ANALYSIS OF INVOLVEMENT OF NANOPARTICLES FULLERENE C_{60} IN REGULATION INNATE AND ADAPTIVE IMMUNE REACTIONS

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Background: Nanoparticles fullerene C60 (FC60) have offered new hope for detection, prevention, and treatment in modern medicine due to their key properties, small size, enhanced permeability, surface modification and retention effects. However, the effects of nanoparticle properties on the immune system are still being explored. The main purpose of this investigation was to assess the influence of FC_{60} on functional activity of the phagocytic cells *in vitro*, production of hemagglutinins, hemolysins and level activity of complement during the primary immune response *in vivo*.

Materials and methods: Peripheral blood (PB) from 10 healthy donors was obtained. FC_{60} was added at 0,01 and 0,1 μM/l to PB and incubated for 10 min at 37°C. Level of phagocytosis, Nitroblue Tetrazolium (NBT)-test, level of myeloperoxidase activity, zimozan-induced chemiluminescence was assayed. Peripheral blood mononuclear cells were incubated with PE-conjugated mAb to CD54 and analyzed by flow cytometry. Balb/c mice were immunized by 2% suspensions of ram red blood cells for induction of the primary immune response. Mice were treated i.p. with 50 ng of FC_{60} during 1, 3 and 6 days after induction of the primary immune response. Titre of hemagglutinins was determined by reaction of hemagglutination, titre of hemolysins – by reaction of immune lysis, activity of complement – by immune hemolysis.

Results: The results demonstrated that FC_{60} did not affect the phagocytic activity of neutrophils at any doses. FC_{60} significantly decreased level of myeloperoxiase activity in neutrophils in doses 0,01 and 0,1 μM/l. FC_{60} significantly increased the indices of the NBT-test in neutrophils in dose 0,01 μM/l. Addition of FC_{60} to peripheral blood suppressed zimozan-induced chemiluminescence in doses 0,01 and 0,1 μM/l. Moreover, FC_{60} strongly reduced level of expression CD54 on lymphocytes and monocytes in doses 0,01 and 0,1 μM/l, but did not effect on neutrophils. The study revealed that FC_{60} induced the production of hemagglutinins and hemolysins, especially in initial and maximum phase of the generation antibodies during induction of the primary immune response. Additionally, F_{C60} induced the complement system activation and enlarged its activity after induction of the primary immune response.

Conclusion: The studies showed that FC_{60} can influence on immune reactions via different mechanisms. FC_{60} negatively alter phagocytic activity of immune cells *in vitro*, but it positively influence on production of hemagglutinins and hemolysins, level activity of complement during the primary immune response in Balb/c mice *in vivo*. Thus, FC_{60} provides a potential perspective medical application because it can display immunomodulatory properties which are directed on the innate (phagocytosis and complement system) and adaptive mechanisms (production antibodies) of immune system.

Key words: nanoparticles, fullerene C_{60}, immune reactions.

DISTRIBUTION OF THE CCR5 Δ32 MUTATION IN POPULATION GROUPS IN ROMANIA

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