

Nanocarrier Mediated Cancer Therapy Polymer Nanoparticle.

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Submitted: 20-09-2022

Accepted: 30-09-2022

ABSTRACT:

A targeted delivery system based on the polymeric nanoparticles as a drug carrier represent a marvelous avenue for cancer therapy. The nano medicines can target cancer cell directly, target the blood vessels that supply the nutrients & oxygen that support tumor growth and target immune cells to promote anticancer immunotherapy. Numerous scientific research works have been performed to test the use of magnetic nanoparticles in the treatment of carcinogenic brain tumor cells and breast cancer cell.

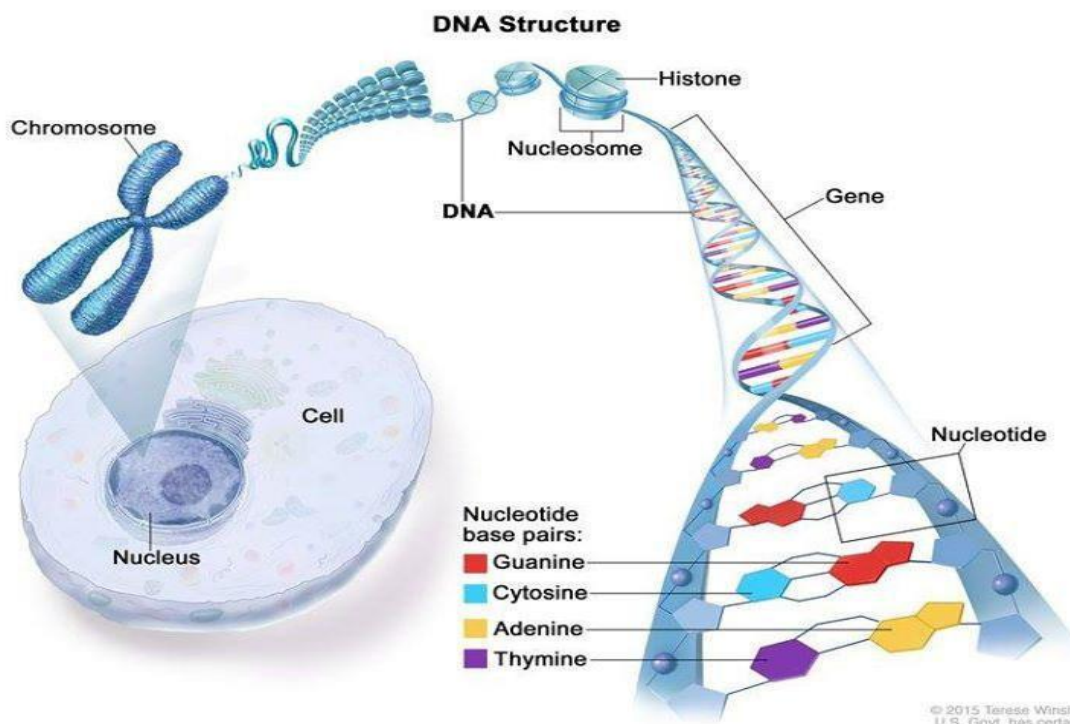
The pivotal characteristic of this system include biodegradability, biocompatibility, non-toxicity, prolonged circulation and a wide payload spectrum

of a therapeutic agent. A variety of nanoparticles of different structural and chemical formulations have been tested for their target specificity and as drug carrier system. Polymer nanoparticles have tremendous potential to improve the efficacy of therapeutic cancer treatments by facilitating targeted delivery to a desired site.

