

Wellness Foods & Supplements

The European magazine for active ingredients



- Minerals and Vitamins ■ Oils and fats ■ Flavours ■ Sports nutrition
- Joint health ■ Encapsulation ■ Functional ingredients



Photo®: Anklam Extrakt GmbH



Beneficial impact of maqui berry extract on chronic disease related risk factors provoked by imbalanced lifestyle

Dr. Stefanie Lang

Maqui berry (*Aristotelia chilensis*) is a unique berry that only grows in the wild forests of Patagonia in Chile and Argentina. This small deep purple to black maqui berry has been consumed since ancient times by indigenous Mapuche Indians because of its' appreciated natural remedial qualities for various fields of indications. Next to the berries, the native people also used the plants stems and leaves and manufactured wine for medicinal purposes for hundreds of years (1).

Today, next to goji or acai, maqui berries are viewed as real “super fruit” due to their superior antioxidant properties. In Chile, the berry is used for jam, juice, ice cream and liquor and is part of the daily life (2). The Patagonian region is close to the Andes Mountains and exhibits a quite harsh climate with cold nights, warm days and intensive UV radiation. These conditions provide maqui berries with a unique phytochemical profile. In this context, screening of maqui berries revealed by nature an extraordinarily rich content in many nutrients comprising vitamins, alkaloids, benzoic and cinnamic acid derivatives, mineral elements and powerful polyphenol species (2, 3). Latter ones and in particular the group of anthocyanins have been linked to the aforementioned health-promoting features of the outstanding Chilean berry like anti-inflammatory, wound healing, pro-digestive and laxative, diaphoretic, expectorant, and diuretic effects (3, 4, 5). Among maqui berry anthocyanins, especially delphinidin and cyanidin species can be found (6). Delphinidins carry three hydroxyl groups, which is a unique feature in comparison to other anthocyanins like cyanidins, peonidins or malvidins. Researchers could demonstrate that due to this chemical structure, delphinidins

possess a high radical scavenging activity in the DPPH test and thus reveal a great antioxidant efficacy (7). In this context, another research group proved that the juice of maqui berries bears a threefold higher content in total polyphenols and with it also a total radical-trapping antioxidant parameter (TRAP) in comparison to other fruits like cranberries, blueberries, red grapes or blackberries (8) (see figure 1). The TRAP assay measures the amount of free radicals that can be trapped by the sample and therefore resembles the total antioxidants present within the fruits.

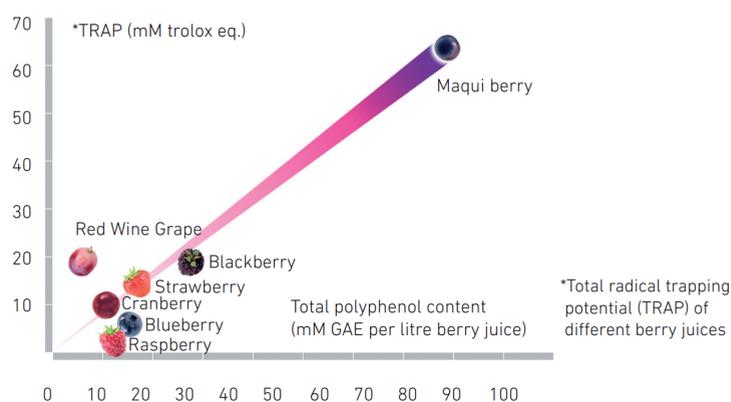


Fig. 1: Maqui berry – superior source of potent polyphenols

Hyperglycemia is associated with an increased risk of fatal and nonfatal cardiovascular diseases, which was reported in meta-analyses from 1999 and 2004 (9, 10). But also frequent excessive post-prandial glucose heights, provoked by an overabundance of dietary energy, impair the maintenance of glucose homeostasis and hence constitute a critical risk factor for developing diabetes (11) and with it also cardiovascular diseases (9, 10). However, the regular consumption of polyphenol-rich food has repeatedly been suggested to inversely correlate with glycemic index and can exert beneficial effects on the treatment and prevention of chronic health problems like inflammatory, cardiovascular, adipogenic and other chronic diseases (12, 13). The mechanisms behind these health-promoting properties of polyphenols ranging from modifications of post-meal glycemic responses by inhibiting glucose or digestion transport, ameliorated fasting blood sugar concentrations, improved pancreatic insulin secretion and insulin sensitivity, up to altered gene expressions and signaling pathways (14, 15). With special regard to anthocyanins, it is known that after ingestion the fate of the plant-derived molecules follows an exceptional pattern that differs from those of other polyphenols since anthocyanins can be absorbed by both the stomach as well as by the intestine (16). Thus, bioavailability studies described that anthocyanins can be detected rapidly in the circulatory system and several tissues (17). Rojo and colleagues found that an anthocyanin-enriched extract of maqui berries ameliorated fasting hyperglycaemia and glucose tolerance in an obese diabetic mouse model. The same group could also show that this maqui extract significantly

increased the glucose uptake of muscle cells *in vitro* (18). Shortly after in 2014, Chilean researchers revealed in the course of a pilot study that a single dose of the branded standardized maqui berry extract Delphinol® significantly diminished post-prandial blood glucose and insulin levels at 60 minutes after boiled rice consumption in volunteers with moderate glucose intolerance (19) (see figure 2).

