



## Technologies in Cancer Care: Dilemmas of Aspirations and Expectations

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In last few decades, cancer care has evolved! So are the expectations of patients and care-givers. And it is rightly so, with advances in technology, and incorporation of it widely in clinical practice; cancer care have changed the way we see cancer as a disease. Cancer patients wish long-term control with no or minimal side effects. With aspiration to have better treatment, high-end technologies have taken entry big time in cancer care. Be it in chemotherapy as form of 'nano-technology' or in radiology as 'PET-MRI' scan. More precise delivery of chemotherapeutic agents with 'nano' technology has claimed to improve pharmacokinetics, and is true to an extent as well. 'Packets' of medicine delivered only within the tumour and minimal delivery to adjacent normal healthy tissue is the goal for such chemotherapy delivery techniques. However, too many loose ends are around need to be tied before coming to an affirmative conclusion. One of the 'real-life' example of effective and precise 'drug delivery' is of Amphotericin - an anti-fungal drug for systemic fungal infection. This highly toxic medicine is possible to be delivered in effective dosage only after implementation of these effective and precise drug delivery systems. It seems now, after years of research and hype, we have agreed that nano-technology drug delivery may be clinically meaningful in highly toxic medicines like Amphotericin, but may not be useful for many other routinely used anti-cancer agents. Marginal and many times 'theoretical' benefits motivates increase usage of similar 'highly specific' technologies.

Radiology is one of the area where technology have its highest influence. Infact, improvement in imaging with CT scan and MRI scan is considered one of the most influential discovery of twentieth century. Computer technology and our understanding of radiology imaging have revolutionized the way we treat patients now. We can't even think of a diagnosis without imaging. The fact is in today's practice, we are dependent on investigations than on our clinical acumen. This has lead to 'overuse', 'inappropriate' use and invention of 'more advanced' imaging modalities. The cost-benefit analysis of these investigations many times 'go out of the window' and rationale take a back seat. Latest in the list of modern radiology is the 'PET-MRI'. It is in 'routine' clinical use even before the verdict is out about its utility in having any additional benefit.

Radiation Oncology in another area of cancer care where technology have played a decisive role in its acceptance and usage. Modern sophisticated machineries have enabled to prepare high-end radiation therapy machines that can deliver precise radiation therapy to the target. Computer hardware has helped in 'computerized', 'automated' and 'precise' delivery of radiation, whereas modern software's have provided us with advanced treatment planning systems. Advancement in imaging in the form of PET scan, MRI and CT scan also has enabled us to 'see' the tumour properly and treat

them appropriately. Now, we have intensity modulated radiation therapy (IMRT) and image guided radiation therapy (IGRT); we can deliver 'curative' high dose of radiation to the target, while sparing normal tissue. With these modern radiation therapy techniques there is claim of significant improvement in local control and preservation of 'quality of life'. In image guided radiation therapy, daily CT scan and matching done before treatment. This highly precise and image guided technology is meant to minimizing 'error' in treatment delivery and hence enables us to reduce treatment volume. Ironically, though treatment delivery is precise, it does not give us the confidence to reduce the treatment volume. The purpose of using technology seems defeated in such situations.

Proton therapy is coming up as 'THE' option in radiation therapy. This highly expensive and elaborate technology is now being used more often. However, the clinical data is sparse and whatever small patient cohort results are available, it seems there is no difference in outcome from the existing treatment options.

Now, patients with cancer not only wish to have controlled disease, but also living with better quality of life, lesser toxicities and comfortable treatment options. Patients wish not only 'safe' and effective, but short course treatment as well. They are happy if the treatment is over in a day as 'day care' procedure; at best they are willing to go back to work in a week's time. Fast paced world have made our treatment 'fast' as well, but at the cost of making us vulnerable to recovery from the treatment. Latest in this advancement is the robotic radiosurgery (CyberKnife). CyberKnife can do 'real time tumour tracking', treat with very high dose short course radiation therapy and now a viable non-invasive option even attractive to surgeons. CyberKnife technology has given us an opportunity to treat even solitary metastatic diseases with non-invasive 'curative' intent. Many so-called 'radioresistant' tumours are responding to high dose of radiation. However, most of these 'claims' are not verified by randomized studies. Patients are also 'demand' the latest technology when the treatment is affordable. Technology and 'convenience' have taken the upper hand in selection of treatment modality. 'Latest' technology have replaced the 'old' treatment. Rationale and experience has been shown the door. It is time to relax, welcome the 'new technology in the block' but not leave our old guard.

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