

<http://dx.doi.org/10.7124/bc.000AD2>

Food additives — carrageenans — in the context of changes in the functional characteristics of body cells

O.A. Nakonechna, S.A. Denysenko, S.O. Stetsenko

Kharkiv National Medical University
4, Nauki Ave., Kharkiv, Ukraine, 61000
sa.denysenko@knu.edu.ua

Background. Currently, varieties of food additives are used in industry, but there are many data in the literature on the safety of carrageenans. There is evidence that degraded carrageenans have a toxic effect on the body. Some authors [1] have proven that λ -carrageenan, a mucopolysaccharide extracted from the cell wall of red algae (*Chondrus crispus*), can induce acute enterocolitis. λ -carrageenans were shown to stimulate the inflammatory process in the body, which contributes to an increase in the blood markers of acute inflammation. In another research [2], semi-refined carrageenan was used as a model for inducing acute enterocolitis in rats. **Objective.** Within the framework of the research project “Investigation of the toxicity and therapeutic activity of food additives of carrageenans (E407/E307a) and their oligosaccharide fragments as modulators of programmed cell death”, a comprehensive assessment of the effect of semi-refined carrageenan (E407a) on the body of rats by oral administration was carried out. **Methods.** The local effects of E407a on the intestine were analyzed using morphological methods. The content of inflammatory markers in the blood was determined: CRP, ceruloplasmin, haptoglobin. The fluorescent probe O10 (2-(2'-OH-phenyl)-5-phenyl-1,3-oxazole) was used to assess the state of leukocyte cell membranes. ROS generation in leukocytes and types of leukocyte cell death were determined by flow cytometry. **Results.** Oral administration of the food supplement E407a for 14 days caused changes in the morphological picture of the intestine, infiltration of the small intestinal lamina propria by macrophages (CD68+ cells). High levels of inflammatory

markers and changes in the phospholipid bilayer in leukocyte cell membranes, as well as increased generation of ROS in leukocytes with activation of their apoptosis were detected in the blood. Oral administration of 1% E407a solution leads to the development of enterocolitis and structural and functional changes in leukocytes.

Conclusions. 1. It is possible to use oral administration of 1% carrageenan solution for 14 days as an experimental model of enterocolitis; 2. Under the conditions of λ -carrageenan administration, an acute inflammatory process occurs, which is accompanied by an increase in the content of acute-phase indicators in the blood; 3. There is an increase in the generation of ROS in leukocytes, changes in the phospholipid composition of membranes, which promotes the development of apoptosis; 4. Additional research is needed because the effect of carrageenan on the body is quite complex and inconspicuous.

Keywords: food additives, carrageenans, inflammation, safety.

REFERENCES

1. *Komisarska P et al.* Carrageenan as a Potential Factor of Inflammatory Bowel Diseases. *Nutrients*. 2024; **16**(9):1367.
2. *de Siqueira Patriota LL et al.* Inhibition of Carrageenan-Induced Acute Inflammation in Mice by the Microgramma vacciniifolia Frond Lectin (MvFL). *Polymers*. 2022; **14**:1609.