

Summary

Swedish whitebeam (*Sorbus intermedia* (Erh.) Pers., Rosaceae) is an endemic of the Baltic Region, which, due to its decorative value and frequent use in public greenery, has spread throughout Europe. Chemotaxonomic data clearly indicated that *S.intermedia* may serve as a potential source of triterpenes. Therefore, the main objective of the present dissertation was phytochemical analysis of the *S. intermedia* fruits aiming at indication of a new and easily available source of triterpenes with a defined biological activities. The basic research tasks included the analysis of the dynamics of accumulation of selected triterpenes during the growing season with the parallel isolation of predominant compounds from this plant material. In turn, the biological investigations concerned the evaluation of: 1) cytotoxic activity, 2) anti-inflammatory activity, i.e. protective effects against heat-induced bovine albumin denaturation, inhibition of release of pro-inflammatory mediators from activated macrophages, and anti-hyaluronidase activity, 3) anti-androgenic and anti-proliferative activities in an cellular model of benign prostatic hyperplasia.

The studies indicated ursolic acid as the predominant triterpene present in the *S. intermedia* fruits. Moreover, β -sitosterol and five ursane-type triterpenes, i.e. ursolic acid, 3 β -O-acetoxy-ursolic acid, ursolic aldehyde, 3 β -O-acetoxy-pomolic acid and uvaol, were isolated from this plant material for the first time ever. The isolated terpenoids were then subjected to a series of biological assays. First, using a broad *in vitro* screening model, their cytotoxic activities were examined against selected cancer cell lines varying in degree of invasiveness and the corresponding normal cells. The highest activity was demonstrated by ursolic acid, and hydroxyl and carboxylic moieties were found to be crucial for maintaining its cytotoxic activity. Moreover, the influence of triterpenes on the cytotoxicity of chloroform extracts prepared from *S. intermedia* fruits at various developmental stages was also investigated. No correlations were observed between their activities and the contents of triterpenes, which most likely indicates a synergistic effect of several groups of compounds. In the next step, the anti-inflammatory activities of terpenoids obtained from *S. intermedia* were assessed. All compounds exerted inhibitory effects on the release of NO, IL-6 and TNF- α from RAW264.7 cells stimulated with lipopolysaccharide. Moreover, most compounds displayed anti-hyaluronidase activity, with ursolic acid and ursolic aldehyde achieving better results than the reference substance – quercetin. Satisfactory results of cytotoxicity studies against prostate cells gave rise to extending the research with the influence of compounds on the cellular model of prostatic hyperplasia. All compounds inhibited the activity of 5- α -reductase as well as suppressed the secretion of prostate specific antigen (PSA) and the proliferation of PNT2 cells treated with testosterone, thereby reversing the stimulating effect of the hormone. Moreover, all terpenoids demonstrated an effect on inflammation which is associated with the

disease development, more frequent occurrence of urination disorders as well as a higher risk of acute urinary retention and/or prostatectomy.

The presented research confirmed that the fruits of *S. intermedia* are a source of bioactive metabolites with a potentially beneficial effects on human body.