

## A CONTEMPORARY VIEW OVER THE HEALING EFFECTS OF FRUITS FROM ARONIA MELANOCARPA

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The homeland of Aronia bushes is North America. The fruits of this plant have been known for their medicinal properties since ancient times.

Today, we rediscover this fruit as a true, useful food, which has, so far, been only incidentally sought in states of disease coming close to the incurable ones. Current research points to the

necessity of including this food in our daily diet as a grace to the healthy lifestyle.

The aronia fruit can be consumed as fresh fruit, cold pressed juice from fresh fruits, the so-called “fruit” wine, or marmalades. Due to the seasonal character of crop, fruits are often offered dried or frozen.

Aronia is a genus in the family Rosaceae. It includes two basic types of deciduous shrubs: Aronia melanocarpa – black fruits, and Aronia arbutifolia – red fruits. The shrubs reach the height of 90-180 cm. They blossom in April and the fruits ripen in end-August. The berries of Aronia melanocarpa are dark violet to black in color, and grow in clusters of 11-14 with a diameter of 6 mm.

Bulgaria is a country with extremely favourable climatic conditions and a lot of sites offering suitable soil and precipitation levels for the planting and growth of Aronia melanocarpa. Specifically, the sun-shine hours in our latitude allow for ripening of fruits with the highest proven contents of biologically active useful substances



in comparison to other European countries. The beginning of cultivated growth of aronia in this country dates back to 1995. There are EC-certified bioproducers of aronia fruits and products (juice, fruit wine, marmalade) in Bulgaria.

A number of studies have been conducted on aronia fruits over the past 15 years. On one hand, the chemical composition of fruits and the juice they contain has been investigated. On the other hand, the specific effects of this juice on patterns of different diseases have been established. The patterns were provided by mice or cellular cultures of human cells taken from various impaired organs.

The cold pressed juice contains: *Bioflavonoids*: essential natural polyphenol compounds – anthocyanins, catechin, quercetin. These are essential natural antioxidants which each cell of human organism should possess to cope with oxidative stress – the basis of all diseases. There is no other plant with such record contents of polyphenol substances (P-active, vitamin P). Aronia contains **5 times the amounts** of these substances as compared to grapes, grapefruit, and the beetroot! Remarkable presence of *minerals* and *microelements*: iodine, potassium, calcium, phosphorus, magnesium, and iron. Record concentrations of iodine and manganese. Vitamins: A, B1, B2, B3, B5, B6, B9, C, E, K, P. Traces of B17. *Carbohydrates*: comprise approximately 15% . Small quantities of fructose required to satisfy daily needs; sorbitol and parasorbid, which attribute some weak to moderate laxative effects to the drink. *Aminoacids*: It contains the adequate concentrations of the ESSENTIAL amino acids – arginine, lysine, histidine, threonine; as well as of the non-essential amino acids – tyrosine, cysteine,  $\alpha$ -alanine, aspartic acid, serine, glutamine.

Polyphenols, in particular, anthocyanins and procyanidins show the highest contents. These components account for the anti-oxidative activity of the plant. Laboratory studies of the anti-oxidative effects of the aronia juice /the so-called ORAC – oxygen radical absorbance capacity/ show record values – 160.62 Trolox Equivalents. In comparison to values shown by other 277 similar “red” plants, these values are multiple times higher.

**Table №1.** Chemical composition of Aronia melanocarpa fruits.

Chemical substance	Quantity and Measure units
Fruit water	65 - 72%
Dry substance	0,44% of fresh weight
Organic acids	1,1 - 1,4%
Tannins	0,5 - 0,6%
Polyphenols /known as Vitamin P/	2000 - 8000 mg/100g dry weight
Glycosides	10 - 18%
Pectin	0,6 - 0,7%
Sorbitol and parasorbid	Included in % of glycosides
Fats:linoleic acid, glycerides, phosphatidylinositol	0,14% of fresh weight
Mineral contents: K , Zn, Na, Ca, Mg, Fe.	micro quantities
Vitamins: B1, B2, B6, B9, K, E, and C, niacin, pantothenic acid, folic acid, $\alpha$ -and $\beta$ -tocopherols, carotenoids.	Various concentrations, satisfying one's daily needs – expressed in mg%
<i>Amino acids</i> (in mg%)	(in mg%)
Arginine	65
Tyrosine	38,6
Histidine and lysine	62,2
Cystine	17,4
$\alpha$ -alanine	12,2
Aspartic acid and serine	14,7
Glutamic acid and threonine	9,3
<i>Microelements</i> ( $\mu$ g%)	( $\mu$ g%)
Iodine	4000
Manganese	500
Boron	traces
Molybdenum	traces
Copper	traces
Triterpenes: $\beta$ -sitosterol, campesterol	micro quantities
<i>Over 40 volatile components:</i> benzaldehyde cyanohydrin, hydrocyanic acid, benzaldehyde.	Traces
Amygdalin (Vitamin B17)	Traces

The polyphenol substances occurring in aronia juice have been identified by the use of contemporary analytical technologies. Polymer proanthocyanins (epicatechin) have been found. High concentration of phenol acids – chlorogenic and neochlorogenic, as well as of quercetin has been established.

