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Nanocarriers and their Characterization in Targeted Drug Delivery Systems

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Opinion Article

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DESCRIPTION

A nanocarrier is a nanoparticle that is used to transport products, such as a drug, micelles, polymers, carbon-based materials, liposomes, and other compounds. Nanocarriers are now being researched for their use in medication delivery and their particular properties suggest that they could be used in chemotherapy.

Nanocarriers range in diameter from 1-1000 nm, but because microcapillaries are 200 nm wide, nanomedicine frequently refers to devices with a diameter of 200 nm. Nanocarriers due to their small size can deliver medications to previously unreachable locations throughout the body. Because nanocarriers are so small, it can be challenging to deliver significant pharmacological doses using them. The emulsion procedures used to create nanocarriers frequently result in low drug loading and drug encapsulation making clinical usage problematic.

Polymer conjugates, polymeric nanoparticles, lipid-based carriers, dendrimers, carbon nanotubes and gold nanoparticles have all been discovered as nanocarriers. Liposomes and micelles are both lipid-based carriers. Gold nanoshells and nanocages are examples of gold nanoparticles. The utilization of nanostructured materials in nanocarriers permits hydrophobic and hydrophilic medications to be transported throughout the body. Because the human body is mainly composed with water, nanocarriers have capacity to transport hydrophobic medicine effectively in humans is a significant therapeutic benefit. Depending on the orientation of the phospholipid molecules, micelles can contain either hydrophilic or hydrophobic medicines. Some nanocarriers include nanotube arrays, which allow them to hold both hydrophobic and hydrophilic medicines.

Unwanted toxicity from the sort of nanomaterial utilised is one potential issue with nanocarriers. If inorganic nanomaterials aggregate in specific cell organelles they can be harmful to the human body. New research is being

performed in order to create more effective and safer nanocarriers. Protein-based nanocarriers offer promise for therapeutic usage because they exist naturally and have lower cytotoxicity than manufactured compounds.

Nanocarriers are useful in drug delivery because they can deliver medications to specific targets permitting drugs to be given to specific organs or cells but not others. Nanocarriers show great potential for application in chemotherapy because they can help reduce the toxicity of chemotherapy on healthy, rapidly growing cells throughout the body. Because chemotherapy medications can be excessively harmful for human cells, it is critical that they are delivered to the tumour while remaining in the body. Nanocarriers can transport medications in four ways: passive targeting, active targeting, pH specificity and temperature specificity.

At certain temperatures, some nanocarriers have also been demonstrated to transport medications more effectively, because tumour temperatures are normally higher than rest of body temperatures around 80ºC this temperature gradient functions as a protection for tumor-specific site delivery.

The majority of nanocarrier research is focused on their potential utility in drug delivery, particularly chemotherapy. Nanocarriers have the potential to reduce the toxicity of many chemotherapy medications because they can be used to selectively target the small pores, lower pH levels, and higher temperatures of malignancies. Because nearly 75% of anticancer medications are hydrophobic and hence difficult to deliver inside human cells, using micelles to stabilise and removing the hydrophobic property of medications successfully raises the potential for hydrophobic anticancer drugs.