



# **NUTRITION**

*Public Health - practice*

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Academic year 2015/2016*

# Why nutrition?

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**Diet and body weight are related to health status. Good nutrition is important to the growth and development of children. A healthful diet also helps reduce risks for many health conditions, including:**

- Overweight and obesity
- Heart disease
- High blood pressure
- Dyslipidemia (poor lipid profiles)
- Type 2 diabetes mellitus
- Some cancers
- Osteoporosis
- Dental caries
- Constipation
- Diverticular disease
- Malnutrition
- Vitamin A, iodine-deficiency
- Iron-deficiency anemia
- ...

# Why are nutrition and weight status important?

Individuals who are at a healthy weight are less likely to:

- Develop chronic disease risk factors, such as high blood pressure and dyslipidemia.
- Develop chronic diseases, such as type 2 diabetes, heart disease, osteoarthritis, and some cancers.
- Experience complications during pregnancy.
- Die at an earlier age

$$\text{BMI} = [\text{weight (kg)} / \text{height (m)}^2]$$

Underweight

<18.5

**Normal weight**

**18.5–24.9**

Overweight

25.0-29.9

Obesity

BMI of 30.0 or greater



# Food Based Dietary Guidelines (FBDG)

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- simple messages on healthy eating, **aimed at the general public**
- Nutrition education tool translating scientific knowledge and dietary standards and recommendations into an understandable and practical form for use by those who have little or no training in nutrition.
- FBDG are generally **based upon scientific evidence on the relationship between diet and chronic disease risk**, taking into account nutrient recommendations.
- They give an indication of what a person should be eating **in terms of foods rather than nutrients**, and provide a basic framework to use when planning meals or daily menus.
- Foods are **classified into basic groups** according to **similarity of nutrient content** or some other criteria.

## WHY? BALANCED, ADEQUATE AND VARIED DIET

- to help consumers in planning an overall healthy diet, while achieving an adequate nutrient intake

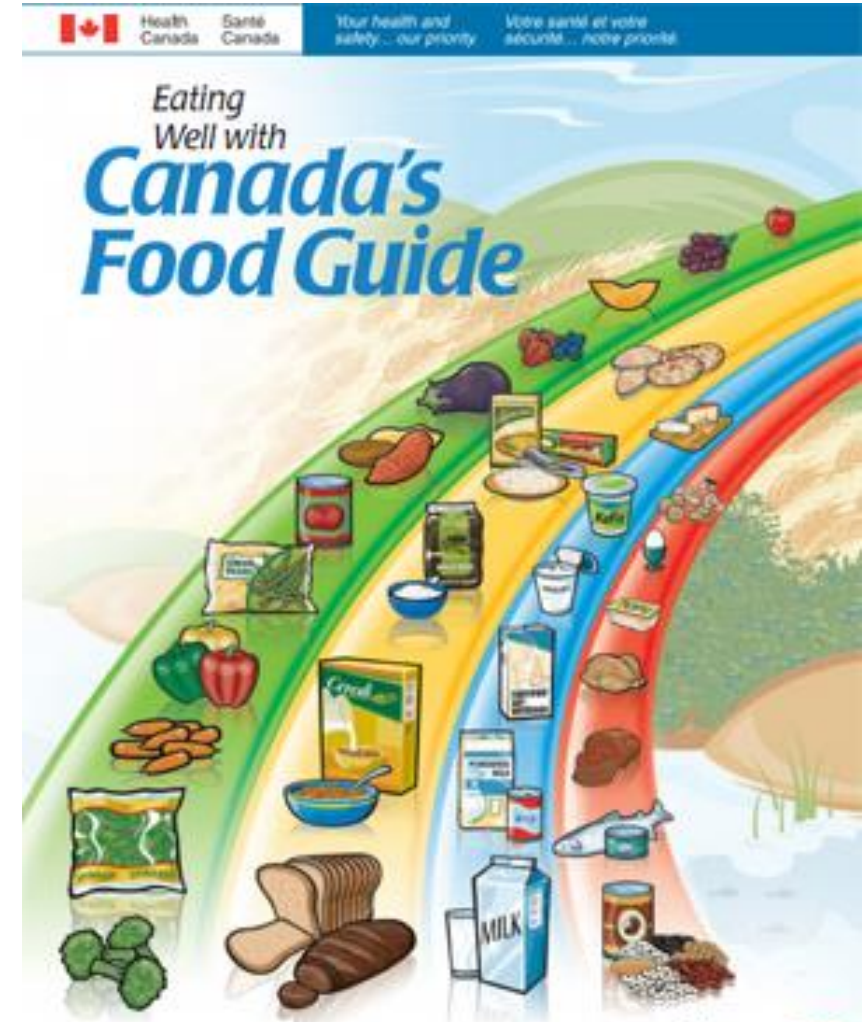
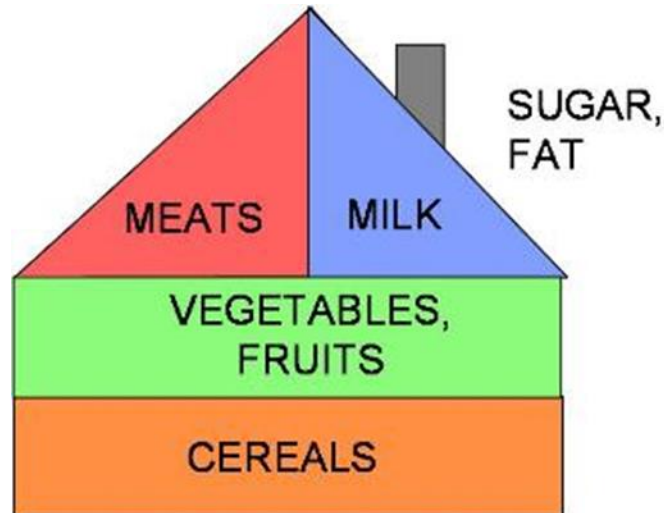
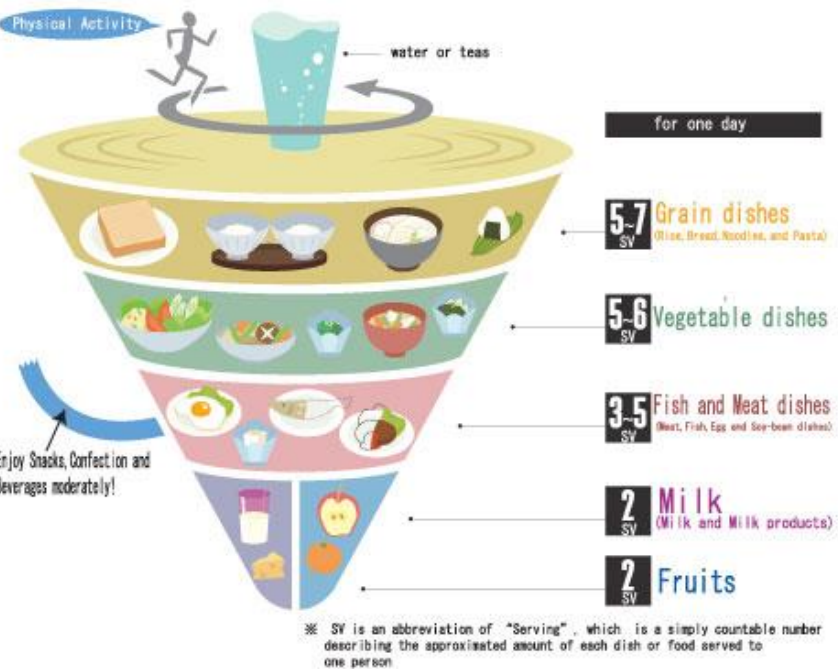
# FBDG

## graphic formats

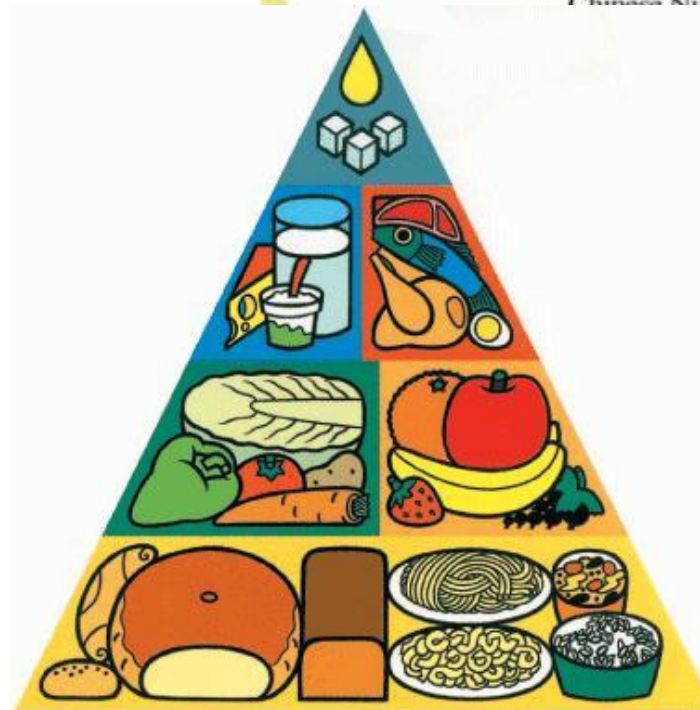
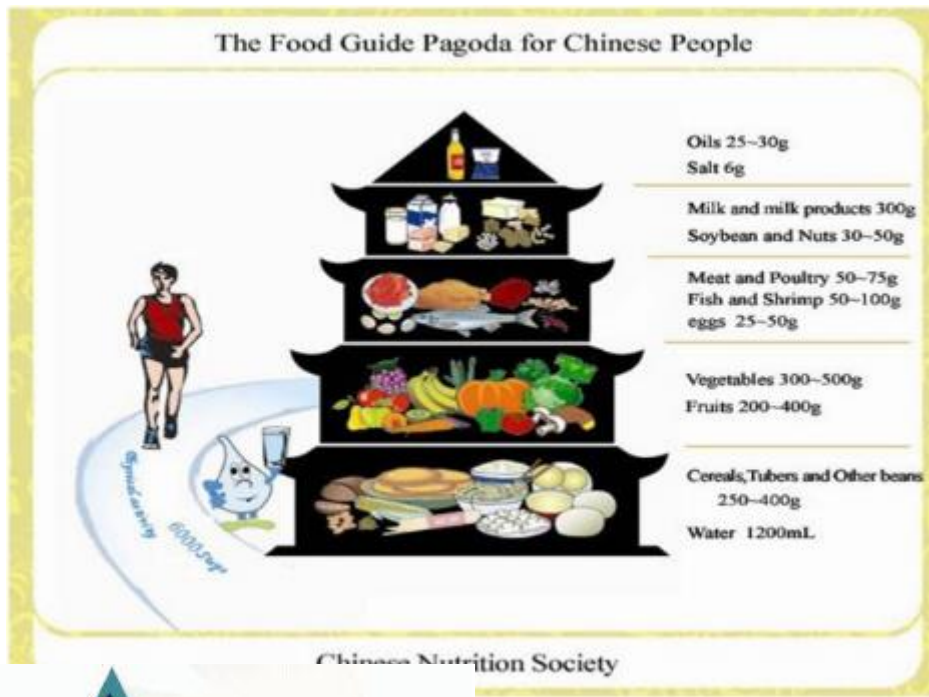


### Japanese Food Guide Spinning Top

Do you have a well-balanced diet?



Decided by Ministry of Health, Labour and Welfare and Ministry of Agriculture, Forestry and Fisheries.



# FOOD LABELING - REGULATION (EU) No 1169/2011

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## Mandatory particulars:

- a) The name of the food
- b) The list of ingredients (in descending order by weight)
- c) Any ingredient or processing aid listed in Annex II or derived from substance or product listed in Annex II causing allergies or intolerances used in the manufacture or preparation of a food and still present in the finished product, even if in an altered form
- d) The quantity of certain ingredients or categories of ingredients
- e) The net quantity of the food
- f) The date of minimum durability or the 'use' by date

[http://ec.europa.eu/food/safety/labelling\\_nutrition/labelling\\_legislation/index\\_en.htm](http://ec.europa.eu/food/safety/labelling_nutrition/labelling_legislation/index_en.htm) (March/2016)

# FOOD LABELING - REGULATION (EU) No 1169/2011

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- f) Any special storage conditions and/or conditions of use
- g) The name of business and address of the food business operator
- h) The country of origin or place of provenance where provided for
- i) Instructions for use where it would be difficult to make appropriate use of the food in the absence of such instructions
- j) With respect to beverages containing more than 1,2 % by volume of alcohol, the actual alcoholic strength by volume
- k) A nutrition declaration**



# Nutrition declaration

The **mandatory nutrition declaration** shall include the following:

- energy value
- the amounts of fat, saturates, carbohydrate, sugars, protein and salt

- 
- 1 kcal = 4,2 kJ
  - 1 g Carbohydrate = 4 kcal
  - 1 g Protein = 4 kcal
  - 1 g Fat = 9 kcal

	Typical value per 100g (%RI)	Typical value per 35g serving (%RI)
Energy	1075kJ / 254kcal (18)	367kJ / 89kcal (6)
Fat	2.3g (3)	0.8g (0.3)
of which: saturates	1.2g (6)	0.4g (2)
Carbohydrate	57g (22)	20g (8)
of which: sugars	1.4g (1)	0.5g (<1)
Protein	1.2g (2)	0.4g (1)
Salt	0.6g (10)	0.2g (3)

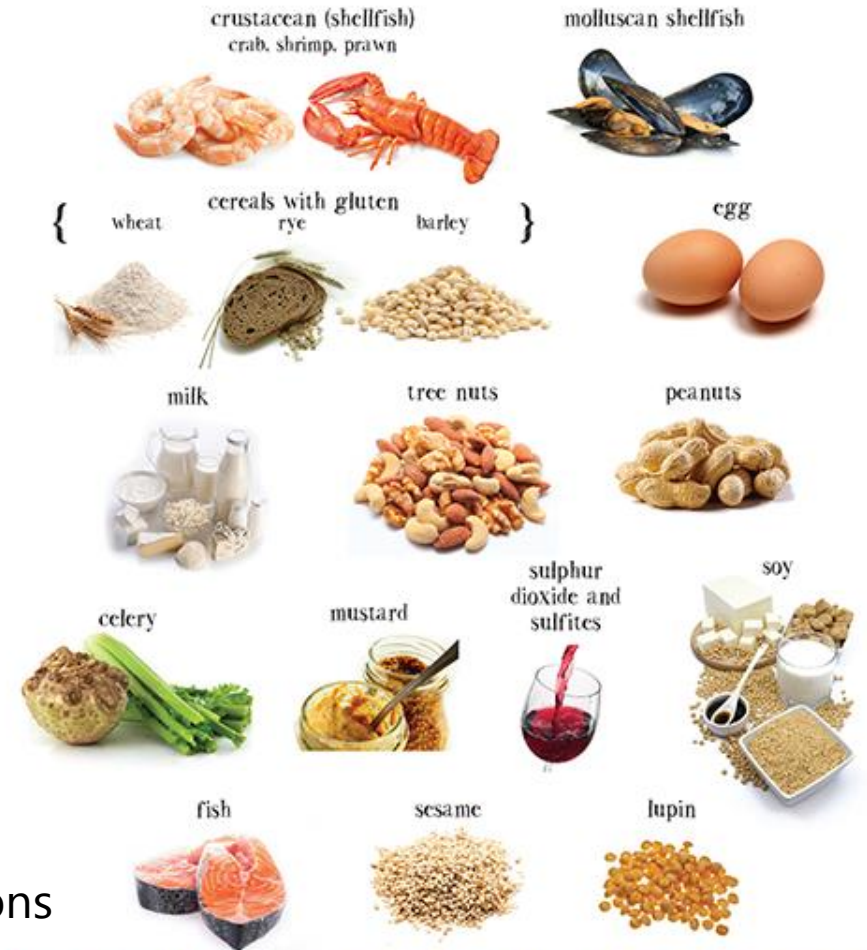
Reference intake of an average adult (8400kJ / 2000kcal)

# Allergens I

- **Food ingredients that must be declared as allergens in the EU**

1. **Cereals containing gluten**, namely: wheat (such as spelt and khorasan wheat), rye, barley, oats or their hybridised strains, and products thereof, except:
  - (a) wheat based glucose syrups including dextrose
  - (b) wheat based maltodextrins
  - (c) glucose syrups based on barley
  - (d) cereals used for making alcoholic distillates including ethyl alcohol of agricultural origin
2. **Crustaceans** and products thereof
3. **Eggs** and products thereof
4. **Fish** and products thereof, except:
  - (a) fish gelatine used as carrier for vitamin or carotenoid preparations
  - (b) fish gelatine or Isinglass used as fining agent in beer and wine

