

hello everyone i welcome you all in the lecture series on ah biomolecules ah today is our 11th lecture and before going to the details of today's lecture i would like to give a recap of ah you know my last lecture in the last lecture we talked about ah enzymes and ah you know how do they function basically how ah you know catalysis takes place and what are the you know ah basically ah what type of functional groups are ah there at the active side of the enzyme which are responsible ah for the catalysis ah and then ah i ah you know discuss little bit of vitamins and in vitamins i talked about the you know ah type of beta means basically ah there are two types of vitamins water soluble vitamins ah and water insoluble vitamins so continuing with the ah same ah where did i leave that you know ah basically i was mentioning that vitamin c and vitamin e are radical innovators and ah therefore are antioxidants and vitamin c basically ah traps radicals vitamin c traps radicals form in aquacinar environment formed in aqueous environment whereas vitamin e traps radical vitamin e traps radicals forming non polynomial in non polar environment in environments so now i will go in the details of this water soluble vitamins and ah water insoluble beta means that you know how many vitamins are ah water soluble and what is their source and ah their deficiency leads to what kind of disease these are the things i want to you know explain you one by one ah so that ah we can learn more about ah these ah you know biomolecules so lets talk first about what are soluble beta means water soluble vitamins so first water soluble determine is so first water soluble vitamin is thiamine vitamin b one thiamine which is betamine b1 and what is its source its source is yeast yeast milk milk green vegetables green veggies basically and cereals cereals these are the sources and its deficiency leads to very very disease very very disease what is very very disease loss of appetite invasive diseases what happen loss of apatite loss of appetite and growth that is happening growth growth second bit water soluble determine is beta mean b two beta mean b two and vitamin b two is also known as riboflavin riboflavin riboflavin and vitamin b2 can be obtained from milk egg white egg white liver kidney and its deficiency leads to geolosis chilocis what is kilosis chilocis leads to the fizzering of corners fizzering at corners of mouth and leaves mouth and lips so this is a basically kilosis in chelosis you will see that you know fizzering at corners of mouth and lips occurs now the third vitamin is vitamin b6 vitamin b6 which is also known as pyridoxine pyridoxine pyridoxine is obtained from east so you can see that is if you take a stick

in your dietary content then you can you know ah compensate thiamine as well as pyridoxine vitamin b1 and vitamin b6 is milk milk is the another dietary intake through which you are you know compensating all the three beta means so milk is very very important for our dietary intake egg oil cereals and grams and grams grams and deficiency of vitamin b6 leads to the convulsions leads to the convulsions now the fourth bitumen water soluble vitamin is vitamin b12 vitamin b12 and vitamin b12 can be obtained from meat fish egg and curd deficiency of vitamin b12 leads to perineus anemia perineus anemia and basically what happens there that rbc deficient deficiency causes in you know hemoglobin rbc deficient in hemoglobin in hemoglobin now i will come to the you know fifth vitamin fib vitamin is ah vitamin c as i have already mentioned that vitamin c is required in fairly good amount and it should not be called beta i mean because when i was defining beta i mean i told that you know vitamin is ah basically ah required in a small amount whereas vitamin c i told you that you know its ah required in fairly good amount and this can be synthesized also ah inside the body however it can be also ah i mean obtained by the dietary intake vitamin c vitamin c which is also known as ascorbic acid is carbic acid ascorbic acid vitamin c can be obtained from citrus fruits citrus fruits such as you know you can get it in amla and green leafy vegetables amla amla and green leafy vegetables vegetables and deficiency of vitamin c leads to the scurvy disease actually scurvy and they are basically bleeding the symptoma is that in bleeding gums you know bleeding gums now we will talk about water insoluble vitamins water in soluble vitamins water insoluble vitamins water water in soluble beta means vitamin a vitamin a is water in soluble bitumen and this can be you know obtained from fish liver oil carrots and milk butter and milk and deficiency of bitumen a leads to zero thylamia xero thermia basically what happens here hardening of cornea of i hardening of cornea of eye cornea of i another vitamin is water in soluble vitamin is beta mean d vitamin d and vitamin d you know nowadays you know vitamin d deficiency is very frequent particularly in people who are working in offices because we do not expose insufficient amount to our body to the sunlight and for the formation of vitamin d sunlight is very very important ah if you want to synthesize vitamin d inside your body vitamin d exposure to sunlight exposure to sunlight fish and egg oak fission egg oil deficiency of vitamin d leads to rickets rickets rickets basically leads to you know ricket disease is you know kind of leads to the bone deform deformities in children bone deformities in children and osteomalaria malaysia osteo malaysia soft bones and joint pain in adults soft bones and joint

