Polyphenol

Polyphenols, also known as phenolic compounds, are chemical substances containing aromatic rings as well as at least two hydroxyl groups. Natural phenolic compounds exist widely in plants, which protect plants from ultraviolet radiation and other insults. Phenolic compounds have superior pharmacological and nutritional properties (antimicrobial, antibacterial, antiviral, anti-sclerosis, antioxidant, and anti-inflammatory activities), which have been paid more and more attention by the scientific community. Phenols can protect key cellular components from reactive free radical damage, which is mainly due to their property to activate antioxidant enzymes and alleviate oxidative stress and inflammation. It can also inhibit or isolate reactive oxygen species and transfer electrons to free radicals, thereby avoiding cell damage. It has a regulatory role in glucose metabolism, which has a promising prospect in the prevention and intervention of diabetes. It also prevents cardiovascular disease by regulating blood pressure and blood lipids. Polyphenols can inhibit cell proliferation by affecting Erk1/2, CDK, and PI3K/Akt signaling pathways. Polyphenols can function as enhancers of intrinsic defense systems, including superoxide dismutase (SOD) and glutathione peroxidase (GPX). Simultaneously, they can modulate multiple proteins and transcription factors, making them promising candidates in the investigation of anti-cancer medications [1)].

Apple polyphenol contains abundant procyanidins, which have been associated with an anti-atherosclerosis and cholesterol-lowering effect. The aim of a study was to investigate whether apple procyanidins (APCs) feature therapeutic efficacy in terms of regressing atherosclerosis and whether this efficacy is due to mechanisms other than a cholesterol-lowering effect.

After eight weeks on an atherogenic diet, rabbits were given a normal diet for another eight weeks to normalize the increased serum lipids level. The rabbits in the baseline group were sacrificed at this stage. The control group was subsequently fed a normal diet for eight weeks, while the APCs group was administrated 50 mg/kg/day of APCs in addition to the normal diet. Serum lipids and aortic intimal-medial thickness (IMT) were serially examined, and the resected aorta was examined histologically and through molecular biology.

Aortic IMT on ultrasonography and the lipid accumulation area examined using Sudan IV staining were significantly reduced in the APCs group as compared to the control group. Serum lipid profiles were not different between the groups. Immunohistochemistry showed significantly decreased staining of an oxidative stress marker and significantly increased staining of ATP-binding cassette subfamily A member 1 (ABCA1) in the APCs group. Western blotting and RT-PCR also showed increased expression of ABCA1 mRNA and its protein in the APCs group.

This study revealed that APCs administration causes a regression of atherosclerosis. APCs might hold promise as an anti-atherosclerotic agent [2)].

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see Resveratrol.

see Polydatin.

1)

Liu W, Cui X, Zhong Y, Ma R, Liu B, Xia Y. Phenolic metabolites as therapeutic in inflammation and

neoplasms: molecular pathways explaining their efficacy. Pharmacol Res. 2023 Jun 2:106812. doi: 10.1016/j.phrs.2023.106812. Epub ahead of print. PMID: 37271425.

2)

Wang L, Fumoto T, Masumoto S, Shoji T, Miura T, Naraoka M, Matsuda N, Imaizumi T, Ohkuma H. Regression of atherosclerosis with apple procyanidins by activating the ATP-binding cassette subfamily A member 1 in a rabbit model. Atherosclerosis. 2017 Jan 27;258:56-64. doi: 10.1016/j.atherosclerosis.2017.01.032. [Epub ahead of print] PubMed PMID: 28196336.