Cancer incidence and novel therapies developed in Japan

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Abstract

According to the ministry of Health, Labour and welfare of Japan, Cancer has been the leading cause of death in Japan since 1981. [1] As per the data in 2010, in Japan, one in every three deaths was due to cancer. [2] The Japanese Government has introduced so far, three terms of 10 years strategies for Cancer control since 1984 till date. The budget allocated for cancer control in 2009 was 52.5 billion yen in Japan. [3] Lung is the leading site for cancer in both males and females in Japan. In males, following the lung, stomach, liver and pancreas are other leading sites while in the females, stomach, colon, pancreas and breast are the other leading sites. [3] In 2006, the cancer incidence was 694,000 and the male cancer incidence was 1.4 times as large as that of females. The peak age for cancer deaths in males is their fifties while in the females it is the sixties among Japanese. In addition to the conventional treatments such as surgery, radiotherapy and chemotherapy, some of other therapies in practice in Japan are the Hyperthermia [4] that uses high temperatures to kill or damage the cancer cells, the Ion Beam therapy using proton beams [5] to damage the DNA of the cells as cancer cells have high rate of cell divisions and lesser ability to repair DNA damage, the molecular targeted therapies that interfere with a specific molecular target involved in tumour growth and progression [6] and most importantly the autologous cell based Immunotherapies.

Modern Cancer Immunotherapy started in the 1970s in Japan. The immunopotentiators using compounds from Bacteria, Beta Glucans from fungi were the first forms of modern Immunotherapy. Then was the era of direct injection of cytokines such as Interleukins, Interferons etc. The adverse effects associated with the injection of cytokines led to development of cell based Immunotherapies in the 1980s. [7] Immuno-cell therapies involve isolation of immune cells which are then processed and re-injected into the body to exert their action against the cancer. There are different kinds of Immuno-cell therapies being practised in more than 25 private and public institutions in Japan using Natural Killer (NK) cells, Cytotoxic T lymphocytes (CTLs), Tumour Infiltrating Lymphocytes (TIL), Lymphokine activated Killer (LAK) cells, Dendritic cells and Gamma Delta T (γδ T) cells. [5] Importantly most of the innovations in cell based therapies in the world have been made in Japan because immunotherapy is a part of the Japanese Health care system and routine therapies for cancer in Japan. There have been randomized clinical trials on Immuno-cell therapy for liver cancer, lung cancer, gastric cancer, ovarian cancer with the results suggesting statistically significant increase in survival rate and increase in disease free survival rate. [6, 9, 10, 11] There are more than 25 institutions in Japan performing such cell based immunotherapies. A comprehensive review by Egawa et al on 1401 patients showed that when Immuno-cell therapy was combined with the conventional therapies, the efficacy increased upto 20-30%. [7] Immuno-cell is the least toxic of all therapies and can be administered even to terminally ill cancer patients. [2] Contrast to drugs, as autologous cell based Immuno-therapies are from the patient’s own blood and as they are custom tailored to each patient, though expensive, the adverse effects are minimal. To conclude, cancer-Immuno-cell therapies are the future of cancer therapies and further research is needed to enhance its efficacy and validate the results.

References:

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