pain in adults joint pain adults deficiency of vitamin d leads to these ah you know problems third one is vitamin e vitamin e vitamin e can be obtained

from the you know vegetable ielts vegetable oils like feed germ oil some flower oil sunflower oil etc deficiency of vitamin e leads to the increased fragility of rbc increased for frazility of rbc's and muscular weakness muscular weakness and finally vitamin k vitamin k can be obtained from green leafy vegetables

so green leafy vegetables also we saw that you know can supplement ah two ah these you know water in soluble vitamins ah

so ah that is also you know

very important ah for the having ah good balance of vitamins ah in our body so it

is always advisable that you know one should take a lot of you know leafy vegetables in their dietary intake

so vitamin k can be maintained by green leafy vegetables and deficiency of vitamin k leads to

the increased blood cut clotting time increased blood clotting time blood clotting time

so this much about the beta means

again i will like to you know ah repeat vitamins classification

so water soluble beta

means water soluble beta means first one was you know thiamine or vitamin b1 and vitamin

b1 can be obtained from yeast milk and green vegetables and cereals deficiency of

vitamin b1 leads to the beriberi disease where basically you know ah symptoms are like

you know loss of appetite and growth then next one is vitamin b2 in the water soluble

vitamins and it can be obtained from you know milk equate and liver and kidney deficiency of

vitamin b to a riboflavin leads to the chilocis basically and in kilos is fizzling at corners

of mouth and lips you know these are the symptom vitamin b6 or pyridoxine can also be ah obtained

from yeast milk egg oil cereals and grams and deficiency of vitamin b6 or periodoxin leads to the convolutions vitamin b12 can be obtained from meat fish egg and

curd and deficiency leads to the pernicious anemia where you know rbc deficient hemoglobin basically is the reason now the fifth one is vitamin c or ascorbic acid ah water soluble vitamin and that can be obtained from the citrus

fruit amla and green leafy vegetables and deficiency of this leads to the scurvy disease

and that is you know symptom is bleeding gums and lets this much about the water soluble

vitamins water insolve water insoluble vitamins you know ah in that series vitamin a and vitamin a

can be obtained from fish liver oil carrots butter and milk and deficiency leads to the xero thalmia

where hardening of cornea of i is the symptom and vitamin d in the water

insoluble vitamin is
you know can be i mean maintained by the exposure to sunlight if we expose our
body to
sunlight then ah that way we can maintain you know proper level of vitamin d
and it can also
be maintained by fish and eggol deficiency leads to the rickets bone
deformities in children
and osteomalacia where basically soft brain and joint pain these are the
symptom of vitamin
d deficiency and as i mentioned that you know it is quite common in the people
who are
working in the offices like you know who who who are not getting proper
exposure of sunlight
to their body actually and particularly ah in the metros ah because of the
nature of
job ah a lot of population is getting affected with the vitamin d deficiency
ah then the third
one is vitamin e and vitamin e can be maintained by the dietary intake of
visitable oils like
wheat gnaemel wheat germial and then sunflower aisle and deficiency leads to
the increased
fragility of rbcs and muscular weakness and the fourth one is in the water in
soluble
vitamin is vitamin k which can be obtained from green leafy vegetables and
deficiency leads to the
increased blood clotting time basically vitamin k helps in the clotting of
blood whenever
we get any wound ah in that you know ah we always ah you know required to ah
clot that you know ah okay otherwise if the bleeding keep on continue then we
will
lose a lot of blood and that they are ah you know vitamin k helps ah because
it immediately
clot that and it starts ah basically in basically ah healing wound healing
process
so these are the role of ah vitamins ah this much about the vitamins and now
i
will ah continue ah the final ah biomolecule ah nucleic acid
so let us
talk about the nucleic acids nucleic acids nucleic acids how do
you define nucleic acids nucleic acids are another bio molecules and you know
ah they
are very very important because ah when we talk about in detail then they they
are the you
know our hereditary ah materials basically and ah let us learn about ah what
is the structure
of these ah you know hereditary ah compounds ah what kind of you know um
molecules and you know
what kind of functional groups are available there in the nucleic acid
so ah how do how
can we define nucleic acid
so nucleic acids nucleic acids are chains a 5 member drink sugar 5 membered
ring sugars ring sugars linked by phosphate groups linked by phosphate groups
notice
that linkages are phosphodiesteres here in the nucleic acid notice that linkages

