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Editor
Komarytskyy M.L.
Ph.D. in Economics, Associate Professor

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e-mail: sweden@sci-conf.com.ua

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THE INFLUIENCE OF SALINE TOGETHER WITH LACTOPROTEIN WITH SORBITOL OR HAES-LX 5% SOLUTIONS ON THE THYROCITES' CELLULAR CYCLE ACTIVIITY

Tiron Oksana
PhD (medicine), Associated Professor
Odessa National Medical University
Odessa, Ukraine

Introductions. The thyroid gland is an important organ that is involved in the regulation of homeostasis and adaptation in various pathological conditions. However, the question of the study of the proliferative activity of thyroid cells by flow cytometry is still poorly understood. It is known that the proliferative activity of the thyroid gland is a manifestation of physiological regeneration at the cellular level, with the number of cells in the state of mitotic division is normally in a small percentage. Changes in the proliferative activity of cells in the thyroid gland depend on age, overall regeneration process and seasonal influences. There is a significant increase in the proliferation of thyroid cells in pathology, which is associated with systemic activation of the body's neuroendocrine system by various factors. It is known that the division of thyrocytes is controlled by central hormones, in particular thyroid tropic hormone and local modulators (growth factors, cytokines), which can stimulate both normal and pathological proliferation.

Changes in thyroglobulin in the colloid of the thyroid follicles are closely correlated with the phases of accumulation and evacuation of thyroid hormones having age, sex and circadian features. The relationships of proliferative activity, synthesis and resorption of thyroglobulin in thyroid cells are quite complex and mediated by a whole group of regulating factors of the gland itself and the hypothalamic-pituitary system.

Given the complexity of histological and morphological life-long study of the thyroid gland, there is a need to involve more accurate methods of studying cell division disorders. More than 60 imaging and evaluation markers have been proposed

to determine apoptosis and cell proliferative activity.

The most informative method for assessing cell division is the flow cytometry method, which is nowadays defined as a reference for determining DNA fragmentation (apoptosis), and such that allows dividing the cell cycle into separate phases. Flow cytometry method allowed estimation of changes in cell division and DNA fragmentation in various organs, in particular, endocrine ones, without pathological influence on the background of the use of infusion solutions. Data on the study of indicators of the cell cycle of thyroid cells by flow DNA cytometry in non tumor pathology, we have not revealed.

Aim. To investigate the indices of the cell cycle and DNA fragmentation of thyroid cells in rats against the background of infusion of 0.9% NaCl solution, lactoprotein with sorbitol or HAES-LX 5%.

Materials and methods. Experimental studies were performed on 90 white male rats weighing 160-180 g. Infusion of 0.9% NaCl solution, lactoprotein with sorbitol or HAES-LX 5% was performed in the inferior vena cava after its catheterization in aseptic conditions through the femoral vein. The infusions were performed once a day for the first 7 days. Trunk catheterization and decapitation of animals (after 1, 3, 7, 14, 21, and 30 days) were performed under propofol anesthesia (60 mg/kg i/v). Within the framework of the agreement on scientific cooperation between the Research Center of National Pirogov Memorial Medical University, Vinnytsya and the Department of Histology, Cytology and Embryology of the Odessa National Medical University (from 01.01.2018), DNA content in the nuclei of thyroid cells of rats was determined by flow DNA cytometry. Cell cycle analysis was performed using the software FloMax (Partec, Germany) in full digital accordance with the mathematical model, which determined the following indexes:

G0G1 - the percentage of cells of the phase G0G1 to all cells of the cell cycle (DNA content = 2c);

S - the percentage of the phase of DNA synthesis to all cells of the cell cycle (DNA content > 2c and < 4c);

G2+M - the percentage ratio of the G2+M phase to all cells in the cell cycle

(DNA = 4c).

Determination of DNA fragmentation (SUB-G0G1, apoptosis) was performed by isolating the RN2 region on DNA histograms before the G0G1 peak, indicating nuclei of cells with a DNA content < 2c. The statistical processing of the obtained results was carried out in the license package "STATISTICA 6.1" using nonparametric estimation methods.

Results and discussion. The data obtained showed a virtually identical pattern of rat cell cycle and DNA fragmentation of the thyroid gland cells at all study times against the use of 0.9% NaCl solution, lactoprotein with sorbitol or HAES-LX 5%. Thyroid cells in rats are predominantly in the inactive phase of DNA synthesis (G0G1) (90.32% - 91.88%), significantly fewer cells are in the G2+M phase (7.56%-9.17%), and there is a small percentage of cells in the S-phase (DNA synthesis) (0.52% - 0.67%) and the SUB-G0G1 interval (DNA fragmentation, apoptosis) (2.23% - 2.81%). We can state that the activity of the main part of the thyroid gland is rather low without pathological irritation.

The study of thyroid cell cycle indices in rats by flow cytometry without pathological effects on the background of infusion of 0.9% NaCl solution, lactoprotein with sorbitol or HAES-LX 5% revealed that their use has no significant effect on the cell cycle fragmentation indices DNA of cells. Also, the determination of cell cycle indices and DNA fragmentation of thyroid cells against the background of infusion of 0.9% NaCl solution, lactoprotein with sorbitol or HAES-LX 5%, allowed to eliminate the potential impact on the normal cycle of gland cells, which was found in similar studies application of these solutions. It should be noted that the data obtained by us generally correspond to similar studies on the proliferative activity of thyroid cells in animals and humans.

Our study has complemented the current understanding of the state of proliferative activity of thyroid cells under conditions of infusion solutions using flow cytometry. Given that we have not identified data on studies of the cell cycle and DNA fragmentation of thyroid cells and this technique is one of the benchmarks for the evaluation of apoptosis and cell division phases, we can state its priority in this

area of research.

Conclusions.

1. Infusion of 0.9% solution of NaCl, lactoprotein with sorbitol or HAES-LX 5% for duration of 7 days does not affect the cell cycle and DNA fragmentation of the thyroid gland cells.

2. Thyroid gland cells in rats are predominantly in the inactive phase of DNA synthesis (G0G1) (90.32% - 91.88%), significantly fewer number of cells are in the G2+M phase (7.558% - 9.174%), there is a small percentage of cells in the S-phase (DNA synthesis) (0.522% - 0.672%) and the interval SUB-G0G1 (DNA fragmentation, apoptosis) (2.232% - 2.814%).