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Improvements in the Drug Delivery System

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INTRODUCTION

Recasting of an existing drug molecule from a regular form to the novel delivery system can remarkably improve its performance in terms of conformity of patient's medication, safety and efficacy. Now a day, the technology has greatly engaged in the development of multiple platforms to get competitive and to extend patient life and to get profits in their market share of the products.

Rebuilding of new molecular drugs is very expensive and time consuming. By utilizing old existing drugs in order to improve the safety efficacy ratio have been attempted by using methods include drug therapy, dose titration, thereuptic drug monitoring. Controlled and slow release of the drug molecules at the targeted site are the other attractive sources that have been using vigorously for the development of various drugs. Numerous invitro and in vivo studies have provided a progressive understanding of the pharmacokinetic and pharmacodynamics principles that govern the action and disposition of potent opioid analgesics, inhalation anesthetic agents, sedative/hypnotics, and muscle relaxants [1-3].

Increase in research and development costs, alternative investment opportunities for drug firms, fewer firms for conducting pharmaceutical research, and erosion of effective patent life have resulted in a decline in the introduction of new chemical entities since the late 1950s. Developing a new drug through discovery, clinical testing and regulatory approval is currently estimated to take a decade and cost well over $ 120 million. Novel drug delivery systems may account for as much as 40% of US marketed drug products by 2000 [4-6].

Research in controlled drug release for cancer treatment has progressed [7-14]. Release of drug within a thereuptic dose to the specific targeted location in a controlled manner within a specific time increase drug efficacy and minimize side effects. Many modifications were devised in order to reach the trigger site of targeted delivery by changes in their physical and chemical changes, temperature, enzymatic conditions, ph by constructing platforms of controlled release is achieved by development of stimulus-sensitive drug carrier which are prepared by complex polymer ,liposomes, or a inorganic

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nanoparticles [9-16]. By combining drug molecules with the carriers improves the drug delivery to the targeted site [15-24]. It can be stimulated by itself or by external stimuli like electrical or magnetic field.

Progressive efforts are made currently in the areas of delivery of drugs which includes;

1) Targeted delivery - delivery of the drugs at the active site of the target region of the body.

2) Sustained release formulations: drug is released from formulation over certain of time in a controlled manner.

a) Liposomes

b) Microspheres - drug loaded biodegradable

c) Drug polymer conjugates

Drug delivery refers to a system for the transporting a pharmaceutical compound into the body in order to achieve the desired therapeutic effect. It is greatly approached through the chemical drug formulation or sometimes it involves through drug-device combination products or also by the targeted site or it might involve facilitating systemic pharmacokinetics and typically concerned with the quantity and duration of drug presence.

Modification in the drug delivery is done by the changes in the drug release profile, ADME(absorption, distribution, metabolism, elimination)studies for the benefit of improving product safety, efficacy , Purity and as well as patient convenience and compliance. Drug release is from: diffusion, degradation, swelling, and affinity-based mechanisms.

Common routes of administration mostly used are;

1) preferred non-invasive per oral (through the mouth)

2) Topical (skin)

3) Trans mucosal (nasal, buccal /sublingual, vaginal, ocular and rectal)

4) Inhalation routes and by injection or a Nano needle array

PROPERTIES OF RESPONSIVE DRUG DELIVERY DEVICE

1) Controlled release profiles for sensitive drugs

2) Long lived, biocompatible, inexpensive

3) Safe from accidental release

4) Easy to fabricate and sterilize

5) High drug loading

6) Inert, mechanically strong

7) Easy to implant and remove-patient compliance

Future research carried out by Scientists study how diseases develop and progress in the body; they are also learning more about the different ways of our bodies respond to illness and the influence of specific environmental or genetic cues which are coupled with advances in technology, this increased understanding suggests new approaches for drug delivery research. Key areas for future research include:

1) Crossing the Blood - Brain Barrier (BBB) in Brain Diseases and Disorders

2) Enhancing Targeted Intracellular Delivery

3) Combining Diagnosis and Treatment

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