are phosphodiester phospho di esters phosphor diesters in rna the five membered ring sugar is what is the difference

so we know that there are two type of nucleic acid dna and rna how are they different

so in rna the five membered ring sugar is d ribose 5 membered ring sugar is d ribose ring sugar is d ribose t ribose in dna the five member ring sugar is two d oxid ribose ring sugar is is two dioxide ribose d ribose now let us talk about the bases in dna and rna

so nucleic acid how to define nucleic acid nucleic acids are chains of five membered ring sugars linked by phosphate groups notice that linkages are phosphor diester

so every five membered sugar is linked by phosphate in between two five membered sugar there will be phosphate linkage

so if you are having three i mean ah sugar five membered sugar

so there will be two ah you know ah phosphate linkages

so that is why i

told that notice that linkages are phosphodiester ah in rna the five membered ring sugar is d ribose

whereas in the dna five member ring sugar is two d oxid ribose two d oxy without the oxygen in

the rna with the you know regular actually ah d ribose but in the dna sugar is two d oxy oxygen

is not there that is different two oxy d dibose now let us learn in detail about the you know

dna and rna structure

so the basis in dna and rna basis in dna and rna i will like to draw the structure of you know ah dna and rna

so as i was mentioning that you know

phosphodiester what is the phosphodiester this is the phosphodiester linkage and we mentioned that here base is attached base base is attached here base and again to i will not you know

so as i mentioned that rna has d ribose

so i will make the deribose structure again and this is the another phosphodiester linkage base again here o h and again this is the continuation part in rna as i mentioned that you know at the two position it will have hydroxyl group

this is it has d ribose

so two prime o h group and this is the phosphor diester linkage this is phosphodiester a phosphodiester link phosphor diester links one five membered sugar to the next one five member sugar to the next one five member to the next ok and

ah

so we can represent you know ah a phosphodiester ah linkage as you know if if i put this d ribose with the r and then again it is through the oxygen it is attached

so and then this is phosphorus and this o minus i can put

it in the o h they again are this is the another you know ribose d ribose this is one d

ribose this is another and in between this is

so this is basically a

phosphodiester this is called phosphodiester phosphodiester and basically its almost

