

## **Modifications of biological effects of drinking mineral waters in Pyatigorsk resort**

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A variety of types of drinking mineral waters (MW) of Pyatigorsk Deposit (PD) is explained by its structural style and hydrogeological conditions. In resort conditions the most widely used mineral waters are acidulated and carbonate chloride sodium hydrocarbonate MW. It has been shown earlier that natural MW have a high biological exposure potential on exchange processes both in norm and during pathological metabolic changes [1, 2].

We have studied some modification options of the composition of natural drinking mineral waters (MW) in Pyatigorsk resort to increase their rehabilitation potential. In the experiment on 110 male-rats of Wistar line there have been examined some biological effects of a course drinking intake (21 days) of natural MW from the spring that has sulphate-hydrocarbonate-chloride calcium-sodic composition with ferrum elevated level (3-5 mg/dm<sup>3</sup>), mineralization of 5,0-5,2 g/dm<sup>3</sup>, 2 1,3-2,2 g/dm<sup>3</sup>, daily flow of 10-86 m<sup>3</sup>/day, temperature from 14 to 370 at the wellhead and MW modified by nanoparticles (NP) of Se (0,04 mg/kg, d - 35 nm) and Ag nanoparticles (0,001 mg/kg, d - 30 nm).

One of the mechanisms of selenium influence on carbohydrate metabolism is the regulation of blood glucose level and its utilization by tissues. After the course by the studied MW type there has been noticed Ca-ATPase level reduction in liver against the background of insulin downregulation and glycemia elevation in blood serum of the rats [1]. There has been also observed glucagon retrogression in the blood of the laboratory animals after the treatment course by natural MW in 3 times (<0,001) and after the course by MW in combination with Se nanoparticles in 1,5 times (<0,01) in comparison with the control (fresh water). At the same time glucose level authentically increased only after the course by natural MW - 4,8 (4,6-5 ‰ mmol/l in comparison with the control - 4 (4 - 4,4 ‰ mmol/l. Insulin concentration did not change with the animals after the watering course by MW with Se nanoparticles whereas the course by MW with Ag nanoparticles was followed by insulin decreased secretion by 22% against the background of hypoglycemia.

In the impact analysis of the course influence of mineral water in combination with Se and Ag nanoparticles there has been noticed an alteration of metabolic effects of native MW. We have observed the decrease in hormonal regulation level of metabolic processes and activation of cellicolous substrate ways of glucose utilization after the course by MW. The fortification of MW with Se nanoparticles restores the reduced activity of glycemia hormonal regulation.

### References

1. Efimenko, N.V. Action mechanisms of drinking mineral waters/ N.V. Efimenko, V.F. Reps// Resort medicine. – 2013. - №3. – P. 106-109.
2. Reps, V.F. Metabolic action mechanisms of the modified balneo-remedies/ V.F. Reps// Resort medicine. – 2013. - №4. - P. 18-21.