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Implementation of a novel molecular trojan horse-like technology as a possible future strategy in non-viral gene therapy to combat hereditary forms of cancer

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Nano-albumin-particle-bound (nab) technology is a novel biologically interactive nanotechnology platform that was first established in 2005 for treatment of metastatic breast cancer. Potentially Albumin-bound technology is based on albumin as a safe and natural polymeric carrier conjugated with a cargo which mostly is a chemotherapeutic drug. The hydrophobic chemotherapeutic drugs are incorporated inside the core of albumin-nanoparticles which access an active receptor-specific transport pathway on the surface of tumour cells. As a result, the interaction of albumin-nanoparticles with tumour-specific receptors on the surface of the tumour cells triggers a Trojan horse-like mechanism tricking the tumour cells to act against themselves by welcoming the anticancer drug through their own gates.

The application of these so called 'molecular Trojan horses' in tumour targeting technology was first introduced to improve the pharmacokinetic behaviour of paclitaxel which is effective in treating a variety of cancers. In a phase III clinical study in Metastatic Breast Cancer patients, Abraxane (nanoparticle albumin-bound Paclitaxel) displayed a significantly improved safety profile and enhanced efficacy compared to paclitaxel alone.

Considering the robust nature of nano-albumin-particles, I am developing a modified-Nab technology platform using albumin nanoparticles as a non-viral gene therapy agent for the treatment of cancer. This technology relies on the Trojan horse-like mechanism of albumin for delivering a copy of specific gene/s into their intended site of action inside the tumour cells. Therefore, nab-technology can potentially represent an effective milestone in the future application of nanomedecine in cancer therapy by replacing a dysfunctional copy of a specific gene with a therapeutic copy of it inside the human genome to combat cancer in its origin.

Biography

Elham Noorian is a 28 years old researcher in nanomedicine. In 2008, she graduated from Tarbiat Modares University with a Master by Research degree in Medical Genetics. She is currently researching on novel therapeutic targets for the treatment of cancer using integrative approaches in gene delivery systems. She hopes to implement her ideas from bench to bed for finding a possible cure for hereditary forms of cancer. Since 2008, she has been awarded several prestigious international fellowships for her multi-disciplinary-based research in genetics and nanomedicine. She is currently a researcher at UNSW and a part-time medical laboratory scientist at Infodoc Company (R&D sector), in Sydney, Australia.

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