## TOP 14 FOOD ALLERGENS European Union



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# Allergens II

5. **Peanuts** and products thereof

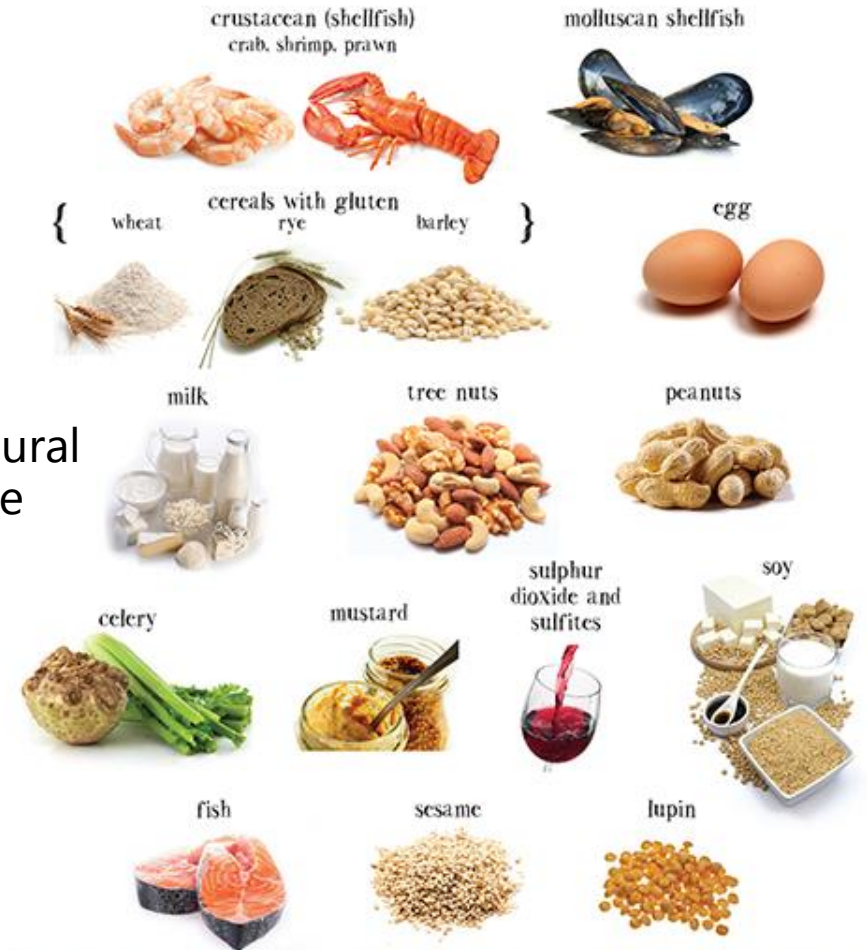
6. **Soybeans** and products thereof, except:

- (a) fully refined soybean oil and fat
- (b) natural mixed tocopherols (E306), natural D-alpha tocopherol, natural D-alpha tocopherol acetate, and natural D-alpha tocopherol succinate from soybean sources
- (c) vegetable oils derived phytosterols and phytosterol esters from soybean sources
- (d) plant stanol ester produced from vegetable oil sterols from soybean sources

7. **Milk** and products thereof (including lactose), except:

- (a) whey used for making alcoholic distillates including ethyl alcohol of agricultural origin
- (b) lactitol

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# Allergens III

- 8. **Nuts**, namely: almonds (*Amygdalus communis* L.), hazelnuts (*Corylus avellana*), walnuts (*Juglans regia*), cashews (*Anacardium occidentale*), pecan nuts (*Carya illinoensis* (Wangenh.) K. Koch), Brazil nuts (*Bertholletia excelsa*), pistachio nuts (*Pistacia vera*), macadamia or Queensland nuts (*Macadamia ternifolia*), and products thereof, except for nuts used for making alcoholic distillates including ethyl alcohol of agricultural origin
- 9. **Celery** and products thereof
- 10. **Mustard** and products thereof
- 11. **Sesame seeds** and products thereof
- 12. **Sulphur dioxide and sulphites** at concentrations of more than 10 mg/kg or 10 mg/litre in terms of the total SO<sub>2</sub> which are to be calculated for products as proposed ready for consumption or as reconstituted according to the instructions of the manufacturers
- 13. **Lupin** and products thereof
- 14. **Molluscs** and products thereof

## TOP 14 FOOD ALLERGENS European Union



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# Nutrition claim...

- ...any claim which states, suggests or implies that a **food has particular beneficial nutritional properties** due to:
- The energy (calorific value) it:
  - (a) provides
  - (b) provides at a reduced or increased rate or
  - (c) does not provide
- The nutrients or other substances it:
  - (a) contains
  - (b) contains in reduced or increased proportions or
  - (c) does not contain



# Permitted nutrition claims - examples

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## LOW SUGARS

- A claim that a food is low in sugars, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 5 g of sugars per 100 g for solids or 2,5 g of sugars per 100 ml for liquids.

## LOW FAT

- A claim that a food is low in fat, and any claim likely to have the same meaning for the consumer, may only be made where the product contains no more than 3 g of fat per 100 g for solids or 1,5 g of fat per 100 ml for liquids (1,8 g of fat per 100 ml for semi-skimmed milk).

## HIGH FIBRE

- A claim that a food is high in fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 6 g of fibre per 100 g or at least 3 g of fibre per 100 kcal.

## HIGH OMEGA-3 FATTY ACIDS

- A claim that a food is high in omega-3 fatty acids, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least 0,6 g alpha-linolenic acid per 100 g and per 100 kcal, or at least 80 mg of the sum of eicosapentaenoic acid and docosahexaenoic acid per 100 g and per 100 kcal.

# Permitted nutrition claims – summary

[http://ec.europa.eu/food/safety/labelling\\_nutrition/claims/nutrition\\_claims/index\\_en.htm](http://ec.europa.eu/food/safety/labelling_nutrition/claims/nutrition_claims/index_en.htm)

- Low energy
- Energy-reduced
- Energy-free
- Low fat
- Fat-free
- Low saturated fat
- Saturated fat-free
- Low sugars
- Sugars-free
- With no added sugars
- Low sodium/salt
- Very low sodium/salt
- Sodium free or salt-free
- No added sodium/salt
- Source of fiber
- High fiber
- Source of protein
- High protein
- Source of (name of vitamin/s) and/or (name of mineral/s)
- High (name of vitamin/s) and/or (name of mineral/s)
- Contains (name of nutrient or other substance)
- Increased (name of the nutrient)
- Reduced (name of the nutrient)
- Light/lite
- Naturally/natural
- Source of omega-3 fatty acids
- High omega-3 fatty acids
- High monounsaturated fat
- High polyunsaturated fat
- High unsaturated fat

# Health claim...

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- ...any statement about a **relationship between food and health**
- The Commission authorises different health claims provided they are **based on scientific evidence** and can be **easily understood by consumers**. The European Food Safety Authority (EFSA) is responsible for evaluating the scientific evidence supporting health claims.
- *"Vitamin D is needed for the normal growth and development of bone in children."*
- *„Iodine contributes to normal functioning of the nervous system."*
- **[Regulation \(EC\) No 1924/2006](#)**
- **REGISTER**  
[http://ec.europa.eu/food/safety/labelling\\_nutrition/claims/register/index\\_en.htm](http://ec.europa.eu/food/safety/labelling_nutrition/claims/register/index_en.htm)







# GRAINS



# Grains group



- all foods made from wheat, rye, barley, oat, rice, cornmeal, such as bread, pasta, oatmeal, breakfast cereals, tortillas,... but also buckwheat, millet, quinoa, amaranth,...
- 3-6 portions a day
  - 1 portion = 1 slice of bread (60 g), 1 roll, 1 scoop of cooked rice or pasta (125 g), 1 bowl of breakfast cereals



**carbohydrates (starch)** → energy → 1 g = 17 kJ (4 kcal)

fibre

B vitamins (thiamin, niacin)

minerals (magnesium)

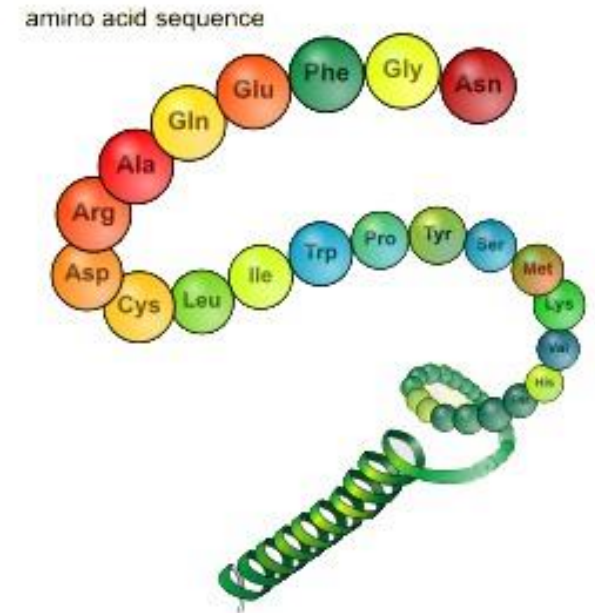
proteins - incomplete



# Incomplete proteins...

## ...limiting aminoacids

- ...is any indispensable amino acid falling below the amount recommended in the amino acid reference pattern
- cereals – lysine
- legumes (soya) – methionine (cystein)
- corn – tryptophan
- rice – lysine, threonine



# Carbohydrates

**1 g = 17 kJ (4,2 kcal)**

## Classification:

- Monosaccharides – glucose, fructose, galactose
- Disaccharides – sucrose, lactose, maltose
- Polysaccharides (complex carbohydrates) – starch, resistant starch, glycogen

- **The Acceptable Macronutrient Distribution Range for carbohydrates in human diet is 45–65 %.**

## Function:

- Energy
- Glycogen-carbohydrate storage
- Protein-sparing action
- Antiketogenic effect
- Heart action
- Central nervous system

# Gluten

## GLUTEN

- wheat, spelt, rye, barley, oat and all products of them (pasta, bread, rolls, breakfast cereals, crackers, pastry, couscous and other grain-based foods)



## GLUTEN FREE

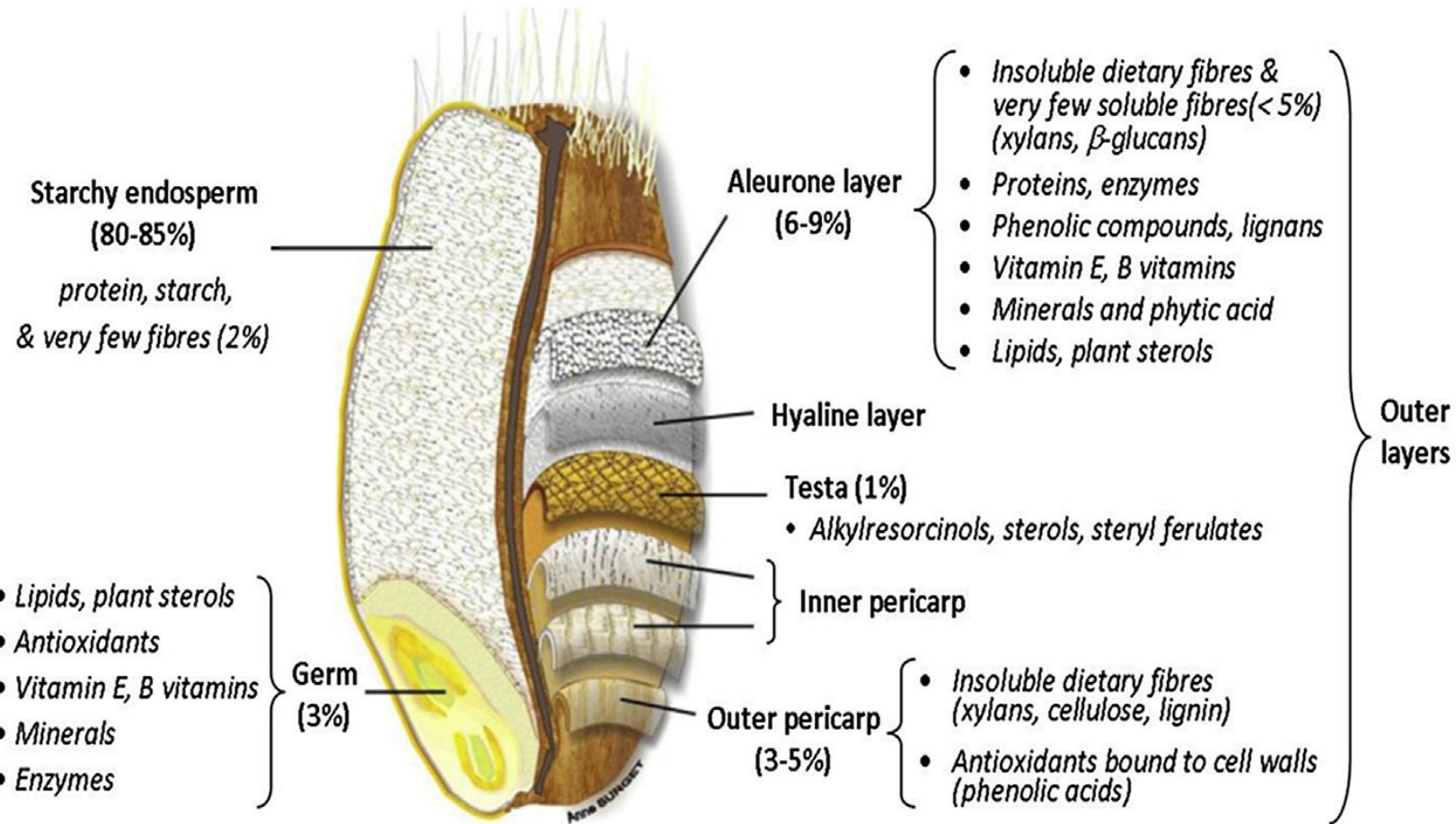
- rice
- corn, cornmeal
- buckwheat
- quinoa
- amaranth
- wild rice
- millet

***Celiac disease = autoimmune disease, not allergy!***

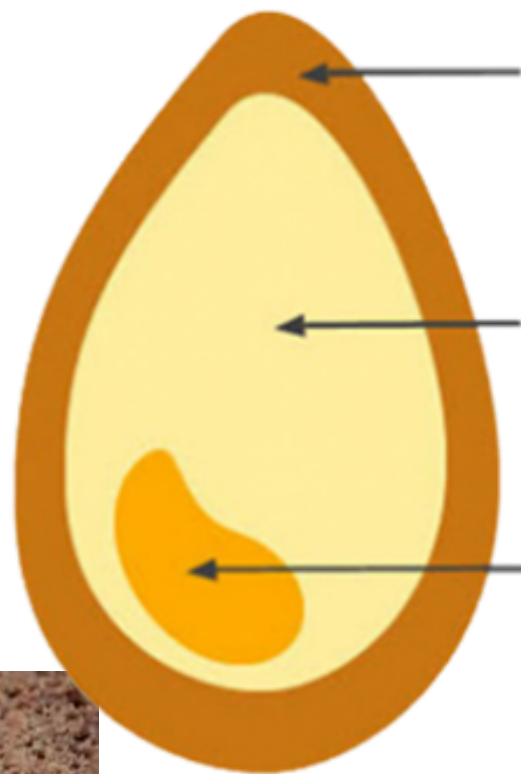
...pseudocereals



# Whole grains



# Whole Grain vs. "White" Grain



## Bran

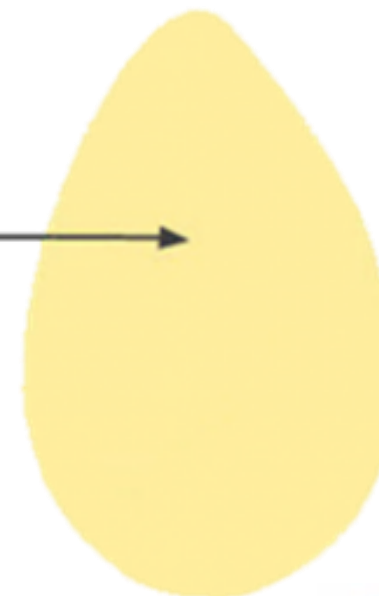
The fiber-rich outer layer that protects the seed and contains B vitamins and trace minerals.

## Endosperm

The middle layer that contains carbohydrates along with proteins.

## Germ

The small nutrient-rich core that contains antioxidants, including vitamin E, B vitamins and healthy fats.





# Dietary fibre



- *"Dietary fiber is the edible parts of plants or analogous carbohydrates that are resistant to digestion and absorption in the human small intestine with complete or partial fermentation in the large intestine. Dietary fiber includes polysaccharides, oligosaccharides, lignin, and associated plants substances. Dietary fibers promote beneficial physiological effects including laxation, and/or blood cholesterol attenuation, and/or blood glucose attenuation."*

*(AACC International)*



- Whole grains, fruits, vegetables, legumes, nuts and oily seeds
- Recommended fibre intake for adults ... **25–30 g per day**



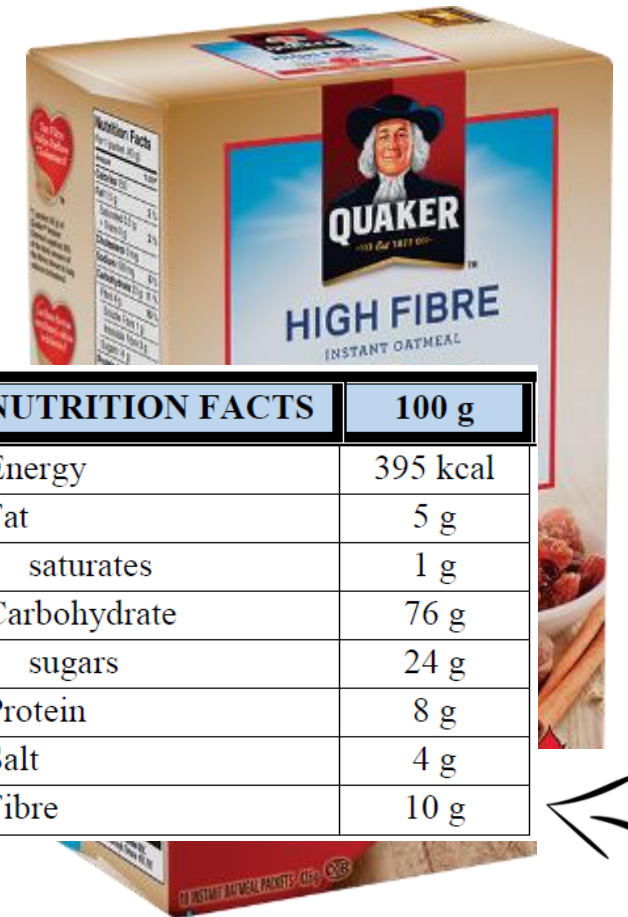
# NUTRITION CLAIMS about fibre

## SOURCE OF FIBRE

A claim that a food is a source of fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least **3 g of fibre per 100 g** or at least 1,5 g of fibre per 100 kcal.

