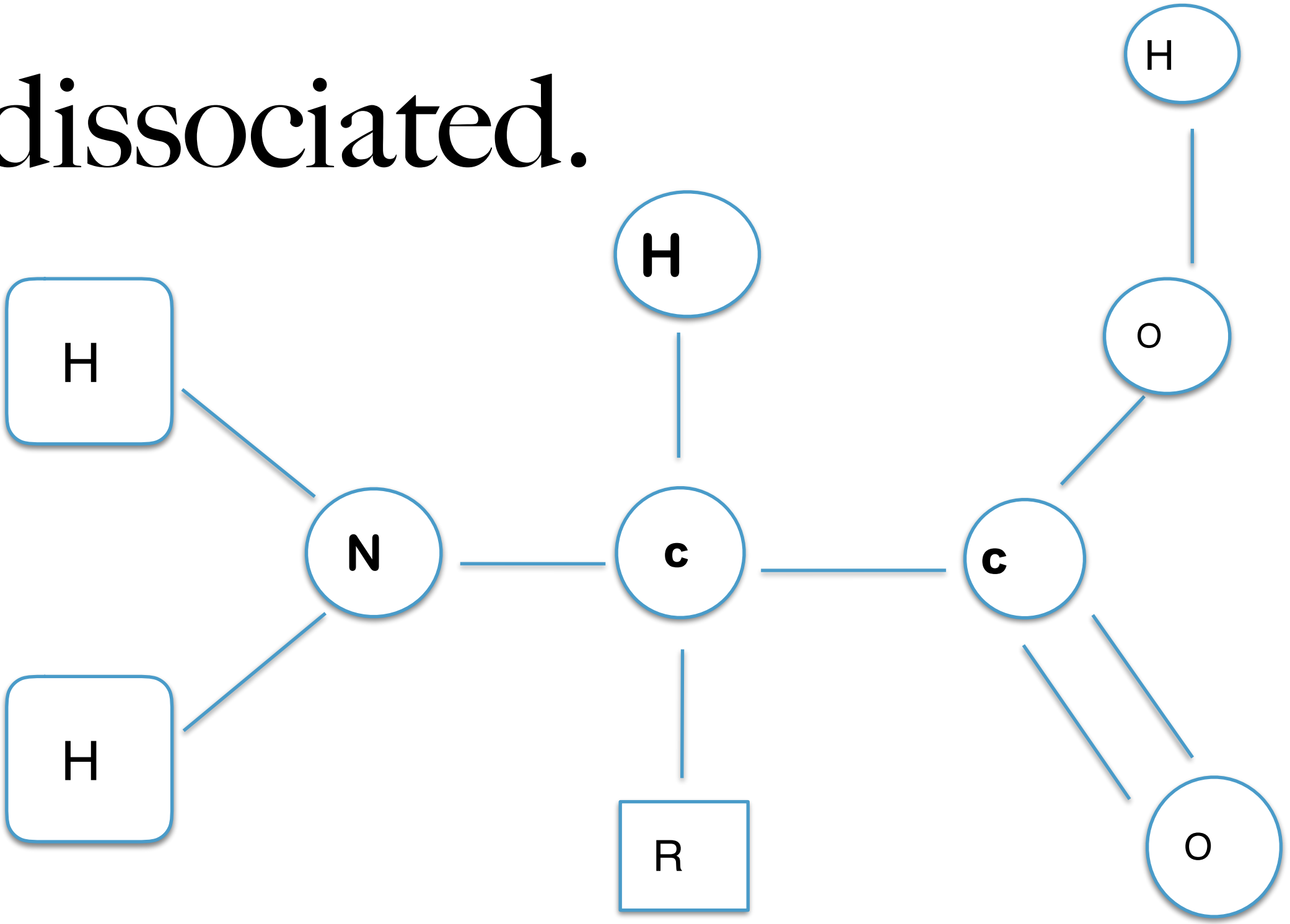
TURE:-

Quaternary protein structure is a protein consisting of

more than one amino acid chain. This structure shows the association of many individual protein sub-units each

with its own tertiary structure into a complex functional unit.The protein will lose its function when the sub units are

dissociated.



STRUCTURE OF AMINO ACID.