PERSONALIZED MEDICINE- THE WAY FORWARD

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Cancer is one of the most dreaded diseases in medicine. Due to advances in treatment research and strategies we have now been able to achieve cure rates of upto 60-90% for certain malignancies. The focus has now shifted from just survival to quality of life of the patients. Today, we aim that each patient gets the right medicine in the right doses at the right time and for the right duration- ie. Customization to the core, so that neither a patient gets treatment more than he needs and suffers unwarranted side effects nor gets less treatment and has a compromised outcomes. That is personalized medicine in a nutshell.

But how do we do this? Research has helped us unravel many biological and molecular changes (mutations) in cancer cells which might have been inherited by the individual as germ line mutations or might have been acquired by the cancer cells in the process of rapid multiplication. Singling out such changes for a particular cancer in an individual help us to identify the biology of the disease which further helps us predict the aggressiveness of the disease, likelihood of the disease to respond to treatment and chances of the cancer relapse. This information helps to identify prevention, screening, and treatment strategies that may be more effective and cause fewer side effects than would be expected with standard treatments.

By performing certain type of tests and analysis, we may customize treatment according to each patient's needs. Here the concept of genetics and genomic comes in. Genetics is a study of inheritance eg. We study the BRCA 1 and BRCA 2 genes in breast cancer patients to find out the chances of the disease getting inherited in to the next generation. Genomics on the other hand is the study of how genes interact and are expressed as a whole. Genomics and gene expression profiling tools focus on the cancer eg. Oncotype DX® Breast Cancer Assay that measures the expression level of 21 genes is measured in tumor tissue from patients that have already been diagnosed with breast cancer. This assay evaluates, if a patient is going to recur (prognostic) and predicts benefit from chemotherapy and hormonal therapy (predictive).

Two other arms of treatment tailoring include pharmacogenomics and targeted therapy. Pharmacogenomics looks at how a person's genes affect the way the body processes and responds to drugs. The differences influence how effective and safe a drug is for a person. People with colorectal cancer that have a specific gene variation may have life-threatening side effects when treated with irinotecan (Camptosar). This altered gene makes it harder for the body to break down irinotecan. In these patients, we prescribe lower amounts of irinotecan so patients will have fewer side effects.

A targeted treatment targets a cancer's specific genes, proteins, or the tissue environment that contributes to cancer growth and survival eg. Certain breast cancer patients have target receptor expression like HER 2 and they are benefited by trastuzumab biological therapy once this is added with chemotherapy. This target therapy gives additional 30-50% response compared to chemotherapy alone.

To summarize, with the help of modern tests it is possible to recognize the nature of the cancer in a particular individual, which can guide the doctors to determine the right drugs and the right intensity of treatment as well as predict the likely course of the disease in that specific patient. Specific target therapies also spare the patients from suffering the varied side effects of nonspecific agents. Hence personalized treatment in cancer care is the way forward.