SLOVAK
UNIVERSITY OF
AGRICULTURE IN NITRA

Biological active compounds in food: benefits and risks

Ing. Miriam Solgajová, PhD.

Faculty of Biotechnology and Food Sciences

SLOVAK UNIVERSITY OF AGRICULTURE IN NITRA

Bioactive compounds

Bioactive compounds occur:

- in many different forms with different effects on the human or consumer physiology

- Bioactive compounds due to their benefits are add to conventional food and such food is called

Functional food

Selected fuctional components

- Dietary fibre
- Oligosaccharides
- Alcoholic sugars
- Peptides and proteins
- Probiotics and prebiotics
- Polyunsaturated fatty acids (PUFA s)
- Minerals
- Vitamins
- Polyphenols and other plant antioxidants

Bioactive carbohydrates

- are sources of energy in our diet, but certain structural characteristics enable their use beyond basic nutrition.
- the most important structural feature is resistance to digestion in the upper tract of gastrointestinal tract.
- it becomes food for microflora (beneficial bacteria) that converts them into bioactive compounds

Bioactive carbohydrates

- Trehalose
- Polysaccharides
- Soluble fiber
- Insoluble fiber
- Resistant starches
- Slowly digestible starch
- Prebiotics (fructooligosacharides)
- Polyphenols as prebiotics

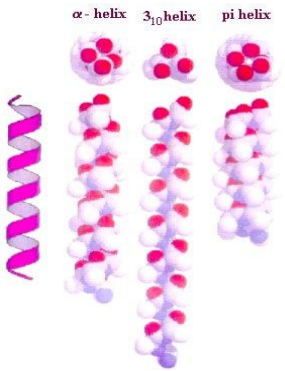
Sources of carbohydrates

- Fruit
- Vegetable
- Cereals
- Meat
- Milk – glucose, lactose, oligosaccharides
- Eggs
- Honey

Bioactive proteins and peptides

Bioactive proteins presence:

- Animal – lactoferin, lysozyme, lactoperoxydase, angiotension converting enzyme (ACE)- inhibitors, phospopeptides
- Plant – ACE-inhibitors, protease inhibitors etc.



Main biofunctionalities of proteins

- Anti-hypertension
- Immunity response
- Probiotic support of intestinal flora
- Inflammation amplification agents production control
- Satiety inducing peptides
- Insulino-tropic effect
- Antioxidants
- Recovery after exhaustion, stress
- Calcium binding

Bioactive proteins and peptides

- Bioactive peptides: are food drived peptides that in addition to their nutritional value exert a physiological effect in the body.

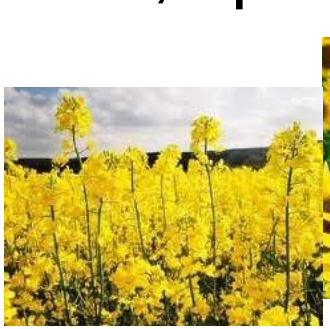
- Sources:
- milk, fish, gelatin, wheat, soy

- Daily intake: 10-15% of energy intake

Bioactive lipids

Main groups of lipids:

- triglycerides, phospolipides, sphingolipides,
- cholesterol, waxes



Sources:

- Saturated fats: meats, baked goods, full-fat dairy products, coconut, palm and its kernel
- Monounsaturated fats: canola, olive, peanut, high oleic sunflower, sunflower oils and nuts
- Polyunsaturated fats: vegetable oils, walnuts, flaxseeds, fish and fish products

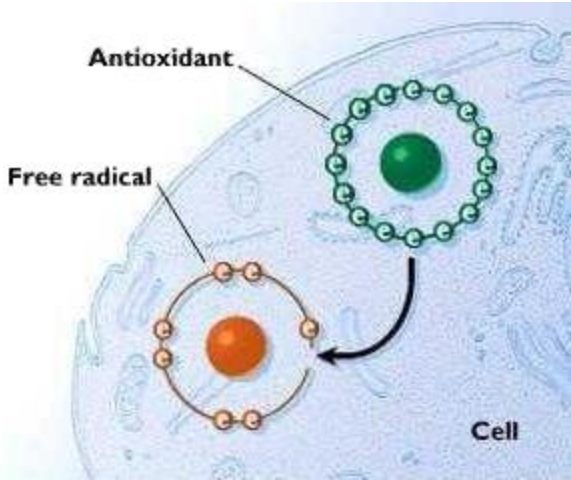
Effects of lipids

- Excellent energy reserves
- Structure of cell membranes
- Organ padding and body thermal insulation
- Essential fatty acids
- Hormone synthesis
- Fat soluble vitamin absorption

Antioxidants

- Antioxidants are our first line of defense against free radical damage, and are critical for maintaining optimum health and wellbeing.

- Cell damage caused by free radicals appears to be a major contributor to aging and to diseases such as:
- cancer, cardiovascular disease,
- cataracts, immune system decline,
- and brain dysfunction



Sources od food antioxidants

Synthetic antioxidants

- synthetic antioxidants are mainly phenolic and include butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tert-butyl hydroquinone (TBHQ) and propyl, octyl and dodecyl gallates.

