

## Chapter 4

# Proteomics in Personalized Medicine: An Evolution Not a Revolution

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### ABSTRACT

*The idea of personalized medicine system is an evolution of holistic approach of treatment and in more evidence based manner. The chapter begins with an introduction of how body system works naturally and impact of modern medicine on overall health, followed by a historical background and brief review of literature providing the description that the concept of personalized medicine is not new but a very old ideology which stayed neglected until the development in the field of medical genetics, followed by the role of omics in modern medicine, the comparison of modern medicine and personalized medicine, medical concepts relevant to proteomics in personalized medicine, impact of proteomics in drug development and clinical safety and finally closing the chapter with future prospects and challenges of proteomics in personalized medicine.*

### INTRODUCTION

Human body is a complex combination of various extremely specialized systems. All these specialized system functions in two major ways. First each and every system performs their functions at individual level and second, they work together with other systems of the body thus making the life possible. The ultimate goal of these specialized systems is to maintain the Homeostasis of the body. As it is known that Homeostasis is the maintenance of nearly constant condition in the internal environment of the body. Disturbance of any form caused to the homeostasis of the body leads to disease. Thus a Disease can be interpreted as the dynamic destruction of the homeostasis of the body. There are several complex biochemical reactions working together as a chain system in the body for maintaining the constant condition of the internal environment. One component from a biochemical pathway is related to some other biochemical pathway and so on. So fault in a single component of a biochemical pathway may

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lead to the collapse of the entire system. There are various control systems in our body that are the contributing factor(s) in the maintenance of homeostasis. Genetic Control System is the most intricate one. It operates in each and every cell in the body for controlling intracellular as well as extracellular functions. Every individual possess a wide range of genes in their body that determines their genotype. But mere presence of the gene in an individual does not mean all those characters will be expressed in that person's lifetime. It is the gene products or Proteins that determines the phenotype of an individual. Expression of a certain gene and production of the functional gene product is broadly dependent on the surrounding environment and lifestyle of that individual. So genotype of individuals may be same but every individual becomes unique at Proteomic level. Proteome is defined as the set of all the gene products/proteins present in an individual. Variation in composition of the protein i.e. Proteome is a key factor that determines an individual's susceptibility to a disease and their response to a particular drug.

Modern Medicine is the dominant form of medicine in the world today and portrays that it is the only system of medicine that actually restores the health of an individual, even though it works by suppression of normal physiological and immunological response to stress or by palliating the complaints of the patient ultimately converting a disease from superficial state to a much deeper state where the patient have either one of the following two choices:

1. Becoming dependent on more and more variety of drugs to keep their systems running till the rest of their life.
2. In cases where modern medicine no longer can manage through palliative and suppressive treatments, they look forward to surgery.

According to World Health Organization the definition of HEALTH is and the author quotes "Health is a state of complete physical, mental and social well-being and not merely the absence of the disease or infirmity".

If the definition of health proposed by W.H.O is compared with the way of treatment followed by the modern system of medicine, it will be clear that it does not restore the health of the patient at all. Instead it only make the body system dependent on more and more drugs, which in long term resulting in dependency of that particular medicine(s) to survive. Deposition of these drug substances in the blood stream and body cells leads to deterioration of mental health which ultimately cripples the patient's social well-being.

There are many factors that contributes to effectivity of modern medicines. Among the many factors the 5 major reasons behind the loop holes of the modern medicine are as follows:

1. Medicines used in Conventional System are first tested on animals or model organisms followed by controlled human trials. The medicines may have worked perfectly on those selected and standardized situation(s) but it doesn't mean that it will have same effect on each and every individual in the world.
2. They does not consider the various systems of the body as a functional whole. They applies the medicine as if all the systems are isolated and discrete units.
3. The medicines used in Conventional System acts at systemic level, so their actions are either suppressive or palliative or both.

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