Keywords: Polymer nanoparticles

I. INTRODUCTION:

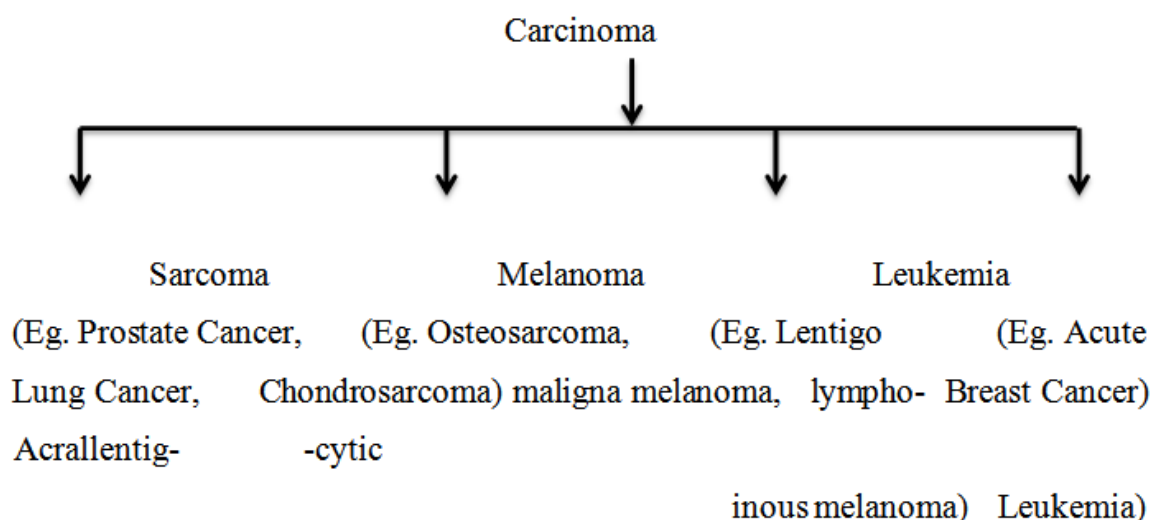
Cancer: Cancer is a disease in which some of the body's cell grow uncontrollably and spread to other parts of the body. [1] **How does cancer develop:**



Cancer is caused by certain changes to genes, the basic physical units of inheritance genes are arranged in long strands of tightly packed DNA called chromosomes. [1]

Type of Cancer

There are various type of cancer.
Cancer [2]

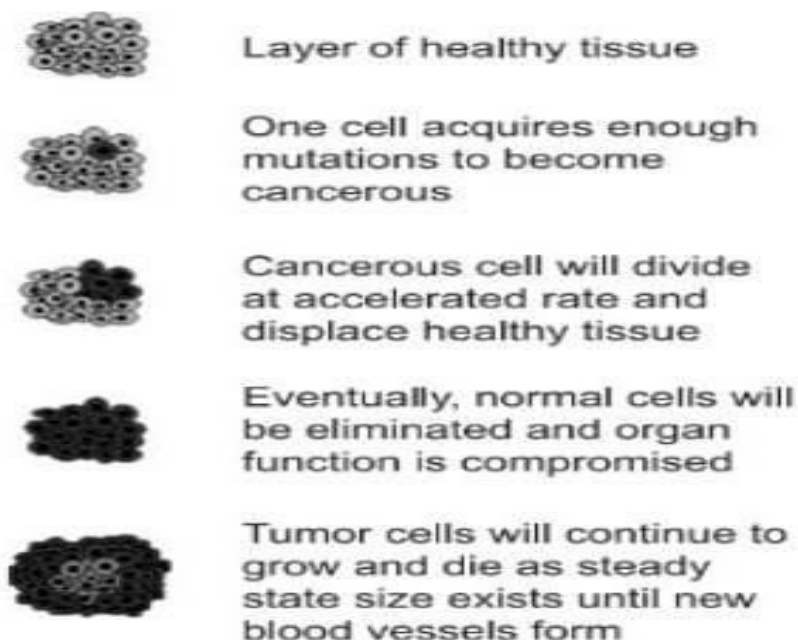


Growth of tumors:

- A single cancerous cell surrounded by healthy tissue will replicate at a rate higher than the other cell. Placing & strain on nutrient supply and elimination of metabolic waste products.
- Once a small tumor mass has formed the healthy tissue will not be able to compete with the cancer cell for the inadequate supply of nutrients from the blood stream.

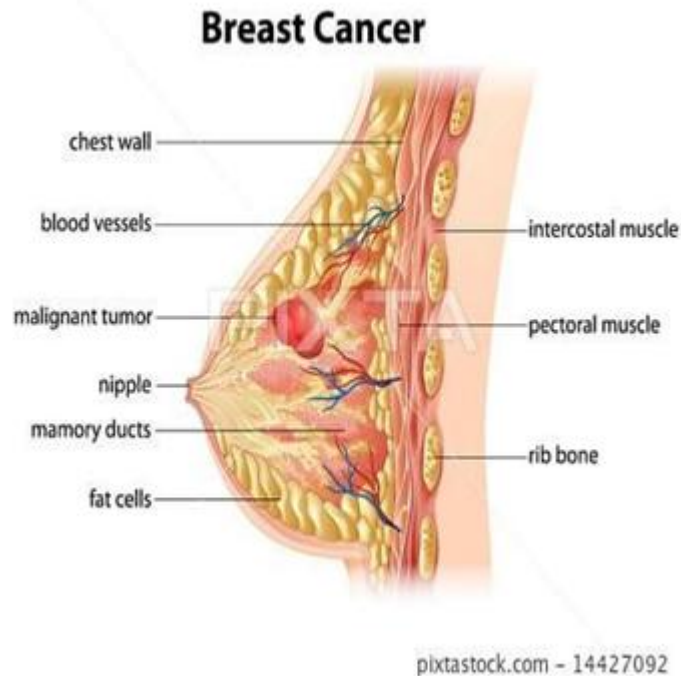
- Tumor cell will displace healthy cell until the tumor reaches a diffusion – limited maximal size.
- Tumor cell will therefore continue dividing because they do so without regard to nutrient supply but also many tumor cells will perish because the amount of nutrients is insufficient. [9]

