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Abstract

Alteration in gut microbiome is a major underlying causative factor of diverse inflammatory and metabolic diseases. Role of probiotics to promote perinatal health, prevention of obesity, irritable bowel syndrome are the current hot topics of research. The bioengineered probiotics with multiple immunogenic and antagonistic properties can deliver drugs, therapeutic proteins into host cells. Already the probiotics have been engineered for their stress tolerance profile, overcoming the physiochemical stresses of the host, and their applications in human nutrition and health. The aim of this article is to provide interest on mining the host microbiota for novel therapeutics and using designer probiotics as therapeutics and nutraceuticals in clinical practice.

At the same time, novel high-throughput technologies such as NGS (New Generation Sequencing) allow a much more detailed and stable analysis of the microbiota than the one done by PCR so to direct industries in designing more selected mixtures and physicians to tentatively apply a more tailor-made gut eco-system interventions and rely on a reliable follow up tool.

Keywords: Designer probiotics; Gut; Health applications; NGS

The healthy human gut microbiota is unique in that it is a naturally evolved home to trillions of microorganisms including prokaryotes, eukaryotic microorganism, archaea and phages that potentially inhabit every tissue. Genome sequencing, molecular techniques and bioinformatics have unravelled a lot about complex and essential relationship between gut, genitourinary tract, documentation of patterns of microbial colonization associated with disease states, neurodevelopment and behaviour of the host [1,2]. The societal changes including overly use of antibiotics, disinfectants and food additives, not only for medical applications, but also their use in farm animal and crops, have provoked the gut microbial aggression that may be a contributing factor to increase obesity epidemic, cardiovascular diseases (CVD), dyslipidemia, and patho-physiological conditions such as allergy, intestinal inflammatory diseases and cancers [3-6].

The probiotics and their metabolites viz., lactic acid, antimicrobial proteins, peptides, short chain fatty acids (SCFAs), and H₂O₂ are favourably viewed as alternative novel strategies for controlling some pathogens, metabolic diseases and intestinal diseases like inflammatory bowel disease (IBD) and cancer through multiple mechanisms [7-10]. Bacteria that are normally found in high number, such as bifidobacteria and lactobacilli (LAB) are involved in

the onset of colitis in IL-10 (-/-) mice, it was regarded as an improved method for cost-effective and long term management of IBD in humans [19]. LAB, Saccharomyces, E. coli Nissle and some Bacillus sp.

mice and protect them from pancreas injury. Though further studies are warranted, this approach might be a new way to the treatment of