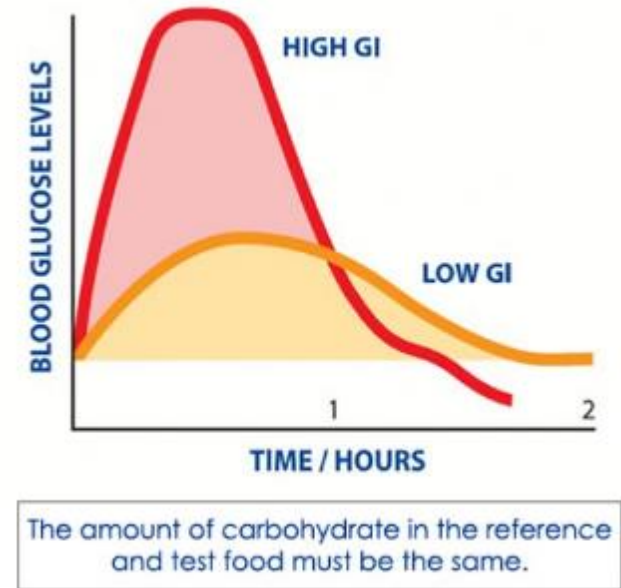
## HIGH FIBRE

A claim that a food is high in fibre, and any claim likely to have the same meaning for the consumer, may only be made where the product contains at least **6 g of fibre per 100 g** or at least 3 g of fibre per 100 kcal.

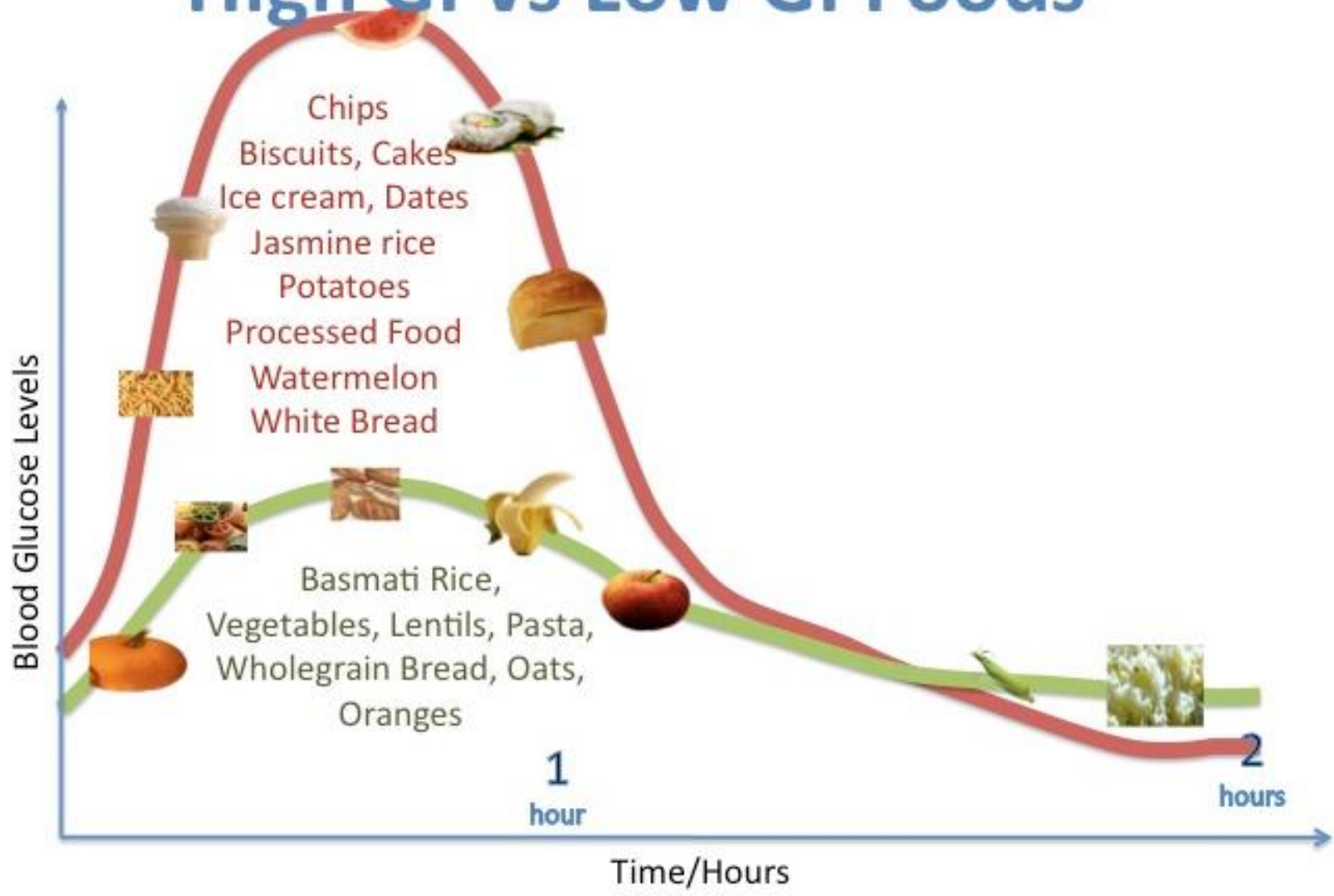


# Glycemic index

- Carbohydrate foods are digested and absorbed at different rates.
- **GI is a relative measure of the effect of different carbohydrate-containing foods on blood glucose level. A food with a high GI will raise blood glucose to a greater extent than a food with a low GI.**
- **A number of factors** influence the rate and duration of the glycemic response - the type and form of the carbohydrate eaten, the cooking and processing methods used, the time of day the carbohydrate is ingested or the amount of other nutrients in the food, such as fat or protein or fibre. In addition, individuals differ in their metabolism, which can also affect the glycemic response.
- For prevention and control of conditions such as **obesity, diabetes and heart disease and has also dietary advice for sport, for example which foods should be eaten in the hours before and after physical exertion.**
- GI does not refer directly to quantified food exchanges → **Glycemic Load**



# High GI vs Low GI Foods



# Health claims about beta-glucans

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## **Beta-glucans contribute to the maintenance of normal blood cholesterol levels.**

The claim may be used only for food which contains at least 1 g of beta-glucans from oats, oat bran, barley, barley bran, or from mixtures of these sources per quantified portion. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 3 g of beta-glucans from oats, oat bran, barley, barley bran, or from mixtures of these beta-glucans.

## **Consumption of beta-glucans from oats or barley as part of a meal contributes to the reduction of the blood glucose rise after that meal.**

The claim may be used only for food which contains at least 4 g of beta-glucans from oats or barley for each 30 g of available carbohydrates in a quantified portion as part of the meal. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained by consuming the beta-glucans from oats or barley as part of the meal.

# FRUITS AND VEGETABLES



# What nutrients?

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- water
- fibre
- vitamins and provitamins, minerals
- carbohydrates (+ proteins, fats)

+ non-nutritive bioactive  
substances

# ...and those are?

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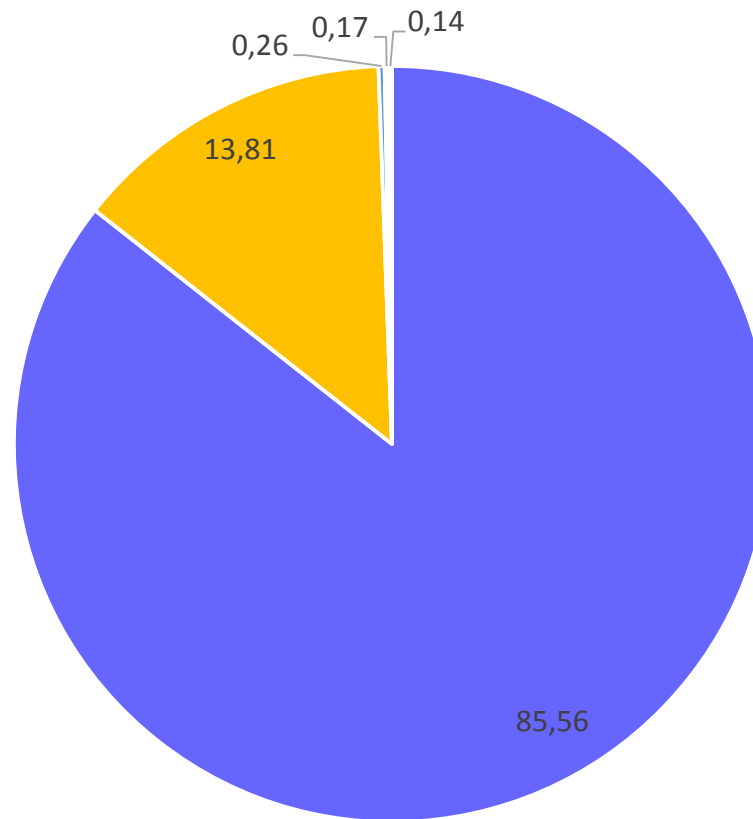
- pigments – carotenes ( $\beta$ -carotene, lycopene), xanthophylls, chlorophylls
- phenolic compounds, polyphenols
- flavonoids, isoflavonoids
- lignans, lignins
- glucosinolates
- ... and much more, serving as:

**provitamins, antioxidants,  
anticarcinogenic, antibacterial effect etc.**



# Nutrient content (apple)

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■ water ■ carbohydrates ■ protein ■ fat ■ bioactive comp.

# Recommendation: min. 5 servings; a serving is...

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## **FRUITS (2-4 servings)**

- banana, apple, orange – 1x 100 g
- berries – a bowl 150–200 ml
- juice / smoothie – 250–300 ml, not diluted

## **VEGETABLES (3-5 servings)**

- carrot, sweet pepper, medium-sized tomato – 1 piece
- raw leafy vegetables – a bowl 150–200 ml
- **cooked**, including **potatoes** \* – 125 g
- juice / smoothie – 250–300 ml, not diluted

\* As potatoes are frequently consumed, they are a good source of vitamin C.

# To imagine that better



# Health claims

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- **dried plums**

- dried plums/prunes contribute to normal bowel function – 100 g per day

- **number of vitamins and minerals**

- **vitamins – mainly vitamin C (acts as antioxidant)**

- normal function of the immune system
- normal collagen formation for blood vessels, bones, cartilage etc.
- normal energy-yielding metabolism
- increases iron absorption
- normal psychological functions ... **etc. etc. – 15 authorised health claims**

- **minerals – mainly potassium (K)**

- normal functioning of the nervous system
- normal muscle function
- maintenance of normal blood pressure



# Vitamin C in fruits and vegetables

USDA National Nutrient Database

Food 100 g	Vitamin C (mg)
Currants, european black, raw	181.0
Peppers, sweet, red, raw	127.7
Broccoli, raw	89.2
Strawberries, raw	58.8
Lemon, raw, without peel	53.0
Tomatoes, orange, raw	16.0
Potatoes, raw, skin	11.4
Banana, raw	8.7

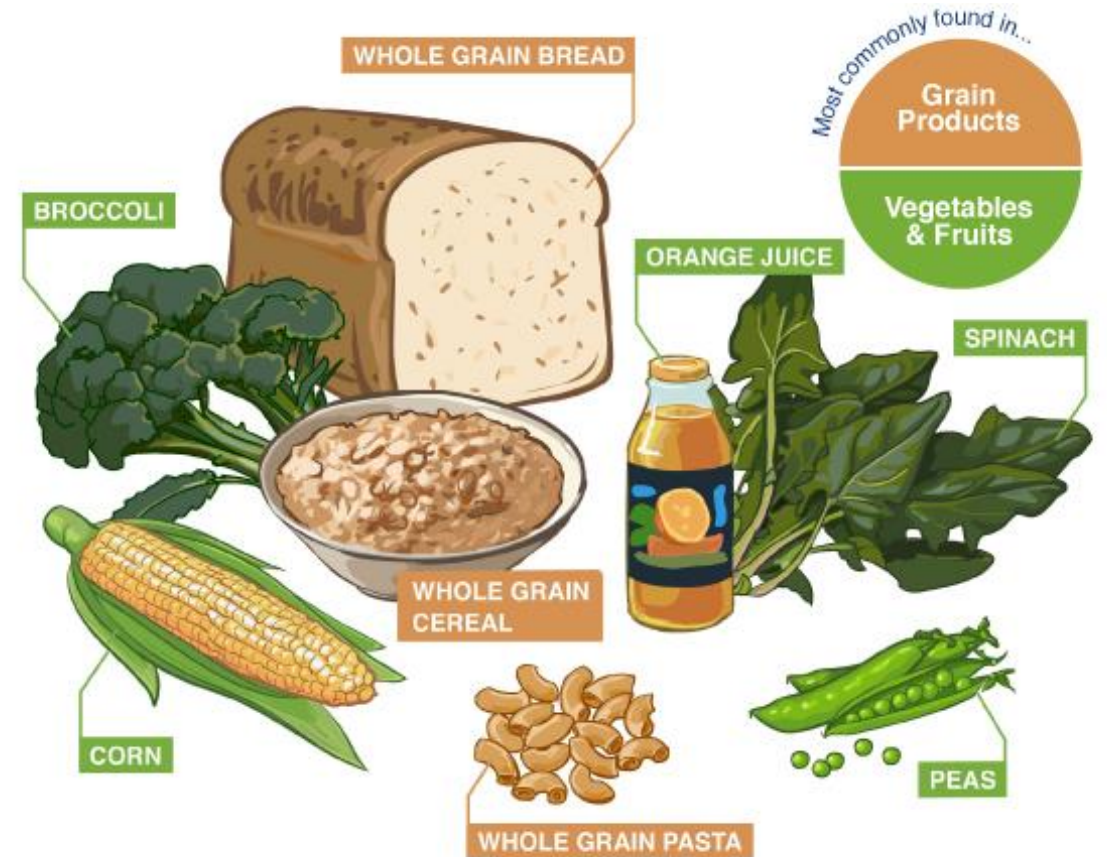


# Health claims

## FOLATE

- contributes to maternal tissue growth during pregnancy \*
- contributes to normal amino acid synthesis
- contributes to normal blood formation
- contributes to normal homocysteine metabolism
- contributes to normal psychological function
- contributes to the normal function of the immune system
- contributes to the reduction of tiredness and fatigue
- has a role in the process of cell division

\* folate reduces the increase of neural tube defects



# One veggie, two faces



Nutrient	Value per 100 g
Energy	47 kcal / 200 kJ
Fat	0,2 g
Saturated	0 g
Carbohydrates	10,1 g
Sugar	8,3 g
Protein	1,2 g
Salt	0,9 g

# Fruit or juice?



Nutrient	Value per 100 g		
	ORANGE	SMOOTHIE	JUICE
Energy	49 kcal / 205 kJ	56 kcal / 235 kJ	43 kcal / 180 kJ
Fat	0 g	0,3 g	0 g
Carbohydrates	10 g	14,4 g	9 g
Sugars	7,3 g	12,1 g	9 g
Protein	0,9 g	0,6 g	0,7 g
Fibre	2 g	1,7 g	0,1 g
Vitamin C	50,7 mg	41 mg	30 mg
Antioxidants (ORAC)	2 103	1 566	900



# And what about you?

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How many portions  
of fruit and vegetable  
did you consume  
yesterday?



# MILK AND DAIRY PRODUCTS



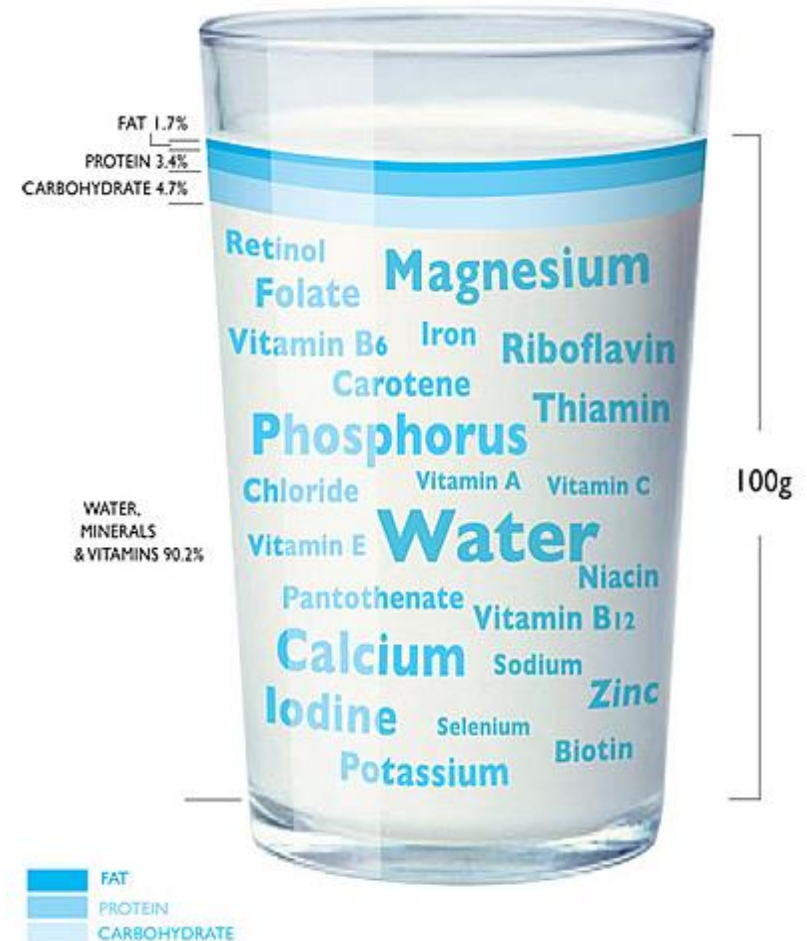
# Milk and dairy products

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- they are for example: yoghurt, cheese, milk, cottage cheese, fermented milk products and other
- they provide a range of nutrients → the main are **proteins, calcium, vitamin B<sub>12</sub>, riboflavin**
- dairy proteins...
  - have a high nutrition value (like those in meat, fish and egg)
  - contain satisfactory proportions of all the aminoacids that are essential to the human organism

# Composition of cow's milk

Component	Amount in 1 l	Percentage
Water	~	87,0 %
Lactose	50 g	4,8 %
Fat	41 g	4,0 %
Proteins	33 g	3,2 %
Calcium	1,1 g	0,1 %
Riboflavin (vitamin B2)	1,83 mg	~
Vitamin B12	4,4 µg	~



# Servings and recommendation

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- one glass/cup of milk (250 ml)
  - one pot of yoghurt (200 ml)
  - cheese 55 g
  - ...or like your palm/your fist/your hand
- 
- **2–3 servings per day**



# Calcium - health claims

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- Calcium contributes to normal blood clotting.
- Calcium contributes to normal energy-yielding metabolism.
- Calcium contributes to normal muscle function.
- Calcium contributes to normal neurotransmission.
- Calcium contributes to the normal function of digestive enzymes.
- Calcium has a role in the proces of cell division and specialization.
- Calcium is needed for the **maintenance of normal bones.**
- Calcium is needed for the maintenance of normal teeth.
  
