



CHERRYGO®



MUSCLE RECOVERY

ORIGINAL COMPOSITION OF STANDARDIZED EXTRACTS

- *Prunus cerasus* L. (Vistula) | Tart cherry
- *Aronia melanocarpa* (Michx.) Elliot | Aronia berry

Helps to speed up muscle regeneration and reduce soreness after physical exertion

Reduces inflammation thanks to strong antioxidative activity



Prunus cerasus L. (Vistula)



Aronia melanocarpa M.

- **REGENERATION AFTER SPORT ACTIVITY**
- **REDUCTION OF MUSCLE SORENESS**
- **REDUCTION OF INFLAMMATION**
- **STIMULATION OF THE IMMUNE SYSTEM**



CherryGO® is a standardized complex of fruit extracts rich in polyphenols, designed to support the body's recovery and reduce muscle soreness after strong physical exertion. It is composed of tart cherry fruit *Prunus cerasus* L. (*Vistula*) and aronia berry *Aronia melanocarpa* (*Michaux*), which have different but complementary polyphenol fractions, including anthocyanins. Such composition is widely proven to be beneficial to our health. As a result of our own laboratory research on the formulation, we have obtained an innovative specific complex with an extended, synergistic spectrum of biologically active ingredients.

Table 1. The main anthocyanin fractions present in tart cherry and aronia.

Plant (fruit) / dominant anthocyanin fraction	
<i>Prunus cerasus</i> L. (<i>Vistula</i>) / Tart cherry	<i>Aronia melanocarpa</i> M. / Aronia
Cy-3-sop	Cy-3-gal
Cy-3-rut-glu	Cy-3-ara
Cy-3-o-glu	Cy-3-glu
Pe-3-rut	Cy-3-xyl

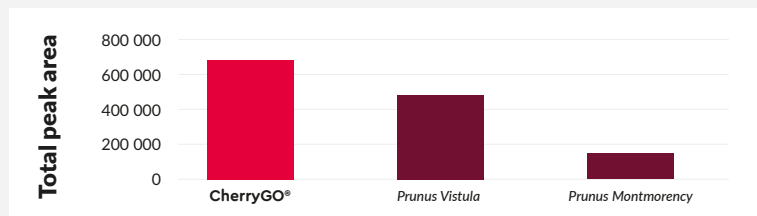


Figure 1. The comparison of anthocyanins **CherryGO®** composition and two varieties of tart cherries (*Prunus Vistula* and *Prunus Montmorency*). Total content of anthocyanins was measured by UPLC. The maximum absorption for the anthocyanidin chromophore was found at 535 nm. The concentration of each extract solution was 1 mg/ml.

Specification

We guarantee the full control of the origin and quality of these locally sourced raw ingredients. Aronia berries are obtained from selected Polish plantations. The tart cherry *Vistula* fruits are from unique, local plantations, traditionally cultivated along the Vistula river on limestone soil for over 100 years now. The *Vistula* sour cheery juice has a very intense colour and more beneficial ingredients compared to most widely grown *Prunus Montmorency* type. The *Vistula* cherries used in production are certified by EU with **Protected Designation of Origin – PDO**. The distance between the plantation and GREENVIT's production facility is **no greater than 300 km**.

The production of **CherryGO®** complex (*Prunus cerasus* L.-*Vistula* + *Aronia melanocarpa* M.) is based on a double standardization of each ingredient simultaneously with anthocyanin (HPLC) and polyphenol (UV) content. The complex is composed of:

- **TART CHERRY** *Vistula* type extract – double standardized for polyphenol (min. 15%) and anthocyanin (min. 3%) content, DER 40:1.
- **ARONIA BERRY** extract – double standardized for polyphenol (min. 50%) and anthocyanin (min. 25%) content, DER 70:1.

Recommended use and dosage

CherryGO® comes in a form of dark red / claret fine powder, with good technological properties. It is convenient to include in formulations, suitable for **capsules, tablets, liquid forms**.

