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Cancer Therapy: An Overview

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Cancer has existed probably since the dawn of civilization; however, it came into prominence during 19th century. There could be many reasons because of which cancer remained out of public attention. Age is one of the strongest causal factors in case of most of the cancers, and symptoms of cancer manifests or become more prominent in old age; therefore, it was regarded as just another old age related health complexity. Before 19th century, there were other diseases like cholera, plague etc., which took lives of millions of people around the world, because of absence of proper medical facility [1]. Life expectancy in those times was much less than that of today's because of absence of proper medical facility, and other factors like war. Simplicity in life style, food habits, was also responsible for keeping a check on cancer related incidences. In the last couple of centuries, we have witnessed tremendous progress in medical science and healthcare, because of which average life expectancy has increased. Owing to increased life expectancy, there are more chances for age related malignancies like cancer to appear in the life time of an individual. The so called 'modern life' is often accompanied by various vices like processed food, sedentary life style, smoking, drinking etc. which are known to trigger cancer initiation [2].

Cancer has become one of the biggest killers of our time, which ranks second only to deaths caused by cardiovascular disease. The huge mortality and economic burden associated with cancer, has brought it into prominence for policy makers, pharmaceutical companies, researchers with the common objective to control mortality and improve survival of the affected persons. The economic burden due to cancer incidences is increasing every day, according to an estimate the amount of money spent on cancer treatment has doubled in past two decades. The mental agony it puts on cancer patients, and their near and dear ones cannot be enumerated by any statistics [3].

The multifactorial role of cancer is established beyond any doubt, which necessitates devising treatment and detection strategies which address these factors. Cancer research is moving towards establishing strength of causality for various factors, which contribute in various phases of cancer (initiation, progression, tumorigenesis). The cancer research started with a reductionist approach, wherein scientific experiments were designed to understand the role of individual factor (gene/protein) in causing cancer. The knowledge gained through such reductionist approach has helped to get the basic understanding of biological complexity of cancer. Since the nature of cancer is multifactorial, it is logical to search for medicinal compound, which have the capability of modulating multiple factors at a same time. It also explains why combination therapy works in case of cancer treatment. The combination therapy is designed to address these multiple factors and bring about synergistic effect [4-6].

Timely detection of cancer in its nascent stages can be regarded as one of most effective method, to control mortalities due to cancer. The majority of the cancers are detected on the basis of appearance of some overt symptoms. The detection of cancer at more advanced stages makes management of cancer more complex, with a little hope of recovery with existing treatment options. Incorrect identification of cancer subtype is also one of the reasons why cancer patient doesn't respond to drugs designed for specific class of cancer. With the current advances in technologies like next generation sequencing, now it is possible to accurately characterise, cancer related features like stage, subtype, resistance to certain drugs etc. It is more than obvious that cancer is predominately man-made malignancy, which means our concerted and sincere efforts can bear fruit by eradication of causal factors like tobacco, alcohol, harmful chemicals, and other carcinogens. Adapting health life-style and diet can also help tremendously in preventing us from cancer.

We are living in fast changing world with path-breaking technological advancements as a norm of the day. With these advancements, it should not be the over-optimistic expectation to believe that cancer would be treated as routine diseases like flu, infection etc. I firmly believe that this would be possible by effective diagnosis and treatment strategy tailored to address phenotypic and genotypic heterogeneity associated with cancer. The availability of therapeutic targets is most important pre-condition for rational drug discovery and equally the effective treatment options are highly desirable for management of oral cancer. Gene expression profiling through microarrays is regarded as promising tool to understand transcriptional changes linked with cancer formation [7].

I envision following milestones to be achieved by the research community in the near future:

- Development of non-invasive, handy, simple yet efficient diagnostic kit for cancer detection.
- Characterization of diagnostic, prognostic, efficacy biomarkers.
- Unravelling of molecular events associated with disease pathogenesis.
- Development of rule based therapy to deal with heterogeneity in cancer (Personalized cancer treatment).
- Clinical use of effective therapies like nano-medicine, oncolytic viruses, immunotherapy, network medicine.

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