MICROBIOME MATTERS
Data, Diet, and Treatment of the Gut

Importance of Microbiome

In our human body, we can find more bacterial cells than human cells, which means that are around 30 trillion human cells in comparison to the 40 trillion bacterial cells found in our body. In addition to these numbers, it is estimated that there are more than one thousand different species of bacteria found inside the human gut, and each of these species plays a unique and special role in our body. While most of the micro-organisms play a vital role in our health, many microbes in the body inflict diseases in our body. Together the microbes weigh around one to two kilograms of weight, which is approximately the weight of the human brain. We could locate most of the microbes in the intestines, an area called the cecum; and are known as 'gut microbiome'. For healthy human development, maintenance of immunity and nutrition, the microbiome is quite essential. Thus, we could safely understand contrary to the popular misconceptions about the bacteria, the bacteria's that are living in and on us are not invaders or foes but are most valuable colonisers.

Many of the present lifestyle diseases like diabetes, multiple sclerosis, rheumatoid arthritis, and fibromyalgia are associated with the microbiome dysfunctions. The disease-causing micro-organisms over some time accumulate in the body, they change the gene activity from inside the body and other metabolic activities and systems, which ultimately leads in weakening of the immune system or responding abnormally against substances and tissues usually that present in the human body. It is not by inheriting the family's DNA that autoimmune diseases appear to an individual; instead, it is through the inheritance of the family's microbiome.

Microbiome Research

Microbial matter in the gut has been linked to a host of conditions and diseases, including diabetes, cancer, anxiety disorders, and infectious diseases. It also impacts individual and community responses to medications and treatment interventions. The number of global data banks to study hitherto neglected aspects of the gut microbiome is growing exponentially. While India has made some strides in understanding the field, there remain huge data gaps. India offers an opportunity to study microbes in various ecological niches and diverse ethnic groups, but more research and diagnostic work are needed to understand the complex landscape that the country presents. Furthermore, the stakeholders engaged in the study and treatment of the gut are isolated in different fields and practices, limiting effective measures for improving health.

Microbiome and their Categories

The topic microbiome has two categories of microbes, one that is highly helpful and the other that is potentially highly harmful. Research shows that most of the microbes are symbiotic – which means that the existence of such microbe's aids both the organism and humans. Some microbes are pathogenic- which means that they are harmful or are

promoters of disease in the human body. In a healthy human body, both the pathogenic and symbiotic micro-organisms coexist in perfect harmony. However, problems arise when there are disturbances in their harmonious co-existence. Scientists are still in the nascent stages of exploring and researching the exact role of the microbiome's in health and how they create problems in the human body.

Microbiome Future Research

1. How human health and diseases are caused and influenced due to the microbiomes and their metabolites (substances produced by metabolism)
2. What are the prompting factors that determine or influence the equilibrium and basis of an individual's microbiome?
3. What are the specific features that influence the microbiome of pregnant women, infants and children?
4. What are the main variances in the microbiome of a healthy individual and individuals with chronic diseases such as cancers, cardiovascular disease, diabetes, gastrointestinal diseases and obesity?
5. To design diagnostic biomarkers from the microbiome in order to nudge or identify diseases right before they occur.
6. To develop technologies to modify the microbiome through transplantation of micro-organisms between various individuals.

Shillim Institute's Seminar on Microbiome

In this context Shillim Institute in partnership with the Columbia Global Centers | Mumbai is hosting an expert workshop from September 29 to October 1, 2019, at the Hilton Shillim Retreat, Shillim, to explore the gut microbiome as a critical area of focus in health and wellness. This interdisciplinary workshop brings together researchers and practitioners in the fields of microbiology, medicine, nutrition, ecology, and the social sciences to share knowledge about latest trends and initiatives in microbiome research and application, and to create a road map for future collaborations. The long-term goal is to improve health outcomes through integrated interventions linking prevention and cure.

