How Much Do We Know! Tissue Specific Microbiomes for Application in Precision Medicine

Bhaskar Roy*, Xiaoxiao Hu, Chao Yang, Yong Zhou and Xiaodong Fang

BGI Genomics, BGI-Shenzhen, Shenzhen, China

*Corresponding Author: Bhaskar Roy, BGI Genomics, BGI-Shenzhen, Shenzhen, China.

Over 17 years ago, microbiome research has exposed and the 10,000 microbial species (NIH/National Human Genome Research Institute) are present in human body. In recent arena microbial related diseases, accumulating evidences demonstrate our body inhabiting microbiome is crucial to our health, microbiome related diseases, such as metabolic disorders (obesity, cardiovascular disease, diabetes) and cancer are increasing both in developed and develop countries. Recently reported that around 50% of cells in the human body are bacterial, fungal and other non-human (Ron Sender *et al*., 2016). The human microbiome is very complex and rapidly change in an individual making it difficult to easily illustrate its role in maintaining physical, physiological and psychological homeostasis of our body. These are the issues that in the dark place require more investigations, such as microbiome and its role in immunity disruption and activation, microbiome metabolites and its role in regulating physiology, nutrition metabolism and absorption, drug response, underserved community disparities. Now, the microbiome is an alternative target for developing highly-personalized, precision treatments. Our hypothesis is that microorganisms inhibiting in human tissues providinge multiple advantages and disadvantages that contribute to functional activity, as, immunity regulation, endocrine modulation, nutrition/drug metabolism and signal transduction. Especially for gut microbiota, some biologists reported that the metabolism of some drugs is highly depending on microbial condition in healthy people Although prior projects like Human Microbiome Project (HMP) provide a catalog of microbiome in various tissues (gut, skin, etc.) where known to host of microbes. Interestingly, microbes are detected by deep sequencing technology in human blood and uterus in which previously considered as sterile, although the findings are still under controversial, solid evidences and , a more comprehensive understanding of the tissue-specific microbiome are urgently required to better illustrate the role of microbes in human health and disease.
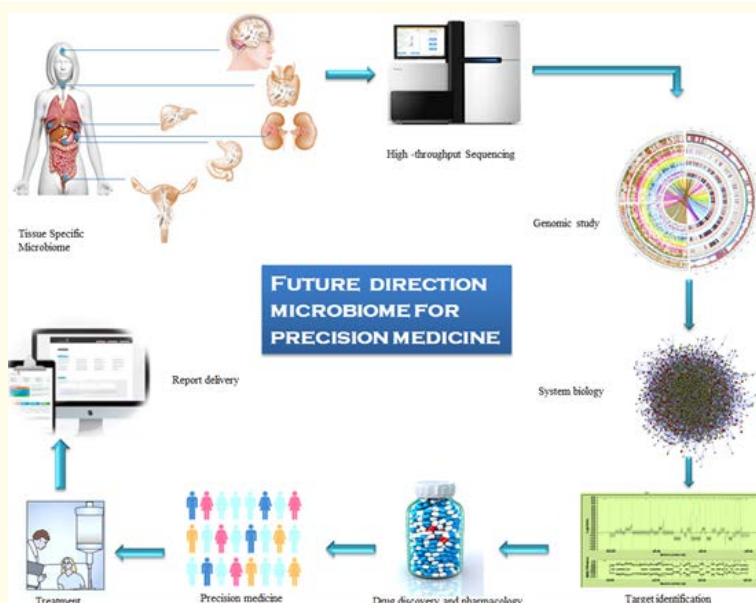

Figure: Art work of microbiome future direction for Precision medicine.

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253

Therefore, this is the right time to make big data of microbiome and microbial response in our health and diseases. The most cutting edge technology have enabled researcher to detect microbes in every part of human. The previous study has shown that microbiota present in Breast (Camilla Urbaniak *et al*., 2014), Oral (Xuan *et al.*, 2017) lung (Wang Z., 2016), brain (Paul *et al.,* 2016), Stomach (Shoaie *et al*., 2015) and also other tissues. Today, in addition to classical pathogens, tissue specific role of microbiome is a most controversial topic and poorly explored. To accelerate identification and how to predict their actions, functions, metabolism, and how to make use of them, researchers need new idea and cooperation. Therefore, we need an urgent call for investigation of tissue specific microbial detection by individual and specially, its roles related to diseases including cancer in each part of the human body through high-throughput sequencing technology. Microbiology research integrates clinical cognition, high-throughput sequencing data, bioinformatics and systems biology strategies, and many early precision medicine projects have focused on genetic differences between individual patients, such as unique genetic mutations in a tumor. The microbiome should be integral to future precision medicine initiatives.

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