# Bilberry anthocyanin-rich extract exerts atheroprotective property through complex molecular mechanism of action

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Anthocyanins are water-soluble plant pigments that belong to the large group of polyphenols and more specifically to the subclass of flavonoids and bilberry is one of the richest sources of anthocyanins. Dietary intake of anthocyaninrich foods has been associated with a reduced risk of coronary heart disease and reduction of atherosclerotic lesions development in mice. However, little is known about the molecular mechanisms underlying the cardiovascular protective effect of anthocyanins. **The aim of our studies was to evaluate the effects of a bilberry anthocyanin-rich extract, when provided by the diet at a nutritional dose, on the development of atherosclerosis in apolipoprotein E-deficient mice and explore the in vivo mechanisms of action using a global transcriptomic approach.**
After a 16-week supplementation, a significant reduction of the size of atherosclerotic plaques was observed as compared to the control one (-15 %,). The plasma antioxidant capacity was not modified by the bilberry extracts, neither were levels of aortic F2-isoprostanes nor hepatic TBARS. Microarray analyses revealed that the BE-supplemented diet affected the expression of 1261 genes in aortas. Bioinformatic analyses indicated that these genes are involved in the regulation of processes underlying atherosclerosis development, such as cell adhesion, migration, inflammation, or angiogenesis. The gene expression profile suggests lower monocyte infiltration into aorta and consequently lesser atherosclerosis development. In the liver, the anthocyanin-rich extract affected the expression of 2,289 genes; genes involved in pathways such as cholesterol metabolism, VLDL removal, reverse cholesterol transport but also inflammatory responses.
In conclusion, supplementation of the diet with bilberry anthocyanin-rich extract led to a significant inhibition of plaque development in apolipoprotein E deficient mice without an effect on oxidative stress parameters, suggesting the implication of other mechanisms of action. The use of holistic transcriptomic approach provided new and global integrative view of molecular mechanisms involved in the preventive action of bilberry anthocyanin-rich extract against atherosclerosis. Globally, bilberry extract induced changes in gene expression to an anti-inflammatory profile, which could be related to its anti-atherogenic properties.