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Biochemistry: Macromolecules & Nutrition

Printable Flashcards — Pre-Med Biology

Carbohydrates, lipids, proteins, nucleic acids, vitamins, minerals, and essential nutrient concepts.

199 cards — Print double-sided, flip on long edge, then cut along dashed lines.

199 cards — Printable Flashcards

Free & Open-Source

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1

Macromolecules (in bio) are basically...

2

The 4 main biological macromolecules:

3

Macronutrients (diet) vs
macromolecules (bio): what's the trap?

4

Micronutrients are...

5

Calories: which gives the most energy per gram?

6

Energy per gram (memorize this set):

7

Digestion vs absorption (don't mix these):

8

Where does most absorption happen?

2

Carbohydrates, lipids, proteins, nucleic acids.

1

Big molecules built from smaller building blocks.

4

Vitamins and minerals (needed in small amounts, no calories).

3

Macronutrients = carbs, fats, proteins (what you eat for energy). Macromolecules also include nucleic acids.

6

Carbs 4 kcal/g, proteins 4 kcal/g, fats 9 kcal/g.

5

Fats (lipids).

8

Small intestine.

7

Digestion = breaking food down. Absorption = moving nutrients into blood/lymph.

9

Large intestine mainly absorbs...

10

Why does the small intestine have villi and microvilli?

11

A monomer is...

12

Carbohydrate monomers are called...

13

Protein monomers are called...

14

Nucleic acid monomers are called...

15

Lipids are a bit different: are they true polymers like proteins?

16

Essential nutrient means...

10

To massively increase surface area for absorption.

9

Water and electrolytes (and some vitamins from gut bacteria).

12

Monosaccharides (like glucose).

11

A small building block that can join to form a polymer.

14

Nucleotides.

13

Amino acids.

16

Your body can't make it (enough), so you must get it from diet.

15

Not really.

17

Non-essential nutrient (example: non-essential amino acid) means...

18

Trap: 'Carbs are essential nutrients.' True or false (strictly)?

19

Water counts as...

20

Carbs' main job in the body (high school answer):

21

Glucose is especially important for... (2 tissues)

22

Monosaccharides: name the big 3 in food.

23

Disaccharide = 2 sugars linked. Name 3 common ones.

24

Sucrose is made of...

18

False (strictly).

17

Your body can synthesize it.

20

Quick energy.

19

An essential nutrient (but not a macromolecule).

22

Glucose, fructose, galactose.

21

Brain and red blood cells.

24

Glucose + fructose.

23

Sucrose, lactose, maltose.

25

Lactose is made of...

26

Maltose is made of...

27

Polysaccharides = many sugars. Give 3 examples.

28

Starch is the storage carbohydrate in...

29

Glycogen is the storage carbohydrate in...

30

Cellulose is...

31

Trap: fiber = 'not a carb'. True or false?

32

Glycogen is stored mainly in...

26

Glucose + glucose.

25

Glucose + galactose.

28

Plants.

27

Starch, glycogen, cellulose.

30

A structural carbohydrate in plant cell walls (dietary fiber for us).

29

Animals (including humans).

32

Liver and skeletal muscle.

31

False.

33

Liver glycogen vs muscle glycogen: what's the key difference?

34

Why does fiber help prevent constipation (basic)?

35

Soluble fiber tends to... (big 2 effects)

36

Insoluble fiber mainly...

37

Carbs have roles besides energy. Name one.

38

Carb digestion starts in the...

39

Most carbohydrate digestion/absorption happens in the...

40

Carbs are absorbed into blood mainly as...

34

It adds bulk and helps water stay in the stool.

33

Liver glycogen helps maintain blood glucose; muscle glycogen is for that muscle's own use.

36

Adds bulk and speeds up movement through the gut.

35

Slow glucose absorption and help lower cholesterol.

38

Mouth (salivary amylase).

37

Cell recognition (glycoproteins/glycolipids) or structure (in plants).

40

Monosaccharides (glucose, fructose, galactose).

39

Small intestine.

41

Brush border enzymes (small intestine) do what?

42

Lactase breaks down...

43

Lactose intolerance is usually due to...

44

Why does undigested lactose cause diarrhea?

45

Why does lactose intolerance cause gas/bloating?

46

Glucose and galactose absorption uses... (simple idea)

47

Fructose absorption is mostly...

48

Glycemic index (GI) is basically...

42

Lactose (milk sugar).

41

Finish breaking disaccharides into monosaccharides.

44

It draws water into the intestine (osmosis).

43

Low lactase activity.

46

Active transport (needs energy).

45

Gut bacteria ferment the lactose, producing gas.

48

How fast a carb-containing food raises blood glucose.

47

Facilitated diffusion (passive).

49

Why do processed carbs often have higher GI?

