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Letter to Editor

Nano-Warriors Against Cancer: Who Won?

Asim Mehmood*
Department of Medicine, Shifa College of Medicine
Islamabad, Pakistan

***Corresponding author:** **Asim Mehmood**
Department of Medicine, Shifa College of Medicine
Islamabad, Pakistan
Email: asim.mehmood@live.com

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Letter to Editor

Dear Editor,

One of nanotechnology's most rapidly expanding fields, nanomedicine has the potential to revolutionize healthcare and medicine by creating ground-breaking new diagnostic and therapeutic instruments. According to the definition of nanotechnology, it is the deliberate design, characterization, manufacture, and uses of materials, structures, devices, and systems by regulating their size and form in the nanoscale range (1 to 100 nm). Currently, nanomaterials are being developed to help molecules pass past biological barriers, to access molecules, to mediate interactions between molecules, and to detect molecular changes in a sensitive, highly efficient manner [1].

It is sometimes said that nanomedicine has fallen short of initial promises in terms of drug delivery because less than 1% of the Active Pharmaceutical Ingredient (API) is released locally, as in the case of cancer treatment in tumoral tissues. According to Scott McNeil, a former director of the NCI's Nanotechnology Characterization Laboratory (NCL), other pharmacological parameters such as peak drug concentration, clearance rate, and half-time elimination may be significantly improved, increasing the therapeutic outcome and decreasing side effects. These additional pharmacological parameters include the average amount of the API delivered locally, which may not be the only parameter to judge the success of nanomedicine in cancer therapy [2]. More crucially, since nanoparticles are not just acting as passive drug carriers, the efficacy of nanomedicine cannot be determined solely by looking at the given dose. Three novel formulations, Vyxeos, Onpattro, and Hensify, have been approved in the past three years, proving conclusively that a new generation of nanomedicine formulations has successfully entered the market and opened up new clinical perspectives based on their distinct physico-chemical features.

According to a recent assessment by several authors, more than 50 nanomedicine formulations are currently licensed for use in clinical settings. These commercialized nanomedicine formulations have received approval for the treatment of macular degeneration, cancer, iron-replacement therapy, anesthesia, fungus, and uncommon genetic illnesses. The statistics also include imaging agents that use nano- and microparticles. Liposomes, iron colloids, protein-based NP, nano-emulsions, nanocrystals, and metal oxide nanoparticles make up the majority of authorized NP classes. The three novel formulations stated in the previous section demonstrate both the market entry of new generations of nanomedicine as well as the steady rise in the number of formulations receiving approval. Since nanoparticles themselves could end up serving as the active therapeutic component, nanomedicine can no longer be viewed as only a means of medication delivery. Today, the tolerance of healthy tissues next to tumors limits the effectiveness of radiation, lowering the energy dose that may be safely given to the patient [3]. A novel profile of material interactions with cell biology has been developed by nanotechnologies. For the local management of radiotherapy-treated solid tumors, the adoption of a novel class of radiation-enhancing nanoparticles may represent a paradigm shift. Hafnium Oxide (HfO2) that has been functionalized forms the foundation of the first-in-class nanoparticle known as NBTXR3. For clinical development, NBTXR3 nanoparticles were selected due to their superior x-ray absorption to acceptable safety ratio. In contrast to the same dose of radiation alone, intratumorally given NBTXR3 causes a cell-localized high energy deposit and enhanced cell death. This is done without endangering the surrounding tissues. By allowing physics to reach the cells' core without altering radiotherapy treatment, this

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novel approach suggests expanding the therapeutic window of radiation therapy. In 2019 NBTXR3 received a CE mark for the management of locally advanced soft tissue sarcoma, and just recently its phase 2-3 clinical study findings were released [4].

Nanomedicine can greatly aid in the fight against cancer by facilitating earlier detection and improved therapeutic outcomes. It is critical to emphasize that, even though the primary goal is to lessen or completely eradicate cancer, it is equally necessary to enhance patients' quality of life throughout treatment in order to lessen the side effects, which are frequently extremely harmful. Furthermore, nanomedicine has a great deal to offer in this area. In a new, patient-centered era, nanomedicine will open up new options to promote the development of early diagnostic tools and better treatments. The ETPN will continue to be a driving force in establishing a cross-technology environment where nanomedicine interacts with other technologies to build cross-technological, interdisciplinary medical solutions for the benefit of the patients.

References

1. Kim BY, Rutka JT, Chan WC. Nanomedicine. N Engl J Med. 2010; 363: 2434-43.

2. Anselmo AC, Mitragotri S. Nanoparticles in the clinic: an update. Bioeng Transl Med. 2019; 4: e10143.

3. Marques M, Choo Q, Ashtikar M, Rocha TC, Bremer S, Wacker M. Nanomaterials-Tiny particles and big challenges. Adv Drug Deliv Rev. 2019; 151-152: 23-43.

4. Bonvalot S, Rutkowski PL, Thariat J, Carrère S, Ducassou A, Sunyach MP, et al. NBTXR3, a first-in-class radioenhancer hafnium oxide nanoparticle, plus radiotherapy versus radiotherapy alone in patients with locally advanced soft-tissue sarcoma (Act.In.Sarc): a multicentre, phase 2-3, randomised, controlled trial. Lancet Oncol. 2019; 20: 1148-59.