

**CYTOLOGICAL CHANGES IN HL-60 CELLS AFTER TREATMENT  
WITH AN EXTRACT FROM *RHODIOLA ROSEA* RHIZOMES**

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*Rhodiola rosea* is a Russian and Chinese medicinal plant used as a stimulating, adaptogenic, anti-arrhythmic agent. Numerous medications containing extracts from *R. rosea* are used in several countries (Russia, Sweden, Canada and the US). The best-known of these is the Swedish Arctic Root Tablet, which displays stimulating properties.

Many investigations have pointed to the anticancer and antimutagenic role of *R. rosea*. In spite of the therapeutic effects of the *R. rosea* extract, little is known about the anticancer mechanism of its action, because few cytological investigations have been conducted on animal cells treated with the extract.

The aim of this study is to investigate the inhibitory influence of an extract from *Rhodiola rosea* rhizomes (containing rosavine and cinnamyl alcohol) on the mitotic activity of HL-60 cells, and its effects on nuclear DNA content, the percentage of cells in apoptosis and their ultrastructure. Changes in DNA content in the cell after treatment, its viability and the percentage of cells in apoptosis were determined using flow cytometry. For ultrastructure analyses, the cells were fixed in 2.5% glutaraldehyde and OsO<sub>4</sub>, and ultra-thin sections were made and examined under an electron microscope.

Our studies have shown that an extract from *R. rosea* rhizomes cause the inhibition of mitosis. During incubation in the extract, an accumulation of G2/M cells was observed. In prophase and metaphase, the chromosomes were shorter and thicker, but the extract did not cause chromosomal aberrations or the formation of micronuclei. Ultrastructure changes after treatment were connected with an increase in the electron density of the ground cytoplasm and lowered electron density of the matrix of mitochondria.