

In vitro digested bread enriched with polyphenols prevents growth of tumor

Dominik Szwajgier, Roman Paduch, Wirginia Kukuła-Koch, Magdalena Polak-Berecka, Klaudia Kowalik and Adam Waśko

Medical University of Lublin, Poland



Abstract

Polyphenols from plants such as: chokeberry, raspberry, wild strawberry, peach, bilberry, apricot, cranberry, and parsley were extracted using ultrafiltration and C18 preparative chromatography and complex polyphenolic preparation (PP) was prepared. Using LC-MS analysis in PP the highest contribution of cyanidin 3-O-glucoside, p-coumaroyl glucoside, chlorogenic acid, neochlorogenic acid, and isoquercetin was detected. Sourdough bread fortified with PP (at 0.16% m/m) was produced, followed by *in vitro* digestion. Fluid obtained after PP-enriched bread digestion (EBD fluid) was tested in terms of cytotoxicity, growth inhibition, antioxidant activity, and morphological changes in cancerous intestinal epithelial cells (HT-29) and normal (CCD 841 CoTr). Results show that EBD fluid concentration over 125 $\mu\text{g}/\text{mL}$ significantly decreased activity of succinate dehydrogenase in HT-29 cells and reduced their viability of 25% and modified morphology of cancer cells. The highest antioxidant activity was observed at concentration of 75 $\mu\text{g}/\text{mL}$, both PP and EBD fluid. Antioxidant activity of polyphenols is one of the mechanisms that explains the observed effect of inhibition the growth of colon cancer cells. In conclusion, we claim that the biological activity of bread enriched with plant polyphenols was related to the presence of p-coumaroyl-glucoside, chlorogenic acid, neochlorogenic acid, cyanidin 3-O-glucoside, and isoquercetin, as well as other compounds, present in the preparation in the minority. Finally, we demonstrated that enriched bread after *in vitro* digestion can play a role in the prevention of colon cancer by inhibition of the growth and viability of tumor cells, including morphological changes.

Biography

A graduate of the faculty of biology and earth sciences of the Jagiellonian university (1996), dr (2001), dr hab. in the field of biological sciences, discipline biotechnology (2015). From 2005 to the present, she is an adjunct at the department of biotechnology, microbiology and human nutrition, university of life sciences in Lublin, Poland. From 2016 to the present, she is the vice-dean of the Faculty of Food Science and biotechnology, university of life sciences in Lublin, Poland. Scientific achievements concern: optimization of biotechnological processes, physiological, biochemical and genetic characteristics of lactic acid bacteria isolated from various ecological niches, with particular emphasis on probiotic strains.



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