

## Therapeutic Properties of Vegetable

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### Executive Summary

In presence of solar energy, vegetables synthesize basic compounds necessary for their survival (carbohydrates, lipids and proteins) and a variety of organic pharmacodynamic compounds which can be extracted as raw materials, having important applications in dermatology, cosmetics, medicine, technology and commerce. Vegetables are low in calories but rich in vitamins and are essential for body balance.

### Vegetables and Pharmacodynamic Compounds

Vegetables continue to be the most important source of pharmacodynamic compounds used in various industries such as pharmaceutical products, food, cosmetics and agrochemicals possessing invaluable commercial values. Vegetables are irreplaceable sources of industrial oils (volatile and fixed), flavors, fragrances, resins, gum hydrocolloid, natural polyphenols and saponins and other surfactants, plant pigments (chlorophylls, carotenoids, anthocyanins, etc.), pesticides, drug substances, and many other special compounds [1]. Vegetables together with other components of vegetal world remain only extraction source of some of collateral metabolites of pharmaceutical and food industry interest, because these cannot be synthesized chemically, being stereo-complexes with chiral centers which may be essential for biological activity [2,3]. Primary and collateral plant metabolites with pharmacodynamic action or used in food industry have some common characteristics: most of them are non-protein chemical compounds that can be extracted from plant material by steam distillation, with organic solvents or aqueous and are low molecular weight compounds excluding biopolymers [4], condensed tannins and some polysaccharides such as gums, pectin and starch [5]. Vegetables that can be used in treatment or control certain diseases are as follows:

- Acidosis: carrot, beet, cucumber and spinach;
- Acne: carrot, lettuce and spinach;
- Allergies: carrot, lettuce and spinach;
- Tonsillitis: carrot, spinach, beet and cucumber;
- Anemia: beets, celery and carrot;
- Appendicitis: carrot, beet and spinach;
- Arthritis: cucumber, beet, celery, carrot and watercress;
- Asthma: carrots, radishes and celery;
- Cardiovascular diseases: Carrot, beet, cucumber and spinach;
- Ocular diseases: tomatoes, carrots, celery, parsley and spinach;
- Bronchitis: tomatoes, carrots, onions and spinach;
- Colitis: carrot, beet, cucumber and spinach;
- Constipation: carrot, beet, spinach and watercress;
- Diabetes: carrot, celery, lettuce and spinach;

- Dyspepsia / Indigestion: carrot, beet, cucumber and spinach;
- Eczema: carrot, spinach, cucumber and beet;
- Epilepsy: carrot, celery and spinach;
- Influenza: carrot, onion and spinach;
- Gout: red, cucumber, beet, carrot, celery and spinach;
- Hemorrhoids: carrots, spinach, turnip and watercress;
- Hypertension: carrot, spinach, beet and cucumber;
- Jaundice: carrot, celery, spinach, beet and cucumber;
- Insomnia: lettuce, carrot and celery;
- Migraine: carrot, lettuce and spinach;
- Obesity: red beet, cabbage, lettuce, spinach and carrot;
- Fatigue: carrot, spinach, beet and cucumber;
- Sinus problems: tomatoes, carrots, onions and spinach;
- Cold: carrot, celery, onion and spinach [6,7].

Vegetables contain substances which inhibit or inactivate pharmacodynamic compounds (vitamins), called antivitamin substances as: ascorbic oxidase, an enzyme which in presence of oxygen oxidizes ascorbic acid first to dehydroascorbic acid (active) and finally to 2,5-diketo-gluconic acid. Other collateral metabolites with action of antivitamin is the oxalic acid (biologically inactive); or anti-mineralized substances: phytic acid and oxalic acid present in green vegetables and pulses (spinach and beans) bind calcium, magnesium and/or iron into insoluble complexes making it impossible their absorption and utilization in human organism; antithyroid substances (isothiocyanates) from cabbage, cauliflower or kale prevent iodine absorption in thyroid gland; some non-proteinogenetic substances (e.g. trypsin inhibitor from beans) have pancreatic trypsin inhibitory action [8- 10].

After fructose metabolism is resulting uric acid, which blocks ability of insulin to self-regulate which turns to obesity, metabolic syndrome and type II diabetes. Hexaphosphoric ester of inositol (phytic acid) reacts with calcium salts and magnesium and forms phytine.

Vegetables and their products have therapeutic value and are

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used as: snacks (celery, peas and chicory), cholagogue (artichokes), depuratives (radish, lettuce, asparagus, dandelion green, leek, celery, watercress and chicory), diuretics (asparagus, dandelions, leeks, celery and watercress), softeners (spinach, leeks, sorrel, lettuce, onions, carrots, potatoes,), expectorants (red cabbage) vermifuges (garlic, onion, cabbage) [9,11].

It is essential to consume vegetables which present different colours.

– White (for vitality)–White and brown vegetables and vegetable products contain Pharmacodynamic Compounds such as allucin, found mainly in vegetables forming onion group. It is recommended to include in diet white and brown vegetables to reduce risk of cancer, fight heart disease, maintain normal blood cholesterol. White/brown vegetables and vegetable products are cauliflower, garlic, mushrooms, onions, parsnips, potatoes, turnips.

