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INFLUENCE OF SELECTED IMMUNOMODATORS FOR NUTRITIONAL HEALTH OF HUMAN HEALTH

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Opole, April 17th-19th 2024

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Natural immunostimulators

constitute a large group of products and preparations

of plant, animal or bacterial origin

that stimulate the immune system.

These products and the compounds isolated from them,

in addition to immunostimulating properties,

have also an **anti-inflammatory** and **antiseptic** properties.

They can be a support for conventional therapy.

Dymarska (2017)

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Immunomodulators – the mechanism of action:

- regulate the **structure of chromatin**, which determines the activation or repression of the transcription process;

- affect the efficiency of **DNA repair** processes and genome stability;

– regulate directly the activity of **nuclear receptors** and indirectly the level of **transcription of genes** controlled by receptors that act as transcription factors.

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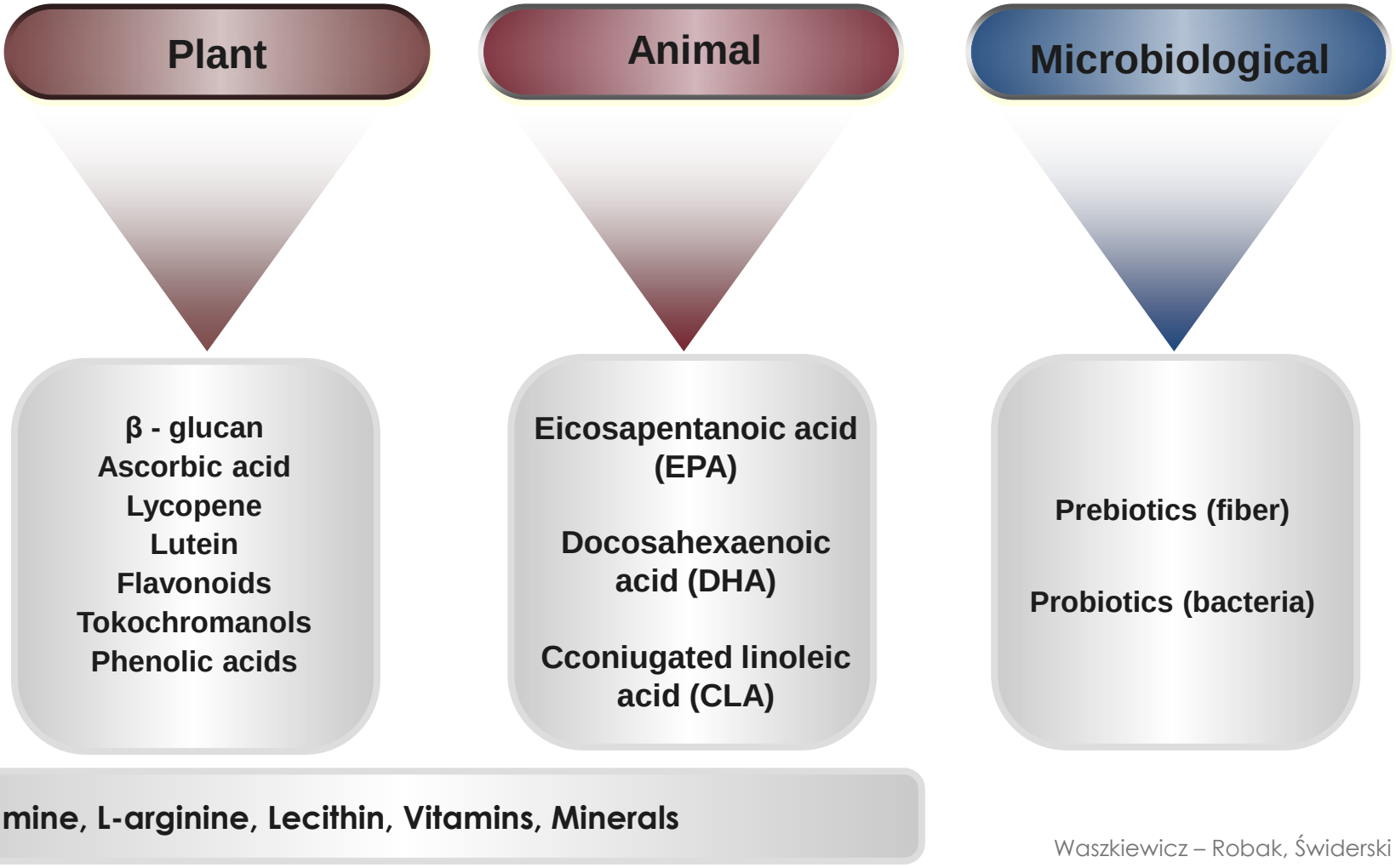
Immunomodulators groups



Waszkiewicz – Robak, Świderski (2009)

