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Novel Target Drug Delivery System - A Review

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ABSTRACT :

Novel Drug Delivery System can be a major advance for solving the problems related towards the release of the drug at specific sites with specific rates. The need for delivering drugs to patients efficiently and with fewer side effects has prompted pharmaceutical companies to engage in the development of new drug delivery system Available existing drug molecules from a conventional to novel drug delivery system which improves patient compliance , safety and efficiency .They have many advantages which give solution to a problem to the release of drug at specific site. Which is an ideal drug delivery which Cross blood Brain. These include medical application of nanotechnology polymer drug conjugates , liposomes , dendrimer & Agent that coupled with targeting Ligands that recognise antigens . Novel Drug Delivery Systems are advanced in solving the problems towards the release of the drug at specific sites with specific rates. delivering the drugs to patients efficiently with less side effects . Many prompted pharmaceutical companies in the development of new drug delivery systems at a stubborn site . To minimize drug degradation and to prevent harmful

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side-effects . Increase drug bioavailability and the fraction of the drug in the required zone and drug targeting systems .

Key words : dosage forms ; novel delivery system ; nano drug delivery system ; nanotechnology ; targeted drug delivery .

INTRODUCTION:

Novel target drug delivery is the method where a drug is delivered which has a significant effect on its efficacy , which is needed for a delivery therapeutics to target in the tissue . Advantage of derived and concentration above or below range can be toxic or produce no therapeutic effect (Singh, Singh and Panwar, 2019)The cell viability and IC50 was calculated from the cytotoxicity. The morphology of the Caralluma treated cells, control, and positive control were observed under reverse phase inverted microscopes (Rahimpour and Hamishehkar, 2012)that have controlling pharmacokinetics, pharmacodynamics, non toxicity , efficacy of drug . Which is drug had drug target interaction which delivered to the site interaction which delivered to the site of action and that cause maximum adverse effect (Kapil, Aggarwal and Harikumar, 2014) target is the ability to direct the drug loaded system to the site passive targeting and active targeting (Ashwini, Ezhilarasan and Anitha, 2017) passive targeting chemotherapeutic agents in Tumors increase vascular permeability of tumour tissue . Active targeting have carbohydrates target , receptor target , antibody targeted (Olin and Wechsler, 2014; Khan, 2017) Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Ariga *et al.*, 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah *et al.*, 2018; Hussainy *et al.*, 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon, Ks, R, *et al.*, 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravinthar and Jayalakshmi, 2018; Seppan *et al.*, 2018; Teja, Ramesh and Priya, 2018; Duraisamy *et al.*, 2019; Gheena and Ezhilarasan, 2019a; Hema Shree *et al.*, 2019; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019; Sekar *et al.*, 2019; Sharma *et al.*, 2019a; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Johnson *et al.*, 2020; Jose, Ajitha and Subbaiyan, 2020).

Drug release and biodegradation:

Desorption of adsorbed drugs , diffusion through carrier matrix , erosion, combined erosion , diffusion process . Drug delivery carriers.New drugs are needed because those that are currently available cannot control symptoms and hinder in the patients and can cause adverse reactions . Colloidal drug delivery carries micellar solution , liquid crystal dispersion , consistency of small particle of 10-400m diameter .long release of drug , long shelf life and low toxicity (Khan, 2017)

Micelles:

They are formed by shelf assembly of amphiphilic block copolymers of great application . They are attractive for drug delivery application where molecular weight and block length ratio easily changed

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Liposomes:
They are phospholipid layers of the liposomal core enabling polar drug molecules to be encapsulated.channel proteins are highly effective and Protected from enzymes . Drug diffuse through the channel by driven concentration (Sun *et al.*, 2014)

TUMOR PROTEASE TRIGGERED CHARGE REVERSAL NANOPARTICLES

Extracellular protease , matrix metalloproteinases regulate biochemical factors in the micro environment during tumor progression . Protease mediates various physiological processes and signaling pathways . Communication between cells and extracellular environment (Sharma *et al.*, 2019b)

Nanoparticles passive targeting and active targeting

Nanoparticles passive targeting of the site of action and .nano-carrier-loaded therapeutic drug delivery methods have shown promising potential in treating lung cancer as its target is to control the growth of tumor cells. In this review, various modes of nano drug delivery options like liposomes, dendrimers, quantum dots, carbon nanotubes and metallic nanoparticles have been discussed .(Öztürk-Atar, Eroğlu and Çalış, 2018)Disease cells have specific markers and are not expressed by healthy cells .targeting specific molecule bonded to that receptors - like folate . Have possible exploiting process And conjugate antibodies to the surface nanoparticles on active targeting CA-125 expressed 85% ovarian cancer are nano biomarkers of active targeting (Bansal and Jamil, 2018)

Drug designing and delivery process

Nano medicine and their advancement of drug design and delivery increases drug specificity and diagnostic accuracy .Interactions of nano carriers with biological system and active organisms designed a crosslinkable lipid shell docetaxel and wormanin prototypical drug controlling kinetics diffusion , solvent Chemical release of drug in nano carriers (Patra *et al.*, 2018) and it should be non toxic and non immunogenic minimal drug leakage drug not affect the drug action both physically and chemically invitro and invivo(Chen, Liu and Jiang, 2016),drug administration protocols simplified .drug quantity reduced affordable therapy . Drug concentration increased at the required site (Roy *et al.*, 2017)

