Recent expansions in cancer nanotherapeutics

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Abstract: Cancer incidence and mortality are rapidly growing worldwide. According to statistics from GLOBOCAN 2018, 18.1 million new cancer cases (17.0 million excluding non-melanoma skin cancer) and 9.6 million cancer deaths (9.5 million excluding non-melanoma skin cancers) were estimated in 2018. Over the past few decades, research expansions in chemotherapy have upgraded the patient survival rate but there is still a need for improvement. Advancement in cancer nanotherapeutics has overcome several limitations of conventional drug delivery systems such as non-specific and non-targeted biodistribution, poor aqueous solubility, oral bioavailability and therapeutic indices [1]. Nanoparticles have been designed for optimal size and surface characteristics to increase their circulation time in the bloodstream, thereby improving the biodistribution of anti-cancer drugs. They are also able to carry their loaded active drugs to cancer cells by selectively using the unique pathophysiology of tumours, such as their enhanced permeability and retention effect and the tumour microenvironment. This review aims to analyze the evolution in research of nanoparticles that are lipid based (liposomes), polymer-based (micelles or dendrimers), viruses (viral nanoparticles), surfactant-based (snedds) and organometallic compounds (nanotubes and nanofibres) carriers for anti-cancer drug delivery [2]. Recent approaches have been pondered in cancer nanotherapy like nano-immunotherapy for stimulation of patient's immune system; nanosysytems for delivering siRNA; in photodynamic, magnetic and thermal therapy in cancer management.

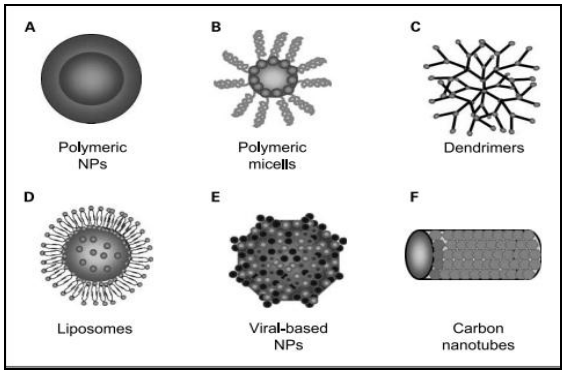

Figure 1: Types of nanocarriers for drug delivery.

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[1] Bertrand, N. Cancer nanotechnology: the impact of passive and active targeting in the era of modern cancer biology. Adv. Drug. Deliv. Rev. 2014; 66, 2-25.

[2] Cho, K., Wang, X., Nie, S. Therapeutic Nanoparticles for Drug Delivery in Cancer. Clin. Cancer Res. 2008;14(5) , 1310-1317.

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