Nanocarriers: Types and Uses

Susobhan dai*

Department of Electronics and Nanoengineering, Aalto University, Espoo 02150, Finland

Editorial

Received: 05/10/2021
Accepted: 20/10/2021
Published: 27/10/2021

***For Correspondence:**

Susobhan dai ,
Department of Electronics and Nanoengineering, Aalto University, Espoo 02150, Finland

E-mail: daisu@au.com

DESCRIPTION

A nanocarrier is nanomaterial getting used as a transport module for a further substance, sort of a drug. Mostly used nanocarriers include micelles, polymers, carbon-based materials, liposomes etc.,

Nanocarriers diameter size ranges from 1–1000 nm, however due to the width of microcapillaries being 200 nm, nanomedicine often refers to devices but 200 nm. Because of their very small size, nanocarriers are able to deliver drugs to otherwise inaccessible sites round the body. Since nanocarriers are so small, it's oftentimes difficult to provide large drug doses using them. The emulsion techniques are used to make nanocarriers also often end in low drug loading and drug encapsulation, providing an issue for the clinical use.

TYPES OF NANOCARRIERS

Liposome

Liposomes were the primary sort of nanocarriers, and are around 80–300 nm in size. They are spherical and contain phospholipids and steroids. They can be prepared instantly by dispersing lipids in aqueous media.

Polymeric nanoparticles

They are derivatives of synthetic polymers and ranges from 10–100 nm. They are sub-divided in to biodegradable and non-biodegradable.

Dendrimer nanocarriers

Dendrimer nanocarriers possess features like: core, dendrons (dendrimers), and surface active groups. The properties of the nanocarriers are determined by the variety of surface active groups.

Silica materials

Silica materials which are used as nanocarriers include xerogels and mesoporous silica nanoparticles. MCM-41 is a well-known silica nanomaterial. Drug loading in these materials occurs by adsorption, hence the drug release is governed by diffusion.

Carbon nanomaterials

Carbon nanomaterials include nanotubes and nanohorns. They can be prepared by single nanotubes rolled in to a sheet or by multiple nanotubes arranged concentrically.

USES

Nanocarriers augment the therapeutic outcomes by protecting them from degradation in unfavourable biological environments, enhancing their half-life and retention time in blood, facilitating absorption through epithelium, providing control over release of drug and site-targeted drug delivery, and improve its access to intracellular targets.

Nanocarriers are often fabricated using organic or inorganic materials, and their physicochemical and biological properties like particle size, shape, porosity, charge, and surface chemistry might be tuned.

The composition, physical properties, and functionalization of nanocarriers dictate their biological behavior and therapeutic efficiency of the drug

The particle size, area, and charge of nanoparticles are related to solubility, stability, oral absorption, and their ability to succeed in the target site

Surface modification of nanocarriers with hydrophilic polymers (e.g., polyethylene glycol (PEG)) prolongs their circulation

Similarly, functionalization of nanocarriers with targeting ligand like antibody and peptide enhances their selectivity to a selected target including the brain and tumor.

Mostly research on nanocarriers is being applied to their effective use in drug delivery, especially in chemotherapy. Since nanocarriers are often specifically used to target the tiny pores, lower pH's, and better temperatures of tumours, they need the potential to lower the toxicity of the many chemotherapy drugs. Also, since almost 75% of anticancer drugs are hydrophobic, and thus demonstrate difficulty in delivery inside human cells, the use of micelles to stabilize, and effectively mask the hydrophobic nature of hydrophobic drugs provides novel possibilities for hydrophobic anti-cancer drugs.

Advantages of nanocarriers over conventional drug delivery

Nanocarriers offer several advantages over free drugs. They help in improving drug efficacy through encapsulation of hydrophobic drugs within the nanocarriers. They have the power to guard the drug from premature degradation, inhibit premature interaction of drug with the biological environment, improve cellular penetration, control pharmacokinetic and drug tissue distribution profile, and enhance absorption of drug during a given tissue (for instance tumor).