

Microbiome Conference held in December 2025 at Swami Rama Himalayan University, Jolly Grant, Dehradun

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1. Introduction

A National Conference on Microbiome and Biota Family: R&D leading to Clinical & Commercial Implications was organized jointly by the Gut Microbiota and Probiotics Foundation (GMPSF) and Swami Rama Himalayan University (SRHU) on December 19-20, 2025, at Jolly Grant, Dehradun, Uttarakhand. The aim of the conference was to share the research outcomes and implications following the completion of two phases of the Integrated Human Microbiome Project (iHMP) by the National Institutes of Health, as well as the Indian Microbiome Project, funded by the DBT, at seven renowned research institutions. The conference resulted in building R & D connect between basic and clinical researchers addressing gut health, wellness, metabolic diseases, pre-term birth, gut-brain axis and special diets for cancer and brain-health.

Spread over six technical session, Nirmal K. Ganguly (Former DG, ICMR and President, GMPSF) delivered the inaugural address on microbiota patterns in Colorectal Cancer, highlighting CRC incidence and

mortality, and limited co-relating microbiome data from Indian tumor tissues. He explained how microbial taxonomy and predictive microbiome signatures influence disease outcomes and gut dysbiosis versus eubiosis, sharing data on fecal microbiome transplant stressing producing Indian data for such interventions. V. Samuel Raj (SRM University, Sonapat) highlighted how long-term high-fat and-salt diets disrupt the gut microbial ecosystem, leading to metabolic and inflammatory alterations. Amoxicillin treatment has shown benefits by reshaping the gut microbiota, restoring blood glucose, lipid, renal, and hematological markers, and moderating diet-induced thrombocytosis without causing significant damage to vital organs. B. Sesikeran (NIN, Hyderabad) highlighted how diet-induced gut microbiota dysbiosis acts as a primary cause of disease. Chronic systemic inflammation was linked to metabolic disorders and ageing-related “inflammaging,” explaining how altered gut barriers allow microbial products into circulation, influencing gut peptides, metabolic pathways, and multiple disease

conditions. Kiran Bhat (SRHU) spoke on the role of biomarkers in the differentiation of IBD and IBS. She emphasized that IBS diagnosis should rely on symptom-based clinical criteria rather than extensive exclusionary investigations with fecal biomarkers as key tools, stating that these markers originate from or leak through inflamed intestinal mucosa. Naveen Kumar Navani (IIT Roorkee) shared about unique *Lactobacillus* species isolated and patented by his group to address malnutrition by non-antibiotic approaches based on nano-biotic strategy using Pd-SNPs with effective antimicrobial activity, including application in biodegradable nanofibers to control food-borne pathogens such as *Listeria*. Priyanka Dey (TIET, Ambala) touched upon Gut Health and Traditional Foods with a focus on traditional methods of making tea and maintaining gut health. He highlighted catechins as key bioactive components of green tea, protecting the gut–liver axis by reducing endotoxin translocation and inflammatory signaling, thereby preventing obesity-associated gut dysbiosis.

Bipin Pradeep Kumar (Iom Bioworks, Bengaluru) described how deep learning is used to map relationships between microbes, metabolites, and health conditions, enabling personalized and targeted interventions. Coined as a “second brain” and virtual endocrine organ, the gut microbiome was highlighted for its influence on brain function and immune responses through the gut–brain axis. Neerja Hajela (GMPFI) presented advanced correlation of the microbiome gut-brain axis specially on Major Depressive Disorder (MDD), highlighting the emerging role of gut microbiota in depressive mood regulation and disease pathophysiology. The discussion also explored microbiome-based therapeutic approaches, including the potential role of probiotics such as Yakult, in reducing depressive symptoms and modulating high stress responses. Srinivas Kiran Ambatipudi (IIT Roorkee) spoke on Milk Fat Globules (MFG) as natural delivery vehicles for probiotics to improve gut health. He highlighted the preferential interaction of specific probiotic strains with MFG, variations in lipid composition across different milk sources, and the role of phospholipids in probiotic adherence.

Rup Lal (DU, Delhi) discussed gut microbiome disruption in TB patients elucidating the role of human gut microbiome in immunity and disease progression. Dysbiosis in TB patients, specifically alterations in butyrate- and propionate-producing bacteria affect immune functions. Key microbial patterns in Indian cohorts were outlined. Rama Chaudhry (AIIMS, New Delhi) presented data on gut microbiome as a key target for innovative disease management strategies, emphasizing its variability, establishment, and maintenance, along with core physiological functions of intestinal flora. The role of intestinal epithelial cells, adaptive immunity, and the Treg/Th17 axis in maintaining immune balance was highlighted. Therapeutic interventions including probiotics, prebiotics, synbiotics, postbiotics, biotherapeutics, and fecal microbiota transplantation were discussed. The session underscored future clinical translation of microbiome–immune interaction studies, and the need for robust human data. Rajendra Singh (SRHU) talked about reframing antibiotic stewardship through a microbiome lens that have implications in antimicrobial resistance, dysbiosis, and novel biotherapeutics. He stressed on how antibiotic misuse disrupts microbial balance, accelerates antimicrobial resistance, and causes dysbiosis. Integrating microbiome-preserving strategies and novel biotherapeutics can optimize treatment outcomes, reduce resistance development, and promote sustainable, precision-based antimicrobial use in modern healthcare systems.