Antioxidants permitted for use in foods in the EU

Antioxidant	E number
Ascorbic acid	E 300
Sodium ascorbate	E 301
Calcium ascorbate	E 302
Mixed natural tocopherols	E 306
Propyl gallate	E 310
Butylated hydroxyanisol	E 320
Butylated hydroxytoluene	E 321
Lecithins	E 322
Citric acid	E 330

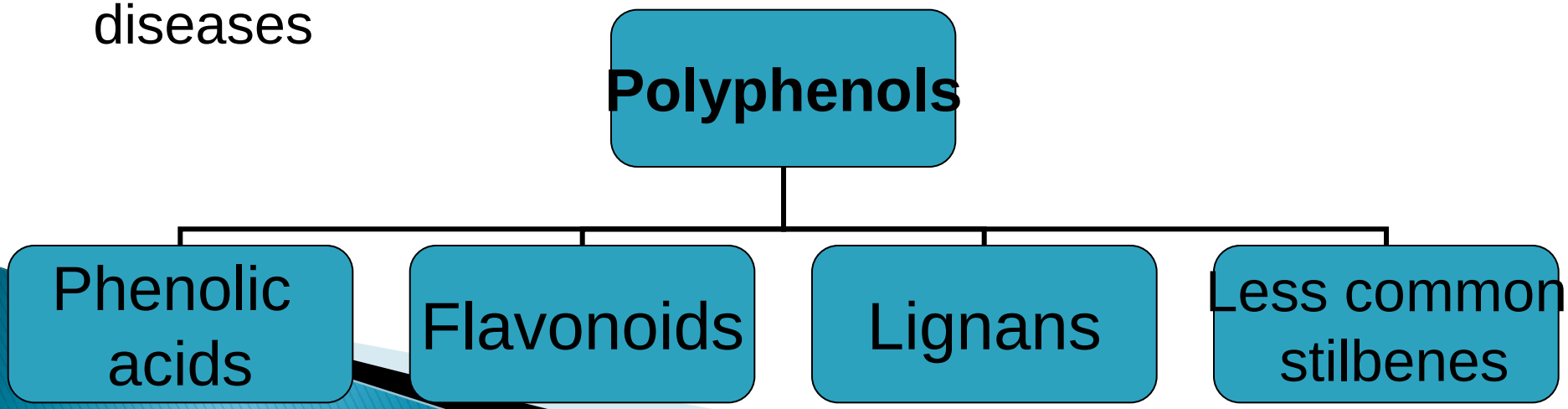
Some naturally occuring antioxidants

- Amino acids
- Carnosine
- Citric acid
- B-carotene
- Curcumin
- Lecithin
- Phytic acid
- Saponins
- Flavonoids
- Lignans
- Phenilic acids
- Sterols
- Uric acid
- Vitamin C
- Vanillin.....

Polyphenols

- Polyphenols (natural antioxidants) are secondary plant metabolites distributed throughout the plant kingdom that contribute to the plant defense system against environmental stressors like UV radiation, attack by pathogens

- are effective nutrients in the prevention of oxidative stress-related diseases such as cancer and heart diseases



Natural Colorants

- natural colorants are substances obtained from foods and other natural sources by physical and/or chemical extraction that results in selective extraction of the pigments.

According to COLOUR we recognize:

- violet and blue – anthocyanins,
- green – chlorophylls,
- yellow – flavonoids, carotenoids, chinons, vulgaxantins,
- orange – carotenoids,
- red – anthocyanins, betalains, carotenoids.

BIOLOGICAL EFFECTS

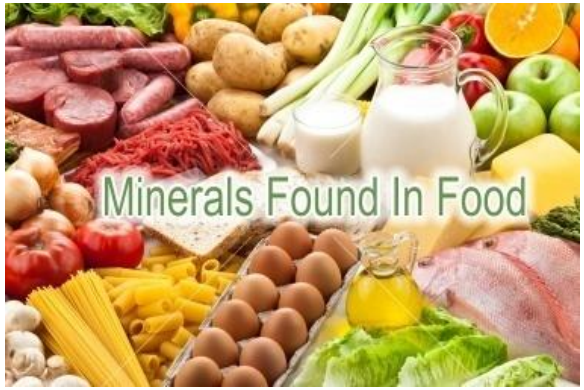
- catalysators of biochemical reactions,
- component of enzymes, provitamins,
- gas transporters, antioxidants.

Vitamins

- are heterogeneous group of substances and are vital nutrients that must be obtained from the diet
- We recognize 13 substances as being vitamins:
- fat-soluble vitamins K, A, D, E
- water soluble vitamins C, B1, B2, B6, B12, niacin, panthothenic acid, biotin

Minerals

- Minerals are inorganic elements which remain behind in the ash when food is incinerated
- They are divided in two groups:
- macro minerals
- micro minerals



- Minerals are classified as essential or non-essential.
- Non-essential are also categorized as either toxic or non-toxic.

Potential risks of BAC

- allergic reaction in organism (colours, fiber)
- in high concentration could be toxic (polyphenols)
- higher content of beta glucans in barley causes reduced filterability, formation of gels and hazes in the beer, cause a „soupy“ effect and the beer is no longer sharp and fresh

Thank you for your attention

Contact: Ing. Miriam Solgajova PhD., Department of storage and food products processing, Slovak University of Agriculture,
E-mail: miriam.solgajova@uniag.sk