Derived lipids – formed from other lipids, in hydrocarbon rings, not chains e.g. cholesterol, Vit D + E, androgens
Phospholipds function – phosphorous containing part attracts water (hydrophilic), fatty acid repels water (hydrophobic), dual nature leads to formation of sandwich bilayer – tails in, polar heads out, make up cell membranes – phospholipid bilayers – selective permeability, cell membrane fluidity – effected by fatty acids it consists of
Fatty Acid Synth – occurs in cytosol in massive enzyme complex – multiple reactions occur here – uses 2C intermediate Acetyl CoA – Acetyl CoA transported from mitochondria to cytosol in citrate form. Acetyl CoA + oxaloacetate →condensation to citrate
Intermediates covalently linked to acyl carrier protein
4 step repeating cycle – condensation, reduction, dehydration, reduction
7 enzyme complex – Acyl carrier protein (ACP)
1st step – Acetyl CoA →carboxylated + CO2 (catalysed by Acetyl CoA carboxylase) → malonyl CoA
Malonyl CoA (attached to ACP) condenses with Acetyl CoA
Acetyl CoA formed still attached to ACP, Acetyl CoA reduced by NADPH to form Beta – 3-hydroxybutyrl – ACP, reduced again to form Butyrl – ACP – 4C fatty acid, undergo 6 more elongation cycles with 2C at a time till 16C long fatty acid →Palmitoyl-CoA, can be further elongated/reduced to introduce C=C
Fatty Acid Synthase – FAS – polypeptide chain with multiple domains – need distinct enzyme activities for fatty acid biosynthesis
ACP – CoA is used as activator for beta oxidation, fatty acid synth activator is used as acyl carrier protein (ACP) – part of FAS complex
Condensing Enzyme – also part of FAS – CE has cysteine SH that participats in thioester linkage with carboxylate group of the fatty acid
During fatty acid synth growing fatty acid chain alternates between K-SH and ACP – SH
Fatty acid synthase – peptide with multiple enzyme domains
Triglyceride synth – glycerol backbone, glycerol activated by addition of phosphate or formed from reduction of dihydroxacetone, Fatty acyl – CoA attached to glycerol backbone via Fatty Acyl Transferase
Fat + energy - primary fatty acid sources – diet, mobilisation from cellular stores in adipocytes + muscle cells
Triglycerides – major energy storage in cells Enzymes cleave fatty acids of glycerol backbone – lipolysis – fatty acids can then be oxidised
Adipose tissue – fatty acids are released from triglycerides – these are stored in adipose tissue (fat) by HSL action (hormone sensitive lipase) HSL activated by adrenaline, nonadrenaline, cortisol, glucagon, inactivated by insulin.
Excersise - increases lipolysis by increasing adrenaline, non adrenaline, cortisol
Muscle – lipoprotein carrys triglycerides to muscle cells, lipoprotein lipase (on endothelium) hydrolyses fatty acid of triglycerides, fatty acids diffuse into cell
Oxidation Reactions – fatty acids must be activated in cytoplasm before being oxidised in mitochondria, activation catalysed by fatty acyl – CoA ligase
Carntine shuttle – transports fatty acyl – CoA into mitochondria, Fatty Acid + ATP + CoA →Acyl CoA +PPi + AMP
Fatty CoA substrate – for Beta oxidation machinery in mitochondria,
Alternative oxidation pathways – natural lipids - even no of C, some have odd Beta oxidation yielding acetyl CoA + propionyl CoA.
Converted to succinyl CoA (uses ATP), succinyl – CoA can enter Krebs for furher oxidation
Lipid Oxidation – oxidation of fatty acids yields more energy per C than carbohydrate oxidation – 1 mole of deic acid →146 moles of ATP

centre farthest from the oxidised end of the sugar, D –hydroxyl group right, L -hydroxyl group left, our carbs are all D
Chirality rules – monosaccharides contain 1 or more asymmetric C-atoms, get D and L forms where D+L designate absolute configuration
D form – OH group is attached to right of asymmetric carbon
L form – OH group is attached to left of asymmetric carbon
If more than one chiral C –absolute config of chiral (furthest from carbonyl group determines whether D or L
D sugars – D-ribose, D-glucose, D-fructose, D-glyceraldehyde
Ring formation – sugars exist in solution as mix of open chain + closed chain/cyclic structures
Open ring form – C atom that contains C=O bond = carbonyl C
Closed ring – anomeric C is the C attached to the O of the ring and an OH group
Simple sugars – one of the hydroxyl groups generally reacts with carbonyl group →intramolecular hemiacetal or hemitetal bond
Alpha + Beta glucose – when alpha glucose molecules are joined chemically to form a polymer – starch formed. When beta glucose molecules are joined – cellulose formed
Dissacharide Formation – Alpha D glucose + B D glucose →Maltose (alpha 1-4 linkage) + water
Condensation reaction, joined by glycosidic bond
Reducing and Non reducing sugars - reducing – sugars that are oxidised by mild oxidising agents as they reduce the oxidising agent
Non reducing sugars – sugar not oxidised by mild oxidisers
All common monosaccharide's are reducing sugars, disaccharide sucrose – non reducing, oxidising agents used to test for sugar – Benedict's solution, Fehling's solution, Tollens reagent