Dhiraj Dhotre (NCCS Pune) gave a dinner talk on the overall data emerging from the human microbiome project funded by DBT, Govt. He presented insights into the human microbiome’s role in health and disease from an Indian perspective. It highlighted how diverse diets, lifestyles, and genetics shape unique microbiome profiles, influencing immunity and disease susceptibility, and emphasized opportunities for population-specific diagnostics, personalized medicine, and microbiome-based therapeutic strategies in India.

Anil Kumar (NII) described the relationship between gut microbiota and cancer, emphasizing the concept of humans as holobionts influenced by microbiota-

derived metabolites. He discussed the role of specific bacteria in cancer development, including *Helicobacter pylori* in gastric cancer and microbial involvement in colorectal cancer through cancer-associated metabolites. Experimental evidence demonstrating the effects of metabolites such as indoxyl sulfate and 4-ethylphenyl sulfate on cell viability and organ physiology was presented using standard viability assays, underscoring the therapeutic relevance of microbiota-cancer interactions. Madiwalesh Chhebbi (SRHU) discussed the critical role of microbiome dysbiosis in the initiation and progression of pancreatic cancer with specific emphasis on oral, gut, and local pancreatic microbiota alterations. He explained the microbiota-cancer axis, focusing on inflammatory pathways, immune dysregulation, and changes in microbial metabolites. Attention was given to the dominance of pro-inflammatory taxa, especially Proteobacteria and Firmicutes, within the intra-tumoural microbiome of pancreatic cancer. Gurpreet Singh (SRHU) explained the emerging therapeutic role of prebiotics, probiotics, and postbiotics in cancer management. He proposed their use as adjuncts to conventional treatment during surgery, chemotherapy and radiation, particularly in pelvic malignancies. Postbiotics seem to have distinct role through bioactive metabolites. Anurag Varshney (PRF, Haridwar) presented the impact of gut dysbiosis on human health, particularly cancer and IBD. Focus was placed on gut microbiome involvement in colorectal cancer and colitis-associated colorectal cancer (CAC), including symptoms and current treatment limitations. Preclinical evaluation of Cystogrit Diamond in an AOM/DSS-induced mice model demonstrated reduced inflammation, regulated tumorigenesis, modulation of inflammatory markers, and restoration of gut microbiota composition, particularly cancer and inflammatory bowel disease. Deepika (IISER, Bhopal) shared functional insights into the Indian human microbiomes revealed through multi-omics approaches. The data highlighted the microbiome as a “second genome” shaped by diet, population, and lifestyle. Distinct gut microbial patterns were discussed, including the differential distribution and metabolic roles of *Prevotella* species across western

and non-western populations.

Rajdeep Dalal (THSTI, Faridabad) spoke on microbiota & IBD highlighting the involvement of specific T-cell subsets, particularly Th9 cells, emerging as contributors to immune-mediated intestinal inflammation. The role of interleukin-9 in colitis progression, the impact of its neutralization alongside metabolic alterations in experimental and clinical colitis was shared. Succinate-dependent activation of Th9 cells and signaling through the SUCNR1/GPR91 pathway were emphasized as key drivers of inflammation. Vineet Ahuja (AIIMS, New Delhi) underlined Yoga & Diet; and its effect on gut microbiome as a supportive role in modulating the gut microbiome in IBD. Regular yoga reduces stress and inflammation, while a balanced, fiber-rich diet promotes beneficial microbes, improves microbial diversity, and supports immune regulation, thereby contributing to better disease management and overall gut health. Babhatosh Das (THSTI, Faridabad) presented data on microbial invasion of the liver playing a significant role in the pathogenesis of metabolic dysfunction-associated steatotic liver disease (MASLD). Alterations in gut bacterial and fungal communities increase intestinal permeability, enabling microbial translocation to the liver via the portal circulation. Understanding bacterial and fungal interactions with host metabolism highlights the gut–liver axis as a critical therapeutic target, opening avenues for microbiome-based diagnostics, dietary interventions, and precision therapies in MASLD management.

The conference ended with a panel discussion moderated by Bindu Dey and Purandhi Roopmani (SRHU) on the future of microbiome science, with deliberations on challenges and opportunities in research, clinical validation, regulatory framework, and commercialization. Divya Rajput (Nexus Startup Hub); Eiji Amano (M/s Yakult India); Pawan Sharma (ICGEB); Urmi Bajpai (DU) and Kiran Katoch (JALMA, Agra) emphasized the need for robust, population-based research, using standardized clinical testing protocols, evidence-based regulatory pathways, and stronger academia–industry collaboration to translate microbiome research into safe and

effective health solutions. The two-day conference provided strategic insights into gut microbiome acting as a central regulator of human health,

influencing immune homeostasis, metabolic balance, inflammatory responses, neurological function, and cancer processes.