- nutrition claim: „SOURCE OF CALCIUM“ (the product contains at least a significant amount of the nutrient - at least 15 % of RDA\* = 800 mg per day) \*RDA=recommended daily allowance
- other sources of calcium are **30 g poppy = 150 g cabbage = 200 g broccoli** = (50 g of hard cheese = yoghurt 150 g = milk 250 ml)

# Calcium absorption

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- calcium absorption from vegetables such as broccoli, cauliflower and kale is **higher** than from milk and dairy products



# Allergy to cow's milk

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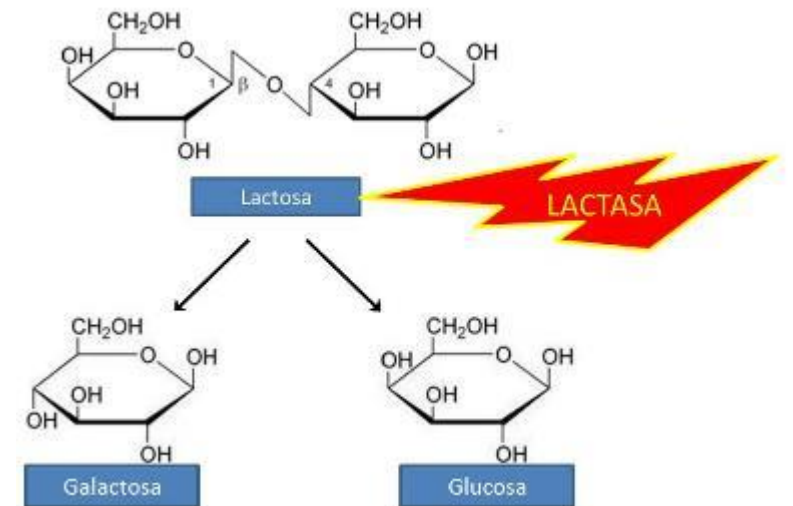
- is an abnormal response of the body's immune system to milk and products containing milk
- allergy **related to proteins lactoglobulin, lactalbumin and casein**
- symptoms of milk allergy: wheezing, vomiting, hives and digestive problems, anaphylaxis (a severe, life-threatening reaction)
- treatment: food-elimination diet



# Lactose intolerance (hypolactasia, lactase-non persistence)

- **primary** lactose intolerance is a genetically influenced **reduction of intestinal lactase**
- **secondary** lactose intolerance can **develop as a consequence** of infection of the small intestine, inflammatory disorders or malnutrition
- symptoms: abdominal bloating and cramping, flatulence, diarrhea after lactose consumption
- treatment:
  - lactose-free or low-lactose diet

ASIANS	98 %
AFRICANS	78 %
CZECHS	6–20 %
SCANDINAVIANS	10 %



# Live yoghurt cultures (health claims)

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- Live cultures in yoghurt or fermented milk improve lactose digestion of the product in individuals who have difficulty digesting lactose.
- in order to bear the claim, yoghurt or fermented milk should contain at least  $10^8$  Colony Forming Units of live starter microorganisms (**Lactobacillus delbrueckii subsp. bulgaricus** and **Streptococcus thermophilus**) per gram



# Read labels!









Nutrient	Sweetened dairy	Natural dairy
Energy	69 kcal / 290 kJ	40 kcal / 170 kJ
Fats	1 g	1 g
Proteins	3 g	3 g
Carbohydrates	12 g	5,4 g



# **MEAT, FISH AND SEAFOOD, EGGS, LEGUMES, NUTS AND SEEDS**



		<b>Energy</b> kJ/100 g	<b>Water</b> g/100 g	<b>Protein</b> g/100 g	<b>Fat</b> (SFA) g/100 g	<b>Carb</b> g/100 g
<b>EGGS</b> Chicken eggs		575	76,1	12,5	9,2 (2,5)	1,3
<b>MEAT</b> Lean beef – raw Lean beef - stewed		427 823	73,3 55,9	22,3 36,9	1,3 (0,6) 5,3 (2,3)	0 0
<b>FISH</b> Tuna		610	69,5	23,7	5,6 (1,3)	0
<b>LEGUMES</b> Lentils – dried Lentils – boiled		1372 466	9,8 62,4	69,6 23,6	0,7 0,4	48,5 16,3
<b>NUTS</b> Almonds		2520	4,7	20,2	52,7	7,3
<b>SEEDS</b> Sesame seeds		2380	3,2	24,5	45,9 (8,5)	13,9



# PROTEIN FOODS

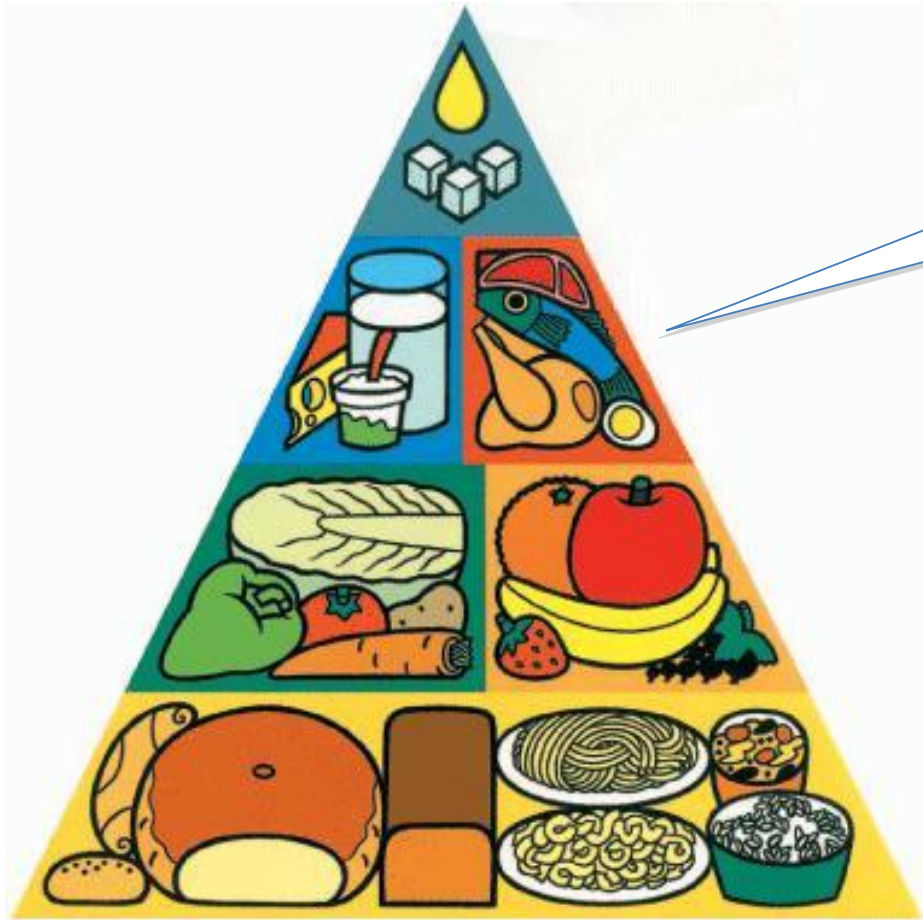


# PROTEIN

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- Function:
  - building blocks for bones, muscles, cartilage, skin, and blood
  - building blocks for enzymes, hormones, and vitamins
  - proteins are one of three nutrients that provide energy
- Protein:
  - **high biological value** = protein contains the essential amino acids in the right proportion required by humans (meat, poultry, fish, eggs, milk, cheese and yogurt)
  - **low biological value** = one or more essential amino acids are present in too short amount (plants, legumes, grains, nuts, seeds and vegetables)
- **!!! Legumes contain relatively low quantities of the essential amino acid methionine (which is found in higher amounts in grains)**
- The amino acid that is in the shortest supply in relation to need is termed the **limiting amino acid**
- Essential amino acid = indispensable amino acids that cannot be produced during metabolism by the body and therefore must be provided by our diet
- Non - essential amino acid = dispensable amino acids that can be produced endogenously in the body from other proteins

# Servings



1-3 portions a day

80 g cooked meat  
2 eggs  
100 g or 250 ml cup of boiled legumes



[www.pav.rvp.cz](http://www.pav.rvp.cz)



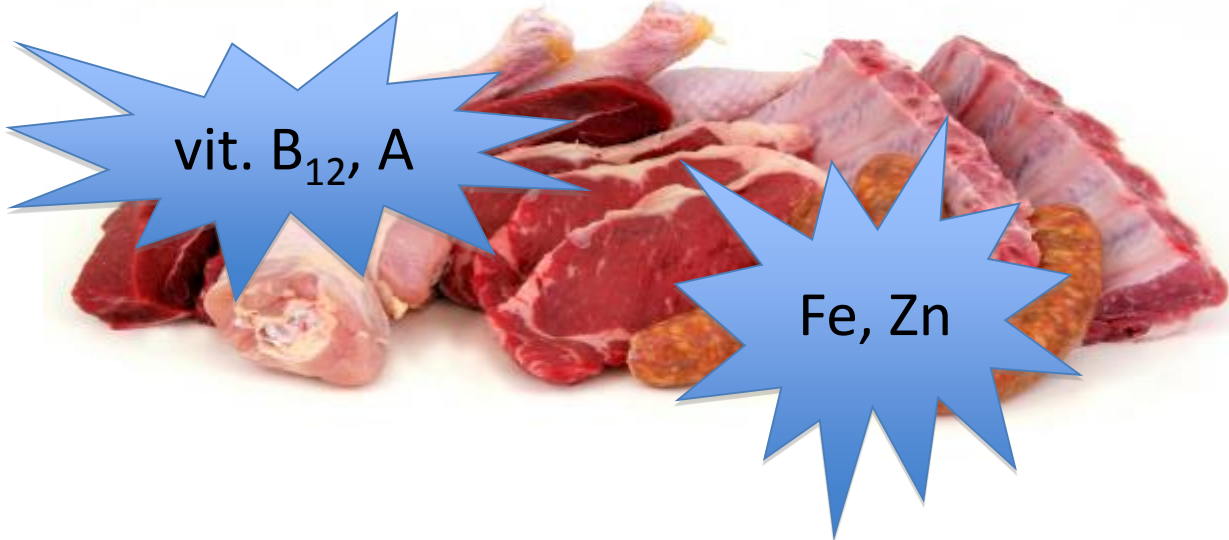


iodine

MERCURY

Omega 3:  
EPA, DHA

vit. D



vit. B<sub>12</sub>, A

Fe, Zn

# PROTEIN FOODS



Omega 3:  
ALA

FIBRE



All essential  
amino acids

# Fish and seafood: EPA, DHA, vit. D

---

## HEALTH CLAIM/RELATIONSHIP:

- **EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid):**
  - maintenance of normal cardiac function<sup>1</sup>, blood pressure<sup>2</sup>, blood concentrations of triacylglycerols<sup>3</sup>
- **DHA:**
  - maintenance of normal (fasting) blood concentrations of triacylglycerols<sup>4</sup>
- **MATERNAL INTAKE:**
  - DHA maternal intake contributes to the normal brain development of the foetus and breastfed infants<sup>5</sup>
  - DHA maternal intake contributes to the normal development of the eye of the foetus and breastfed infants<sup>6</sup>
- **vitamin D:**
  - absorption and utilisation of calcium and phosphorus and maintenance of normal blood calcium concentrations, maintenance of bones and teeth, normal muscle function, normal function of immune system and inflammation response, cell division<sup>7</sup>

# Conditions for using the claims

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<sup>1</sup>The claim may be used only for food which is at least a source of EPA and DHA as referred to in the claim SOURCE OF OMEGA 3 FATTY ACIDS as listed in the Annex to Regulation (EC) No 1924/2006. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 250 mg of EPA and DHA.

<sup>2</sup>The claim may be used only for food which provides a daily intake of 3 g of EPA and DHA. In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 3 g of EPA and DHA. When the claim is used on food supplements and/or fortified foods information shall also be given to consumers not to exceed a supplemental daily intake of 5 g of EPA and DHA combined. The claim shall not be used for foods targeting children.

<sup>3</sup>The claim may be used only for food which provides a daily intake of 2 g of EPA and DHA. In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 2 g of EPA and DHA. When the claim is used on food supplements and/or fortified foods information shall also be given to consumers not to exceed a supplemental daily intake of 5 g of EPA and DHA combined. The claim shall not be used for foods targeting children.

<sup>4</sup>The claim may be used only for food which provides a daily intake of 2 g of DHA and which contains DHA in combination with eicosapentaenoic acid (EPA). In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 2 g of DHA. When the claim is used on food supplements and/or fortified foods information shall also be given to consumers not to exceed a supplemental daily intake of 5 g of EPA and DHA combined. The claim shall not be used for foods targeting children.

<sup>5</sup>Information shall be given to pregnant and lactating women that the beneficial effect is obtained with a daily intake of 200 mg of DHA in addition to the recommended daily intake for omega-3 fatty acids for adults, i.e.: 250 mg DHA and EPA. The claim can be used only for food which provides a daily intake of at least 200 mg DHA .

<sup>6</sup>Information shall be given to pregnant and lactating women that the beneficial effect is obtained with a daily intake of 200 mg of DHA in addition to the recommended daily intake for omega-3 fatty acids for adults, i.e.: 250 mg DHA and eicosapentaenoic acid (EPA). The claim can be used only for food which provides a daily intake of at least 200 mg DHA.

<sup>7</sup>The claim may be used only for food which is at least a source of iron as referred to in the claim SOURCE OF [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S] as listed in the Annex to Regulation (EC) No 1924/2006

# Mercury in fish and shellfish

**Mercury may harm an unborn baby or young child's developing nervous system!**

Recommendations for pregnant women, breastfeeding women and young children:

**1. Do not eat shark, swordfish, king mackerel, tilefish.**

*They contain high levels of mercury.*

**2. Eat up to 340 g a week of a variety of fish and shellfish that are lower in mercury.**

Five of the most commonly eaten fish that are low in mercury are shrimp, canned light tuna, salmon, pollock, and catfish.

Another commonly eaten fish, albacore ("white") tuna has more mercury than canned light tuna. So, when choosing your two meals of fish and shellfish, you may eat up to 170 g (one average meal) of albacore tuna per week.

**3. Check local advisories about the safety of fish caught by family and friends in your local lakes, rivers, and coastal areas.**

If no advice is available, eat up to 170 g (one average meal) per week of fish you catch from local waters, but don't consume any other fish during that week.

