Chapter 1 KeyTerms

Polymers

Proteins, carbohydrates, lipids(fats), nuclear acid(DNA/RNA),

Is a chain of many monomers linked together.

Mono = one

Di = two

Monomers

Amino acids, sugars, fatty acids, nucleatoids

Made:(Dehydration synthesis) or broken down(Hydrolysis) over in living cells

MacroMolecules

Large Polymers called macromolecules

Formed by monomers joining, through loss of water called peltydatiation synthesis

Dehydration Synthesis (DS)

Monomers are joined in dehydration synthesis

Chains of monomers are Polymers

Enzymes that speed up DS, are called dehydrogenases

Hydrolysis

Polymer breaking into units is hydrolysis

Enzymes that speed it up are called hydrolases

Lipids

Lipids

Made up of C,H,O

Large molecules that are insoluble in water

Neutral Fats

Triglycerides

Lipids (cont)

Made up of 3 fatty acids bonded to one glycerol

Fatty acids contain a long chain of 16-18 carbons with an acid on the end

Glycerol is small 3 carbon chain with 3 alcohol (OH) groups

Butter, animal fats molecules bind together through dehydration synthesis

Types of Triglycerides

Saturated Fats

No double bonds in the carbon fatty acid chains

Filled with hydrogens

Unhealthy

Mostly come from animals

Become solid at room temperature

Examples:Lard, butter, animal fats

Unsaturated Fats

There is one monounsaturated or more double bonds oolyunsaturated

Mostly come from plants

Liquid at room temperature

Healthy

Example:Olive oil, Corn oil, Palm oil

Phospholipids

Used to make up two layered cell membraines in cells

The third fatty acid group of a triglyceride is replaced by an inorganic phosphate group

^ This creates a polar end

Polar End

Phosphate end is water soluble:HydroPhilic

Lipids (cont)

Fatty Acids is not water soluble:Hydrophobic

Steroids

Very different structure from lipids but are also water isoluble

Made up of 4 carbon ring molecules fused together

Example:Testosterone, estrogen, cholesterol, and vitamin D

Used as sex hormones

Uses of Lipids

Long term storage for energy

Better energy storage than glycogen or starch

Insulation and protection in animals

Making hormones(Steroids)

Structure of cell membranes.

Without lipids we would have no cells

DNA RNA difference

DNA	RNA
Nitrogen base:ATGC	Nitrogen Base:AUGC
Sugar:deoxy ribose	Sugar:ribos
Double stranded	Single stranded
1 type	2 types:mRNA - Messanger rRNA - Ribosomal rRNA - Transfer
Forms double helix	No helix
DNA makes DNA	DNA makes RNA
Very bid molecule	Much smaller molecule

Adenosine Triphosphate

ATP

ATP also has nuclear acid has same structure as nucleotide

Only three phosphate groups instead of one

Energy source for the body

Adenosine Triphosphate

Cellular Respiration

Mitochandria turn energy of glucose into ATP

It takes a lot of energy to put two phosphate molecules together

When you break the bond a lot of energy is released

**C6H12O6 + 6O2 --> 6CO2 + 6H2O + energy (Heat and ATP)

Monomer Polymer Building Blocks

Monomers (Sub units)	Polymers
Sugars	Polysaccharides
Fatty Acids	Eats/Lipids/Membranes
Amino Acids	Protiens
Nucleotides	Nuclear acids
Cycle	
Polymers	
	Carbohydrates
	Protiens
	Lipids(Fat)
	DNA/RNA(Nuclear acids)
Go through H20 Energy (Hydrolysis)	
Monomers	
	Simple Sugar
	Amino Acids
	Fatty Acids @ Glycerol

Monomer Polymer Building Blocks (cont)

Nucleotides

Go through H20 Energy Dehydration Synthesis

Reactions require

ATP energy

Water

Enzymes

Cycle Continues

Proteins

Proteins

Made up of C,H,O and N

No set ratio

Made up of chains of Amino acids (Usually 75 or more)

Amino acid chains formed through dehydration synthesis

40% of the human body is made of protein

Building blocks of Proteins are Amino acids

Amino group (NH2 or NH3) acts as a base (Accepts H+)

Carboxyl group (COOH or COO-) acts as an acid (Donates H+)

R Group:There are 20 different possibilities

Amino acids bond through dehydreation synthesis

The amino acids bind together with a peptide bond

Proteins (cont)

Peptide bond is formed between C and N no water is lost (Dehydration Synthesis)

When original two amino acids form beginning of the chain with one peptide bond is called a Dipeptide

It can grow and become a Tripeptide

End state is Polypeptide (30 and 30,000 amino acids)

Another name fro polypeptide is Protein

Every protein is different because the order of amino acids is different

Or order of different R groups and how they bond

They also function differently

Levels of Protein Structure

Primary Structure

First level of how proteins are formed

Order of amino acids joined together with peptide bonds

Amino acids sequence tgat determine the nature and chem of protein

Secondary Structure

Proteins (cont)

Second step in forming protein

When peptide bond is formed, a double bonded oxygen is left over.

Attracted to positive NH3 amino group from other amino acids in the chain

This attraction forms a hydrogen bond

This causes the chian to twist called alpha helix or a beta pleated sheet

Tertiary Structure

The next interaction take place between R groups

Some R groups are reactive and will interact with other reactive R groups in the chain.