Recommended dosage: 400mg of **CherryGO®** per day.

What makes CherryGO® unique?

Innovative, standardized **CherryGO®** complex supports the body's natural defense system and regeneration by utilizing health beneficial properties of the two traditionally used fruits that provide high polyphenol content - tart cherry and aronia berry. **CherryGO®** complex enables, among others:

- effective regeneration after sport activity, especially endurance and resistance trainings,
- reduction of muscle soreness,
- reduction of inflammation,
- stimulation of the immune system response,
- prevention or treatment of diseases resulting from oxidative stress (restoring the balance between anti- and pro-oxidative processes),
- effective prevention and/or support for the treatment of respiratory infections of viral and/or bacterial etiology.

CherryGO® complex has antioxidative and anti-inflammatory properties, and therefore can improve performance in physical activity (excessive production of reactive oxygen species (ROS) has been linked to the development of fatigue), as well as muscles recovery.¹

Target Group

CherryGO® complex is recommended for both recreational and professional athletes; and people with physically demanding jobs.

The registered trademark belongs to GREENVIT. Its use is exclusively related to the purchased complex of extracts. The use of the **CherryGO®** trademark in the final products containing this complex mixed with other ingredients belonging to the same botanical family is not permitted.

PRUNUS CERASUS L. (VISTULA) and ARONIA MELANOCARPA M. studies

It is assumed that regular and adequate physical exertion, including sports, have a beneficial effect on the immune system. This is very important in the **prevention of mild forms of immunodeficiency (accompanied by recurrent infections) and allergic diseases.**

Unlike moderate physical activity, intense, prolonged physical exertion can cause immunosuppression and lower immunity. It seems that short-term, transient immunosuppression (the so-called immunosuppressive window 'opened window') appears after acute physical stress and lasts about 3 – 12 hours. Insufficient regeneration and repeated transient immunosuppression can cause the so-called overlapping of open windows and, consequently, a decrease in the body's immunity.²

During the immunosuppression window, the risk of sub-clinical and clinical infections increases. These changes can cause an increase in susceptibility to frequent respiratory infections, in particular during the 1 to 2 week rest phase after long and intense physical exertion (marathon runners, long-distance runners, etc.) and to the occurrence of chronic fatigue syndrome and hidden viral infections (CMV, EBV, herpes viruses, etc.). Additional factors that increase the risk of infection in people performing high-intensity efforts are: greater exposure to pathogens due to more intense breathing, especially cold and dry air, high mental stress, lack of sleep, malnutrition, and in the case of athletes, additionally more frequent stay in large human communities and travel.

Chronic fatigue syndrome after viral infection is also very dangerous. It lasts for several months and is manifested by lethargy, depression, excessive drowsiness, night sweats, muscle pain and poor performance in sports.

There is a rather unfortunate concept of 'soreness', which is described as pain and stiffness occurring after 'excessive' physical exertion. The phenomenon of 'soreness' is precisely exceeding the tolerance of physical load, which can lead to damage to ligament structures, sarcomeric (muscular) proteins and the cytoskeleton. As a result of exceeding the load tolerance, an unfavorable condition-inflammatory reaction occurs, which manifests itself as the so-called delayed muscle pain syndrome for up to a few days. The pain associated with acute muscle injury is most likely caused by oxidative tissue damage resulted from excessive free radicals production, which in consequence leads to an inflammatory response and increased secondary muscle soreness. On the other hand, chronic inflammation also increases the body's immune response, affecting muscle regeneration.