<http://www.fda.gov/Food/FoodborneIllnessContaminants/BuyStoreServeSafeFood/ucm110591.htm>

# MEAT: Fe, Zn, vit. B12



## HEALTH CLAIM/RELATIONSHIP:

**Iron:** cognitive function, contribution to normal energy-yielding metabolism, formation of red blood cells and haemoglobin, oxygen transport in the body, function of the immune system, reduction of tiredness and fatigue, cell division\*

**Zinc:** DNA synthesis and cell division, acid-base metabolism, contribution to normal carbohydrate metabolism, cognitive function, fertility and reproduction, contribution to normal macronutrient metabolism, maintenance of normal serum testosterone concentrations, vitamin A metabolism, contribution to normal protein synthesis, maintenance of bones, normal hair, normal nails and normal skin, fertility and reproduction, maintenance of vision, function of the immune system, protection of DNA, proteins and lipids from oxidative damage, DNA synthesis and cell division\*

**B12:** energy-yielding metabolism, contribution to neurological and psychological function, contribution to normal homocysteine metabolism, contribution to neurological and psychological function, red blood cell formation, function of the immune system, reduction of tiredness and fatigue, cell division\*

**A:** metabolism of iron, maintenance of normal skin and mucous membranes, normal vision and normal function of the immune system, cell differentiation\*

\*The claim may be used only for food which is at least a source of iron as referred to in the claim SOURCE OF [NAME OF VITAMIN/S] AND/OR [NAME OF MINERAL/S] as listed in the Annex to Regulation (EC) No 1924/2006

# Health claim: **MEAT or FISH**

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Meat or fish contributes to the **improvement of iron absorption when eaten with other foods containing iron\***

**= MEAT FACTOR EFFECT**

\*The claim may be used only for food which contains at least 50 g of meat or fish in a single quantified portion. In order to bear the claim information shall be given to the consumer that the beneficial effect is obtained by consuming 50 g of meat or fish together with food(s) **containing non-haem iron.**

# PROCESSED MEAT x RED MEAT

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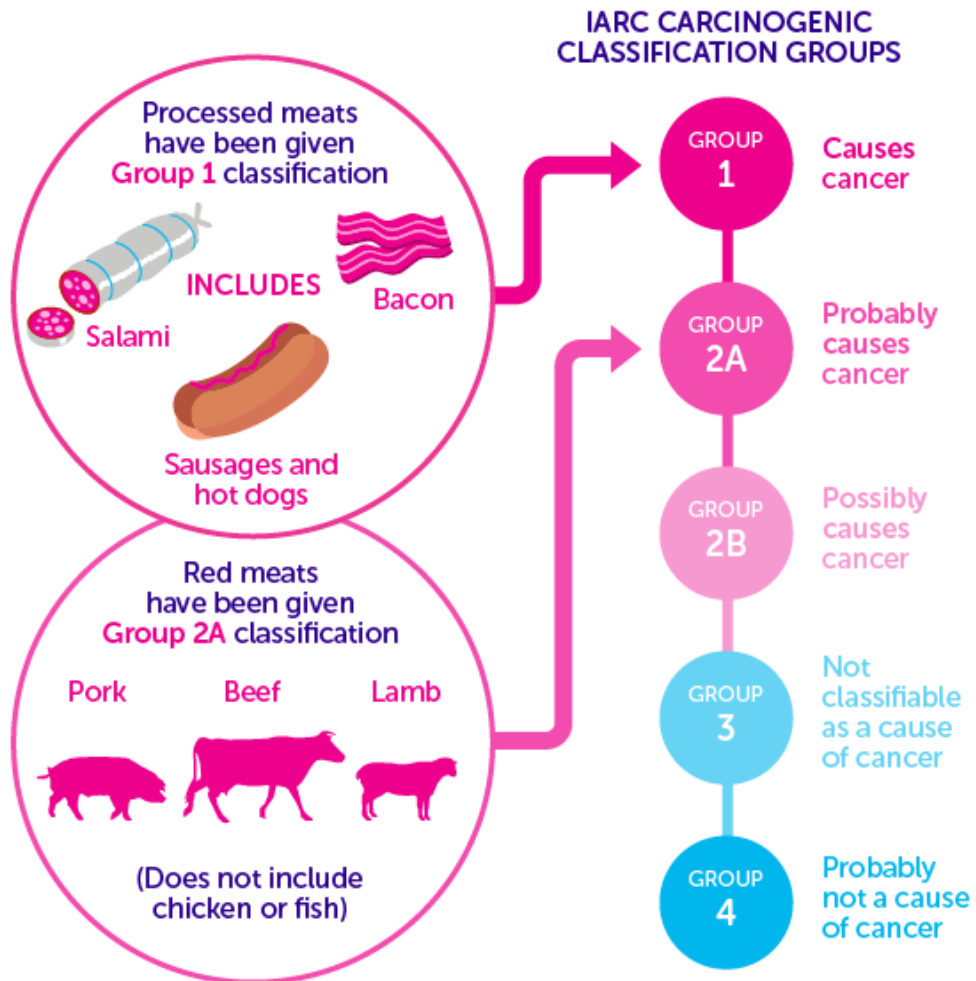
- **Processed meat** refers to meat that has been transformed through salting, curing, fermentation, smoking, or other processes to enhance flavour or improve preservation (bacon, salami, sausages, hot dogs)
- **Red meat** refers to all mammalian muscle meat, including beef, veal, pork, lamb, mutton, horse, and goat.

## IARC (International Agency for Research of Cancer)

- **Processed meat was classified as Group 1** - this classification is based on sufficient evidence from epidemiological studies that eating processed meat causes colorectal cancer. An analysis of data from 10 studies estimated that every 50 gram portion of processed meat eaten daily increases the risk of colorectal cancer by about 18%.
- **Red meat was classified as Group 2A, probably carcinogenic to humans.** *The cancer risk related to the consumption of red meat is more difficult to estimate because the evidence that red meat causes cancer is not as strong. However, if the association of red meat and colorectal cancer were proven to be causal, data from the same studies suggest that the risk of colorectal cancer could increase by 17% for every 100 gram portion of red meat eaten daily.*

# MEAT AND CANCER

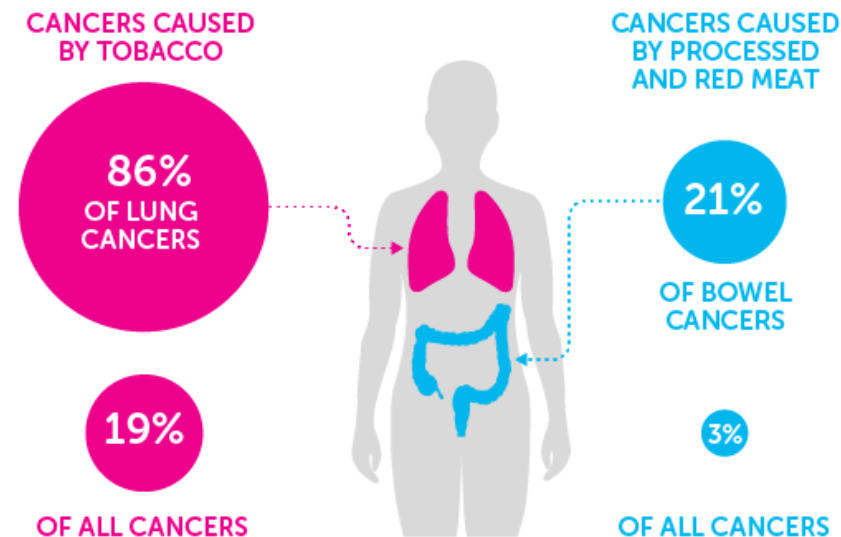
## HOW STRONG IS THE EVIDENCE?



These categories represent how likely something is to cause cancer in humans, not how many cancers it causes.

# TOBACCO vs MEAT WHAT'S THE RISK?

The **EVIDENCE** that processed meat causes cancer is as strong as the evidence for tobacco, but the **RISK** from tobacco is much higher...



THE NUMBER OF CANCERS PER YEAR IN THE UK THAT COULD BE PREVENTED IF...



= 1,000 PEOPLE

Source: [cruk.org/cancerstats](http://cruk.org/cancerstats)



# Cholesterol

Myth: „If you have high cholesterol, stop eating eggs“

- only the cell membranes of animal tissue contain cholesterol
- chicken liver (497 mg / 100 g), egg yolk (1281 mg / 100 g), butter (266 mg / 100 g),
- **!!! Cholesterol is not a fat. It's a sterol.**
- it is a "fat-like" substance present in all body cells that is needed for many essential body processes



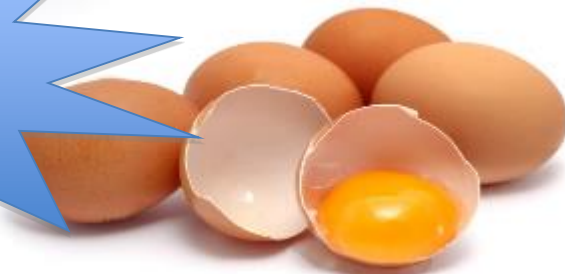
## Importance:

- **component of cell membranes**
- **it contributes to the digestion of fat and the skin's production of vitamin D**

...dietary determinants of blood cholesterol levels are saturated fatty acids and trans fatty acids

# Nutrients in eggs

All essential nutrients  
(except vitamin C 😊)



CHICKEN FEED



8,25 µg Se/100 g



40 mg EPA+DHA/100 g

# Legumes, nuts and seeds: **FIBRE**

## SOURCE OF FIBRE (nutrition claim)

= product contains at least 3 g of fibre per 100 g or at least 1,5 g of fibre per 100 kcal.

## HIGH FIBRE (nutrition claim)

= product contains at least 6 g of fibre per 100 g or at least 3 g of fibre per 100 kcal



FIBRE	
SOYBEANS - dried: 19,4 g/100 g - boiled: 7,9 g/100 g	ALMONDS: 12,2 g/100 g PISTACHIOS: 10,4 g/100 g HAZELNUTS: 8,7 g/100 g
LENTILS: - dried: 15 g/100 g - boiled: 5 g/100 g	POPPY SEEDS: 22,7 g/100 g SESAME SEEDS: 7,9 g/100 g PUPMKIN SEEDS: 3,9 g/100 g



# Legumes, nuts and seeds: ALA

ALA

= alpha-linolenic acid (omega-3 fatty acid)

- **flaxseed** oil, canola oil, soyabean oil, **walnuts**, ...
- **health claim:** ALA contributes to the maintenance of **normal blood cholesterol levels**\*

\*The claim may be used only for food which is at least a source of ALA as referred to in the claim SOURCE OF OMEGA 3 FATTY ACIDS as listed in the Annex to Regulation (EC) No 1924/2006. Information shall be given to the consumer that the beneficial effect is obtained with a daily intake of 2 g of ALA.



ALA → EPA and DHA  
!!! conversion efficiencies 10%

# Health claim: **WALNUTS**

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Walnuts contribute to the improvement of the elasticity of blood vessels\*

\*The claim may be used only for food which provides a daily intake of 30 g of walnuts. In order to bear the claim, information shall be given to the consumer that the beneficial effect is obtained **with a daily intake of 30 g of walnuts.**



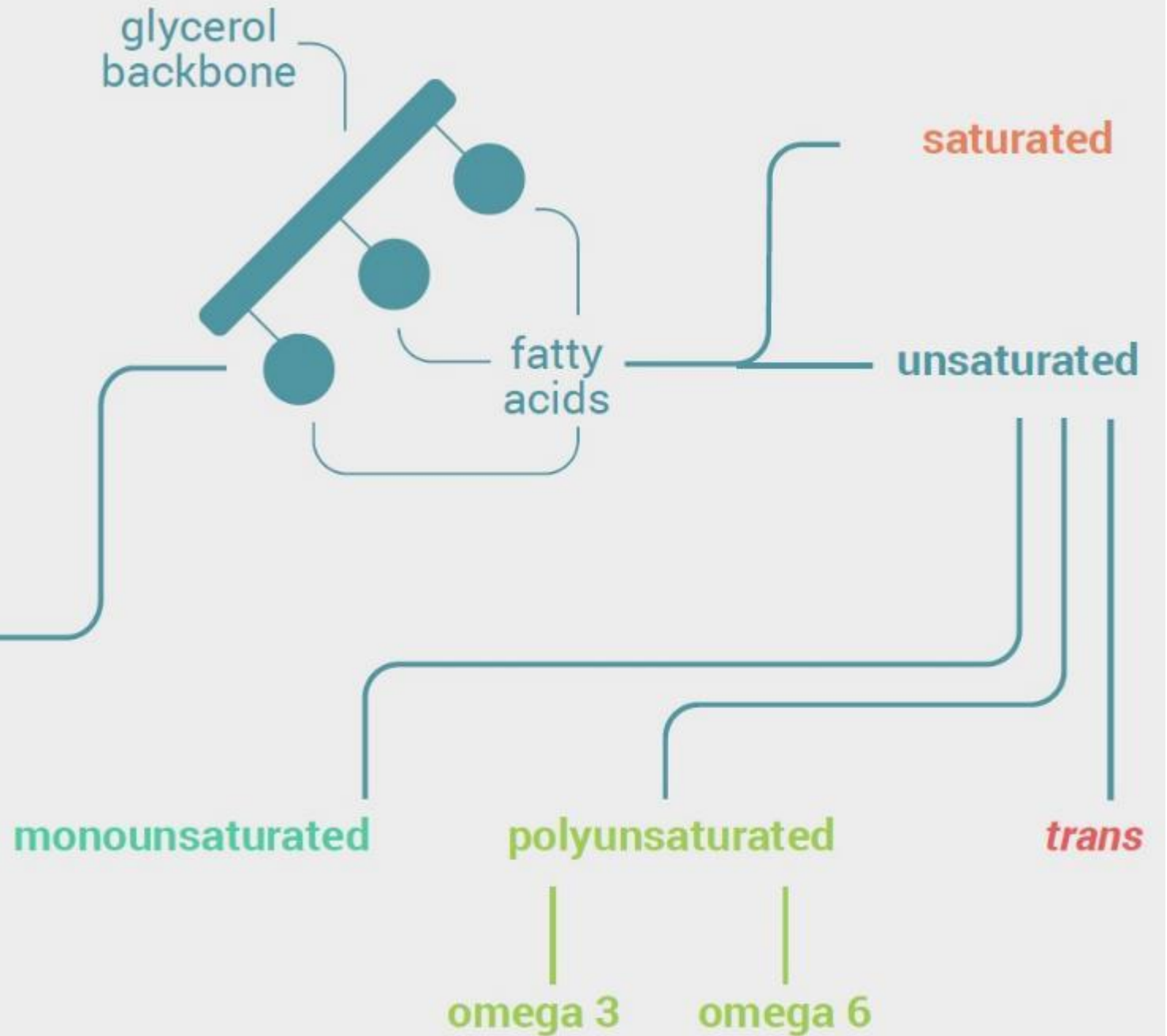
# **FAT, SALT AND SUGAR**



**Use moderation with their intake!**

# What are dietary fats?

over  
**90%**  
of fats are  
triglycerides



# LIPID

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- Lipid = a compound that is insoluble in water, but soluble in an organic solvent (e.g. ether, benzene, acetone, chloroform)
- "lipid" is synonymous with "fat", but also includes phospholipids, sterols etc.
- chemical structure: glycerol + fatty acids > triacylglycerols = triglycerides = TAGs
- Contain carbon, oxygen, and hydrogen



as a structural  
component  
of **cells**



support the  
**absorption**  
of vitamins



# Why do we need dietary fats?

help **brain**  
**development**  
and function



60% of  
brain is fat

source  
of **energy**



certain types  
help to keep a  
**healthy heart**  
and blood vessels



# Functions of Fats

---

- supply energy - fats provide 9 kcal per gram
- carry vitamins A, D, E and K through the body
- provide a reserve store of energy
- promote healthy skin
- secure normal cell growth
- act like a "cushion" and heat regulator to protect your heart, liver and other vital organs
- used to manufacture major sex hormones
- key to the structure of cell membranes
- components of hormones and precursors for prostaglandin synthesis
- help us feel full longer
- add flavour to food, increase palatability of foods

# 20-35 % (adults) of a person's total calories should come from fat sources.

Generally we eat too much fat

How much fat do we really need per day?



45 - 77 g  
of total fat  
  
< 22 g  
of saturated fat

55 - 97 g  
of total fat  
  
< 27 g  
of saturated fat



# Fatty acid nomenclature

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- nomenclature reflects location of double bonds
- there are also used common names (e.g., oleic, stearic, palmitic)
- linoleic is also known as 18:2 n-6
- this means the FA is 18 carbons in length, has 2 double bonds, the first of which is on the 6th carbon
- arachidonic = 20:4 n-6

# Difference in double-bond location

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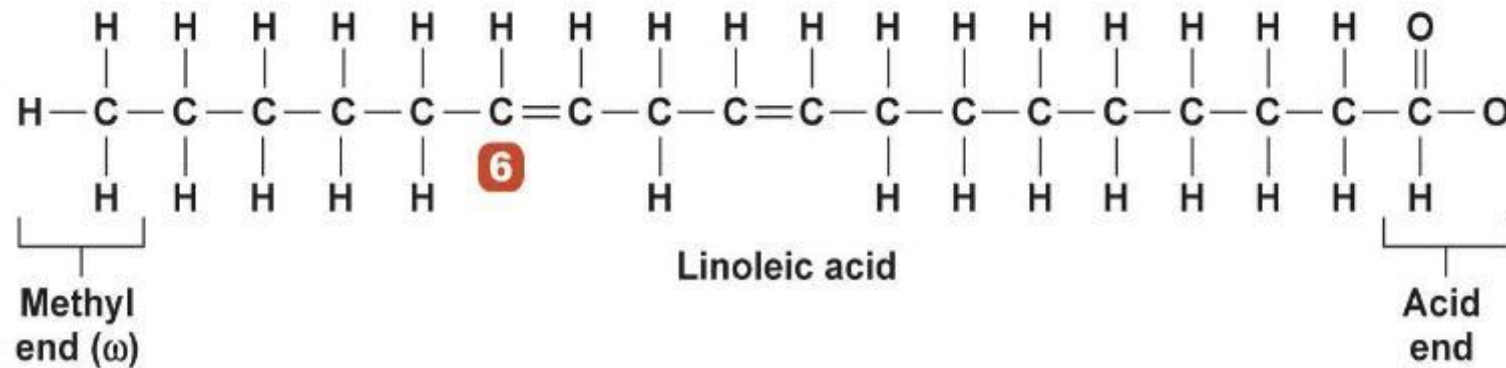
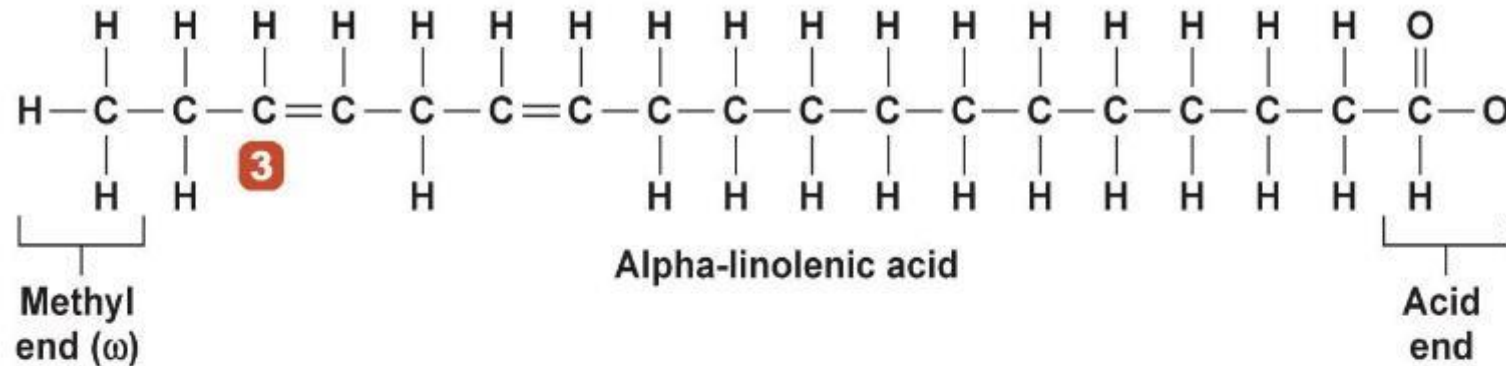
- The location of the first double bond in unsaturated fatty acids differ the omega-3 fatty acid and omega-6 fatty acid
- Omega-3 fatty acid
  - First double bond is between the third and fourth carbon from the omega end
  - Example: Alpha-linolenic acid
    - One of the two essential fatty acids