50

Lipids include... (3 common types)

51

Triglyceride is made of...

52

Phospholipids are key because they make up...

53

Cholesterol is used to make... (name 2)

54

Fatty acid 'saturated' means...

55

Unsaturated fat means...

56

Saturated vs unsaturated: which usually makes membranes more fluid?

50

Triglycerides (fats/oils), phospholipids, steroids (like cholesterol).

49

They're broken down/absorbed faster (less fiber, more surface area).

52

Cell membranes (lipid bilayer).

51

Glycerol + 3 fatty acids.

54

No double bonds (fully saturated with hydrogen).

53

Steroid hormones and bile acids (also vitamin D, membranes).

56

Unsaturated fatty acids.

55

One or more double bonds.

57

Trans fats are dangerous mainly because... (basic)

58

Omega-3 and omega-6 are examples of...

59

Name the 2 essential fatty acids (high-yield):

60

Why are fats useful besides energy? Name 2.

61

Which gives more calories per gram: carbs/protein or fat?

62

Fat-soluble vitamins are...

63

Water-soluble vitamins are...

64

Trap: fat-soluble vitamins can build up in the body more. True or false?

58

Essential fatty acids (you must get them from diet).

57

They act more like saturated fats and are linked to worse blood lipid profiles.

60

Membranes (phospholipids), insulation/protection, hormones, vitamin absorption.

59

Linoleic acid (omega-6) and alpha-linolenic acid (omega-3).

62

A, D, E, K.

61

Fat (9 kcal/g vs 4 kcal/g).

64

True.

63

B vitamins and vitamin C.

65

Trap: water-soluble vitamins never cause toxicity. True or false?

66

Most fat digestion happens in the...

67

Bile is made by the... and stored in the...

68

Bile's job is to...

69

Trap: bile digests fat by breaking chemical bonds. True or false?

70

Main enzyme that digests triglycerides in the small intestine:

71

After emulsification, fat digestion products form... to get to the intestinal wall.

72

After absorption into enterocytes, long-chain fats are packaged into...

66

Small intestine.

65

False.

68

Emulsify fat (break big blobs into tiny droplets).

67

Made by liver, stored in gallbladder.

70

Pancreatic lipase.

69

False.

72

Chylomicrons.

71

Micelles.

73

Dietary fats enter the bloodstream first through the... (route)

74

Short-chain fatty acids can be absorbed...

75

If bile secretion is blocked, a likely symptom is...

76

Why are fat-soluble vitamins (A, D, E, K) affected by fat malabsorption?

77

Cholesterol in food is absorbed with...

78

Cholesterol is transported in blood inside...

79

LDL is often called 'bad' because it... (basic)

80

HDL is often called 'good' because it... (basic)

74

More directly into blood
(easier than long-chain fats).

73

Lymphatic system (lacteals) then blood.

76

They need normal fat absorption to be absorbed.

75

Fatty stools (steatorrhea) and poor
absorption of fat-soluble vitamins.

78

Lipoproteins (because
cholesterol isn't water-soluble).

77

Dietary fats (in the small intestine).

80

Carries cholesterol back to the
liver for removal/recycling.

79

Delivers cholesterol to tissues/artery
walls (high levels linked to plaque).

81

Trap: cholesterol is always harmful and you should have zero. True or false?

82

Cholesterol in membranes mainly helps...

83

Proteins' main jobs (name 3):

84

Enzymes are mostly made of...

85

Antibodies are...

86

Hemoglobin is a protein used for...

87

Protein building blocks (monomers) are...

88

A peptide bond links...

82

Stabilize membrane fluidity
(not too rigid, not too fluid).

81

False.

84

Proteins.

83

Structure (muscle/skin), enzymes,
transport/signaling (like hormones/receptors).

86

Transporting oxygen in blood.

85

Proteins.

88

Two amino acids.

87

Amino acids.

89

Primary structure of a protein is...

90

Denaturation means...

91

Why does denaturation often kill enzyme function?

92

Proteins are stored long-term like fat. True or false?

93

If you eat excess protein, one thing the body does is...

94

Urea is made mainly in the...

95

Urea is excreted mainly by the...

96

Essential amino acids are...

90

A protein loses its shape (and usually its function).

89

The amino acid sequence.

92

False.

91

Enzymes need a specific active site shape to work.

94

Liver.

93

Remove the nitrogen and
convert it to urea (in the liver).

96

Amino acids your body can't
synthesize, so you must eat them.

95

Kidneys (urine).

97

Non-essential amino acids are...

98

Complete protein means...

99

How can plant-based diets still get complete protein?

100

Protein digestion starts mainly in the...

101

Stomach acid helps protein digestion by...

102

Pepsin is a...

103

Most protein digestion/absorption happens in the...

104

Proteins are absorbed mainly as...

98

It contains all essential amino acids in adequate amounts.

