

**Aronia Melanocarpa Fruit Juice Prevents the Hepatic Impairment in an Experimental Model of Metabolic Syndrome****Authors:** [Mehmed Reyzov](#)<sup>1</sup>, Maria Tzaneva<sup>2</sup>, Miroslav Eftimov<sup>1</sup>, Silvia Gancheva<sup>1</sup>, Milena Todorova<sup>1</sup>, Maria Zhelyazkova-Savova<sup>1</sup> and Stefka Valcheva-Kuzmanova<sup>1</sup>**Affiliation:** <sup>1</sup>Department of Pharmacology and Clinical Pharmacology and Therapeutics, Faculty of Medicine, Medical University “Prof. Dr. Paraskev Stoyanov”, Marin Drinov 55, 9002 Varna, Bulgaria; <sup>2</sup>Department of Basic and Clinical Pathology, Forensic Medicine and Deontology, Faculty of Medicine, Medical University “Prof. Dr. Paraskev Stoyanov”, Hristo Smirnenski 1, 9010 Varna, Bulgaria  
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Hepatic injury is a feature of the metabolic syndrome (MS) [1]. Fruits of *Aronia melanocarpa* are distinguished by their high polyphenol content. *Aronia melanocarpa* fruit juice (AMFJ) has been studied for its potential hepatoprotective effects in animal models of liver damage [2]. The goal of this study was to elucidate the effects of AMFJ on the liver in an experimental model of high-fat, high-fructose (HFHF) diet-induced MS. Fifty rats were allocated to five groups (control, MS, MS+AMFJ<sub>2.5</sub>, MS+AMFJ<sub>5</sub> and MS+AMFJ<sub>10</sub>). In the course of a 10-weeks, the control group was fed a standard rat diet, whereas the other groups were provided a HFHF diet. Daily oral treatment was performed during MS induction and it included administration of 10.0 ml/kg distilled water (control and MS groups) or AMFJ at doses of 2.5, 5.0, and 10.0 ml/kg (the other three groups, respectively). At the end of the 10<sup>th</sup> week, liver tissue samples were collected. Hematoxylin-eosin staining was used to explore the histological changes under light microscopy. The immunohistochemical expression of the pro-apoptotic marker Bax, the anti-apoptotic marker Bcl-2 and the pro-inflammatory marker MAC387 was determined by the universal highly sensitive visualization system for antibody detection EnVision FLEX, using rabbit polyclonal Bax and Bcl-2 antibodies, and a mouse monoclonal MAC387 antibody. The expression was assessed semi-quantitatively by determining the expression in fifty cells from each sample in randomly selected fields. For each cell, the intensity of the cytoplasmic expression was assessed as: 0 – lacking, 1 – weak, 2 – moderate or 3 – strong. The mean expression score of each marker was calculated for each group. In addition, Bax/Bcl-2 ratio was calculated to determine the susceptibility of hepatocytes to apoptosis. In MS rats, hepatocytes exhibited steatotic, inflammatory, and degenerative alterations, non-specific granulomas were found and the expression of Bax and MAC387 was markedly elevated ( $p < 0.001$  vs. Control group) while Bcl-2 expression was decreased non-significantly. The Bax/Bcl-2 ratio was significantly increased ( $p < 0.001$  vs. Control group) indicating a pro-apoptotic phenotype. These alterations were prevented in the AMFJ-treated groups and the hepatic histological and immunohistochemical picture of the treated groups resembled those of the control group. Compared to MS group, the expression of Bax and MAC387 decreased significantly ( $p < 0.001$  vs. MS group) and Bcl-2 increased, with a significant effect detected in MS+AMFJ<sub>5</sub> group ( $p < 0.01$  vs. MS group). Bax/Bcl-2 ratio in all AMFJ-treated groups decreased dose-dependently ( $p < 0.001$  vs. MS group) indicating an anti-apoptotic phenotype. In conclusion, AMFJ prevented the inflammatory, steatotic, degenerative and pro-apoptotic changes in the liver, proving the hepatoprotective properties of the juice in a rat model of MS.

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- [1] P. Sangro, M. de la Torre Aláez, B. Sangro and D. D'Avola (2023). Metabolic dysfunction-associated fatty liver disease (MAFLD): an update of the recent advances in pharmacological treatment, *J. Physiol. Biochem.* **79**, (4), 869-879.
- [2] S. Valcheva-Kuzmanova, P. Borisova, B. Galunska, I. Krasnaliev and A. Belcheva (2004). Hepatoprotective effect of the natural fruit juice from *Aronia melanocarpa* on carbon tetrachloride-induced acute liver damage in rats, *Exp. Toxicol. Pathol.* **56**, (3), 195-201.