# Difference in double-bond location

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- Omega-6 fatty acid
  - First double bond is between the sixth and seventh carbon from the omega end
  - Example: Linoleic acid
    - One of the two essential fatty acids

# The Omega fatty acids



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# Types of fatty acids

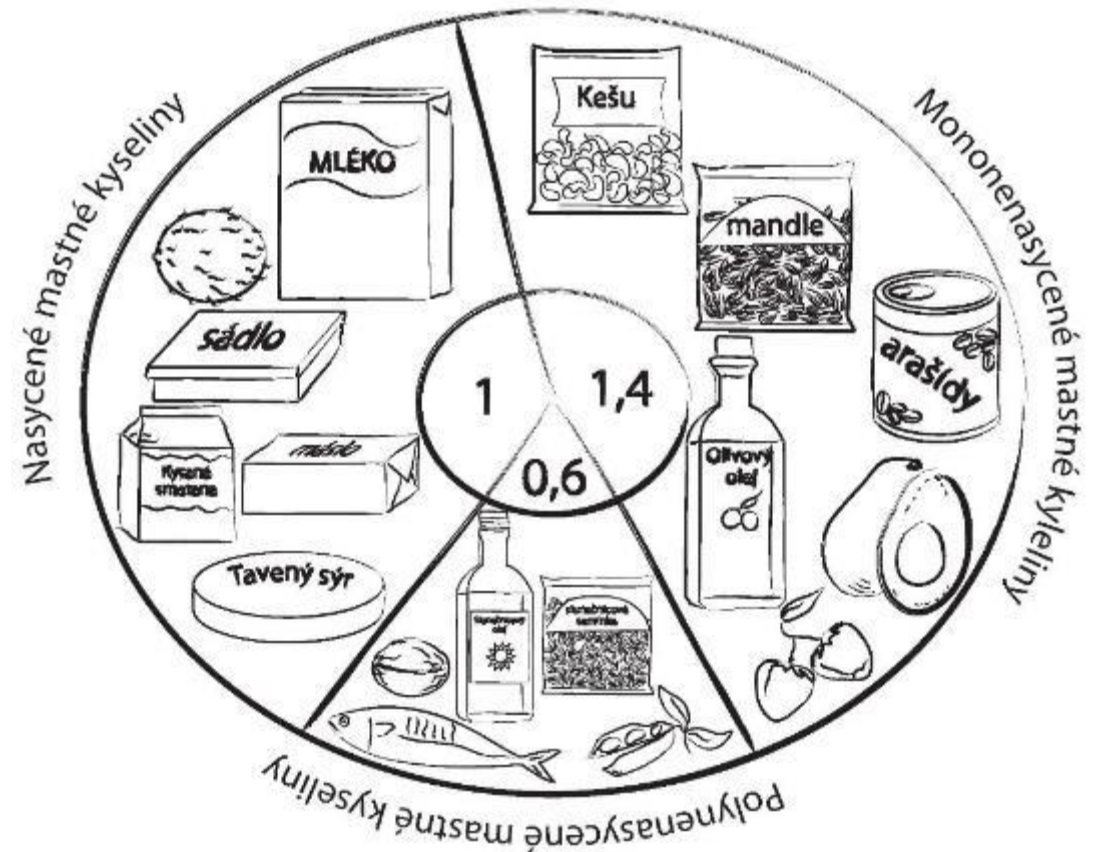
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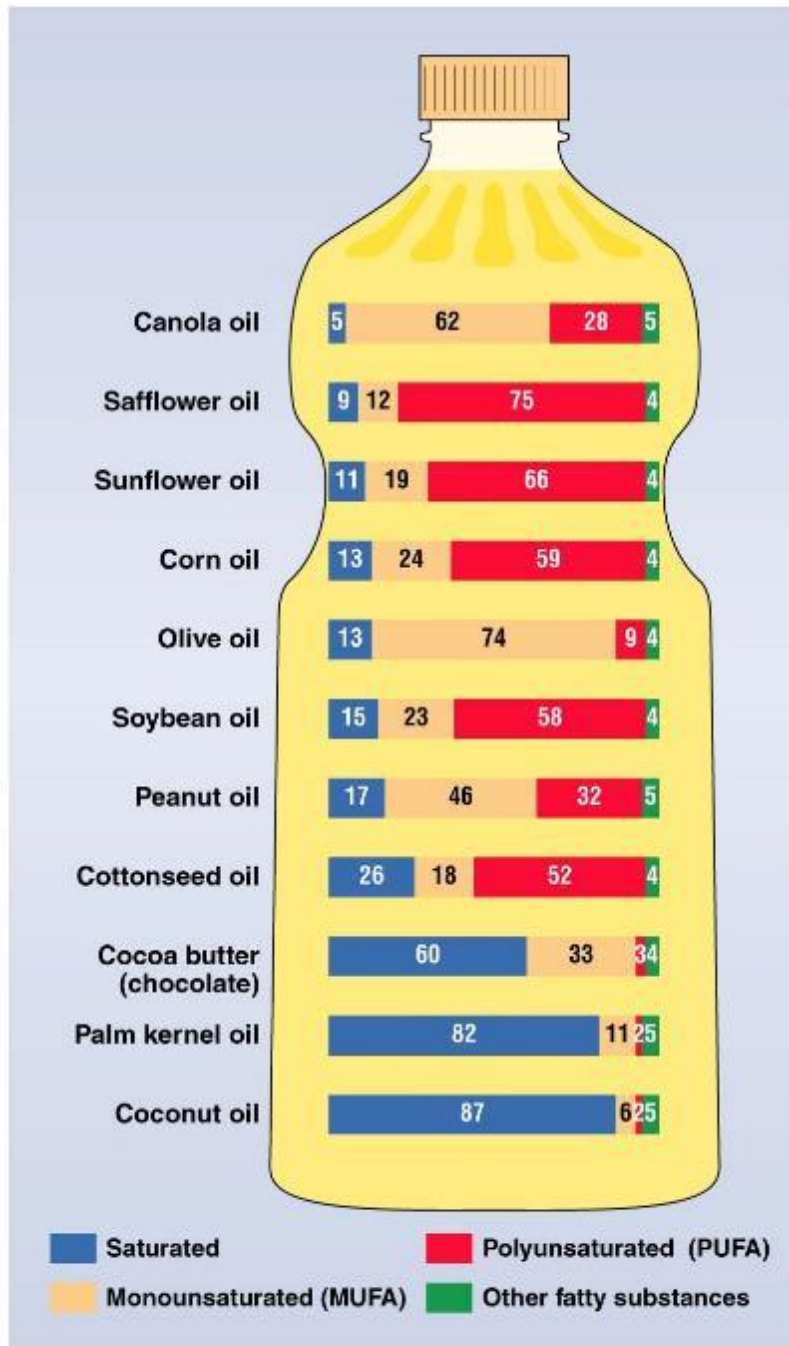
- **organic acid units** that make up fat
- there are three types:
  1. **Saturated FA - SFA (SAFA)**
  2. **Monounsaturated FA - MUFA**
  3. **Polyunsaturated FA – PUFA**
- recommended ratio: **1 SFA : 1,4 MUFA : 0,6 PUFA**



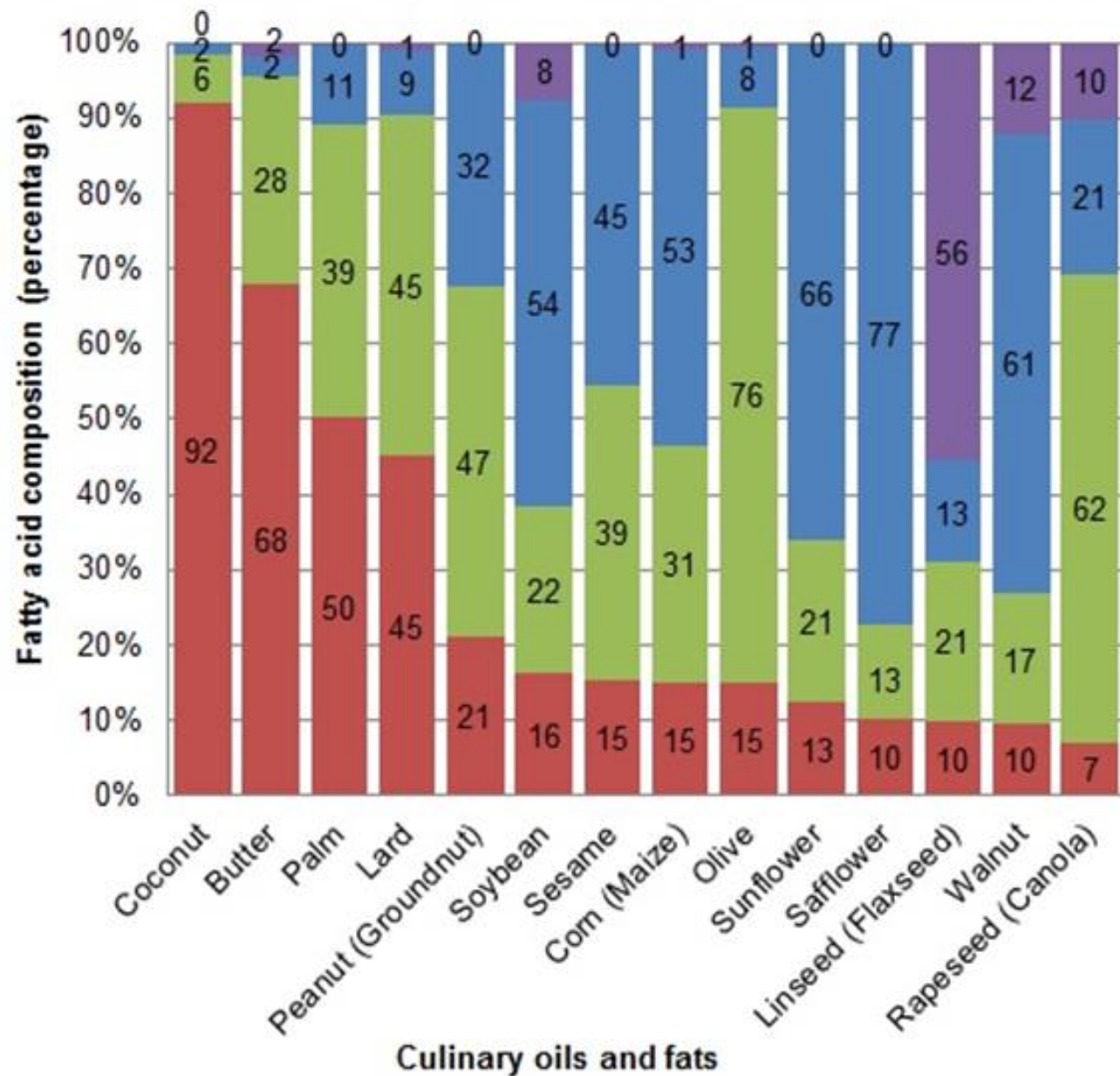
# Sources of fatty acids

- **Saturated fatty acids** sources: butter, beef fat, lard, meat, milk and dairy products, coconut, palm and palm kernel oils  
**1**
- **Monounsaturated fatty acids** sources: olive, canola oil, nuts - pistachios, almonds, hazelnuts, cashews, as well as peanuts, avocados  
**1,4**
- **Polyunsaturated fatty acids** sources: walnuts, soybeans, flax, sunflower, sesame oils, salmon, mackerel, herring (ie. especially oily fish and seafood)  
**0,6**





■ n-3 Polyunsaturated ■ n-6 Polyunsaturated ■ Monounsaturated ■ Saturated



# Cooking with oils

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- Stability of the fatty acids varies between oils. Heat stability is indicated by the **'smoke point'** - the temperature at which decomposition becomes visible as bluish smoke. If the cooking temperature is too high, the oil will eventually degrade. Generally, the longer it is heated, the more it will deteriorate. On the other hand, if the temperature is too low, cooking time is extended and more oil will be absorbed. In general, refined oils have higher stability and smoke point.
- It is important to note that **the higher the level of unsaturation of the fatty acids, the lower the heat stability of the oil**. Refined monounsaturated-rich oils, such as refined, non-virgin olive oil, peanut oil, as well as high oleic rapeseed and sunflower oils, are therefore more stable, and can be re-used to a greater extent than polyunsaturated-rich oils, such as corn oil and regular sunflower.

# How much fats are there in common foods\*?



\*standard portion sizes

# Hydrogenation of unsaturated FA

---

= conversion of PUFA to MUFA & SFA

- **purposes:**

- production of solid fats (shortening) from liquid oils
- production of more chemically stable fats (resist oxidation, rancidity)
- the process in which missing hydrogen atoms are added to an unsaturated fat to make it firmer

# Trans-unsaturated fatty acids (TFAs)

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- Trans fatty acids are produced by **partial hydrogenation** of liquid plant oils
  - hydrogenation of unsaturated FA = **conversion of PUFA to MUFA & SFA**
  - **purposes:** production of solid fats (shortening) from liquid oils  
production of more chemically stable fats (resist oxidation, rancidity)
- Trans fatty acids occur **naturally in animal products** such as meat and dairy products
- Trans fatty acids are **formed during heating of cooking oils (> 220 °C)**

# TFA<sub>s</sub>

## Trans-fatty acids

Trans-fatty acids are found in fried foods, commercial baked goods, processed foods and margarine



ADAM.



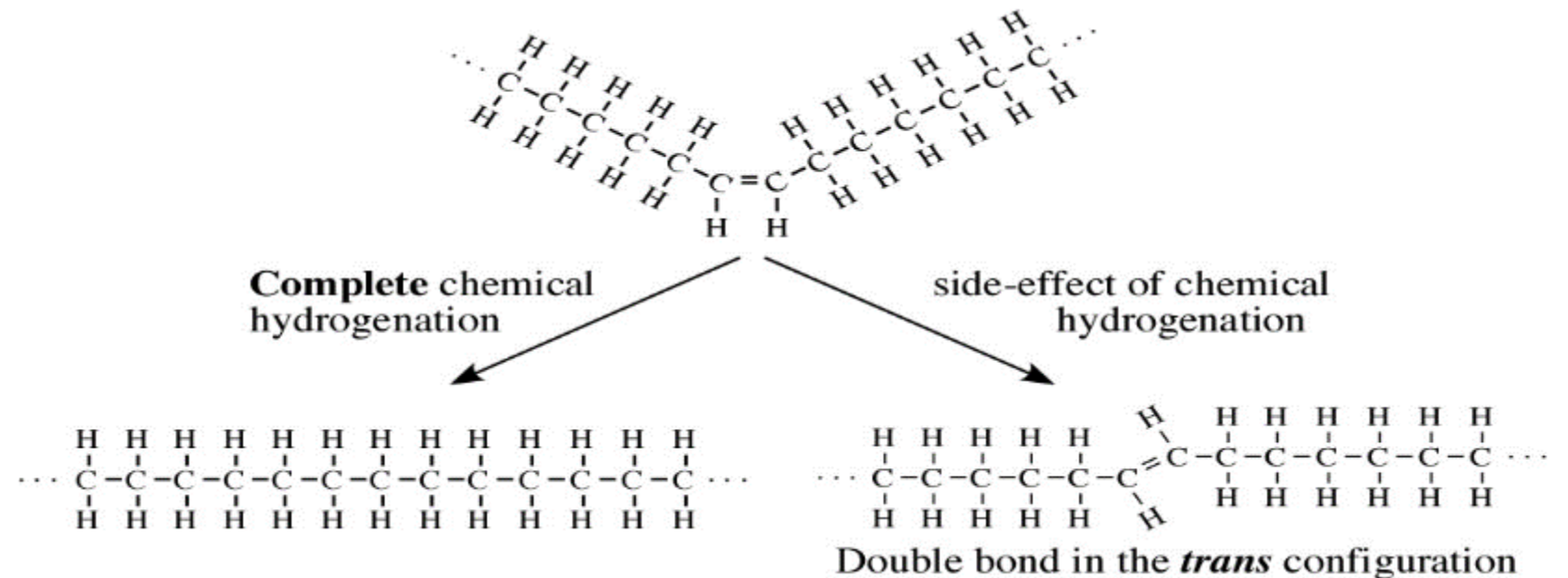
# Trans-unsaturated fatty acids

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- A large number of TFA isomers of MUFA and PUFA, including positional isomers of individual fatty acids, occurs in foods. These TFA originate from several sources:
- **bacterial transformation** of unsaturated fatty acids in the rumen of ruminant animals.
- **industrial hydrogenation** used to produce semi-liquid and solid fats that can be used for the production of foods such as margarine, shortenings and biscuits
- **deodorisation** (a necessary step in refining) of unsaturated vegetable oils (or occasionally fish oils) high in polyunsaturated fatty acids
- **heating and frying** of oils at too high temperatures ( $> 220\text{ }^{\circ}\text{C}$ ). These modifications are time-dependent with about 5 % of isomerisation of n-3 18:3 after 2 hours and 25 % after 12 hours of heating.