97

Amino acids your body can synthesize.

100

Stomach.

99

Combine different plant sources (e.g., legumes + grains).

102

Protein-digesting enzyme in the stomach.

101

Denaturing proteins (unfolding them) and activating pepsin.

104

Amino acids (and small peptides) into the blood.

103

Small intestine.

105

After absorption, amino acids go first to the...

106

Trap: proteins are absorbed through lymph like fats. True or false?

107

Protein provides energy when... (big picture)

108

If you don't eat enough protein over time, you struggle to... (one big effect)

109

Protein calories per gram:

110

DNA's main job:

111

RNA's main job (high-level):

112

Nucleic acids are made of repeating...

106

False.

105

Liver (via the portal vein).

108

Maintain/build tissues and make enough enzymes/antibodies.

107

Carbs/fats are low or during prolonged fasting/starvation.

110

Store genetic information.

109

4 kcal/g.

112

Nucleotides.

111

Help use genetic information to make proteins.

113

ATP is technically a...

114

Trap: 'ATP is stored like fat.' True or false?

115

Do you need to eat DNA/RNA as an essential nutrient?

116

Nucleic acids in food are digested into... (high-level)

117

Vitamins are...

118

Fat-soluble vitamins:

119

Water-soluble vitamins:

120

Vitamin A is most linked to...

114

False.

113

Nucleotide (used as energy currency).

116

Nucleotides/nucleosides and bases.

115

No (your body can build nucleotides).

118

A, D, E, K.

117

Organic micronutrients needed in small amounts (often as enzyme helpers).

120

Vision (especially night vision) and healthy epithelium.

119

B vitamins + vitamin C.

121

Vitamin D is most linked to...

122

Vitamin E is often described as...

123

Vitamin K is important for...

124

Vitamin C is important for...

125

Scurvy is caused by deficiency of...

126

Rickets (kids) is often linked to deficiency of...

127

Night blindness is often linked to deficiency of...

128

Vitamin D can also be made in the body when...

122

An antioxidant (protects membranes).

121

Calcium absorption and bone health.

124

Collagen formation and antioxidant function.

123

Blood clotting.

126

Vitamin D (and/or calcium).

125

Vitamin C.

128

Skin is exposed to sunlight (UV).

127

Vitamin A.

129

Trap: 'All vitamins must come from food.' True or false?

130

B vitamins are mostly about...

131

Why does fat malabsorption cause vitamin deficiencies?

132

Minerals are...

133

Calcium's big jobs (name 2):

134

Iron is mainly needed for...

135

Iodine is needed to make...

136

Goiter (enlarged thyroid) is classically linked to low...

130

Helping energy metabolism (coenzymes).

129

False.

132

Inorganic micronutrients (elements) needed in small amounts.

131

It reduces absorption of fat-soluble vitamins (A, D, E, K).

134

Hemoglobin (oxygen transport).

133

Bones/teeth strength and muscle/nerve function.

136

Iodine.

135

Thyroid hormones.

137

Sodium and potassium are key for...

138

Magnesium is a common...

139

Zinc is often linked to... (high-level)

140

Why do we call minerals 'essential' in diet?

141

Trap: 'Iron is a vitamin.' True or false?

142

Vitamin C can help with absorption of...

143

Essential amino acids: how many are there in adults (classic number)?

144

Conditionally essential amino acids means...

138

Enzyme cofactor (helps enzymes work).

137

Nerve impulses and muscle contraction (electrical gradients).

140

You can't synthesize elements, so you must obtain them from food.

139

Enzyme function and immune support.

142

Non-heme iron (from plant foods).

141

False.

144

Usually you can make them, but during growth/illness you might not make enough.

143

9.

145

Essential fatty acids: why are they essential?

146

Trap: 'Cholesterol is essential in the diet.' True or false?

147

If a nutrient is 'essential', does that mean you need a lot of it?

148

Best simple carb sources:

149

Best simple protein sources:

150

Best simple healthy fat sources:

151

Omega-3 sources (classic):

152

Vitamin C sources (classic):

146

False.

145

We can't create some double bond positions, so we must eat those fats.

148

Grains, fruits, starchy vegetables, legumes.

147

Not necessarily.

150

Nuts, seeds, olive oil, avocado, fatty fish.

149

Meat, fish, eggs, dairy, legumes, soy.

152

Citrus fruits, berries, peppers, broccoli.

151

Fatty fish (salmon), flax/chia, walnuts.

153

Vitamin D sources (classic):

154

Iron sources (simple):

155

Iodine source (classic):

156

After absorption, glucose goes first to the...

157

After absorption, long-chain dietary fats go first through...

158

Pancreas helps digestion by releasing...

159

Why does the pancreas also release bicarbonate into the small intestine?

