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Blackcurrant juice polyphenols and the change in their content by lactic acid fermentation

Abstract: Lots of scientific research is focused on excessive free-radical reactions and exacerbated inflammatory processes as the causes of the neurodegenerative disorders. In turn, polyphenolic compounds present in food are suggested to be the reason for its pro-health actions. The biological effects of blackcurrant are in the limelight for some time due to its high polyphenolic contents, antioxidant effect, cholinesterase and cyclooxygenase 2 inhibition. It has been well documented that bioavailability of polyphenols after oral administration is contingent on the hydrolysis of the glycoside linkage. Thus the main attention of the study is focused on free aglycons including flavonols of blackcurrant juice. The selection of bacteria strains (among *Lactobacillus rhamnosus* strains) exhibiting the highest β -glucosidase activity can improve the fermentation process. The methodology included the use of liquid chromatography high-resolution mass spectrometry LC-HRMS (UHPLC 1290 Infinity with an accurate mass quadrupole time-of-flight (Q-TOF) 6550 iFunel mass spectrometer, Agilent Technology) to analyze the flavonol profile in blackcurrant juice followed by the application of spectrophotometric techniques to study total polyphenols and total flavonols contents in the fermented juice. As a result, the content of flavonols in the fermented juice was determined and the effect of the process duration and the used strain of bacteria were observed. In addition, the increased pH value (due to the optimization of the bacteria growth process) also negatively affected the content of flavonols. The highest contents of total polyphenolic compounds and flavonols were observed in the juice fermented by *L. rhamnosus* 1445. However, it is suggested that *L. rhamnosus* B-1937 strain is able to increase the juice bioavailability due to high production of β -glucosidase.

Keywords: blackcurrant, juice, lactic fermentation, flavonols, LC-MS

Biography: I am a graduate of biotechnology at the University of Life Sciences in Lublin and I completed my dissertation there in 2014. I have completed two training research internships: "Breeding of zebrafish *Danio rerio* and cell cultures in vitro" (2023) and "Application of LC-Q/TOF-MS in the analysis of bioactive compounds from bilberry fruit" (2019/2020). I am the co-author of the invention entitled "Polyphenolic composition having the application in prophylaxis and supporting treatment of neurodegenerative diseases, preferably Alzheimer's disease" (Patent no. PL 237891) and leader of two projects supported by the National Science Centre in Poland (2019-2020 and 2024-2027).