Proper muscle regeneration and repair is complex and requires time. However, it can be accelerated through healthy eating coupled with **appropriate antioxidant supplementation.**^{3,4,5,6,7}

Tart cherries belonging to the *Prunus* species are a rich source of polyphenols, which have antioxidant and anti-inflammatory properties. The chemical composition of tart cherries is influenced by many factors such as variety, ripening stage, agricultural practices and environmental conditions. At least 24 anthocyanins, 12 phenolic acids, 17 flavonols and 18 flavones were identified in cherries, which gives a **high content of polyphenols and a very diverse profile.**⁷

The bioactive properties of tart cherries result from the interaction of different polyphenols present in this fruit, which can act synergistically in modulating different molecular pathways.⁸

In the research of *Kirakosyan et al.* on the compounds present in the tart cherry, the most significant conclusion is that compounds with strong antioxidant abilities show interactions that are primarily synergistic.⁹

Reactive oxygen species (ROS), i.e. oxygen free radicals and compounds capable of generating them, are involved in many key physiological processes. Both excessive production of free radicals and their deficiency can be harmful to the body, which is why the balance between pro- and antioxidant mechanisms is so important. Understanding the role of oxidative stress caused by ROS in the formation and development of many chronic diseases resulted in the conscious use of anthocyanins as antioxidant compounds showing **health beneficial and anti-inflammatory properties.**¹⁰

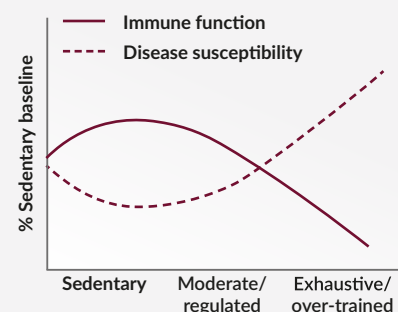


Figure 2. The hypothesis of the inverted letter "J" in exercise immunology, according to which susceptibility to diseases is increased in people who lead a sedentary lifestyle and overtrain compared to regulated, moderate training.⁴

Table 2. Antioxidant activity of aronia extract

Antioxidant activity of aronia extract (mMol Troloxu /100 g sm)			
Method used	DPPH	ABTS	FRAP
	336,05	394,88	352,56

Antioxidant activity of aronia extract was determined by spectrophotometric methods (averaged results of determinations carried out for 3 separate batches of the extract).

The anti-inflammatory properties of anthocyanins can be attributed primarily to their antioxidant properties, which result in downregulation of the redox-sensitive nuclear factor - $\kappa\beta$ signaling pathway (NF- $\kappa\beta$). Moreover, anthocyanins effectively inhibit the production of inflammatory mediators such as prostaglandin E2 (PGE2) as well as pro-inflammatory cytokines and enzymes such as COX-2, PLA2, LOX and iNOS.^{11,12}

Supplementation with antioxidants can **counteract fatigue and increase performance** through increased perfusion of the exercising muscle, better maintained excitation-concentration coupling and central drive. There is some empirical evidence to support this view, as antioxidant supplementation has been shown to improve exercise performance.¹³

Among the mechanisms responsible for the antiviral effects of aronia, the most frequently mentioned are: blocking hemagglutinin (HA), which prevents adhesion and penetration of the virus into the host cells, inhibition of viral reproduction, preventing further transmission of the virus from cell to cell by inhibition of neuraminidase.^{14,15,16}

An equally important, indirect, mechanism for fighting viral infection – both in case of tart cherries and aronia berries, may be to stimulate the immune system response.

In the context of the total benefits of health-promoting compounds present in tart cherry and aronia berries, recent research on the bioavailability of anthocyanins and flavanones is of significant importance. The published results indicate that they are much more bioavailable than previously predicted, which further indirectly **confirms the protective, regenerating effects** of these substances in the diet and supplementation.¹⁷

Detailed results of *in vitro* studies related to anti-inflammatory, antiviral activity are included in relevant Greenvit materials related to aronia extracts and are available upon request.

Source publications:

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Greenvit sp. z o.o.

 Aleja Wojska Polskiego 27A
 18-300 Zambrow, Poland

 +48 85 733 60 54
 info@greenvit.pl
