

PUBLICATIONS

CYTOTOXIC ACTIVITY OF GLYCYRRHIZIC ACID COMPLEXES IN CELL CULTURE

Sh.B. Karimova¹, Z.S. Khashimova², R. Esanov²

¹*Gulistan State University, Gulistan, Republic of Uzbekistan, e-mail:
shoira9217@gmail.com*

²*Institute of Bioorganic Chemistry named after Academician A.S. Sadykov, Academy of
Sciences of the Republic of Uzbekistan, Tashkent, Republic of Uzbekistan*

The search for plant-derived biologically active compounds, the development of complex compounds based on them, and the study of their cytotoxic activity and structure–function relationships for their application in agriculture are among the priority areas of research.

Glycyrrhizic acid (GA) is one such compound. It was previously established that GA complex compounds exhibit biostimulatory properties, promoting the growth, development, and germination of cotton seeds.

A number of supramolecular complexes were synthesized and characterized at the Institute of Bioorganic Chemistry named after Academician A.S. Sadykov. Their physicochemical characteristics were determined.

The aim of this study was to investigate the cytotoxic activity of glycyrrhizic acid complex compounds in HeLa cell culture using the MTT assay, since these substances will subsequently be used for agricultural purposes.

For this purpose, HeLa cells were seeded into 96-well plates at a density of 20,000 cells/mL in 100 µL of RPMI-1640 medium supplemented with 10% fetal bovine serum and cultured at 37°C in a CO₂ incubator. After 24 hours, the substances were added at concentrations of 100, 10, and 1 µg/mL per 100 µL of medium, and the cells were cultured for 24 hours, after which MTT was added to the cells. Following a 3-hour incubation, the medium was carefully removed, 50 µL of DMSO was added to each well, and the plates were incubated for 20 min. Optical density was measured at a wavelength of 620 nm using an EnSpire Multimode Plate Reader (PerkinElmer, USA).

Control cells were incubated in the same growth medium without exposure to the substances. The cytostatic drug “Cisplatin–Kemoplat” (India), containing cisplatin as the active component, was used as a positive control.

The data obtained from three experiments were expressed as the mean value of three measurements for each concentration.

Cell viability in the presence of the investigated compound was calculated using the following formula: $(\text{mean OD of experimental wells} - \text{mean OD of medium} / \text{mean OD of control wells} - \text{mean OD of medium}) \times 100\%$, where OD represents the mean optical density value. Calculations were performed using the Microsoft Excel software package.

As follows from the obtained results, the GAMAS complexes at ratios of 2:1 and 4:1 and the GAMAS complex at a ratio of 2:1 showed a slight increase in cell growth (5–10%). The GAMAS complex at a ratio of 4:1 demonstrated slight dose-dependent cytotoxic activity (14% at a concentration of 100 µg/mL). The HR4 and HR5 radicals are 2-amino-5-propyl-1,2,4-thiodiazole and 2-amino-5-isobutyl-1,2,4-thiodiazole, respectively.

Thus, these compounds are non-toxic and may subsequently be used in agriculture as plant biostimulants.