In addition, *in vitro* analyses suggest that delphinidin, the main anthocyanin species of the extract, inhibits the sodium glucose co-transporter (SGLT-1) in murine jejunal mucosa thus, moderating the enterocytic glucose uptake and release into the blood stream. Another *in vitro* study showed that two maqui berry anthocyanins namely delphinidin-3-glucoside and cyanidin-3-glucoside potently stimulated insulin secretion in pancreatic cells (20) demonstrating a further mode of action of maqui berry related compounds on metabolic processes. Recently two clinical follow-up studies confirmed that Delphinol® i) significantly lowered blood glucose levels 30 minutes after glucose challenge, ii) daily supplementation over a period of three months continuously lowered HbA1c levels and iii) significantly decreased LDL, referred to as “bad cholesterol”, and in turn significantly increased the “good” or protective HDL cholesterol concentrations in pre-diabetic subjects (21, 22). The study designs comprised an open exploratory design with 43 volunteers with altered blood glucose values (21), as well as an open prospective design with 31 subjects fulfilling pre-diabetic conditions respectively (22).

MORE TECHNOLOGY

MORE SOLUBILITY

Captisol is a proprietary technology that is rationally engineered to improve solubility, stability, bioavailability and formulation of water-insoluble ingredients.

Try your FREE starter kit today at CAPTISOL.COM!

CAPTISOL®

A Ligand TECHNOLOGY CAPTISOL.com

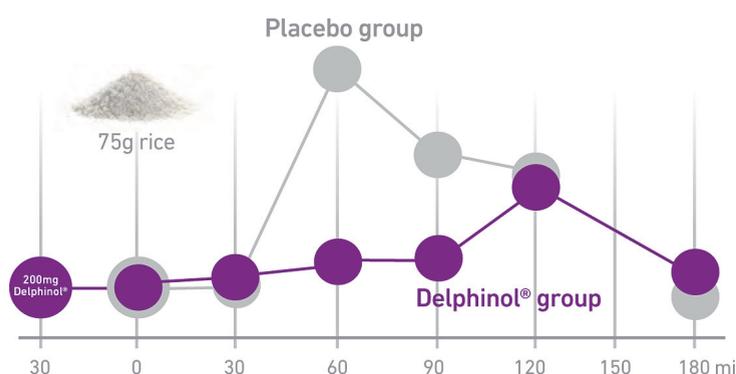


Fig. 2: Decelerated but steady glucose increase in blood stream

Accordingly, the enriched and standardized maqui berry extract Delphinol® may represent a supportive dietary supplement for maintaining healthy glucose and cholesterol levels in blood and hence for cardiovascular health parameters. Likewise, the antioxidant potential of the Patagonian berry was investigated. It is of broad acceptance that oxidative stress and its effects may have a substantial impact in the pathophysiology of numerous chronic diseases. Free radicals are formed either by regular cell metabolisms or by external stimuli like cigarette smoking, radiation, air pollution, toxins or also certain medications (23). An overabundance of free radicals will lead to their reaction with proteins, cell membrane fatty acids and to DNA damage, thus impairing the functionality and predispose for chronic disorders affecting several organ systems like Alzheimer's (central nervous system), rheumatism (joints), asthma (lungs) or atherosclerosis (cardiovascular) (23, 24). Therefore, researchers focus on the lipid peroxidation status and commonly analyze plasmatic oxidized LDL (ox-LDL) and urinary 8-iso-PGF2a as reliable markers for oxidative stress. Within the course of a four weeks double-blind, placebo-controlled intervention with Delphinol®, the dietary intake of the branded maqui berry extract resulted in a significant reduction of both parameters in healthy, overweight smoker subjects – presenting strong antioxidant efficacy in the selected predisposed trial participants (25) (see figure 3).

Additionally, another study reported that the dietary supplementation with Delphinol® increases concentrations of IL-6 and decreases those of H₂O₂ in exhaled breath condensates of moderate cigarette smokers. The findings indicate that maqui berry-related respiratory changes could lower oxidative stress in the lungs and simultaneously ameliorate the risk for pulmonary infections.

Since no adverse events occurred throughout the presented studies, Delphinol® maqui berry extract can be regarded as safe, which was confirmed by safety and toxicity data.

