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Need for novel drug delivery system in advanced cancer condition

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Cancer is a major public health concern throughout the world and it is estimated that by 2040 the number of new cases per year could rise to 29.5 million. Despite significant early diagnosis and treatment progress, successful remedies are alarmingly insignificant. Over 100 different cancer types exist, along with a daily increase in the number of patients affected. Therefore, we must constantly look for reliable treatment options to deal with this. Although conventional chemotherapy is beneficial, novel targeted drug delivery systems have shown to improve clinical outcomes in patients. Conventional formulations, such as tablets, capsules and injectables involve problems such as severe toxic side effects on healthy organs, clinical administration difficulties, drug resistance and limited drug tumour coverage. These limitations require a focus on controlled drug delivery systems to target cancer cells. Novel drug delivery systems for cancer therapy permit controlled medicines, sustain therapeutic activity and target the malignant tissue to produce a better therapeutic effect with minimal side effects. In order for cancer therapy to be effective, new strategies for the efficient supply of chemotherapy to cancer cells need to be improved and developed. Conventional chemotherapy agents accumulate because of non-specificity in both normal and tumour cells. Cancer therapy aims ultimately at reducing systemic toxicity and improving the quality of life. Over the last four decades, the cancer treatment landscape has improved considerably. Embolism, non-specificity and medication-induced toxicity can be related to direct drug administration. Hence, in order to resolve biological barriers, protein binding, and first-pass metabolism in cancer cells, an orally administered drug regime is often needed to achieve therapeutic doses. When cancer is benign, direct drug administration may be successful in the tumour setting. However, as cancers grow and spread, the forecast is entirely different. Tumour cells infiltrate other tissues by modifying the phenotype under those situations (metastasis). In comparison to normal cells, there are metabolising enzymes that express efflux pumps, namely P-glycoprotein (P-gp), multidrug-resistant proteins (MRP) and breast cancer resistant protein (BCRP). Such overexpression helps to withstand tumour cells and creates xenobiotic resistance (anticancer agents). For example, glioblastoma multiforme (GBM) is one of the metastatic diseases that so far has been very difficult to treat. It is highly difficult to supply metastatic cancer cells with anti-cancer agents at therapeutic stages. Hence, the targeted delivery of medicinal products will mitigate the metastatic tumour and limit the toxicity target. Therefore, the over-expression of carriers and receptors to cancer cell plasma membranes can be utilised in the delivery of targeted medication and improve the approach towards cancer treatment.

Keywords: Cancer cells, Chemotherapeutics, Novel drug delivery, Targeted cancer therapy

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