160

Stomach's main job is to... (2 key things)

154

Red meat and legumes/leafy greens (absorption differs).

153

Sunlight exposure + fortified foods + fatty fish.

156

Liver (via portal vein).

155

Iodized salt and seafood.

158

Digestive enzymes (amylase, lipase, proteases) into the small intestine.

157

Lymph (as chylomicrons) before reaching blood.

160

Store/mix food and start protein digestion.

159

To neutralize stomach acid and create a better pH for enzymes.

161

Small intestine's main job is to...

162

Large intestine's main job is to...

163

Why does diarrhea cause dehydration fast?

164

If carbs are very low, the liver can make glucose using...

165

If carbs are low for a while, the liver makes... from fats.

166

Trap: red blood cells can use ketones for energy. True or false?

167

Limiting amino acid means...

168

Why do legumes + grains complement each other (protein-wise)?

162

Absorb water and form stool.

161

Finish digestion and absorb nutrients.

164

Gluconeogenesis (from amino acids and glycerol).

163

Less time to absorb water ->
you lose water and electrolytes.

166

False.

165

Ketone bodies.

168

They tend to be low in different essential amino acids, so combining fills the gaps.

167

The essential amino acid that is lowest in a food, limiting protein building.

169

Nitrogen is found in...

170

Why are many saturated fats solid at room temperature?

171

Monounsaturated fat means...

172

Polyunsaturated fat means...

173

Vitamin K deficiency tends to cause...

174

Vitamin A deficiency tends to affect...

175

Vitamin D deficiency tends to cause... (high-level)

176

Why are fat-soluble vitamin overdoses more likely?

170

They pack tightly (straight chains) -> higher melting point.

169

Proteins (amino acids).

172

More than one double bond.

171

One double bond.

174

Vision first (night blindness) and epithelial tissues.

173

Easy bleeding (clotting problems).

176

They can be stored in body fat and not excreted quickly.

175

Weak bones (poor mineralization).

177

Electrolytes are basically...

178

If someone loses a lot of salt and water (sweating/diarrhea), what's the risk?

179

Energy per gram of fat (kcal/g):

180

Energy per gram of carbs (kcal/g):

181

Energy per gram of protein (kcal/g):

182

Fat-soluble vitamins (4 letters):

183

Water-soluble vitamin groups:

184

Storage carbohydrate in animals:

178

Dehydration + electrolyte imbalance.

177

Minerals in solution that carry electrical charge (like Na^+, K^+, Cl^-).

180

4

179

9

182

A, D, E, K

181

4

184

Glycogen

183

B vitamins and vitamin C

185

Storage carbohydrate in plants:

186

Enzyme that breaks lactose:

187

Main fat-digesting enzyme from pancreas:

188

Bile is made by the _____ and stored in the _____.

189

Protein-digesting enzyme in the stomach:

190

Monomers: carbs -> {{c1::monosaccharides}},
proteins -> {{c2::amino acids}},
nucleic acids -> {{c3::nucleotides}}.

191

Energy yields: carbs {{c1::4}} kcal/g, protein {{c2::4}} kcal/g, fat {{c3::9}} kcal/g.

192

Sucrose = glucose + {{c1::fructose}};
lactose = glucose + {{c2::galactose}};
maltose = glucose + {{c3::glucose}}.

186

Lactase

185

Starch

188

Liver; gallbladder

187

Pancreatic lipase

190

Monomers: carbs -> monosaccharides, proteins -> amino acids, nucleic acids -> nucleotides.

189

Pepsin

192

Sucrose = glucose + fructose; lactose = glucose + galactose; maltose = glucose + glucose.

191

Energy yields: carbs 4 kcal/g, protein 4 kcal/g, fat 9 kcal/g.

193

Starch = plant storage; glycogen = {{c1::animal}} storage; cellulose = {{c2::fiber}}.

194

Fat-soluble vitamins: {{c1::A}}, {{c2::D}}, {{c3::E}}, {{c4::K}}.

195

Bile {{c1::emulsifies}} fat; pancreatic lipase {{c2::breaks}} triglyceride bonds.

196

Most absorption happens in the {{c1::small intestine}}; large intestine mainly absorbs {{c2::water}}.

197

Liver glycogen helps {{c1::blood glucose}}; muscle glycogen is for {{c2::that muscle}}.

198

Protein digestion starts in the {{c1::stomach}}; fat digestion mostly happens in the {{c2::small intestine}}.

199

Red marrow makes {{c1::blood cells}}; yellow marrow stores {{c2::fat}}. (Not a brain question!)

194

Fat-soluble vitamins: A, D, E, K.

193

Starch = plant storage; glycogen = animal storage; cellulose = fiber.

196

Most absorption happens in the small intestine; large intestine mainly absorbs water.

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Red marrow makes blood cells; yellow marrow stores fat.