In essence a steady state. [9]



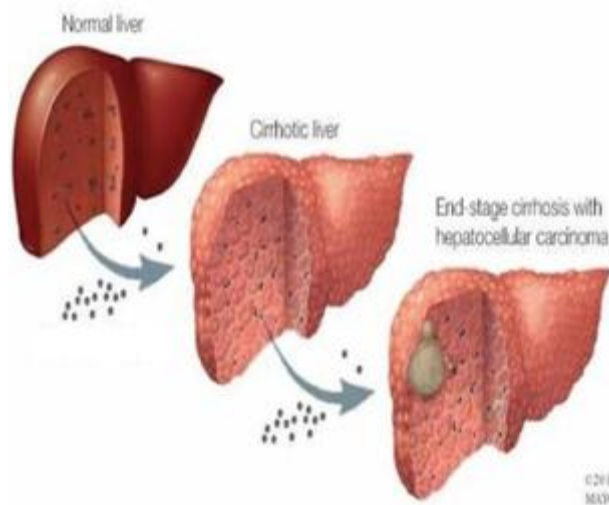
Breast cancer happens when cells in your breast grow and divide in an uncontrolled way, creating a mass of tissue called a tumor. Signs of breast cancer can include feeling a lump in your

breast, experiencing a change in the size of your breast and seeing changes to the skin on your breasts. [10]



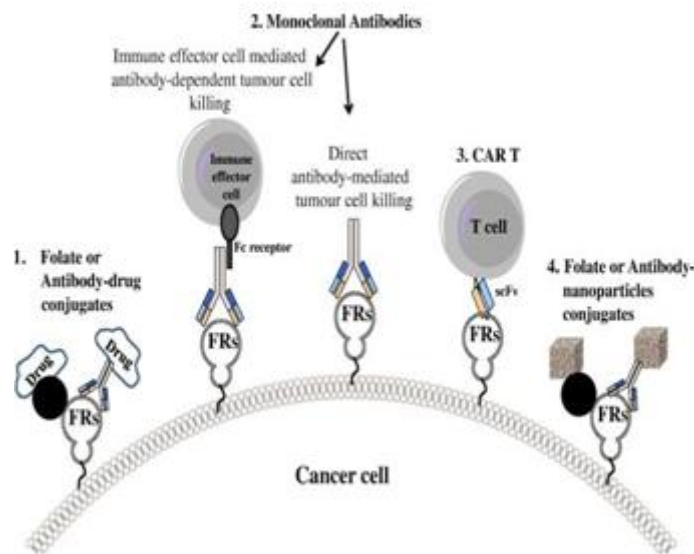
2. Liver

The liver does many important things including makes bile. Which helps carry away waste and break down fast in the small intestine during digestion. [11]



3. Folate receptors. [7]

Folate receptors are frequently overexpressed in a number of human malignancies including cancers of the ovary, lung, endometrium, kidney, breast, bladder and brain. [12]



Polymer Nanoparticles:

- ❖ Particles within the size range from 1 to 1000 nm & can be loaded with active compounds entrapped within or surface-adsorbed onto the polymeric core.
- ❖ The terms “nanoparticle” stands for both nanocapsules and nanospheres. Which are distinguished by the morphological structure. [2]

What are polymer nanoparticles used for

Due to the extremely small size high volume – surface. Area ratio, tunable pore. Polymer nanoparticles have been used for various application in different fields. For example in drug delivery, biosensors, stimuli responsive cargo

delivery, nanocomposites, agricultural and environmental applications.