Scientific studies aim to prove the role of bioflavonoids (and specifically, of anthocyanins) in neutralizing free radicals stored in the body. Bioflavonoids show a more powerful neutralizing effect than classic antioxidants, such as Vitamins C and E and beta-carotene (Vit C and beta-carotene are also provided by aronia juice intake). It is widely known that damage provoked by free radicals underlies the emergence of most *present-day socially significant diseases*. This is why a multifaceted healing effect has been manifested with models of diseases after the course of aronia juice intake, for instance:

- general anti-inflammatory effect, regardless of the process localization;
- antimutagenic (anticarcinogenic) effect;
- facilitates heart activity by stabilizing the heart muscle, the circulation system and enhancing the blood supply through strengthening the blood vessels of the heart (removes atheromatous plaques and endothelial dysfunction);
- prevents the development of or improves hypertonic disease by restoring the elasticity of the arterial blood vessels;
- Improves the hepatic function by facilitating metabolic processes in the liver cells (less “poisons” reach the liver);
- reconstructs the mucosa in gastro-intestinal tract in cases where it has been impaired;
- acts directly on various pathogenic microorganisms – viruses and bacteria, and stimulates immune-active cells to cope with infections;
- when exposing animals to radiation, those who have taken aronia fruit juice show a bigger number and a higher activity of CD4 and CD8 lymphocytes (the cells fighting the destructive effects of radiation);
- aronia products improve glucose assimilation by the cells (intracellular transportation of glucose) in patterns of Type 2 diabetes mellitus (T2DM) whereby the values of blood glucose are reduced and the patients’ condition is favorably affected; other mechanisms of influencing T2DM are currently being investigated.
- it has been established that aronia products reduce thrombocyte aggregation and prevent thrombi formation in the arteries;
- last but not least, we should mention the favorable neuro-psychological effects experienced by subjects in the groups under study.

Over the recent years favorable changes at the genetic level have been reported following courses of aronia juice intake (experiments with animals).

Clinical investigations with people are a bit more limited, however, they undoubtedly supplement and by no means contradict the results reported from the

experiments with animals and cellular culture patterns. It can definitely be concluded that the consumption of aronia juice does not have any toxic effects! Eventual over-dosage may have a laxative effect which is terminated through dosage reduction, and this is individual conditioned.

I would like to clarify that in the studies discussed here I have used cold pressed juice derived from fresh fruit and aronia wine. These are my preferable kinds of aronia products because they have proved to be physiologically the most convenient ones for consumption. The juice and the wine enable a direct contact of the useful substances and the digestive system. The cells of the stomach and the intestines are the first ones to experience the effects. We should account for the fact that some quantities “are lost” because they are assimilated by the intestinal bacteria. Aronia is an enemy to the disease-producing bacteria but it turns to be good food for the useful bacteria. Nature has found a fine balance for all its interrelations. It is therefore necessary to give people who have never used aronia juice a period of 30 to 60 days if they are to feel its influence on their whole organism. People should follow individual dosage regimen. I recommend the following:

### **1. When you are healthy!**

Take the juice as functional food, stick to a daily dose of 50-60 ml in 200 ml of water and some freshly squeezed lemon juice. It tastes nice if you add the juice to 200 ml of yoghurt. Recommended intake – 15 minutes before meals.

The overall strengthening properties of aronia affect favourably pregnant women, children and sportsmen.

### **2. As prophylaxis of recurring conditions consume aronia juice in two-months courses three times a year. Which are these conditions?**

- Predisposition to or confirmed allergic reactions in certain seasons of the year.
- Before and during the time of flu epidemics.
- People spending more than 4 hours daily working at a computer, mobile phones; people exposed to ionizing medium; people working with potentially toxic products.

- Children in the age of quick growth (12-17 years of age)
- Following contact with people suffering from infectious diseases to avoid danger of spreading the infection.
- People older than 55.

In all the above cases you should take the juice prepared according to the given instructions every day over a period of 60 days, the dosage should be 50 ml three times daily (150 ml per day).