Organ based targeted drug delivery

Accumulation of drug at the target tissue to targeted drug delivery.proposed drug coated nanoparticles and release of drug into the cells and mechanism of the drug . Delivers to specific sites require a unique delivery system on route Folate targeting receptors overexpressed in various tumors which bind vitamin folate and folate drug for malignant disorder 1)binding affinity acid therapeutic strategy 2)high affinity even after binding likewise . It had antibody targeting glycoprotein targeting , oligonucleotide membrane protein targeting (Tiwari *et al.*, 2012)

FUTURE SCOPE AND CHALLENGES

Smart drug targeted delivery system optimal therapeutic malignant and other disease divers drug to the exact targeted tumor site in the right dosage required risk in alterations which influences and modify and test success of methodologies(Dhanasekaran and Chopra,

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2016).Technology in drug delivery with technological improvements in medicine , elucidate molecular and cellular mechanism underlying disease (Kaur and Kumar, 2019)

Nanosponges:
Material of microscopic particle with few nanometers wide cavities , large substances can be encapsulated both lipophilic and hydrophilic improves solubility encapsulating nano particle , complexing nano particle and conjugating nano particle Liposomes from of vesicles within hydrophobic domain have selective filter passive diffusion of small solutes ions , nutrients and anti biotic stocks (Yan and Li, 2016)

Erythrocytes
they are natural and biodegradable in nature , entrapment of drug not needed chemicals modification incorporation of protein and nucleic acid eukaryotic cell by cell infusions RBC and targeted within reticuloendothelial system (Kumar *et al.*, 2017)

Transdermal drug delivery
self contained , direct dosage they are consistent and safe avoid first pass metabolism , gastrointestinal incompatibility and self administration improving physiological and pathological response (Jahangirian *et al.*, 2017)

Market opportunities:
The global market drug delivery system reached 50.9billiom dollars in 2009 and estimated an increase of CAGR 7.5% in the 5th year period and 45.8 billion dollar . Which is 2nd largest market share (Mulla *et al.*, 2017)

Other drug treatments and their uses in other causes
Diabetes mellitus necessitates the need to develop new drugs for its effective management (Anitha and Ashwini, 2017)surgery, ra- diofrequency ablation, cryosurgery, chemotherapy, radiotherapy, targeted therapy with monoclonal an- tibodies, angiogenesis inhibitors (Ashwini, Ezhilarasan and Anitha, 2017) anti-diabetic, anti-oxidant, astringent, anti-viral, cytotoxic, and anti-inflammatory activity (Lakshmi *et al.*, 2015) focuses primarily on reducing toxicity and improving the bioavailability of anticancer drugs to the target tumor cells (Sharma *et al.*, 2019b) Previous studies have reported the anticancer Efficacy against several human in vitro cancer cell lines (Ezhilarasan, Lakshmi, Vijayaragavan, *et al.*, 2017)biscoumarin (SSBC) to induce apoptosis and inhibit cancer proliferation using in silico and in vitro approaches (Perumalsamy *et al.*, 2018)Nanoparticles play an important role in the target-specific delivery of drugs (Mehta *et al.*, 2019) treatment also caused significant downregulation of Bcl-2 gene expression (Ezhilarasan, Lakshmi, Nagaich, *et al.*, 2017) reactive intermediates are said to induce profibrogenic cytokines, several inflammatory markers, collagen synthesis during the progression of hepatic fibrosis (Ezhilarasan, 2018) proapoptotic agents and senescence inducers with the high affinity toward the activated HSCs may be the novel therapeutic strategy for the treatment of hepatic fibrosis in the near future (Ezhilarasan, Sokal and Najimi, 2018)Syringic acid (SA) has been studied for its hepatoprotective, anti-inflammatory, immunomodulatory, free radical scavenging, and antioxidant activities.(Gheena and Ezhilarasan, 2019b) Selenium nanoparticles have at present picked up a vital prospect in the field of medicine, due to their inquisitive properties when compared to other selenium

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compounds. They are comparatively better as anticancer, non- toxic, and biocompatible operators than selenite (Menon, Ks, Santhiya, *et al.*, 2018)M. indicia -mediated synthesis of ZnO NPs as antioxidant and, anticancer agents for the treatment of lung cancer and subsequent therapeutic applications.(Rajeshkumar, Kumar, *et al.*, 2018) Antibacterial properties of nanoparticles were evaluated against Escherichia coli, Bacillus subtilis, Staphylococcus aureus, Bacillus cereus and Klebsiella pneumoniae, using agar well diffusion method antibacterial activity of (Karthiga, Rajeshkumar and Annadurai, 2018)zinc oxide nanoparticles was determined by agar well diffusion method against Gram-positive and Gram-negative bacteria.(Rajeshkumar, Agarwal, *et al.*, 2018).Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

CONCLUSIONS

Novel target drug delivery systems have the ability to switch the surface change one to avoid nonspecific absorption and enhance tumor target delivery . They provide a greater avenue to treat cancer in future and to have reduced side effects of drugs advantageous medicinal performance of each drug Carrier at targeted site of action and overcome many challenges in drug findings and give opportunity to scientists for formulation and development of the novel targets for drug delivery mechanisms.

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