Advantage of polymeric nanoparticle

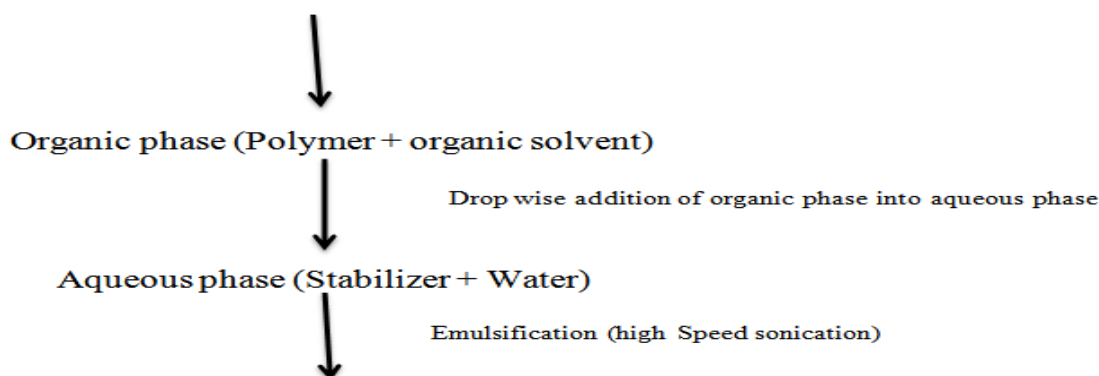
1. Provide controlled release to the desired site.
2. Proved stability to labile molecules (eg. proteins)
3. Provide ability to modify surfaces with ligands for stealth and targeted drug delivery purpose. [5]

Disadvantage of polymer nanoparticle

1. It is toxic degradation.
2. It is toxic monomers aggregation.
3. It is residual material associated with tem.
4. It is toxic degradation process. [5]

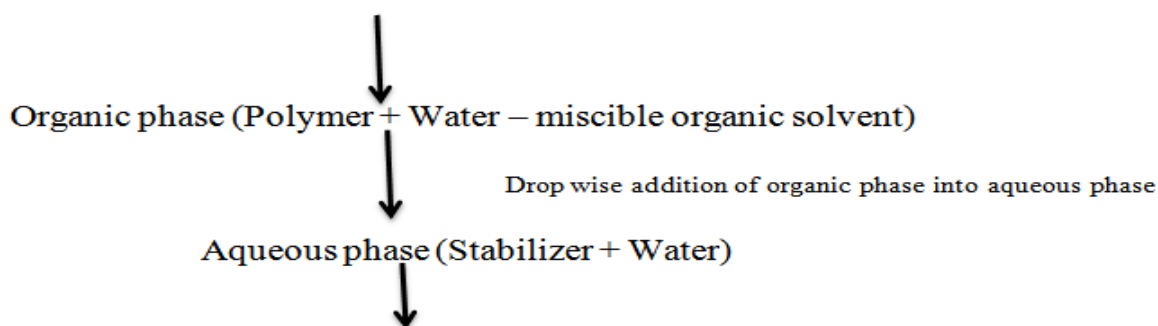
Approaches used for synthesis of Polymeric Nanoparticles. (PNPs)

1. Emulsification and solvent evaporation/extraction



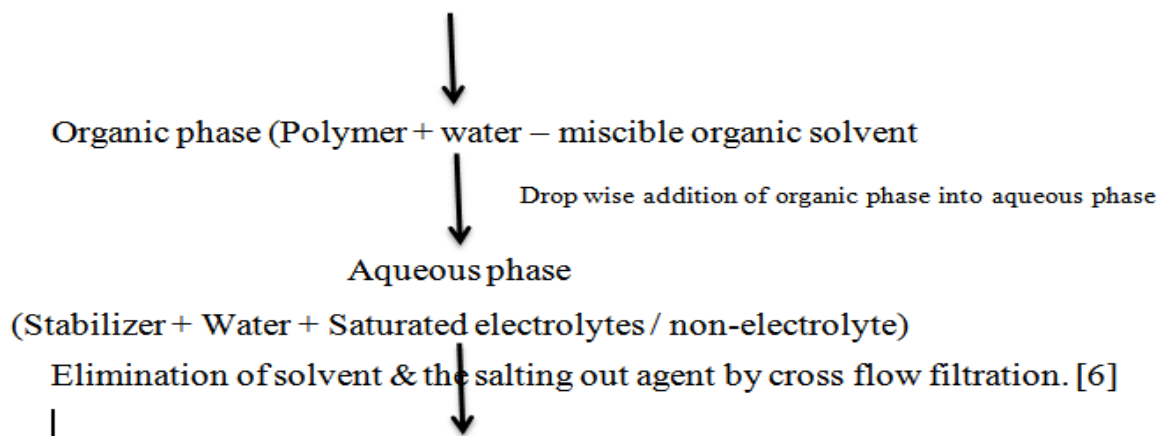
Stirring at room temperature. [6]