### **3. A number of diseases are favourably influenced by aronia juice administration:**

- Cardio-vascular diseases;
- Fats and carbohydrate metabolism problems (Diabetes mellitus);
- Hypertension;
- Chronic obstructive pulmonary disease;
- Chronic colitis and chronic gastritis;
- During rehabilitation period following acute severe diseases;
- At times of chemo- and radiotherapy;
- In post-operative period of major surgery;
- Following brain strokes;
- Surface and deep vein conditions;
- Non-severe states of hemorrhoids;
- Erectile dysfunction in men;
- Cases of difficult defecation;
- Chronic pain caused by musculoskeletal disorders;
- Thyroid gland conditions;

- ‘Inexplicable’ headache (where brain tumor has been excluded);
- Diseases of the peripheral nervous system – sciatica, plexitis, facial nerve inflammation, diabetes induced polyneuropathy (when combined with alpha lipoic acid).

*Recommended intake* is 60 ml three times daily – a total of 180 ml, (prepared following the above given instructions); during the months of July, August, and September, when seasonal black fruits can be obtained, it is possible to discontinue the juice intake. The duration should extend to 12 months, after that you can go on with a supporting daily dose of 60 ml.

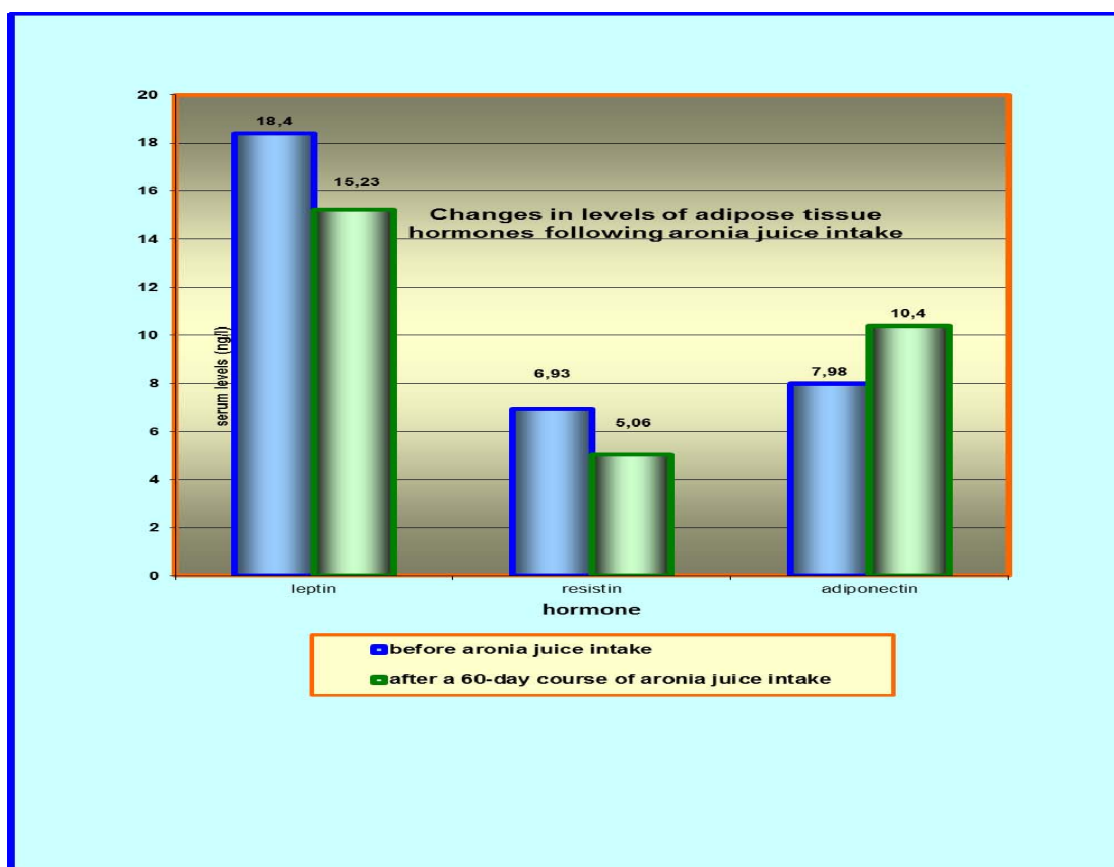
## **MY RESEARCH STUDIES**

My research studies found data about strong favorable effects on a number of laboratory parameters characteristic of metabolism in humans, the biochemical clarification of which supports the data obtained in investigations carried with experimental animals and cellular cultures. These investigations are going on. All patients filled in a questionnaire relating to the changes in their bodies and their behavior assessed by the participants themselves. What the patients themselves report is of key importance when it comes to reliability and generalizing the results of the multi-sided beneficial effects following the consumption of aronia juice.