Taken together a substantial body of research suggests a highly beneficial nutritional impact of anthocyanin-rich maqui berry extract Delphinol® on the prevention of chronic diseases associated with dietary unbalanced metabolic conditions and oxidative stress that accumulate in our modern but often also unhealthy lifestyle.

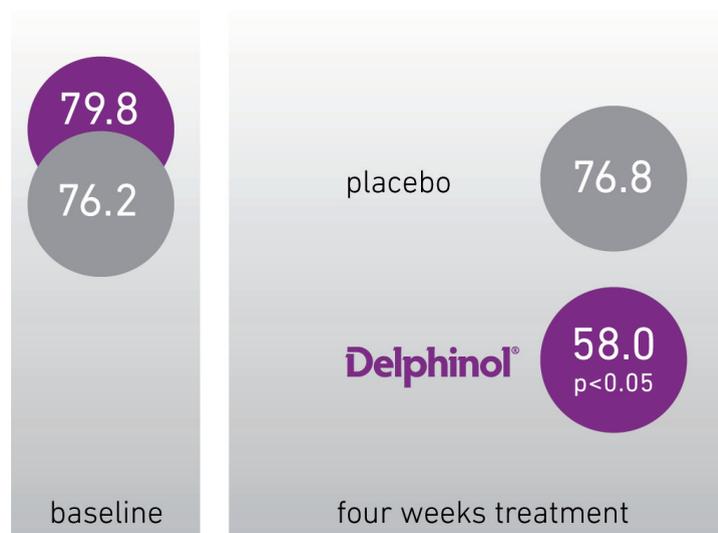


Fig. 3: Blood plasma concentration of oxidized LDL [U/L]

References

- (1) Scapagnini et al., Approaches to Aging Control. Vol 18. September 2014
- (2) Schreckinger et al., J Med Food 13 (2) 2010, 233–246
- (3) Araos JP (2015) Aristotelia chilensis: A Possible Nutraceutical or Functional Food. Med chem 5:378-382.
- (4) Escribano-Bailón et al., Phytochem. Anal. 17: 8–14 (2006)
- (5) Céspedes et al., Food Chemistry 107 (2008) 820–829
- (6) Fredes et al., J Sci Food Agric. 2014 Oct;94(13):2639-48
- (7) Kähkönen and Heinonen, J Agric Food Chem. 2003 Jan 29;51(3):628-33
- (8) Miranda-Rottmann et al., J Agric Food Chem 50: 7542-7547, 2002
- (9) Coutinho et al., Diabetes Care 1999;22:233–240
- (10) Levitan et al., Arch Intern Med 2004;164:2147–2155
- (11) Coe and Ryan, Journal of Nutritional Science (2016), vol. 5, e24
- (12) Kim, Keogh and Clifton, Nutrients 2016, 8, 17
- (13) Nyambe-Silavwe and Williamson, Br J Nutr. 2016 Aug;116(3):443-50
- (14) Williamson, Mol. Nutr. Food Res. 2013, 57, 48–57
- (15) Jayaprakasam et al., J Agric Food Chem. 2005 Jan 12;53(1):28-31
- (16) Fang, Drug Metab Rev. 2014 Nov;46(4):508-20
- (17) McGhie and Walton, Mol. Nutr. Food Res. 2007, 51, 702 – 713
- (18) Rojo et al., Food Chem. 2012 Mar 15;131(2):387-396
- (19) Hidalgo et al., Panminerva Med. 2014 Jun;56(2 Suppl 3):1-7
- (20) Jayaprakasam et al., J. Agric. Food Chem., 2005, 53 (1), pp 28–31
- (21) Alvarado et al., Biomed Res Int. 2016;2016:9070537
- (22) Alvarado et al., Panminerva medica 2016 September;58(Suppl. 1 to No. 3):1-6
- (23) Pham-Huy, He and Pham-Huy, Int J Biomed Sci. 2008 Jun; 4(2): 89–96
- (24) Khansari, Shakiba and Mahmoudi, SeRecent Pat Inflamm Allergy Drug Discov. 2009 Jan;3(1):73-80.
- (25) Davinelli et al., J Am Coll Nutr. 2015;34 Suppl 1:28-33

For more information, please contact

Dr. Stefanie Lang
 Research Manager
 Anklam Extrakt GmbH
 Campus Marienberg
 Marienbergstr. 92
 90411 Nuernberg, Germany
 Phone +49 911 247901-24
 stefanie.lang@anklam-extrakt.com
 www.anklam-extrakt.com

The article “Beneficial impact of maqui berry extract on chronic disease related risk factors provoked by imbalanced lifestyle” was written by Dr. Stefanie Lang, Research Manager at Anklam Extrakt GmbH, Germany. If you want to know more about this topic, Dr. Lang will give a talk at Vitafoods Europe in Geneva, Switzerland on May 16, 2018 beginning at 12.45 pm in the Life Stages Theatre.