# Hydrogenation

- forms a new type of fatty acid called trans-fatty acid
  - (“man-made” fat)
- trans-fatty acids have many of the same properties as SATURATED fats



# Down with TFAs – less than 1 %

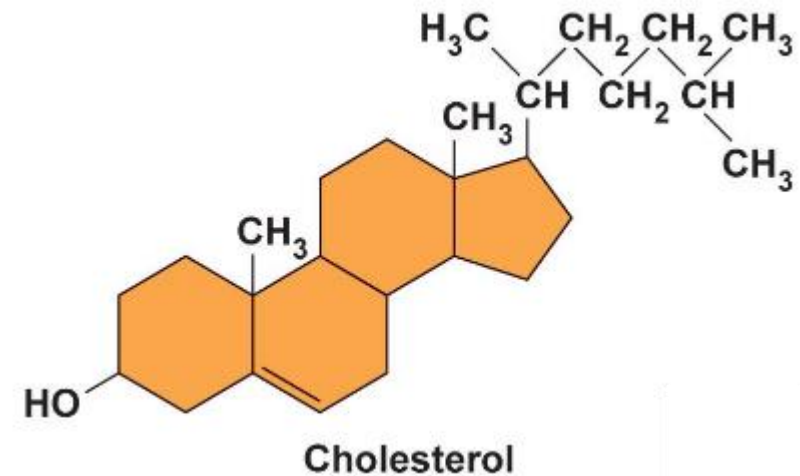
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- **TFAs have been associated with a detrimental effect on plasma lipids, with raised levels of LDLs, and lowered high-density lipoproteins (HDLs)**
- Because of this, food manufacturers have in recent years worked to lower levels of TFAs in foods, and TFAs are declared on some labels.
- ***Trans* fatty acids intake should be as low as possible** within the context of a nutritionally adequate diet.
- The available evidence is insufficient to establish whether there is a difference between **ruminant and industrial** *trans* fatty acids consumed in equivalent amounts on the risk of coronary heart disease.

# Sterols

**Sterols are not fat!**

- More complex than phospholipids or triacylglycerols
  - Four connected rings of carbon and hydrogen
- Do not provide energy
- Cholesterol is the best known sterol
  - Found in every cell



# What is cholesterol?

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- Cholesterol is NOT a fat.
- a “fat-like” substance present in all body cells that is needed for many essential body processes
- contributes to the *digestion of fat* and the skin’s production of vitamin D
- adults manufacture all the cholesterol they need, mostly in the liver
- all animals also have the ability to manufacture cholesterol

# Cholesterol In Foods:

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- all animals make cholesterol > if you eat any animal product, including MEAT, POULTRY and FISH, you will be consuming some "extra" or unneeded cholesterol.
- other foods high in cholesterol are:
  - egg yolks
  - liver / organ meats
  - some shellfish



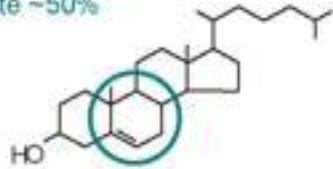
# Phytosterols – major plant sterols

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- phytosterols are derived from plants
- **beta-sitosterol** is obtained from nuts, cereals, fats and oils
- plant stanol and sterol esters have been marketed in recent years to **help in cholesterol lowering**, as they compete with cholesterol for absorption and promote the increases loss of cholesterol in faeces

# Phytosterols

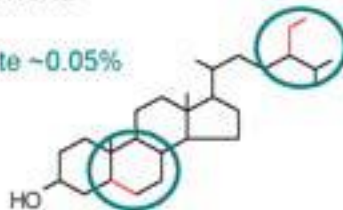
Cholesterol  
Absorption rate ~50%



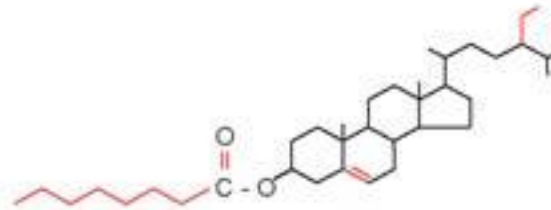
Plant sterol  
Main component:  
sitosterol  
Absorption rate ~0.5%



Plant stanol  
Main component:  
sitostanol  
Absorption rate ~0.05%



Plant sterol ester



Chemical structure of cholesterol, sitosterol (plant sterol), and sitostanol (plant stanol). Both plant sterols and plant stanols differ from cholesterol only in the side chain attached to the sterol ring. Plant stanols are saturated plant sterols without a double bond in the sterol ring. Due to their saturation status, plant stanols are less effectively absorbed. Esterified plant sterols and plant stanols are supplemented in 'nutraceuticals' to reduce serum cholesterol levels



# Plant sterols/stanols – HEALTH CLAIMS

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- following wording reflects the scientific evidence: “Plant sterols/stanols help to maintain normal blood cholesterol levels”.
  - **Plant sterols improve blood cholesterol levels**
  - **Daily phytosterols intake helps achieve acceptable LDL-cholesterol levels**
- In order to bear the claim, a food should provide at least 0.8 g per day of plant sterols/stanols in one or more servings. These amounts can be reasonably achieved in the context of a balanced diet. The target population is adults.
- Food products containing plant sterols and/or plant stanols may not be nutritionally appropriate for pregnant and breastfeeding women, and for children under the age of five years.

# LDLs and HDLs

---

- certain amount of cholesterol circulates in the blood
- it does not float through the bloodstream on its own, but in chemical “packages” called lipoproteins
- there are two major kinds of lipoproteins:
  1. **LDLs** (Low-Density Lipoproteins)
  2. **HDLs** (High-Density Lipoproteins)

# Low-Density Lipoproteins

---

- take cholesterol **from** the **liver** to wherever it is needed in the body
- if too much LDL cholesterol is circulating, the **excess** amounts of cholesterol can **build up** in **artery** walls
- this buildup **increases** the risk of **heart disease** or **stroke**
- thus, LDL cholesterol has come to be known as "**bad cholesterol**"

# High-Density Lipoproteins - “Heroes”

- picks up excess cholesterol and takes it **back** to the **liver**, keeping it from causing harm
- thus, HDL cholesterol has come to be known as “**good cholesterol**”



# Important!

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For most people, the **amounts** and **types** of *fats* eaten have a **greater** effect on blood cholesterol than does the cholesterol itself.

The fats found in food, such as butter, chicken fat, or corn oil, are made up of different combinations of *fatty acids*.

# How do fats affect our health?

mono  
unsaturated



decrease cholesterol  
and cardiovascular  
disease levels,  
especially when  
replacing saturated fats

poly  
unsaturated



saturated



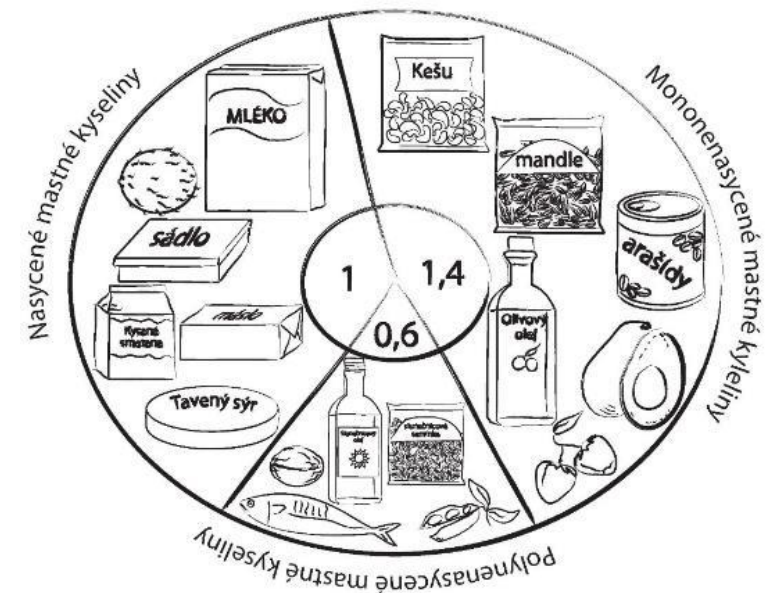
increase  
cholesterol  
levels

*trans*

increase  
cardiovascular  
disease risk and  
cholesterol levels

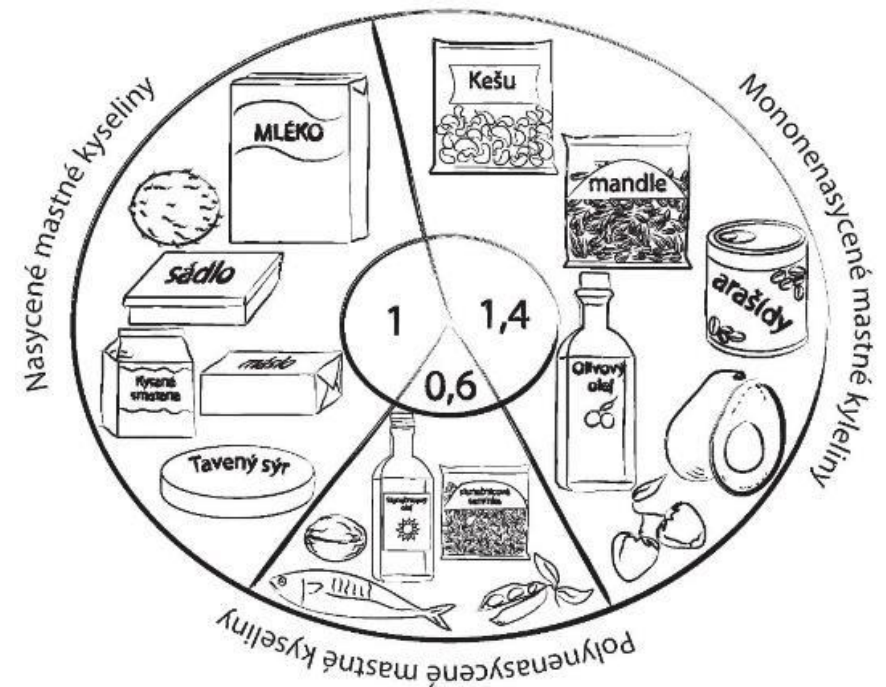
# Saturated fatty acids

- **raise LDLs** - lauric, myristic and palmitic acid raise blood total and LDL cholesterol concentrations
- **raise HDLs** - lauric acid strongly increases blood HDL cholesterol



# Monounsaturated fatty acids

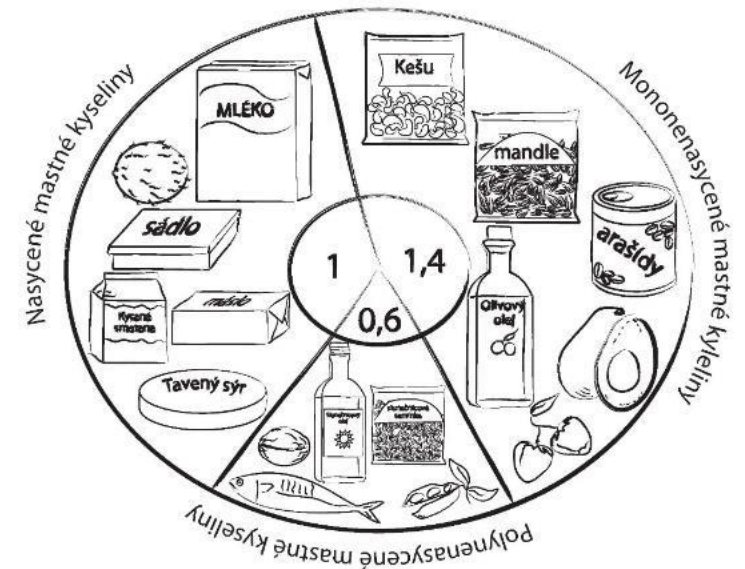
- appear to **lower LDL** ("bad") cholesterol and help **raise** levels of **HDL** ("good") cholesterol





# Polyunsaturated Fatty Acids

- *n*-6 PUFA **lower** blood **total and LDL** cholesterol concentrations
- effects of alpha-linolenic acid on the blood lipoprotein profile are comparable to those of linoleic
- EPA and DHA **lower** blood **triacylglycerol** concentrations



# Lipoprotein profile

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- The most favourable lipoprotein profile to lower atherosclerotic risk is achieved when a mixture of SFA and TFA is replaced by a mixture of oleic acid, linoleic acid and n-3 LCPUFA. These effects are dose-dependent. The various SFA may also differ in their effects on the blood lipoprotein profile. In particular, the effects of **stearic acid** may be less disadvantageous than those of myristic and palmitic acids. However the available data are insufficient to set different DRVs for different SFA.

# Effect on blood cholesterol

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- all fats include all 3 kinds of fatty acids, but in varying amounts
- each type of fat has a different effect on cholesterol levels
- decreasing the intake of SFA and TFA, and increasing the intake of fish oil, lower cardiovascular risk

# Essential fatty acids

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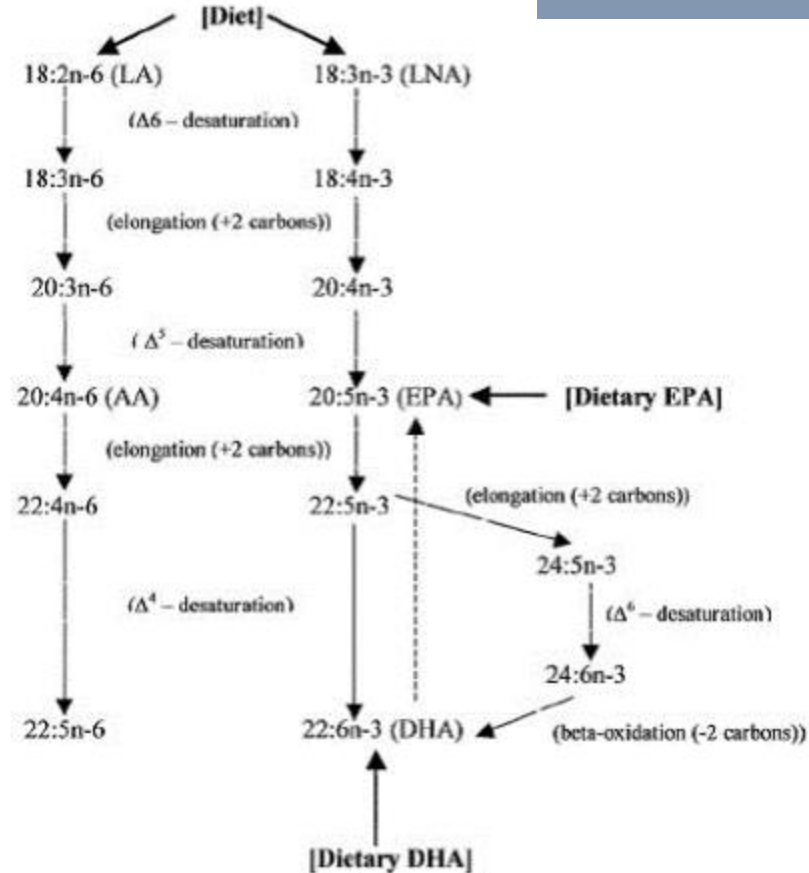
## 1. Alfa-Linolenic Acid (LNA, ALA)

## 2. Linoleic Acid (LA)

- “essential” because the body cannot manufacture them
- have to be supplied by food a person eats
- both polyunsaturated fatty acids
- found in the natural oils of plants and fish
- body needs them for its basic functions, including production of various hormones

# Interconversion between fatty acids

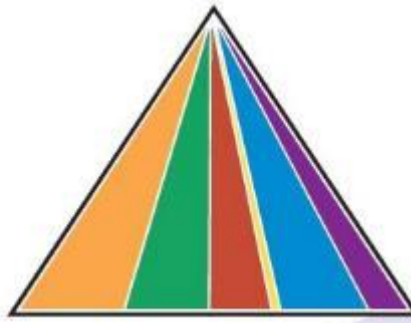
desaturation and elongation



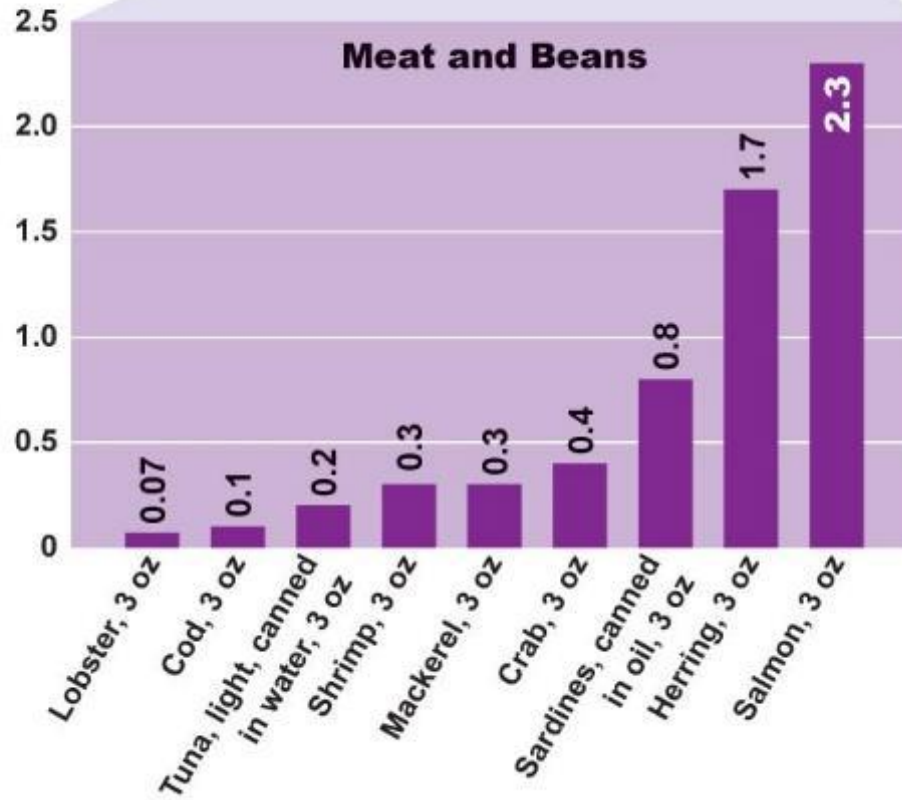
# Essential fatty acids, eicosanoids, and cell membrane

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- linoleic acid can be elongated and converted to arachidonic acid
- alpha-linolenic acid
  - converts to eicosapentaenoic acid (EPA)
    - EPA elongates to docosahexaenoic acid (DHA)
  - needed for healthy cell membranes
  - intake of 250 mg per day of EPA plus DHA (1 to 2 fatty fish meals per week) appears to be sufficient for primary prevention (cardiovascular) in healthy subjects.



