

The main goal of the project is investigation of chemical composition of common in Poland white birch species buds: silver birch (*Betula pendula*) and downy birch (*Betula pubescens*) and determination of antitumor activity of their constituents.

The roots of medical use of birch buds lead back to ancient times. Extracts and decoctions of buds were used for treating severe infections, inflammations, urinary tract disorders (as a diuretic), stomatitis, chronic tonsillitis, acute respiratory diseases, and as an antiseptic for wound healing. The wide spectra of diseases which are treated with birch buds in official medicine of east European countries attests of their biological activity. Recently, scientists in Russia and some other countries have been used birch buds (including standardize birch bud preparations, *Gemmae betulae*) in investigations *in vitro* and *in vivo* of antitumor, antimicrobial, antioxidant and diuretic, as well as possibility of Pb and Cd binding. These investigations confirmed medicinal action of birch bud extracts. Unfortunately, these investigations were not accompanied with determination of the chemical composition of used extracts and decoctions. Although *in vitro* and animal models provide strong support for traditional medicinal uses, there are no clinical studies demonstrating health benefits in humans.

Investigations of birch buds chemical composition began more than 100 years ago, however they were not so wide and deep as investigation of birch leaf chemistry. It can be noted that our knowledge on the chemical composition of birch buds is not satisfied for medicinal purposes. Nevertheless, many found in birch buds chemical compounds characterize a high biological activity. Such activity demonstrate triterpenoids of lupane group, flavonoids, and proanthocyanidins. Many other bud metabolites have the structure similarity with compounds which biological activity is known and medicinal effect is documented. This similarity allows to suppose analogous features of new discovered in birch buds substances.

Innovatory character of the project consists in the determination of wide range of birch bud metabolites: from the more volatile compounds emitted into the gas phase, to medium-volatile (mainly terpenoids), low-volatile (flavonoids) to non-volatile bud components. The latter group of the primary (carbohydrates, glycerides) and secondary (carbohydrate alcohols and acids, glycosides and proanthocyanidins) birch buds metabolites was not investigated up to present. Innovatory character has also an approach to the investigation of biological action of bud components: apart from determination of the effectiveness of "raw" extracts and isolated chemical substances it will be investigated antitumor properties of isolated fractions. Selection of the fractions for testing will be performed on the basis of their chemical composition (fraction have to contain different bioactive compounds in different proportions). Purpose of these tests is the discovery of compound "combinations" with high activity, particularly against of particular tumour cells.