Outcomes of the Seminar

a) To facilitate cutting-edge research on the gut microbiome in India through connections and collaborations between diverse stakeholders
b) To address multiple health diseases related to the gut microbiome by creating an integrative action plan targeting niche geographical area

The seminar brought together scientists, researchers, medical and integrative medicine doctors together in a common platform to discuss the complex topic of the gut microbiome. Despite advances in human health, the disease is often understood in isolation. Hypertension is often treated with medicine targeting the heart; diabetes is answered with insulin and cholesterol is with medicines to lower its levels. However, the functioning of the gut pushes us to understand that the human system is far more complex. Not only by the sheer number of bacteria and viruses living within but also their

complex interactions with each other, the rest of the body and the environment in which it lives. The platform enables us to question mainstream medicine and bring the wellbeing of the human back at the centre of disease and treatment. It supports the view that treatment of the disease requires a multi-layered approach, one that appreciates the need for modern medicine and alternative healing practices to address the human being and its environment in a more holistic way. It also furthers the importance that the environment plays on the human gut microbiome and vice versa.

Points discussed at the seminar

- The current state of Gut Microbiome research in India
- Antibiotics and their effect on the gut microbiome
- Mass gatherings and their effect on the microbiome of the environment
- Prebiotics and probiotics - their use in the treatment of children with malnutrition or obesity
- Herbals and extracts - their positive effects and use in the treatment
- Diet and lifestyle
- Possibility of trying integrated medicine

The opening session addressed the status of research in the microbiome field, shedding light on diverse methods of classification and data collection, and pointing to the need for moving beyond disciplinary siloes and conventional taxa to address prevailing data gaps. Dr Nerges Mistry, a microbiologist and immunologist from The Foundation for Medical Research in Mumbai (FMR), emphasised the importance of exploring links between the gut intestine and the respiratory tract, and not treating them as separate and unconnected zones. She argued that an imbalance of gut microbiota in early life increases the risk of developing allergic airway diseases, resulting in overdependence of antibiotics and consequent gut dysbiosis.

Dr Avinash Sharma from the National Centre for Microbial Resource (NCMR) and the National Centre for Cell Science (NCCS) in Pune proposed that for effective public health management during enormous mass gatherings, microbial studies must have beyond diagnosing human populations and extend to ecological bodies as well. He cited his lab's study of the River Ganges where millions of pilgrims gather for the Kumbh Mela; the river undergoes a significant transformation when its microbial elements become dominated by the human skin microbial mix of ritual bathers that can be detrimental to both aquatic biodiversity as well as to humans consuming water downstream.

The composition of various food ecosystems and elements in our diet was the subject of the second session. Dr Tannaz Birdi of FMR presented her study demonstrating that herbals, when taken in appropriate quantities and disciplined forms, can positively influence gut microbiota while Dr Praveen Rahi from NCMR and NCCS showed how the right combination of microbial communities in the soil is essential for plant health and human nutrition in turn.

In the last session that focused on treatment initiatives and challenges, speakers highlighted the complexities of building a practice and prescribing cures based on the gut microbiome. Dr Elena J. Ladas, a clinical nutritional scientist from the Columbia University Medical Center, posited that modifying the composition of microbiota through probiotic therapy or diet may be a cost-effective approach to preventing and treating several diseases, particularly in resource-limited settings. She, however, cautioned that the research evidence for scaling such therapies was still sparse, requiring concerted research investments globally.

Other seminar participants included Dr. Phillip Abraham, a gastroenterologist from the P.D. Hinduja Hospital in Mumbai, Dr. Verima Periera from the Indian Institute of Technology Bombay, Dr Vikram Lanjekar from the Agharkar Research Institute in Pune, Dr. Narsingh Chauhan, Assistant Professor of Biochemistry from the Maharshi Datanand University in Rohtak, and Dr. Kushan Shah, the principal Naturopath physician in the Nisargopchar Ashram in Maharashtra. There was active participation in the discussion from Dr Arun Pillai and other members of the Shillim team as well who expressed their commitment to building a practice that integrates conservation, sustainability, and wellness.

The consensus drawn at the seminar

To further the platform's initiatives by continuing the dialogue on the gut microbiome through the exchange of knowledge and data as well as facilitating potential collaborations, not only to advance current research but also thrash out thoughts and processes towards other forms of holistic treatment.