**Grams (g) of Omega-3s  
(EPA and DHA)**



**Avoid** processed foods containing **trans fat**



**Limit** the consumption of foods containing high amounts of **saturated fats**

**Use vegetable oil,** not animal fat

from the World Health Organization

**Boil, steam or bake** rather than fry

**Remove the fatty part** of the meat



# Use moderation with fat intake

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- read food labels
- use olive oil, canola oil for cooking
- avoid margarine with trans fatty acids
- choose lean meat, fish, poultry
- eat less bacon, sausages, hot dogs, organ meats
- choose nonfat, lowfat dairy products
- use substitutes for higher-fat products

# SALT

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# Salt vs. Sodium

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- **Salt** is sodium chloride (NaCl)
- **Sodium** is an element which occurs naturally and is used by the body
- **1 g of sodium = 2,5 g of salt**



# Salt: a history

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- The word salt comes from the word '*salarium*' in latin (salary)
- This is because roman soldiers used to be partly paid in salt



# Salt: a history

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Salt was once needed as a preservative to make food last longer – we call this increasing “shelf life”



# Salt: a history

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We now have fridges, freezers and cans to make food last a long time



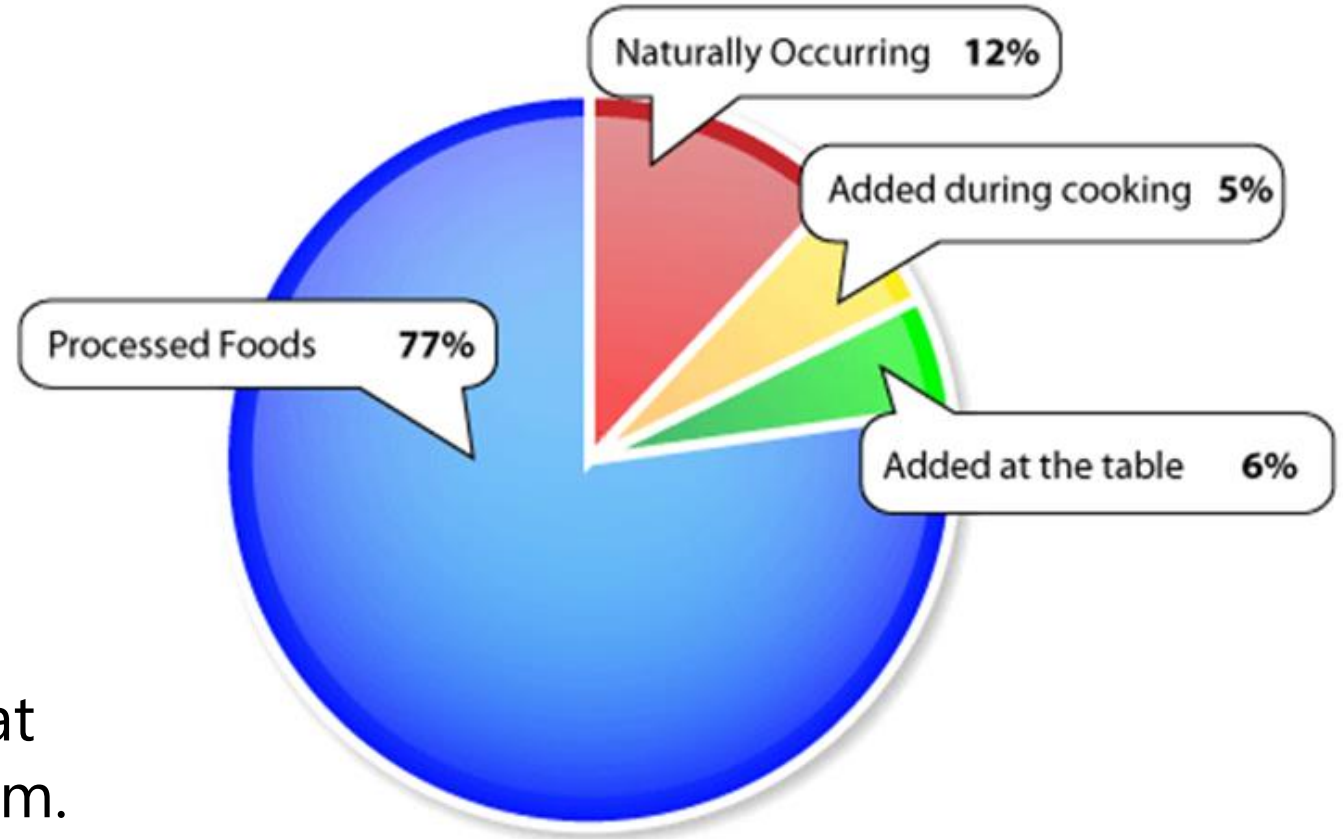
# Salt: a history

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But there are much nicer and healthier sources of flavours such as herbs and spices...

# Where is the sodium?



**Fact:** Most of the foods we eat contain too much sodium.



# Where is the salt?

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- around 75 % of our salt intake comes from processed foods, e.g. bread, breakfast cereals and ready meals.
- **TIP for you:** it is important to know how much salt the food product provides. **You can check the salt content on the food label before you buy, to help you make a good choice.**
- many commercially-made food products have been reformulated to reduce their salt content

# Why Sodium Reduction?

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- hypertension
- stomach cancer
- obesity
- osteoporosis
- ...

...consume less than 2000 mg sodium per day.



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Reduction to **5-6 g salt** (2-2.4 g sodium) per day  
is recommended



# Iodine and salt

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- IDD is the world's leading cause of preventable **mental retardation** and impaired **psychomotoric development** in young children.
- iodine-deficiency results in goiter
- in its most extreme form, iodine deficiency causes **cretinism**
- it also significantly raises the **risks of stillbirth and miscarriage** for pregnant women
- food sources of iodine: seafood, fish, milk, dairy products

# Differences in Na between Countries

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- **USA - 6-piece Chicken Nuggets**

- 600 mg sodium
- (280 calories)

- **United Kingdom - 6-piece Chicken Nuggets**

- 280 mg sodium
- (260 calories)

**= 320 mg less sodium**

# Recommendations for sodium restriction



- Use nutrition information on food labels
- Avoid obviously salted foods such as a bouillon, soup and gravy bases, canned soups and stew; bread and rolls with salt toppings, salted crackers; salted nuts or popcorn, potato chips, pretzels and other salted snack foods
- Avoid smoked or cured meat, such as bacon, cold cuts, and other processed meat
- Avoid salted and smoked fish
- Avoid olives, sauerkraut and vegetables prepared in brine, tomato and vegetable cocktail juices
- Avoid soy sauce, Worcestershire sauce
- Serve salty cheese in limiting amounts
- Avoid drinking of sodium-rich mineral waters
- Prepare food with little salt
- Consume potassium-rich foods such as fruits and vegetables
- Use herbs and spices to flavour your food
- Regular table salt (sodium chloride) may be replaced by other mineral salts which do not contain sodium, e.g. potassium chloride.

# SUGAR

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# SUGARS = mono- and disaccharides

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The proposed labelling reference intake for (total) sugars (90 g) corresponds to 18 E% for a 8400 kJ (2000 kcal) diet. The proposed value is at the lower end of the range of average intakes of total sugars in adults in EU countries (about 17 - 26 E%). **Total sugars include both indigenous** (sugars naturally present in foods such as fruit, vegetables, cereals and lactose in milk products) and **added sugars**. There are generally no recommended intakes for total sugars.

Some authorities have recommended upper limits of intake of added sugars (generally 10 E%) for individuals in the general population, while others recommend that intake of added sugars, or certain foods containing added sugars, be limited but do not recommend an upper limit.



# Sugar

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- It has been estimated that indigenous sugars provided by recommended daily intakes of fruits, vegetables, cereals and dairy products would amount to about 45 g in adults.
- Assuming that the remaining 45 g of sugars (up to the 90 g proposed for the labelling reference intake) are added sugars, this would correspond to 9 E% for a 8400 kJ or 2000 kcal diet.

# Sugar

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## Intrinsic sugars

- from intact fruits & vegetables

## Added sugars

- the term “added sugars” or “extrinsic” sugars” refers to sucrose, fructose, glucose, starch hydrolysates (glucose syrup, high-fructose syrup) and other isolated sugar preparations used as such or added during food & beverages preparation and manufacturing.

## Free sugars

- added sugars + concentrated sugars (i.e. from honey, syrups, and juices)

# Sugar - European legislation

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Sugar alcohols (polyols) such as sorbitol, xylitol, mannitol, and lactitol, are **usually not included** in the term "sugars".

# Sugar

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## Why is sugar added to foods?

- flavour enhancement
- provide texture and colour
- permits fermentation
- adds bulk
- acts as a preservative
- balance acidity

**Sugar is addictive!**

# Empty Calories?



	Honey	Coke	Apricots
<b>Size of 100 kcal portion</b>	1.5 tbsp	1 cup	6
<b>Carbohydrate - sugars (g)</b>	26	26	24
<b>Protein (g)</b>	trace	0	2
<b>Calcium (mg)</b>	2	6	30
<b>Vitamin A (mg)</b>	0	0	554
<b>Vitamin C (mg)</b>	trace	0	22

# Sugar recommendations

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DRI:

- < 10 % of average daily energy intake should be from sugars

Tips for limiting sugar intake:

- use **food labels** to determine amount of sugar in products
- use **ingredient lists** to identify multiple sugar sources and added sugars
- use **less added sugar**
- **limit soft drinks**, juice, sugary cereals, candy
- choose fresh fruits





**WATER**

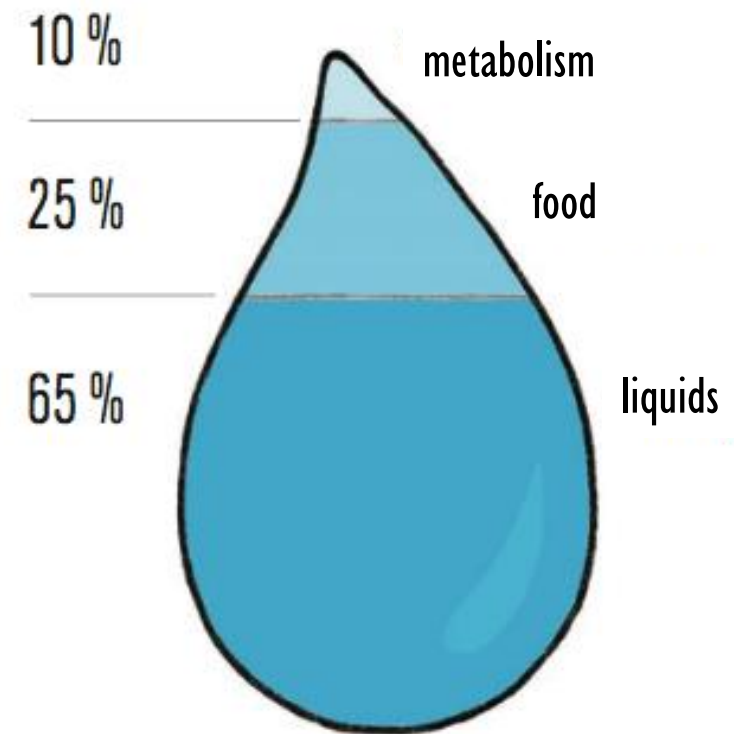
# Water balance

## • IN

- fluids: 1 400 ml
- food: 700 ml
- metabolism: 200 ml

## • OUT

- urine: 1 400 ml
- feces: 100 ml
- perspiration: 100 ml
- insensible loss (skin, respiration): 700 ml





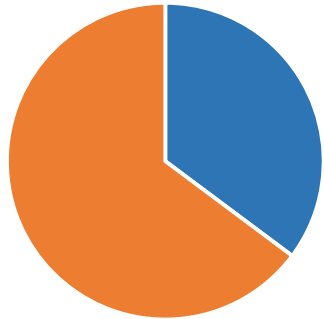
# Functions of body water

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- is essential to the life of every cell
- gives body form and structure
- environment for chemical reactions to take place
- nutrients and waste products transport
- dissolves important substances in tissues and cells
- body temperature regulation
- dissolves medications

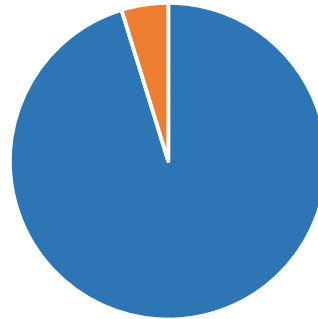
# Content of water in food

Wheat bread



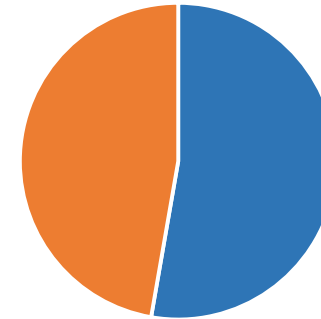
■ water ■ dry matter

Cucumber



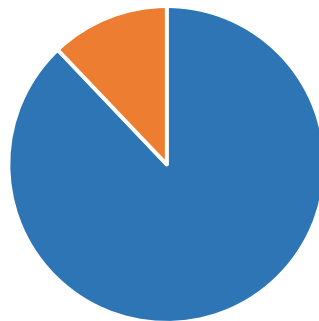
■ water ■ dry matter

Chicken breast



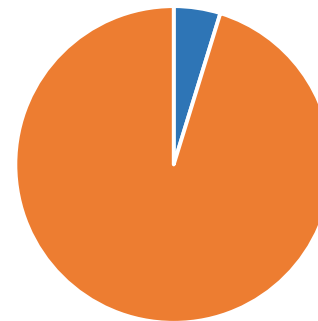
■ water ■ dry matter

Yoghurt



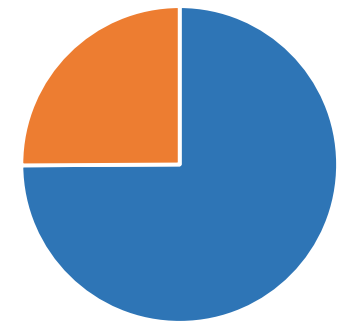
■ water ■ dry matter

Walnuts



■ water ■ dry matter

Banana



■ water ■ dry matter

# How much water?

**30–35 ml/kg BW\*/day**

average man of 70 kg

**= 2,1–2,5 l**

(total intake from food and drinks)



Older adults with a diminished sense of thirst, vigorous physical activity of long duration, the critically ill with a high rate of metabolism, persons in very hot environments with high losses of water via sweat, exposure to cold weather in high altitudes, impaired renal concentration ability, fever, diarrhea, vomiting, or people doing strenuous physical work require special attention.

\*BW...body weight (ideal)

**Use nutrition information on food labels to help you make healthier food choices.**



# REQUIRED LITERATURE

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- Krause's food & nutrition therapy. Edited by L. Kathleen Mahan - Sylvia Escott-Stump. 12th ed. St. Louis, Mo.: Saunders/Elsevier, 2008. xxiv, 1352. ISBN 9781416034018. pp. 22-157, 357-362.
- <http://is.muni.cz/predmet/med/jaro2016/aVLOZ0241c?lang=en>



# Useful references

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- **EFSA - <http://www.efsa.europa.eu/>**
- **EUFIC – [www.eufic.org](http://www.eufic.org)**
- **USDA National Nutrient Database - <https://ndb.nal.usda.gov/>**

## **Journals:**

- American journal of clinical nutrition
- Nutrition reviews
- Journal of the American College of Nutrition
- Journal of the Academy of Nutrition and Dietetics
- Clinical nutrition
- European journal of clinical nutrition
- Nutrition bulletin

# Thanks for your attention!

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