Nanocomposites and nanomaterials

The C_{60} Fullerenes influence on the state of liver and pancreas under rat ulcerative colitis model

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Oxidative stress is one of the major contributing factor in the inflammatory bowel disease (IBD) development, including ulcerative colitis (UC). Water-soluble C60 fullerene nanoparticles are proposed for prevention and treatment of various pathological conditions caused by oxidative stress through scavenge reactive oxygen species and other free radicals. So the collation of intraperitonal (i.p.) and intrarectal (i.r.) administration of pristine C60 fullerene aqueous colloid solution (C60FAS) for UC-caused liver and pancreas damage correction was aimed to be discovered.

UC was modeled by intrarectal application of 0.5 ml 10% acetic acid solution. Male Wistar rats (200-250 g) were divided into 4 groups: 1 – control; 2-4 - UC; 3 and 4 – C60FAS (0.5 mg/kg) i.p. or i.r respectively after UC induction.

The acetic acid-induced colitis leads to significant liver and pancreas damage, manifested by changes of hepatocytes morphology, centrolobular cells and their nuclei size decrease, replace of some hepatocytes by connective tissue, inflammation in periportal zone, liver vasodilatation and blood stasis and pancreatic exocrine cell nuclei decrease. Only sporadic connective tissue and inflammation zones but centrolobular hepatosites and their nuclei size decrease persistence were observed under C60FAS i.p. and i.r. application, suggesting partial restoration of the liver state. Furthermore, normalization of exocrine cell nuclei size and even increase the endocrine cells ones (by 14% compared with control and by 19% compared with UC) caused by C60FAS i.p. application evidenced restoration of pancreas state. However C60FAS i.r. does not affect the status of exocrine and endocrine pancreatic parts. Thus, the both i.p. and i.r. C_{60}FAS reduce liver damage and cause systemic effects on the pancreas, restoring its exocrine function and enhancing the endocrine one. So C60 fullerenes at low doses could be suggested as perspective anti-UC therapeutic agents.