*My research studies are aimed both at selected groups of patients and individual patients.*

A group of obese patients consumed aronia juice in a dose of 70 ml three times daily over a 60-day period. They did *not* change anything in their lifestyle – they went on with their routine diet and habits. None of them had taken aronia before. They did not even know of the existence of such fruit. We analyzed the levels of the three basic fatty tissue hormones before the study began and after 60 days of aronia juice intake.

Fig.11. Changes in the serum levels of adipose tissue hormones



**Leptin** is a hormone regulating the energy balance of the body. It is primarily made by the fat cells of the white fatty tissue. However, certain leptin amounts are secreted by the brown fatty tissue, musculoskeletal apparatus, the stomach, the liver, the ovaries, the placenta in pregnant women, etc. It communicates with hypothalamus in the brain and tells you when it is time to stop eating. Besides that, it is associated with metabolism regulation, reproductive functions, the immune system, bone growth, the regulation of blood pressure, blood sugar, body temperature, and so on. *Leptin resistance* means that hypothalamus cells “cannot hear” the leptin’s voice and we go on eating and gaining weight. This is established by increasing fasting blood levels of leptin.



**Resistin** is extremely important. It enhances insulin resistance through damaging the insulin receptors along the surface of the cells, thus preventing insulin from exercising its physiological effect. Resistin levels decrease when people are hungry and increase when they are obese. The process is most frequently manifested in obese elderly people and T2DM patients. It is believed that resistin is an important adipose signal when insulin resistance occurs thus playing the role of a link between diabetes and obesity. This is how a vicious circle closes at a biochemical level bringing along severe consequences.

**Adiponectin** is another important hormone secreted from adipose tissue. It has been proved that adiponectin participates in regulating carbohydrate and lipid exchange. There exists an *inverse correlation* between its activity and the development of diabetes mellitus. High serum levels of adiponectin – no diabetes. Low serum levels of adiponectin – diabetes develops. High serum levels of adiponectin enable the organism to control inflammatory processes. The hormone plays a role in preventing cardiovascular diseases and vascular atherosclerosis.

It is evident that following aronia juice intake (for the short period of 60 days) these hormones levels are favorably changed. Adiponectin increases while leptin and resistin become lower. The conclusion is that a regular import of bioflavonoids into the body will result into regulated carbohydrate and fats metabolism and stabilizing the blood pressure.

The other group of patients presented with pronounced metabolic syndrome, obesity, pre-diabetic condition, dyslipidemia, hypertension, and liver steatosis. These patients were also investigated before (or at the beginning) and after the 60-day course of aronia juice intake. The difference was that this group had to follow Barry Searse method of eating and had to do daily physical exercises because this was the group of patients. We also had a control group which did not take aronia juice. The following figures show the results of our laboratory findings on carbohydrate and lipid metabolism and on liver enzymes.

