

Nanocomposites and nanomaterials

Comparative analysis of the C₆₀ Fullerene and Cytostatic 5-Fluorouracil antineoplastic activity *in vivo*

O.V. Lynchak¹, V.K. Rybalchenko¹, Yu.I. Prylutsky¹, U. Ritter²

¹ESC "Institute of Biology", Taras Shevchenko National University of Kyiv, 01601 Kyiv, Ukraine.

E-mail: o.lynachak@gmail.com

²Institute of Chemistry and Biotechnology, Technical University of Ilmenau, Ilmenau 98693, Germany.

The antitumor activity of water-soluble C₆₀ fullerenes (C₆₀FAS) compared to traditional cytostatic drug 5-fluorouracil (5-FU) was investigated and analyzed in detail using the model of colorectal cancer induced by 1,2-dimethylhydrazine (DMH) in rats. Male Wistar rats (180-200 g) were divided into following groups: 1 – control; 2-4 - animals got weekly s.c. injections of DMH (20 mg/kg) for 20 weeks; 3 and 4 - starting from 21 week animals got weekly s.c. injections of C₆₀FAS (2 mg/kg) and 5-FU (45 mg/kg), accordingly, for 7 weeks. Animals were sacrificed and examined for intestinal tumors. The number, size and location of the tumors were recorded and the pathology was examined.

The tumors were detected in all parts of the colon of experimental rats, but in a majority they were observed in the distal part of colon, that is typical for this model of carcinogenesis. The tumors had different size and shape, exophytic and endophytic type of growth. Histological studies revealed adenoma and adenocarcinoma. Animals treated by C₆₀FAS in a majority had adenomas. It was found that administration of C₆₀FAS contributes significantly reducing the number of tumors and total lesion area in the cecum on 57% and 65%, respectively, compared with control. The 5-FU drug caused only a slight tendency to reduce these indexes. Same time, administration of C₆₀FAS and 5-FU helped reduce of the number of tumors on 31% and 28%, and total lesion area on 42% and 43%, respectively, in the colon compared with control. The results of the research clear indicate that the biocompatible and bioavailable C₆₀ fullerenes at low doses are perspective agents in the therapy for colorectal cancer.