

### Interaction of Genomics and Medical Biochemistry: Implications for Precision Medicine

Treatment protocols have been designed primarily as a generic management schema—'one size fits all'. This is wrought with a number of fallacies. The primary deterrent is the heterogeneity of humans. This, in combination with different eating habits, lifestyles, sociocultural practices as well as climatic and geographical diversity, leads to innumerable disease fingerprints. The role of pharmacogenomics in drug metabolism is well known. All the above-mentioned factors have a pivotal role to play in our response to treatment protocols. The urgent need for amalgamation of genetic signature, sociocultural practices and available treatment protocols was understood and as a result the concept of 'precision medicine' was born.

Precision medicine takes into account individual differences in genes, environments and lifestyles by collating findings from various studies and analyzing the data. The objective of precision medicine is to make diagnosis of disease or illness, treatment therapies, and prevention more personalized, proactive, predictive, and precise.

Medical biochemistry is one of the pillars of precision medicine. The omics era has revolutionized research and now we have a humongous amount of data emerging from proteomic, genomic and metabolomic studies. Analytic chemistry can now monitor numerous chemical differences not just from person to person but moment to moment as per the circadian rhythm which has made it possible to explain the variability of investigations conducted on the same patient the same day. Application of appropriate statistical tools to analyze the data has generated information that can now be used to treat individualistically.

Precision medicine has revolutionized oncology research since cancers are known to be genetically heterogeneous. The availability of allele-specific drugs (Ivacaftor aimed at the 5% of cystic fibrosis patients with a specific G551D mutation) and allele-specific management protocols (e.g., warfarin dosing based on CYP2C9\* type) has made therapeutic protocols more mathematical than incidental.

In a country like India with the world's largest population and unequal distribution of resources as well as ignorance regarding good health; application of precision medicine is still a distant dream. Genetic tests are expensive and burn a hole in the pockets of even the upper middle class. However, India has now become the cancer capital of the world and we need to address this health scourge in a rational and scientific way. Precision medicine is the only way forward and we need to formulate ways to make it more pocket friendly.

**Binita Goswami**

Professor

Department of Biochemistry

Maulana Azad Medical College, New Delhi, India