similar to the phosphoric acid you know phosphoric
so in the phosphoric
what what do we have h o three ways s three p o four this is phosphoric is
phosphoric
so this is about the rna now i
will make a structure of dna dna is also you know similar ah but slightly
different
as i told you that you know at the in the five membered ring sugar at the two
position it does not have you know hydroxyl group
so here again it is attached with the base base it is attached with the base as
with the base
so this is a rna this is rna and this is dna now i will compare that you know
in the dna no two prime o h group no two prime o h group and also both you know
d ribose
in the rna and two d oxy d ribose in dna both are having beta glycosidic
linkage with the base
so this is a beta glycosidic linkage beta glycosidic linkage here also it has a
beta glycosidic linkage beta glycosidic linkage
so this is the you
know structural backbone for ah dna and rna so in what is the basic difference
between the ah dn
na and rna is that sugar that which is part of ah is a structure scaffold in
dna it has two d oxid
ribose five member ring sugar whereas in rna it has you know d ribose and what
other differences
are there the other differences are there in the you know base what kind of
base rna is having and
what kind of base dna is having similarities that both of them are linked with
the linked with
the phosphodiester linkages which i showed in that is common a in dna also two
five membered
sugars are connected with phosphodiester linkages and in rna also two five
membered ah sugars
are connected with the phosphodiester linkages
so as i mentioned that there
are also difference in the bases available there what kind
of bases are there there are only four bases in dna in dna two are substituted
purines two are substituted purines what are they substituted
purines are adenine and guanine adenine and guanine and two
are substituted pyrimidines two are substituted pyrimidines pyrimidines and they
are substituted pyrimidines are cytosine and thymine cytosine and thymine
cytosine and thymine
so let me first introduce what is purine and what is pyrimidine
so i will
like to draw the structure of purine purine base purine base has six and five
membered fused ah ring
so i have drawn here six membered
and then this is five membered this is purine purine how to number it one two
three four five six seven eight and nine i
told you that dna has two substituted purines adenine and guanine
so i would like
to draw the structure of adenine and guanine adenine this is adenine and
basically in adenine it has at the
sixth position amino group and guanine guanine guanine

so adenine and guanine and then pyrimidines two substituted pyrimidines

so ah let me write the structure of pyrimidine pyrimidine has a single ah six membered ring with the two nitrogen and again it can be numbered from 1 2 3 4 5 and 6.

so this is pyrimidine pyrimidine so dna has two substituted pyrimidine cytosine and thymine

so let me write the structure of you know cytosine cytosine and thymine is this is thymine

so as i mentioned in the beginning that you know ah dna has two purine bases adenine and guanine and it has two pyrimidine substituted pyrimidines cytosine and thymine similarly rna also contains four bases rna also contains only four bases three adenine guanine and cytosine three adenine guanine and cytosine are same as those in dna are same as those in dna the fourth base in rna is

uracil instead of thymine the fourth base in rna is uracil instead of thymine is you ratio instead of thymine instead of thymine let me draw the structure of uracil how it is looks like

so this is uracil uracil

so i will again ah like to ah you know ah rephrase about the structure of ah nucleic acids ah rna has d ribose sugar and these d ribose sugar are linked

with each other by ah phosphodiester linkages where as dna has 2d oxide ribose sugar and

these 2d oxide ribose sugar this 5 membered ring sugar are linked with each other again

with the phosphodiester linkages and they have these sugars are having beta glycosidic

linkage with the ah bases dna has four base ah two ah basically two pyrimidine substituted

pyrimidines and two substituted ah purines sorry dna has two ah substituted ah purines adenine and

guanine and ah it has two substituted pyrimidines cytosine and thymine here is the structure

of purine bases basically it has adenine has ah six amino purine basically and guanine it has

like you know oxo group at the six and at the two position it has amino group in the you know

purine and pyrimidines you know in the dna it is a cytosine and thymine basically it is a substituted

pyrimidines rna also contains four bases and three out of three adenine and cytosine are same as

those in the dna the fourth base in rna is uracil instead of you know thymine here is the

structure of uracil

so this much about the you know basic structure of ah nucleic acid

ah now i will talk about the you know ah how ah these biomolecules ah are formed actually ah

so first i will talk about the nucleosides nucleosides what is nucleosides

a compound containing a base a base bonded to d ribose bonded to d ribose are

two d oxy ribose two d oxy are two d oxy d ribose is called a nucleoside is called a nucleoside

so nucleoside

in rna what are the nucleoside in rna nucleosides in rna nucleosides in rna are since

we had the you know 4 bases nucleosides in rna will be you know base dependent

so here d ribose

connected with the adenine will be adenosine adenosine d ribose connected with the guanine guanosine d ribose you know ah connected

with the cytosine cytidine d ribose connected with the uracil is uridine

so these are the nucleosides i

will stop here and i will again continue you know structure of nucleosides in the

next class thank you very much for the attention you