– Blue/purple (beat effects of aging)–these vegetables and vegetable products contain pharmacodynamic compounds (anthocyanin and phenols) with antioxidant and anti–aging properties. It is recommended to include in diet blue / purple vegetables for cancer risk reduction, positive impact on urinary tract, improved memory, providing a slow and natural aging. Blue / purple vegetables and vegetable products are purple asparagus, red cabbage, eggplant, red potatoes.

– Yellow and orange (powerful antioxidants)-Yellow/orange vegetables and vegetable products contain antioxidants, such as vitamin C, carotenoids and bioflavonoids. It is recommended to include in diet yellow/orange vegetables for maintaining heart health, a healthy body, strengthening immune system, reducing risk of cancer. Yellow/orange vegetables and vegetable products are carrots, yellow peppers, potatoes, pumpkin, yellow tomatoes.

– Red (for health and vitality)–Red vegetables and vegetable products contain lycopene and anthocyanin, pharmacodynamic compounds that have benefic influence on body. It is recommended to include in diet red fruits and vegetables to maintain heart health, improve memory; reduce cancer risk, positive impact on urinary tract. Red vegetables and vegetable products are red beetroot, red peppers, red onions, red potatoes, radishes, tomatoes.

– Green (for good health)–Green vegetables and vegetable products contain pharmacodynamic compounds such as lutein and indoles, which attract attention due to its antioxidant properties. It is recommended to include in diet green vegetables that help reduce cancer risk, ensuring a healthy body, strengthens bones and teeth. Green vegetables and their products are asparagus, broccoli, Brussels sprouts, Chinese cabbage, green beans, celery, cucumbers, leafy greens (spinach, lettuce etc.) leeks, onions, peas, green peppers, spinach [3,12].

Vegetables and vegetable products do not constitute a favorable environment for growth of microorganisms (bacteria, viruses or parasites). However, poor hygiene can cause food poisoning or intestinal parasites. Bacterial and viral diseases can have vegetables as a means of transportation: salmonellosis, dysentery, cholera, leptospirosis, enteroviruses, etc.

In addition, by vegetables and vegetable products organism can come in contact with parasite cysts of *Giardia*, tapeworm proglottids (solium, saginata, *Echinococcus*) geohelminth eggs (ascarids, tricocefals). Vegetables and vegetable products may be contaminated with bacteria from soil, from fertilizer, infested irrigation water, by vectors etc. As a preventive measure consumption of vegetables should start only after thorough washing and, optionally, in particular epidemiological

In Table 1 is presented albumins and glucides content in mushrooms and vegetables.

Name (100 g)	Albumins (g)	Glucides (g)
Mushrooms	3.5	6.8
Cabbage	1.4	4.8
Beet	1.0	7.4
Red onion	1.4	9.9
Potato	1.8	14.7
Tomato	1.0	4.0

**Table 1:** Albumine and glucides content of mushrooms and vegetables.

The proteins, lipids, glucides, vitamins and minerals content is presented in table 2, as follows:

Vegetable	Proteins	Lipids	Glucides	Vitamins	Minerals
Potato	1.7	0.2	17.4	B, C	Na, K
Carrot	1.5	0.3	8.8	B, C	Na, K
Cucumber	0.6	–	1.5		
Mushrooms	5	0.5	2.5	B <sub>1</sub> , B <sub>2</sub> , C, PP	Na, K, Ca, Mg, Fe, P, S, Cl
Horseradish	1.4	0.3	5.9	B, C, A, K	Na, K
Lettuce	1.9	0.3	2.9	A, B <sub>1</sub> , B <sub>2</sub> , PP, C	Na, K, Ca, Mg, S, Cl, Cu, P
Parsley	3.6	0.7	6.6	A, B <sub>1</sub> , B <sub>2</sub> , PP, C	Na, K, Ca, Mg, S, Cl, Cu, P
Garlic	7.2	0.2	2.6	C	Na, K
Onion	1.5	0.2	10.5	A, B <sub>1</sub> , B <sub>2</sub> , PP, C	Na, K, Ca, Fe, Mg

**Table 2:** Chemical composition of vegetables and vegetable products.

condition to be consumed only after heat treatment. In terms of pollution with harmful chemicals, nitrogen fertilizers used in exaggerated doses may increase nitrogen remanence, especially in leafy vegetables and vegetable products (spinach) or root (carrot). Using Vegetables and vegetable products of this type in soups or sautéed for young person's diet can lead to methemoglobinemia. Polycyclic aromatic hydrocarbons (Tables 1 and 2) with carcinogenic effect, resulted from combustion processes can be deposited and vegetables.

Toxic metal debris can pollute vegetables and vegetable products, coming from pesticides or improper materials used to manufacture containers for storage, treatment or processing. By root vegetables can generate mycotoxins, most common being patulin, a soluble substance, highly carcinogenic. It is possible to exert toxic effects even some of natural compounds of plants [5], which are undesirable for humans: solanine in potatoes sprouting (gastrointestinal toxicity) or amygdalin kernels (cyano radicals toxic action on cellular respiratory chain).

## Final Remarks

Vegetables and vegetable products act directly through concentration on metabolism of biological elements, especially brain, nerve cells and glands. Vegetables and vegetable products are basic nutrition that keeps cells young and vital. Through their great content of fibers, they are first–order incentives of bowel transit, with crucial implications both in somatic equilibrium and psychic. Vegetables should play a central role in our diets.

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