2. Nanoprecipitation

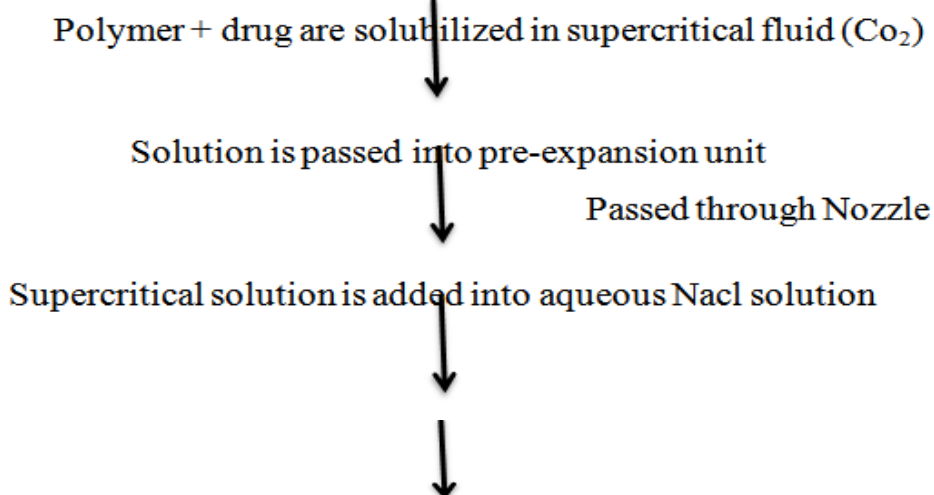


Stirring at room temperature [6]

3. Salting out



4. Supercritical anti-solvent system



Evaporation of supercritical fluid leads to precipitation of solute particle. [6]

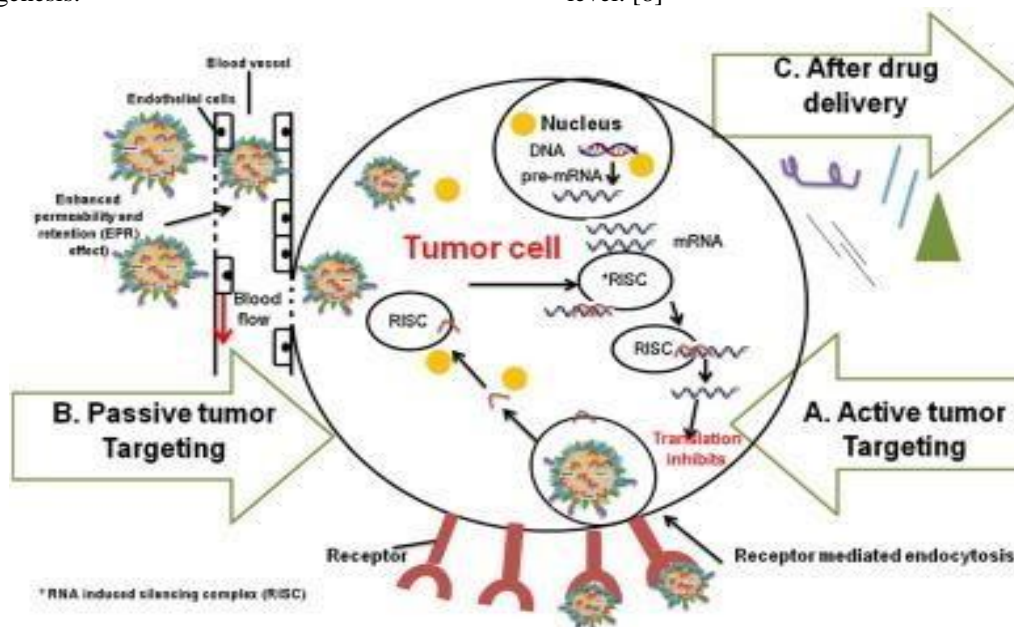
Nanoparticle in Cancer treatment:

-Nanoparticle are currently studied for their use in detection of cancer at its earlier stage and in target anti-cancer drug delivery of the above mentioned drug.

-The critical step in cancer treatment is the detection of cancer at its initial stage of carcinogenesis.

-Result of neomorts researches done in nanotechnology are inspiring the scientific community to discover new innovative non-innovative tools at the nanoscale level for such purposes.

-Nanoscale cantilevers and quantum dots are being studied as a cancer detection tolls at the cellular level. [8]



II. CONCLUSION:

- Discussed in this review are the research works done in the past decade in targeting novel nanoparticles towards the treatment of cancer
- A few of these innovative treatment techniques have made their way's into clinical trials
- The research studies in nanotechnology will definitely P ave the way for early detection & prevention of cancer therapy improving the life and quality of cancer patient.

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