Fig.12. Changes in carbohydrate metabolism

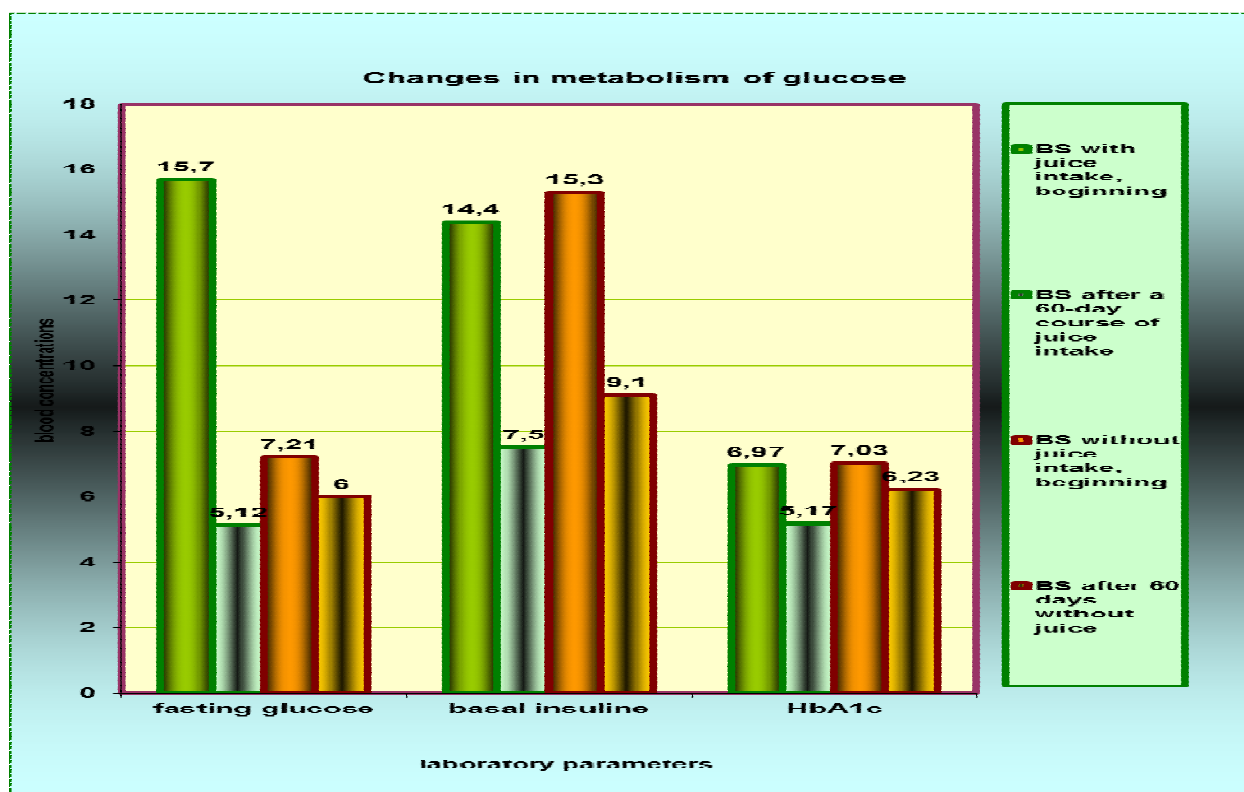


Fig.13. Changes in lipid metabolism

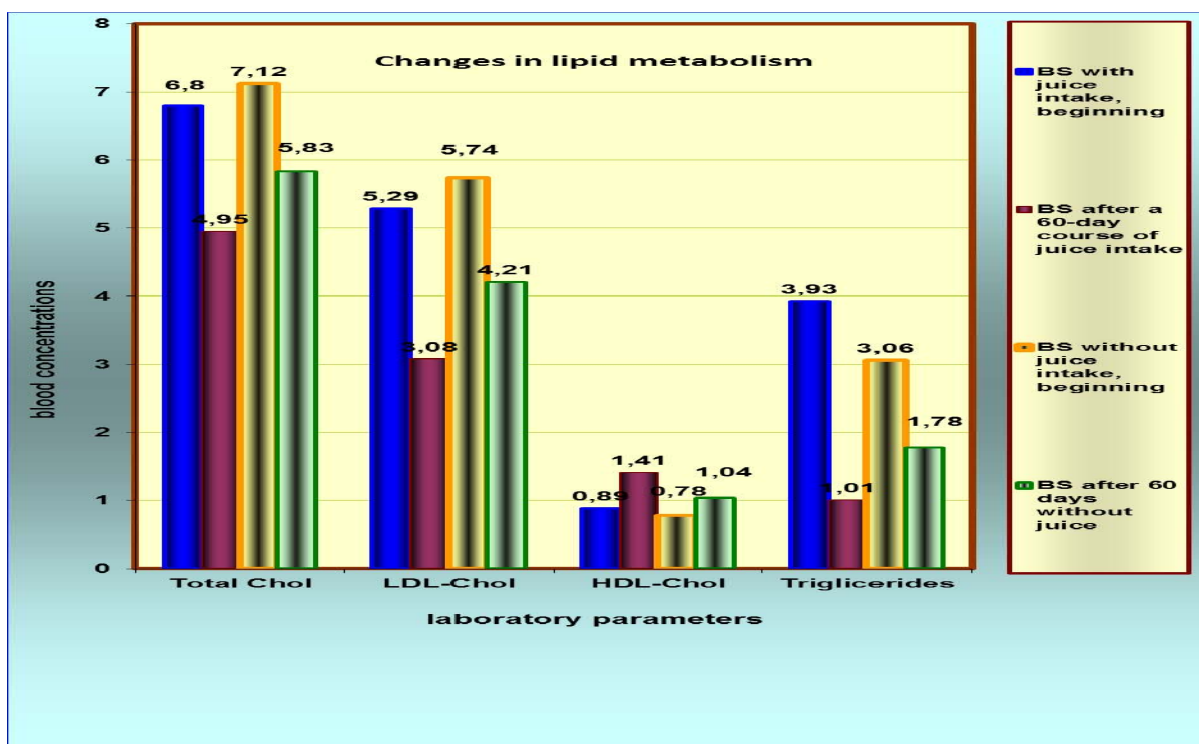
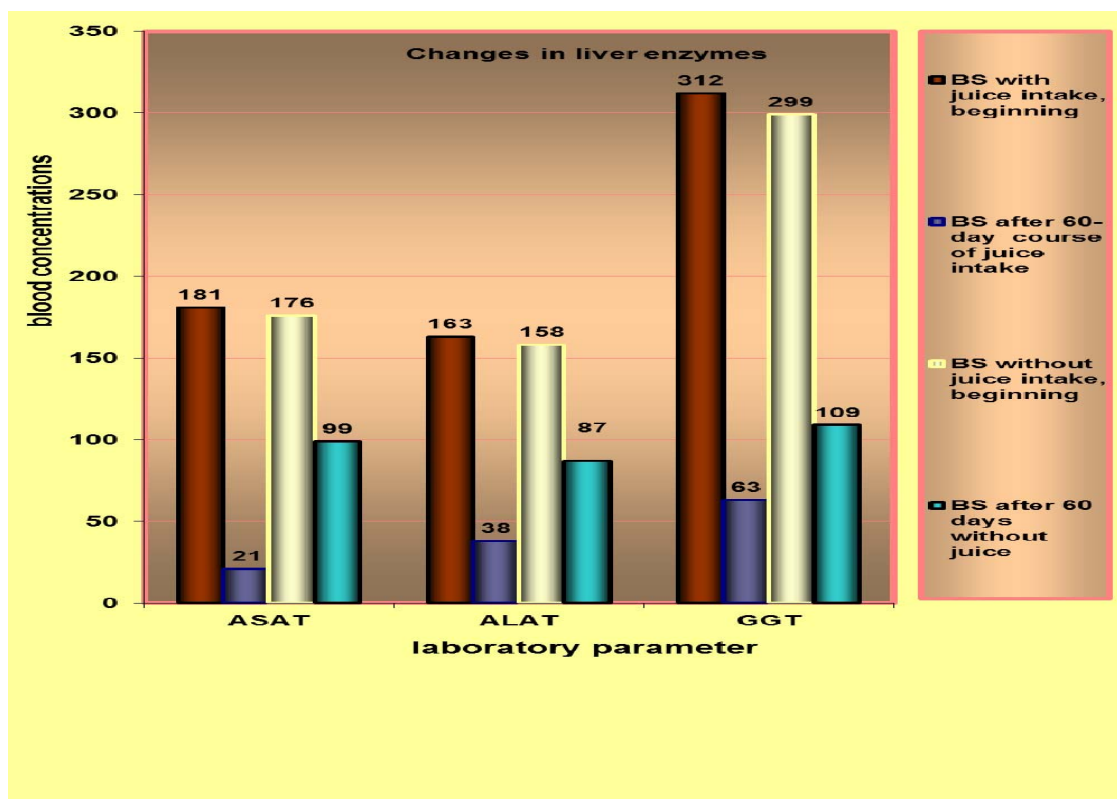


