

Personalized Medicine is the Key to Effective Cancer Treatment

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Editorial

Cancer is a disease involving abnormal cell growth with the potential to invade or metastasize to other parts of the body. The most common types of cancer in males are lung cancer, prostate cancer, colorectal cancer, and stomach cancer, and in females, the most common types are breast cancer, colorectal cancer, lung cancer, and cervical cancer. In children, acute lymphoblastic leukemia and brain tumors are the most common types of cancer. The risk of cancer increases significantly with age in addition to the many other risk factors such as the use of tobacco, obesity, lack of physical activity, environmental pollutants, viruses and many others. Also genetic defects inherited from parents contribute to 5–10% of cancers. The standard mode of therapy for most type of cancers such as surgery, radiation and chemotherapy are effective in only 50% of the patients. Hence there is a need for targeted therapeutic approach in cancer patients and personalized cancer care to better the odds. Thus understanding each patient's "cancer" is unique, and by making accurate and deeper diagnosis, better cancer treatment can be achieved upon matching each cancer patient with the best of targeted/ personalized treatment options. Thus the key to personalized medicine lies in analyzing an individual patient's tumor to determine what combination of drugs will work best. Further understanding the factors that may have contributed to the origin of this disease such as exposure to carcinogen, chemical toxins, heavy metals, infectious agents and many more which may have altered the genes and caused mutations are also important contributors to progress in personalized cancer care. Genetic alterations effectively compromise the immune

system, resulting in continuous inflammation and eventually spread or metastasize. Thus treatment selection can be enhanced upon identifying the molecular and genetic targets or rather find the best target for each individual patient, which means rather than relying on statistics, it would be nice for a patient to know if a certain treatment showed to be effective before starting treatment. Thus the dream of personalized medicine requires that the disease is analyzed at the molecular level and the analysis identifies a drug target and the drug gets delivered to the target site. Although personalized medicine is the dream and expectation of any cancer patient, and is yet to be a reality, certain cancers such as breast cancer has had a personalized approach for a long time where breast cancer patients are screened for estrogen receptor, progesterone receptor and HER2 tumor markers to help target treatment. Presently, The Cancer Genome Atlas (TCGA), a project of the National Cancer Institute, has compiled comprehensive genomic maps of 20 common cancers which has been possible through next generation gene sequencing technology and has helped to understand how one type of cancer differ molecularly from one patient to the other. Further sequencing of tumor genomes has revealed several subtypes within a cancer type. Thus one of the major goal of personalized medicine is to provide cancer patient the treatment that are most likely to be effective for their particular cancer and henceforth limit fruitless attempts at treatment and unpleasant side effects. Further, understanding that every patient has a unique set of factors driving their cancer and there are multiple targets in each patient that may need to be hit based upon tumor profiling is a key to effective treatment.