Kharkiv National
Medical University

INTERNATIONAL SCIENTIFIC INTERDISCIPLINARY CONFERENCE

of Young Scientists and Medical Students

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25-27 May 2026

Kharkiv, Ukraine

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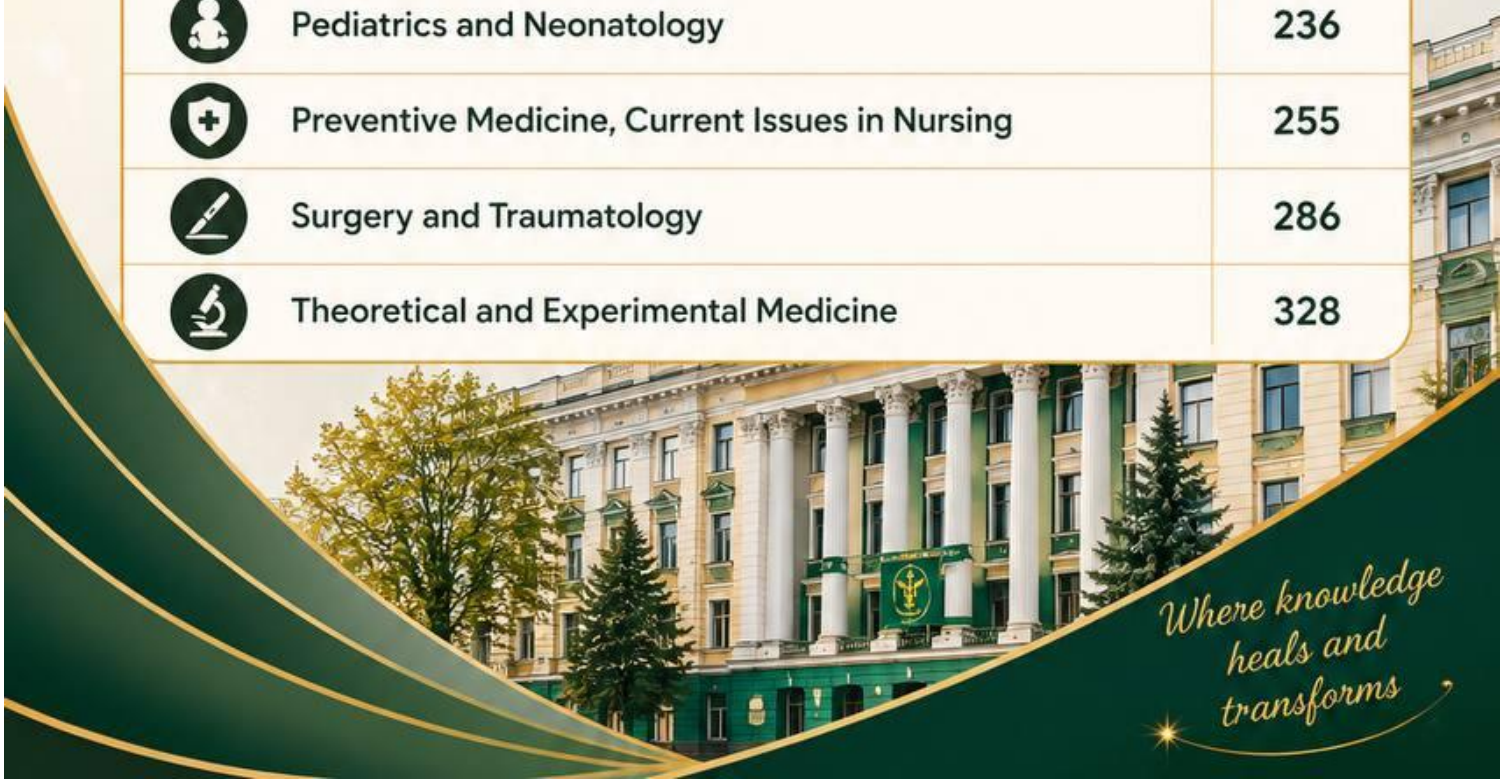
SECTION	PAGE
Dentistry and Maxillofacial Surgery	4
Infectious Diseases, Epidemiology, Dermatology	33
Internal Medicine	64
Neurosciences	160
Obstetrics and Gynecology	187
Pediatrics and Neonatology	236
Preventive Medicine, Current Issues in Nursing	255
Surgery and Traumatology	286
Theoretical and Experimental Medicine	328



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THE ROLE OF THE HUMAN MICROBIOME IN HEALTH AND DISEASE

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Introduction. The human microbiome - the collective assembly of trillions of microorganisms inhabiting the gastrointestinal tract, respiratory system, skin, and urogenital surfaces - has emerged as a central subject of biomedical inquiry. This review aims to synthesize current scientific understanding of the microbiome's functional significance in maintaining human health, its involvement in key physiological processes, and its documented associations with pathological conditions ranging from metabolic and autoimmune disorders to neuropsychiatric disease.

Materials and methods. This abstract is based on a narrative review of peer-reviewed literature from PubMed-indexed journals, medical textbooks, and WHO reports.

Priority was given to large-scale cohort studies, randomized controlled trials, and systematic reviews investigating microbiome composition, host-microbe interactions, and therapeutic implications. Results. Evidence consistently demonstrates that a diverse and balanced gut microbiota is fundamental to host homeostasis. Commensal bacteria contribute to the digestion of complex dietary polysaccharides and biosynthesis of essential vitamins. Short-chain fatty acids - butyrate, propionate, and acetate - regulate intestinal barrier integrity and antiinflammatory signaling. The microbiome also shapes maturation of both innate and adaptive immune systems.

Dysbiosis has been implicated in obesity, type 2 diabetes mellitus, inflammatory bowel diseases, and neuropsychiatric conditions including major depressive disorder and autism spectrum disorder via the gut-brain axis. Depletion of vaginal Lactobacillus species is associated with bacterial vaginosis and increased susceptibility to sexually transmitted infections. Conclusions. The human microbiome functions as a dynamic and indispensable component of human physiology, exerting regulatory influence across metabolic, immunological, and neurological domains. Its perturbation contributes to a wide range of chronic diseases. Microbiome-targeted interventions - including dietary modification,

probiotic and prebiotic therapies, and fecal microbiota transplantation -hold considerable promise for advancing personalized medicine and disease prevention.