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MEETING ABSTRACT

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Influence of anthocyanins on the adipogenic and chondrogenic differentiation of human adipose mesenchymal stem cells

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Background: Anthocyanins are flavonoids responsible for the pigmentation in plants [1]. Anthocyanins are known for their anti-oxidative, anti-inflammatory and anti-tumor properties [2]. The influence of anthocyanins on the reduction of obesity and diabetes has been a subject of discussion in recent years. It has been shown that consumption of anthocyanins lowers the risk of obesity and type 2 diabetes [3]. However, the effects of anthocyanins on the chondrogenic differentiation has not yet been studied in detail.

Objectives: Aim of this study was to evaluate the effect of anthocyanidins—malvidin, cyanidin, delphinidin—on the adipogenic and chondrogenic differentiation of human adipose mesenchymal stem cells (aMSCs).

Methods: The cytotoxicity of anthocyanidins was evaluated by the CCK-8 assay and the non-toxic concentration of 25 µM was used in the further experiments. aMSCs (purchased from ATCC) were differentiated into adipocytes and chondrocytes by Gibco® StemPro® differentiation kits for 21 and 14 days respectively. 25 µM malvidin, cyanidin and delphinidin (all from Sigma Aldrich) were added to the differentiation medium. Medium change was done each 2–4 days. The expression of adipogenesis genes *adiponectin*, *FABP4*, *LPL* and chondrogenesis genes *Sox9*, *Col2a1*, *aggrecan* and *TGF-β1* was analyzed by qPCR.

Results: Anthocyanidins induced a concentration-dependent cytotoxicity in aMSCs after 24–72 h incubation. 25 µM was assumed as optimal anthocyanidin concentration for the differentiation. All tested anthocyanidins decreased the expression of the adipogenesis marker *adiponectin*; however, only delphinidin decreased *FABP4* and *LPL* expression in aMSC after adipogenic differentiation. Malvidin increased the expression of chondrogenic markers *Sox9*, *Col2a1* and *TGF-β1*, delphinidin increased the expression of *Col2a1*, but cyanidin had no effect on chondrogenesis marker expression in aMSC after differentiation.

Conclusions: Anthocyanidins affect the differentiation efficiency of aMSC into adipogenic and chondrogenic lineages. Delphinidin has the highest activity in the reduction of adipogenesis and malvidin has a chondrogenesis-promoting capacity in aMSCs.

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Keywords: anthocyanidins – malvidin – cyanidin – delphinidin – mesenchymal stem cells

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