Fig.14. Changes in liver enzymes



What we see is that the harder a patient tries (to follow the recommended diet, to do physical exercises daily), the more they achieve. Improvement in all laboratory values is observed. Our patients reported weight reduction and feeling generally well. The patients who passed the aronia juice course, however, had their laboratory values fully normalized. Besides weight reduction, these patients also reduced by half the dosage of their hypertensive medications with a marked tendency to stop taking them. We had reports about good mood, improved memory capacity and concentration in one's work, higher libido (questionnaire data).

The two studies I conducted complemented the results obtained by studies with animal models. It may be that the activity mechanisms of bioflavonoids and the other ingredients of aronia juice reach to the most intimate biochemical mechanisms of the cells and the genome.

## CLINICAL CASES

### Clinical case 1.

Let me give an example with myself. I have been suffering from photodermatitis since the age of 41. Though I am a medical doctor, I followed advice given by my colleagues-dermatologists. When I was 58 I first heard of aronia fruit. I checked the Internet about it and went through a considerable number of publications on the medical effects of juice produced from aronia melanocarpa fruits. I learned the juice was made in Bulgaria, too. I chose the products of *Aroniada-agro* company – cold pressed fruit juice. I started regularly taking the juice since October. The dosage was 60 ml three times a day or 80 ml twice a day (whatever I could manage since I had to go to work), but I watched carefully not to miss a day. Well, it happened now and then, but this is not life-saving treatment. This is supporting treatment which regulates intracellular metabolic processes and keeps the person's health. I did not expect any special effect, and in fact I did not have any major complaints. What happened? The winter passed by and I had nothing of the usual flus (I work in a hospital and have a continual contact with patients during epidemics). When summer came I found out that my photoallergy had gone away. After almost 20 years! This is the third summer in a row that I can freely expose my body to the sunshine and swim in the sea without experiencing any skin problems. No photodermatitis! I continue my regular intake of aronia juice – 60 to 70ml once a day. Even though I am a doctor, till my 58-th year I have not thought what kind of and what quantities of bioflavonoids I receive with my food. I am convinced that this fruit which is the richest one in bioflavonoids should be proclaimed functional food and given the label of good health. This would help its promotion and make it accessible for any Bulgarian and all people interested! It should be offered to schoolchildren while they are at school. It should be included free of charge in the diet of people working with toxic and harmful products or doing jobs associated with too much stress – for instance, those engaged in aviation or at airports. This product should by all means be present at our table every day!

