

# Is Micro Biome Profiling Can Be Personalized or Individualized



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## Mini Review

As we all know every branch of science is personalized precisely to individual and his individual needs akin to the mobile apps. Specialized research published shows us that the gut micro biome is a virtual versatile Rosetta Stone of human health, playing a potentially meaningful role in the development of illnesses and human health and in particular to the community health. As we know vaccination to the common childhood diseases lead to the eradication of common epidemic viral and bacterial infections in most of the countries.

Now with advances in the molecular understanding of communicable and non-communicable diseases, future is bright, that it is perhaps inevitable and need is that micro biome research would swiftly go out of the labs and into our kitchens. Now moment appears that, that has arrived to our plates, with a variety of companies now offering at-home made micro biome testing kits that promise give us a hope of the teeming world within our guts and all of its prognostic power.

In broad terminology Microbiome profiling is a well dedicated process used to identify and enumerate the organisms in samples from diverse sources such as soil, clinical samples and oceanic environments. Human microbiome analysis is the study of microbial communities found in and on the human body. The goal of human microbiome studies is to understand the role of microbes in health and disease. This profiling is an important first step in determining the important bacterial and protist organisms in a biome and how they interact with and influence their environment. Microbiome profiling is usually achieved by sequencing PCR-amplified variable regions of the bacterial 16S and of the protistan small subunit ribosomal RNA genes. Other sequences, such as the GroEL genes may also be targeted for independent validation.

The microbial profile of a sample may be determined by traditional Sanger sequencing, by terminal restriction

length polymorphism analysis or by denaturing gradient gel electrophoresis..The recent introduction of massively parallel 454 pyro sequencing has resulted in a radical increase in the popularity of microbiome profiling because a large number of PCR amplicons can be sequenced for a few cents per read . A recent report demonstrated that short sequences derived from Illumina sequences could be used for robust reconstruction of bacterial communities. This group used Illumina sequencing to determine the partial paired-end sequence of the V4 16S rRNA region in a variety of samples using single-end sequence tagged PCR primers.

Importantly, it's found that the Illumina sequencing method has an exceedingly low error rate and that the majority of errors arise during the PCR amplification step. It is argued that the error profile has profound implications for choosing the appropriate seed sequence for clustering using the data generated by Illumina sequencing. The San Francisco-based uBiome in November launched SmartGut, a clinical microbiome screening test that measures bacterial diversity in a person's gut using DNA sequencing. SmartGut classifies a person's gut microbiome by sequencing a single gene, the 16s ribosomal gene present in all bacterial DNA, to provide information with clinical ramifications [1].

Traditionally, studying samples from human skin, stool, or blood relied on time- and labor-intensive microbiology techniques of growing and isolating individual organisms followed by phenotypic or genotypic analysis. Microbial community profiling within a single sample was not possible with these methods. The advent of next-generation sequencing (NGS) enabled several high-profile collaborative projects including the human micro biome project and Meta IHT, which have published a wide range of data on the human micro biome using NGS as a foundational tool. The throughput and cost savings of NGS has fueled met genomics studies capable of

surveying the genomes of entire communities, including those of uncultivable organisms.

Experimental NGS methods for analyzing the human micro biome include:

- a. **16S rRNA sequencing:** A 16S ribosomal RNA gene sequencing method used to identify and compare bacteria present within a given sample.
- b. **Microbial metatranscriptomics:** Analysis of all RNAs encoded by a group of microorganisms within a complex sample.
- c. **Shotgun metagenomic sequencing:** A DNA sequencing method that enables comprehensive sampling of all genes in all organisms in a given complex microbial sample.

Many micro biome testing companies services resemble traditional laboratory and research work and offers a test that must be prescribed by a doctor and assesses for 26 bacteria targets that are clinically actionable, such as *Salmonella enterica* and *Clostridium difficile* etc. The tests, which are approved and certified by the American College of Pathology and Centers for Disease Control and Prevention to conduct a study of hospital-acquired infections, will identify any bacteria with established links to specific conditions in humans. The increasing reach of these personalized micro biome testing wouldn't be possible, however, if this once-obscure concept had not entered the mainstream through traditional scientific media outlets and their more hyperbolic counterparts found across the Internet. As people's awareness of the pivotal role that their micro biomes play in their health and well-being increased, so too, understandably, did their desire to actively monitor and positively intervene in it.

The recently launched start-up, one such company that aims to meet these customers' needs these offers a monthly subscription service whereby its customers send in fecal samples obtained on pieces of toilet paper and in return receive reports summarizing the sequencing results. The user friendly end product summarizes each subscriber's overall «Gut Wellness Score,» and along with general lifestyle advice, the company offers its own line of probiotics. Accordingly there are generally three types of customers taking advantage of such services [1]:

- a. Bio hackers satisfying their own curiosity and augmenting their biomes as they see fit.
- b. mothers caring for children with chronic conditions; and
- c. Patients with gastrointestinal-related conditions themselves.

The sheer complexity of micro biomes makes it and target for devising effective interventions to many chronic illness for both communicable and non-communicable disease. According

to experts, we're simply too early in our understanding of it to say what will or won't work when it comes to affecting, much less improving, our gut profile [1]. It appears that we can find out what's in your gut bacteria and is becoming more and more evidence-based. Natural fluctuations within patient's microbiomes, which can occur during times of sickness, insomnia, or dietary changes, will guide us for disease diagnosis, treatment, intervention and prognostication of that particular disease.

With general agreement that the micro biome will yield valuable interventions in the years to come, and a resulting influx of capital, it makes sound business sense for companies to set up shop early and wait for the science to refine their offerings. In the meantime, using patients' micro biome profiles to endorse probiotics and lifestyle changes is unlikely to prove disruptive. The unique thing about the micro biome is that most of the potential therapeutic options are not going to harm because the side effects are minimal, which advises pharmaceutical and other companies in the development of micro biome-based interventions.

The testing companies see themselves as playing a pivotal role in raising public awareness of the micro biome. For its part, one of these companies has amassed over 100,000 gut microbial samples, what they say is the largest such library in the world. The logic runs that the more customers these companies entice with their services, the more robust their databases become, which in turn will enrich the research community as with genomics, it's really interesting space to be in, where the beginning phase is collecting a large-enough dataset in order to learn more about it. Probably in the next 3-5 years, through aggregating all of the data and making correlations, we will be able to find out exactly how the micro biome affects different health outcomes. As we continue to grow, will be sequencing not only humans but also different areas of life and hopefully we can start devising more information from improving the health of the entire world.

It's a quality of optimism that characterizes the field overall. Revelations about the micro biome have come so fast especially relative to other areas of medicine that it's hard to believe that the pace will not continue. I do think that though, that the micro biome is going to be as regimented a part of medical practice and I think those days are coming soon the marriage of academic research fruits and commercial endeavors is what's going to help push this micro biome field forward.» I believe that we are fast approaching a day when we can use the gut micro biome to search for a disease footprint and devise treatment strategies accordingly for individual patient's needs.

### References

1. Gloor GB (2010) Microbiome profiling by illumina sequencing of combinatorial sequence-tagged PCR products. PLoS One 5(10): e15406.



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