

# Personalized Nutrition for Microbiota Correction and Metabolism Restore in Type 2 Diabetes Mellitus Patients

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## Abstract

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Type 2 diabetes is one of the most common noncommunicable diseases in the world. Recent studies suggest a link between type 2 diabetes and microbiota, as well as the ability to treat and prevent it using personalized approaches to nutrition. In this work, we conducted clinical studies on the effects of a personalized diet on 56 female patients. Biochemical, physical, and immunological parameters were measured by standard methods on days 1 and 18 of the experiment. Gut and oral microbiota studies were performed in dynamics on days 1, 7, 11, and 18 using real-time polymerase chain reaction. With the help of the developed information system, a personalized diet was developed for each participant of the experiment. In the group of patients following personalized diets a statistically significant decreasing levels of glucose, thymol test, creatinine, very low-density lipoprotein, urea, secretory IgA, and tumour necrosis factor- $\alpha$ , and improvement in all physical parameters were observed. There was a statistically significant increase in uric acid, sodium, and magnesium. Statistically significant changes in gut microbiota were observed in *Enterococcus faecalis*, *Escherichia coli* (lac+, lac-), *Lactobacillus* spp., and *Candida* spp. Such microorganisms of oral microbiota as *E. faecalis*, *Lactobacillus* spp., *Pseudomonas aeruginosa*, and *Candida* spp. demonstrated statistically significant changes. All these changes indicate an improvement in the patients' condition in the experimental group compared to the control group. Our algorithm used for the development of personalized diets for patients with diabetes type 2 demonstrated clinical efficacy of its implementation.