These amino acids that are either charged or that have a sulphure atom

The interactions (tand attractions and S-S bridges) will fold the molecule over into a highly specific 3 dimensional shape

It is 3-D shape that will determine the proteins job or role in the body

Proteins (cont)

Quaternary Structure

This last level in protein formation is not seen in all proteins

Proteins can actually be 2 or more molecules joined to form a functional protein

These are held by ionic bond

Two Examples

Insulin has 2 subunits

Hemoglobin has 4 subunits

The whole process	Bonds
Primary protein structure	Peptide Bonds
Secondary protein structure	Hydrogen Bonds
Tertiary protein structure	Interactions between R groups
Quaternary protein structure	Ionic Bonds

Denaturation

Final shape of protein is very specific and enables it to do its job/function

Any change in a proteins shape will affect its function

Denaturation is when a protein tertiary structure is lost

This happens when R group bonds are broken

Proteins (cont)

When a denaturation the protein cannot do its joband becomes useless

How does this happen?

Temperature

High temperature affects the weak hydrogen bonds and can distort or break them

A slight increase in temp can cause reversible change (Fever)

A high increase will cause irreversible change (Cooking an egg)

Chemicals

Heavy metals like lead and mercury are large atoms that are attracted the R groups of amino acids

They bond to the R group and distort proteins shape

This is usually irreversible

PH

As some of the R groups are acids and some are bases, every protein (enzyme) has a preferred PH

Proteins (cont)

Any change in PH causes a change in the acid base R group interactions and this will change the shape of the protein

Functions of Proteins

Structural

Proteins help make up all structurers in living things

Actin & Myosin: Muscle Proteins

Keratin: Nails, Hair, Horns, Feathers

Collagen:Bones, teeth, cartilage, tendon, ligament, blood vessels, skin matrix

Functional

Other proteins help us to keep our bodies functioning properly and to digest our food

Enzymes:Are proteins that are catalysts which speed up reactions and control all cell activities

Food Source:Once we have used up all of our carbohydrates and fats, proteins will be a use of energy

Proteins are worth the least amount of energy per gram

CarboHydrates

Hydrated Carbons

(CH20)n

Ratio of Carbons, Hydrogens and Oxygens are 1:2:1

(CH20)3 = C3H6O3

(CH2O)6 = C6H12O6

Sugars

Known also as Succandes

Carbohydrates end in 'ose'

Carbohydrates

Riohasocharides

Basic sugar molecule Glucose

Glucose:C6H12O6

Glucose has ring Structure

Glucose:6 sided

Fructose:5 sided

6 sides:Hexose

5 sides:Pentos

Carbohydrates

dissaccharides

If two sugar are formed through dehydration synthesis a disaccharide is formed

Glucose combination

Glucose + Glucose = Maltose

Glucose + Fructose = Sacrose

Galactose + Glucose = Lactose

Carbohydrates

Polysaccharides

When many sugars bind through dehydration synthesis four polysaccharides can form

Starch

Glycogen

Cellulose

Chitin

Carbohydrate Polysaccharides

Cellulose

CarboHydrates (cont)

Plant Cell walls made of cellulose

Are long chains of glucose molecules with side chains

No mammal can break the bond

Linkage between carbon atoms of the sugars is different than starch and glycogen

We can't digest cellulose(Fibre)

Carbohydrate Polysaccharides

Starch

Plants store energy as starch

Starch made up of glucose molecules linked together (Many)

Few side chains

Carbohydrate Polysaccharides

Glycogen

Animals store energy as glycogen (Extra glucose)

Glycogen made up of glucose molecules linked together

Glycogen has many side chains

Carbohydrate Polysaccharides

Chitin

Made by animals and fungi

Long glucose chains linked by covalent bonds

Very strong

Make structures like exo-skeletons, fingernails, claws, and beaks

Main function of carbs

Energy:When bonds between carbon atoms are broken, energy released can be used by cells

Carbohydrates are primary energy molecules for all life

Structural:Cellulose major structural compound in plants (Cell wall)

Nuclear Acids

Nuclear Acids

Are acidic molecules are found in nucleus

Two types VERY large

DNA:Deoxyribonueleic acid

RNA:Ribonucleic Acid

All acids are composed of units called Nucleotides

Nucleotides composed of three sub molecules

Pentese sugar (Ribose or deoxyribose)

Phosphate

Nitrogen Base (Purine of Pyrimidine)

Nitrogen base

Purines

Adenine and Guanine

Have two rings

Found in DNA and RNA

Nitrogen base

Pyrimidines

Cytosine, thymine and Uracil

Have one ring

Cytosine is in both DNA and RNA

Thymine is DNA only

Uracil is RNA only

Deoxyribonucleic Acid

Structure of DNA:Composed of two complimentary nucleotides

Two strands joined by hydrogen bonds which between complimentary nitrogen bases:

Adenine with Thyanine (A-T or T-A)

Cytosine with Guanine (C-G or G-C)

When DNA is first formed its just two linear strands of nucleotides joined together

Dure to internal bonding the DNA molecule then forms into a double helix

Nuclear Acids (cont)

Functions of DNA

Directs and controlls all cell activity

Does this by making all proteins and enzymes

Contains all genetic information necessary to make one complete organism of very exact specifications

Bonucleic Acid

RNA is made by DNA

Not confined to the nucleus it moves out of the nucleus into the cytoplasm of the cell

It has ribose sugar instead of Deoxyribose

No thymines uses uracils instead

Single stranded no helix

8 types of RNA

RNA function is assist DNA in making proteins

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