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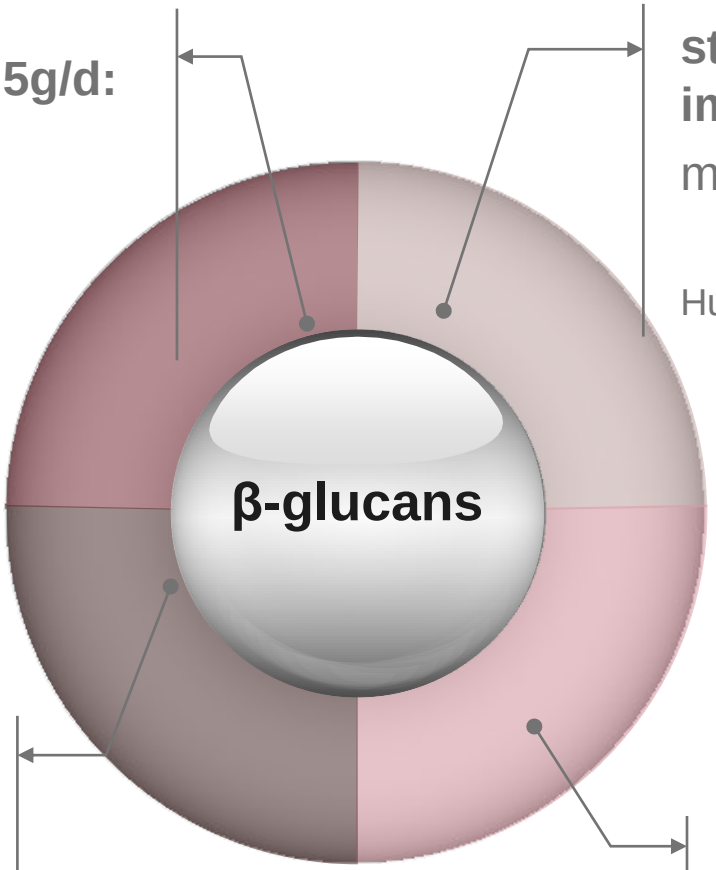
β–glucans

in hypercholesterolemia 5g/d:
- decrease tChol, LDL
- normal HDL, TG

Chen i wsp., 2009



stimulating immunological effect:
macrophages, cytokins

Hunter i wsp., 2004

In diabets 10g/d:
- decrease glucose
- decrease insulin

Biörklund i wsp., 2005

antioxidant properties

Peterson, 2001

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Flavonoids

heterogeneous group of phenolic compounds widespread in the plant world (flavanones, flavanols, isoflavones, anthocyanins)

they affect the functions of enzyme systems that are involved in the immune response and the emergence of inflammatory processes

anticancer activity

they inhibit the release of histamine

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Flavonoids

affect the functions of enzyme systems, which are involved in the immune response and the emergence of inflammatory processes

catechin, epicatechin, quercetin and polyphenols

inhibit the activity of DNA methyltransferases,

(Yang i wsp., 2008; Mathers, 2006; Johnson i Belshaw, 2008)

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Flavonoids

anticancer activity

- **Feng et all. (2007)** they proved the **anti-cancer** effect of flavonoids, among which the most effective reaction was characterized by an **anthocyanin extract** from red cabbage;

- **North i Verdin (2004)** examined polyphenolic compounds contained in **grapes and wines** and proved that they **inhibit lipid peroxidation** of cell membranes, and have an **anti-inflammatory** effect

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Flavonoids

they inhibit the release of histamine

Anti-alergic properties, by:

- inhibiting lymphocyte proliferation,
- inhibiting Ig class E, G, M, A synthesis,
- inhibiting cytokine release
- inhibiting histamine release from mast cells previously stimulated by IgE

Examples: quercetin and luteolin.

Czeczot (2011); Olszewska (2003)

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Phenolic Acids

phenolic acids with hydroxyl and carboxylic group (benzoic acid, phenylacetic, cinnamon)

the major precursors are tyrosine and phenylalanine

- the ability to block carcinogens
- protection of LDL lipoproteins against oxidative modification
- anticancer activity (ferulic, caffeic, chlorogenic, ellagic acid)

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Tokochromanols

fat-soluble antioxidants, mainly found in oily plants in the form of tocopherols, tocotrienols and plastochromanol-8

- antioxidant activity - an effective peroxide radical quencher
- anticancer activity
- Neuroprotective effects: prevention of neurodegenerative diseases
- Cardioprotective activity – decrease cholesterol and lipoprotein levels,
- anti-coagulant activity

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FATTY ACIDS: EPA & DHA

Immunomodulatory effects

- Presumably, they modify the synthesis of mediators responsible for cell communication and the change in the expression of surface molecules
- Weaken phospholipase activity, which indirectly affects the suppression of genes encoding cytokines

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FATTY ACIDS: EPA & DHA

Acid derivatives - EPA and DHA as mediators - suppressing the inflammatory process

RESOLVINS - activate the process of quenching an acute inflammatory reaction - they stimulate macrophages to phagocytosis of dying neutrophils, and reduce the release of pro-inflammatory cytokines.