Fig. 1. An image of photodermatitis rash.

That's what I looked like till 2011 – each summer.



**Case discussion:** Sun sensitivity/allergy is also called photodermatitis. The sun itself is not an allergen but it can activate allergens. The signs may include red spots on the skin, rash, and severe itching. The condition appears from 3-5 hours to 18-72 hours after exposure to the sun. Treatment is difficult and usually takes up to 8 days. Causes for the condition can be classified as outer and inner ones. The outer (exogenic) causes relate to the use of allergy-inducing lotions

or detergents. The inner (endogenic) causes include some physiological conditions, such as avitaminosis, dormant (not clinically presented) diseases of the kidneys, liver, endocrine system, as well as predisposition to such diseases.

Aronia juice shows medicinal properties and enhances restoring processes in all human tissues and organs. The mechanisms of bioflavonoids' action we discussed at the beginning are completely adequate in this specific case.

## **Clinical case 2.**

Elvira N. is a 36-year old woman. She is Bulgarian, working in Austria with her husband. The adaptation period was difficult for both of them and when they achieved some financial stability personal drama entered their life. There was another woman. A couple of months of emotional stress and quarrels. During this period Elvira lost appetite, suffered from continuous stomachache and vomiting. Various diets and treatment prescribed in Austria did not help the young woman. She lost a lot of weight and strength. She could not work. She came back to Bulgaria and her mother brought her for a consultation with me. She had gastroscopy on the following day. Her diagnosis was erosive gastritis and *Helicobacter Pylori* infection.

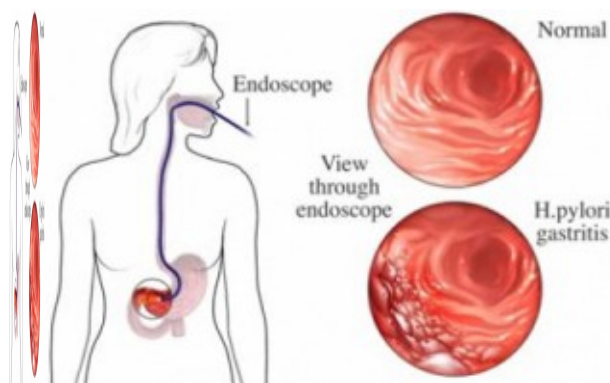
Fig.2. Elvira's gastroscopy.

A multitude of erosions (surface ulcers) and inflammation.



Fig.3. Gastroscopy image. The view of non-damaged gastric mucosa.

What does inflamed gastric mucosa look like?



The gastroenterologist prescribed the standard therapy including medications to suppress the salt-acid secretion and taking an antibiotic. On the second day the patient came back to me with a complaint she felt averse to the medicines and the vomiting persisted. I advised her to stop the standard therapy and prescribed aronia juice intake. We used *another product* – juice which had been subjected to slight fermentation by natural yeast – up to 5% alcohol contents. The concentration of bioflavonoids and vitamins is not changed. In my judgment, the slight alcohol contents would help give the body energy quicker. The effect achieved beat my expectations. At the 20-th hour the patient had some light cooked meal and did not

vomit. After 30 hours she joined routine housework in her home and started taking meals – in small portions and observing the prescribed diet. After the 3-rd day she started her normal life, stopped complaining and went on with the recovery process. Her gastroscopy done after 14 days showed completely repaired gastric mucosa. Elvira's good health contributed to building better family relations and keeping them.

**Case discussion:** Emotional stress is a common cause for the incidence of erosive changes in the gastric mucosa. Such conditions are characterized by suppressed synthesis of prostaglandins and leukotrienes, irregular blood supply of the lining of the stomach, and damage to the protective mucus barrier. *Helicobacter pylori* infection comes easily. Sometimes patients show intolerance to standard gastroenterologist therapy, as is Elvira's case. Aronia juice is suitable for stomach diseases because it creates direct contact with the cells of the gastric mucosa. The juice ingredients possess antibacterial, anti-inflammatory, and stabilizing effect. The only requirement is for the patient to take in the juice very slowly, in 10-15 minutes (and the juice should be prepared according to the instructions). Once absorbed by the gastro-intestinal tract and finding its place in the body, the juice stabilizes all functions of organs, including neurologic and mental disturbances.

