

A Systemic Review on Nanoparticles

Damini Mishra⁴, Mohammad Gayoor khan¹, Umama Yezdani^{2*}, Shalini Jaswal³, Vinesha Ravi⁵, Shivam Choudghal⁶, D Mukilan⁵

¹Department of Pharmacy, Truba Institute of Pharmacy, Bhopal Madhya Pradesh India

²Department of Pharmacy Practice, MRM College of Pharmacy, Hyderabad Telangana, India

³Department of Pharmaceutical Chemistry, ISF College of Pharmacy, Punjab India

⁴Department of Pharmaceutics, Rameshwaram Institute of Technology and Management, Uttar Pradesh India

⁴Department of Pharmacy Practice, Vels Institute Chennai, Tamilnadu India

⁵Department of Pharmaceutical Chemistry, KMCH College of Pharmacy, Tamilnadu India

⁶Department of Pharmacy Practice, ISF College of Pharmacy, Punjab India

***Corresponding Author:** Umama Yezdani, Department of Pharmacy Practice, MRM College of Pharmacy, Hyderabad Telangana, India.

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Abstract

A comprehensive and authentic From the ancient time nanotechnology is widely used for various treatment like cancer based treatment and presently ndds is used for treatment of psoriasis and it play good role in healthcare field nowadays one of the focused area in nanotechnology which is nanoparticles. nanoparticles are at the forefront of the rapidly developing field of nanotechnology with several potential applications in drug delivery, clinical medicine and research as well as in other varied sciences. Due to their unique size-dependent properties, nanoparticles offer the possibility to develop new therapeutics. The ability to incorporate drugs into nanocarriers offers a new prototype in drug delivery that could be used for secondary and tertiary levels of drug targeting. Different production methods which are suitable for large scale production and applications of nanoparticles are described. Appropriate analytical techniques for characterization of nanoparticles like photon correlation spectroscopy, scanning electron microscopy, differential scanning calorimetry are highlighted.

Key words: Nanoparticles (NPs); Drug carriers; Homogenization; TEM; Nanotechnology

Introduction

The prefix nano comes from the ancient Greek vavoc through the latin names meaning very much. Nanoparticles are defined as particulate dispersion or solid particles with size range of 10-1000nm. The drug entrapped, dissolved, encapsulated or attached to nanoparticles matrix surrounding interfacial layer.

Nano Capsules: The nano capsules are the system in which the drug us confined to cavity surrounded by a unique polymer membrane.

Nanospheres: The Nano spheres are matrix system in which the drug is uniformly and physically dispersed.

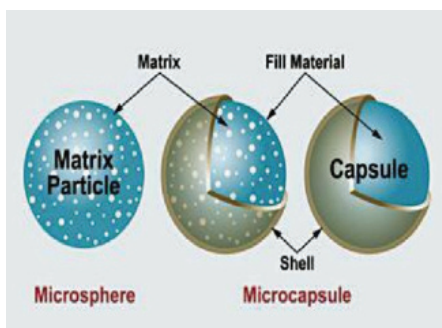


Figure 1.1: Microsphere and Microcapsule.

1.1 Ideal Properties of Nanoparticles Necessary for Drug Delivery:

1. Stable in blood
2. Biodegradable
3. Non - Immunogenic
4. Non - thrombogenic
5. Non inflammatory

1.2 Advantages of Nanoparticles

Fairly easy preparation

- Well protection in encapsulated drug
- Increased the efficiency of therapeutics.

Good control size reduction and size separation

- Longer clearance time
- Dose proportionality

Targeted drug delivery

- Increased bioavailability
- Retention of drug at the active site

1.3 Disadvantages of Nanoparticles

- Toxicity
- Cytotoxicity
- Disturbance of autonomic imbalance
- Limited targeting abilities
- Discontinuation of therapy is not possible

1.4 Nanomedicines For Drug Delivery: There are lots of medicine is available Dendrimer , Silica gold nanoshell, colloidal gold, polymer- protein Conjugate, functionalized quantum dot, single walled carbon nano tubes, PEGylated carbon tube, fullerene, nano Liposomal vesicle, solid nanoparticles, functionalized Nanoparticles,

polymeric Micelle, functionalized magnetic , polymer - antibody conjugate, functionalized nanodiamonds .