PROTECTINS - pro-extinguishing agents in the region of inflammation. Neuroprotectin supports the maintenance of normal brain function.

MAREZINS - prolactin mediators of the acute phase of inflammation. Their action is multi directional, limiting the accumulation of polymorphonuclear leukocytes in the region of inflammation.

Dymarska i wsp. 2013

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L-ARGININE

Arginine is a substrate in the synthesis of:

- **nitric oxide** responsible for the regulation of the blood supply to the intestine, secretion of mucus and regulation of motor activity; platelet activation and aggregation; participate in the nerve conduction; affects immunomodulation;

- Polyamines that stimulate cellular biosynthesis of DNA and RNA; they perform immunoregulatory functions are the strongest stimulus to secrete **insulin** and the **growth hormone**.

Reynolds i wsp., (1988, 1990)

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GLUTAMINE

- essential for the **synthesis of protein** and other amino acids, amino sugars and their derivatives, nucleotides, glucose, glutathione;
- participates in many metabolic pathways,
- is the most important **source of nitrogen**,
- together with glutamate are the main compounds responsible for the intercellular transport of nitrogen and the **detoxification of ammonia,**
- plays a key role in the **growth** of many types of cells, in particular cells with a high rate of proliferation,
- is an essential **source of energy** for the cells of the immune system and for enterocytes, colonocytes and fibroblasts,
- **prevents atrophy** of the intestinal villi

Calder i wsp., (2002)

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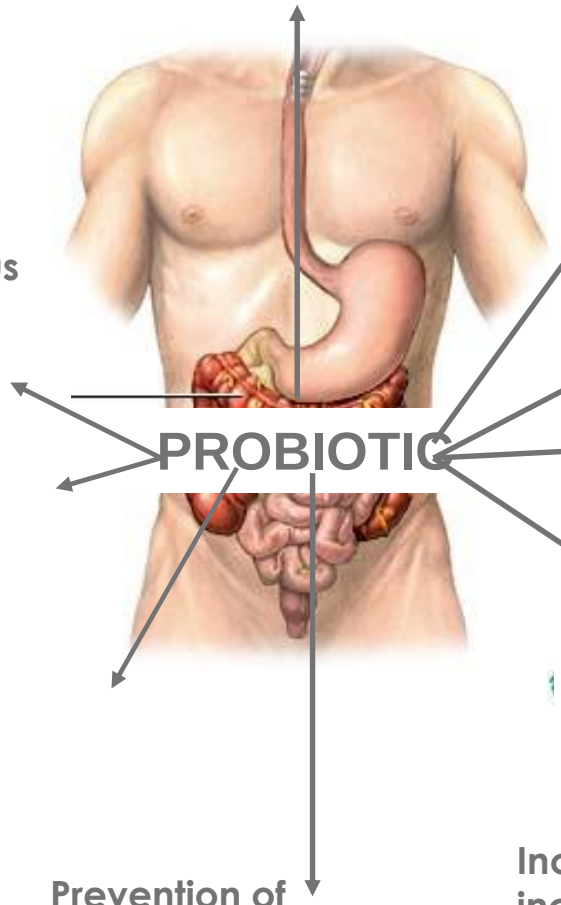
PROBIOTICS

Favorable modification of the composition intestinal microflora
(Nowak, Libudzisz (2008)

Inhibition of growth and translocation pathogens. Reduced infection with intestinal pathogens (*Salmonella*, *Shigella*)
Kawka – Skrzypczak i wsp. (2012)

Activation of specific and non-specific Immunological responses
(Kawka – Skrzypczak i wsp. (2012)



Lowering cholesterol
(Tennyson, Friedman (2008)

Reduction in the duration of rotavirus diarrhea (and other etiology)
(Hickson i wsp. (2007)

Reducing the risk of obesity
(Tennyson, Friedman (2008)

Lowering the activity of faecal enzymes
(Nowak, Libudzisz (2008)

increased lactose digestion decreased symptoms of lactose intolerance
Kirjavainen i wsp. (2001)

detoxification from carcinogens
(Nowak, Libudzisz (2008)

Protection against colon cancer

Prevention of constipation
(Hickson i wsp. (2007)

Increased absorption of nutrients, increased absorption of minerals
(Kawka – Skrzypczak i wsp. (2012)

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SUMMARY

Natural immunomodulators:

- regulate the development and function of various cells of the immune system, DNA activity and repair,

- diet rich in particular immunomodulators may prevent and/or treat certain diseases:
  - inflammation of the gastrointestinal tract,
  - immune dysfunctions,
  - carcinogenesis.

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Thank you for your attention

Prof. dr hab. Monika Bronkowska