

Summary

Colorectal cancer is one of the most frequently diagnosed malignancies worldwide. Despite significant advances in the treatment of colorectal cancer, the effectiveness of therapy for advanced stages of the disease remains limited. Furthermore, adverse effects associated with chemotherapy and the development of chemoresistance continue to reduce therapeutic efficacy. Colorectal carcinogenesis is a multifactorial process influenced by both genetic predisposition and environmental factors. Since some of these factors can be modified, increasing attention has been focused on chemoprevention based on natural bioactive compounds present in natural products of plant and mushroom origin. Particular interest has been directed toward functional foods, whose constituents may influence the process of carcinogenesis. Therefore, the aim of this dissertation was to evaluate the chemopreventive potential of natural products derived from plants and mushrooms after *in vitro* digestion using cellular models of colorectal cancer and to determine the effect of biofortification on the biological properties of mushrooms. The study included an extract of fireweed (*Epilobium angustifolium* L.) and extracts of biofortified lion's mane mushroom (*Hericium erinaceus* (Bull.) Pers.). The obtained results demonstrated that the *E. angustifolium* extract retained its biological activity after *in vitro* digestion and exhibited the ability to inhibit the proliferation of colorectal cancer cells. It was also demonstrated that the biofortification process significantly affected the metabolomic profile of *H. erinaceus* fruiting bodies and that the chemical form of iron determined their biological properties. Among the tested variants, extracts from *H. erinaceus* biofortified with FeHBED exhibited the highest anticancer activity.

The conducted studies confirmed the proposed research hypothesis, indicating that natural plant- and mushroom-derived products constitute a valuable source of bioactive compounds with chemopreventive potential against colorectal cancer. The obtained findings suggest that the selected plant and mushroom extracts may serve as a source of compounds with promising biological activity in cellular models of colorectal cancer; however, further studies are required to confirm their chemopreventive potential.

Keywords: *Epilobium angustifolium*, *Hericium erinaceus*, colon cancer, biofortification, functional foods