Ayurgenomics and Modern Medicine

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Within the disciplines of modern medicine, P4 medicine is emerging as a new field which focuses on the whole patient. The development of Ayurgenomics could greatly enrich P4 medicine by providing a clear theoretical understanding of the whole patient and a practical application of ancient and modern preventative and therapeutic practices to improve mental and physical health. One of the most difficult challenges today is understanding the ancient concepts of Ayurveda in terms of modern science. To date, a number of researchers have attempted this task, of which one of the most successful outcomes is the creation of the new field of Ayurgenomics. Ayurgenomics integrates concepts in Ayurveda, such as Prakriti, with modern genetics research. It correlates the combination of three doshas, Vata, Pitta and Kapha, with the expression of specific genes and physiological characteristics. It also helps to interpret Ayurveda as an ancient science of epigenetics which assesses the current state of the doshas, and uses specific personalized diet and lifestyle recommendations to improve a patient's health. This review provides a current update of this emerging field.

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1. Introduction

Ayurveda is the ancient system of traditional medicine in India. The term Ayurveda comes from two Sanskrit words, "ayus", meaning life or lifespan, and "Veda", meaning knowledge or science. Ayurveda may be translated as "the science of life", or more specifically, "the science of lifespan". Ayurveda was originally an oral tradition of natural health, and it was much later that this knowledge was written down in books[1]. Some of the knowledge became fragmented and lost due to many years of foreign rule in India.

The Tridosha theory of Ayurveda explains that there are three fundamental principles or forces, called doshas, which govern the physiology of each individual. Vata is the dosha involved in transportation in the body; from the transportation of molecules to the transportation of nervous impulses. It arises from the elements of ether and air. Pitta is the dosha that governs the process of digestion, as well as all metabolic pathways inside each cell. It is formed from fire and water. Kapha is the dosha that governs structure and cohesion in the body. It is an expression of earth and water. Each individual is born with a particular combination of these three doshas; this is called Prakriti. There are seven basic types of Prakriti: Vata; Pitta; Kapha; Vata/Pitta; Pitta/Kapha; Vata/Kapha; and Vata/Pitta/Kapha.

Is there a scientific explanation for Prakriti? The best description so far has come from the new field of Ayurgenomics, which attempts to describe Prakriti types in terms of modern genetics and physiology.

2. Modern Medicine and Ayurgenomics

Modern medicine uses a highly reductionist system to describe the fundamental basis of our physiology and health, using terms like genome, gene expression and epigenetics. Ayurveda uses an entirely different holistic system, which includes terms such as dosha and Prakriti.

Unfortunately, modern medicine has not recognized many of the useful preventative approaches of Ayurveda, due to a cognitive bias against folk or traditional medicine. Even though traditional systems of medicine are still widely used in many countries around the world, more research on their preventative and therapeutic treatment programs is necessary[2].

Up to now, the research has been primarily on specific herbal preparations, with the main outcome being an attempt to isolate one active ingredient which can then be used by a pharmaceutical company. Ayurgenomics offers a new bridge between traditional medicine and modern medicine by providing a rigorous scientific understanding of basic concepts, and at the same time incorporating the practical preventative approaches of Ayurveda into modern medicine.

Over the last ten years, a new field has arisen in modern medicine, which is known as P4 medicine. The four Ps are: predictive; preventive; personalized; and participatory[3][4][5][6]. This new system attempts to switch the emphasis from a disease-oriented system to a wellness-oriented system centered around the patient. It is closely related to other new fields such as Integrative Medicine, Functional Medicine, Lifestyle Medicine, Personalized Medicine and Preventive Medicine.

Ayurveda and other systems of traditional medicine have been patient-oriented and predictive, preventive, personalized and participatory for many thousands of years.

Long before the advent of epigenetic and other fields such as nutrigenetics, Ayurveda understood how diet and other lifestyle factors could affect our health. They recognized what modern medicine is only beginning to comprehend, that prevention is key to health. Improvements in diet, sleep, exercise and stress management are crucial for an effectively preventative system of medicine.

The development of Ayurgenomics, as we have said, helps give credibility to Ayurveda and other systems of traditional medicine by describing their ancient concepts in terms of modern science. New approaches in Ayurgenomics, which use big data analysis and machine learning, may greatly facilitate this whole process[7][8][9]. Of course, the therapeutic programs of these system will ultimately have to be tested through carefully controlled clinical trials.

Ayurveda and genomics can contribute to each other. Modern science can help Ayurveda as an evidence-based system of medicine, and Ayurveda can help modern medicine, particularly through its preventative approaches. This is especially true with P4 medicine, which is based on many of the same principles of Ayurveda. Having time-

tested personalized preventative lifestyle recommendations would make it easy for each individual to participate in their own self-care (see Figure 1).

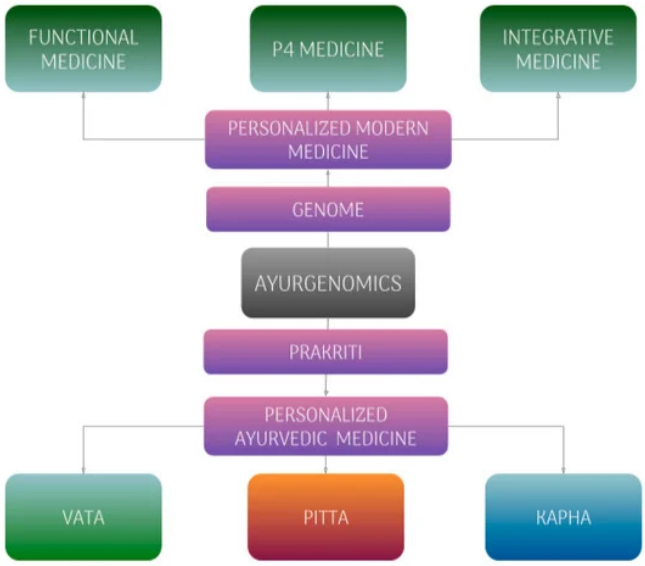

Figure 1. Ayurgenomics and its Relationship to Modern Medicine.

Ayurveda could also contribute to modern medicine in terms of the diagnosis of disease. Many believed that the enormous progress in the field of genomics would quickly bring a personalized system of medicine that could predict and prevent disease. Progress has been made, but researchers now realize that this may take longer than expected due to the highly complex nature of gene expression in the development of disease conditions. Ayurveda could help by stratifying individuals into broader categories using the Prakriti system of classification, along with modern genomics. Can we consider Prakriti as being our Ayurvedic genome? Can Ayurgenomics be used to diagnose and treat diseases?

These and many other questions will need to be answered by future research. We can only hope that a massive research effort is undertaken as soon as possible. The combination of Ayurveda and genomics promises to markedly improve many areas of healthcare throughout the world.

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