S. NO	Nanoparticles types	Material used	Application
1	Nano suspensions and nanocrystals	Drug powder is dispersed in surfactant solution	Stable system for controlled delivery of poorly soluble drug
2	Solid lipid nanoparticles	Melted liquid dispersed in aqueous surfactant	Least toxic more stable colloidal carrier system
3	Polymeric nanoparticles	Biodegradable polymer	Controlled and targeted drug delivery
4	Polymeric Micelles	Amphiphilic block copolymers	Controlled and systemic delivery of water insoluble drugs
5	Carbon nanotubes	Metals, semiconductors	Gene, DNA Delivery

Table 1: Types of Nanoparticles and its Classification, Application.

Routes

- Topical Application, Non - Biodegradable implants, injectable nano rod, biodegradable implants.
- Functionalized nanoparticles pulmonary delivery.
- Permeation enhanced nanoparticles loaded delivery.
- Growth factor delivery [Future technology]
- Functionalized nanoparticles oral smart drug delivery.

Polymer: Polymer of drug delivery system play great role in the advancement of drug delivery controlled therapeutic agent for longer time cyclic dosage both hydrophilic and hydrophobic drugs.

Polymer used in Preparation:

Natural Hydrophilic

- Proteins
- Polysaccharides

Synthetic Hydrophobic

- Pre- Polymerized
- Polymerized in Process

Natural Hydrophilic Polymer

Protein Polysaccharides

1. Gelatin Alginates
2. Albumin Dextran
3. Lectins Chitosan
4. Legumin Agarose
5. Vicilin Pullulun

Materials and Methods or Experimental Procedures

Techniques of Preparation

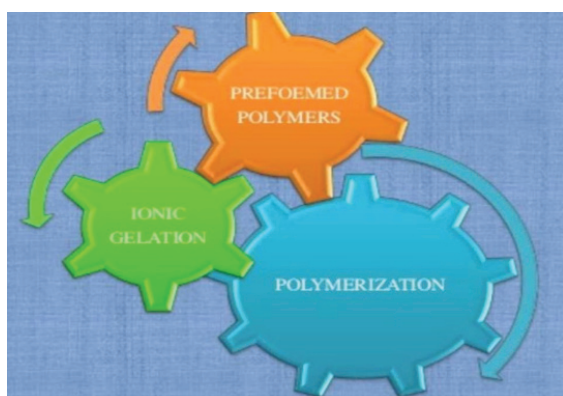


Figure 1.2: Techniques of Preparation.

These techniques is using for preparation of nanoparticles preformed polymers, ionic gelation, Polymerization.

Evaluation Parameters of Nanoparticles

1. YIELD OF NANOPARTICLES
2. DRUG CONTENT / SURFACE ENTRAPMENT/ DRUG ENTRAPMENT
3. PARTICLE SIZE - Particle size and its distribution is important characteristics in nanoparticles as they plays major role in distribution, pharmacological activity, toxicity and targeting the specific sites
4. PARTICLE SHAPE - Particle shape of the nano suspensions is determined by scanning electron microscopy SEM.
5. ZETA POTENTIAL - Zeta potential is the potential difference existing between the surface of solid particle immersed in conducting liquid and the bulk of the liquid.

Conclusion

The main goal of this review was to describe the different preparation technique available for productive of polymeric nanoparticles and drug will be loaded nanosphere can be produced by simple,

safe reproducible technique available. On technique is not sufficient for all drugs, post preparative steps, such as preservation all these challenges in term of technology, nanoparticles have been showed great promise for the development

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