### **Clinical case 3.**

Vladimir M is a 60-year old man living in the country. Computer programmer. His complaints include loss of appetite, getting tired easily, vomiting, feeling weak. An examination with gastroenterologist revealed carcinoma of the greater curvature of the stomach. In 2012 a famous surgeon from the capital made a total gastrectomy and the nearby lymph nodes. The patient also underwent plastic repair resulting in a new "stomach". What followed was post-operative recovery and discharge from hospital with a report referring the patient to the regional oncology board. The latter prescribed chemotherapy. V. sought my advice (the reason might be we are former classmates). After looking through the medical documentation I recommended that he should reject the chemotherapy course. We started aronia juice consumption alongside a special dietary regimen and supplemented by injections of Vitamin B12. The diagram shows changes in the patient's laboratory parameters and weight over the years. Vladimir now still goes to work. He regularly goes hiking in Bulgarian mountains. He regularly has his medical check-

ups, image diagnostic tests and laboratory control of his condition and none of these shows any deviations from the norms. He enjoys spending time with his grandchildren. He is practically healthy.

Table 1. Changes in some parameters (Vladimir) – before surgery and after surgery accompanied by aronia juice intake.

<b>Parameters</b> ↓	<b>Feb 2011</b> <b>Before surgery</b>	<b>July 2011</b> <b>controls</b>	<b>July 2012</b> <b>controls</b>	<b>July 2013</b> <b>controls</b>	<b>July 2014</b> <b>controls</b>
<b>Weight (kg)</b> (height 166 cm)	<b>56</b>	<b>61</b>	<b>66</b>	<b>70</b>	<b>72</b>
<b>Haemoglobin</b> (130-180 g/L)	<b>87</b>	<b>95</b>	<b>110</b>	<b>128</b>	<b>139</b>
<b>Iron</b> (10-30 mmol/L)	<b>3.9</b>	<b>10.5</b>	<b>15.3</b>	<b>16.4</b>	<b>17.1</b>
<b>Ferritin</b> (15-300 ng/mL)	<b>4.43</b>	<b>11.52</b>	<b>27.38</b>	<b>33.75</b>	<b>46.15</b>
<b>S Albumin</b> (35-50 g./L)	<b>30</b>	<b>33</b>	<b>39</b>	<b>40</b>	<b>41</b>
<b>CRP</b> (up 5.0 mg/L)	<b>19.7</b>	<b>7.5</b>	<b>3.0</b>	<b>1.5</b>	<b>0.9</b>
<b>Ca 72-4</b> Tumor marker (up 6.9 U/mL)	<b>15.412</b>	<b>7.001</b>	<b>0.930</b>	<b>0.850</b>	<b>0.760</b>

**Case discussion:** Stomach cancer is a malignant tumor. It can involve various parts of the stomach. Treatment is always through surgery if it is not too late for that. Vladimir's condition was in stage T3-N1-M0. This means timely diagnosis, no metastasis with the exception of one lymph node (they were all excised). The post-operative period requires a thorough assessment: Chemotherapy has its down



side, too – it impairs other organs, reduces overall immunity, changes the personality, leads to mental collapse due to meeting more severe oncology patients (as a result the patient starts feeling worse). All these factors do not contribute to initiate the recovery of the organism. We decided to use another strategy. I motivated my ex-classmate about the future; we started therapy with a natural product – aronia juice whose anticancer effects have already been confirmed in experiments with mice and carcinoma cultures. V. had never before taken the adequate quantities of bioflavonoids. I explained to him that the other chemical components of the juice are essential supplements for the organism. A big advantage for this patient is that he takes in the juice in a serving of yoghurt. Doing so, he provides his body vital bacteria for the intestinal flora and yoghurt proteins are easier assimilated. The aronia juice stimulates hematopoiesis in the bone marrow, activates metabolism in each cell and balances free radicals formation (their accumulation leads to oxidative stress which has destructive consequences). Apart from that, aronia juice consumption enhances brain functions and stabilizes one's mentality which is manifested in improved memory, facility of thinking process, elevated self-confidence, belief in one's own potential, improved libido. When 5 years elapse without detecting metastases, a patient is assumed to be healthy. In Vladimir's case the time passes till now is 4 years and 3 months. He continues taking his *aronia juice in yoghurt*.

**It is necessary for all of us who want to transform a hectic routine into a healthy lifestyle to realize that we need to have a daily consumption of this wonder food – fruit, juice, and wine of Aronia melanocarpa. We should not wait for diseases to come upon us and look for nature's blessings as a measure long overdue. Let us take advantage of these blessings, let us enjoy the wonderful taste of aronia products WHILE WE ARE STILL HEALTHY!**