



## USE OF NANOTECHNOLOGY IN PHARMACEUTICAL INDUSTRY

D. Sripriya, PhD Scholar, JTT University, Rajasthan

“Nanotechnology in medicine which is going to have an impact on the survival rate of human race” ( Beanard Marcus)

### INTRODUCTION

This Nanotechnology is a revolutionizing drug delivery, which will have a high impact on the health care. One will need to know about the metabolism of drug and nano medicine pharmacokinetics to achieve suitable therapeutic dosing.

### NANOTECHNOLOGY

It is a technology that deals with dimensions and tolerances at molecular scale.

### NANOMEDICINE

Nano medicine is a function of nanotechnology which is used to prevent and cure the diseases in a human body at molecular level by using the engineering tiny machines (nanotechnology and nanostructures).

### NEED OF NANOTECHNOLOGY AND NANOMEDICINE

1. Due to the damage of molecular and cellular levels, diseases are formed.
2. Tools used for Surgical are huge and imperfect in comparison.

### APPLICATION OF NANOTECHNOLOGY AND NANOMEDICINE

1. Diagnostic
  - Imaging and Identification
2. Therapeutic

- Delivering medication to the exact location
- Erasing the bacteria, viruses, and cancer cells
- Rebuild of damaged tissue
- Oxygen transport
- Skin and dental care

### MECHANISM OF ACTION

1. Nano medicine works by injecting nano particles into the body. With the help of nano medicine we can deliver the anticancer drug specifically to malignant cells by targeting the different ligands like antibodies, folate, transferrin, peptides and proteins etc. These ligands will bind to specific receptors on the malignant cells.
2. Nano shells are spherical nano particles consisting of a dielectric core which is covered in a thin metal shell. Dielectric core will be made of silica and the metal shell will be gold. The rapid increase of tumor results by a poor blood supply, by allowing the nano shells to present in the bloodstream and to enter the tumor through its leaky blood vessels. Now a laser fibre is injected into the skin and pushed into or around the tumor. Infrared is then emitted from the fibre for about 4 to 6 minutes.



The nano shells convert this energy into heat. The extreme brightness, excellent photo stability and ready modulation of silica particle make them useful for molecular imaging and ultrasensitive detection.

3. Nano robots are nano devices which are very small in nano dimension used to repair or detect targeted damages and infection. It will have on board computers. The installed navigation network will enable the physician to keep track of the various devices in the body.
- A microscopic machine injected in your blood which will be roaming through the blood stream, taking samples of different compounds for identification and determining the concentrations.
- By inhaling a single nano robot reaches deeply inspired into lungs and it will attaches to tissue surface.
- Mechanical drilling of a small tumor mass.

When the treatment is finished, the doctor broadcasts an ultrasound signal and the nano robots exit the body through the kidneys.

4. DNA molecules, three dimension nanostructure that can be readily modified for specific cell-type recognition or DNA antisense for gene silencing. The lipid core and sphere of projecting nucleic acids can enter cells without any agents and have high resistance to nuclease digestion making them ideal candidates for drug delivery and cancer therapy.

5. Cancer cells are found using actinium-225 through nanoprobe and they are destroyed by acoustic signals.
6. Devices which are working in the blood stream can remove the atherosclerotic deposits, widening the affected blood vessels. This can prevent the heart attacks.

#### **USES OF NANOTECHNOLOGY AND NANOMEDICINE**

1. We can prevent blindness by treating glaucoma using nano particulate eye drops.
2. Silver based products made from silver nano particles used to stop from spreading of Methicillin-Resistant Staphylococcus Aureus (MRSA) in hospitals.
3. Nano imaging is used to get direct feedback to the physician by using the therapy of monitoring.
4. These are capable of detecting glucose levels.
5. Nanotechnology vacancies for diseases such as hepatitis one injection cost may be low.
6. To facilitate bone regeneration in the treatment of osteoporosis.
7. Drug delivery of CNS disorders. Nanotechnology can also be used improve delivery of antiretroviral medications across the barrier of blood brain.
8. For treating cancer new drugs are focused on genetic keys that are specific to the individual person. With some genetic mutations, some



drugs work better than other, produce better outcomes.

9. A cream containing nano robots can be used to cure skin diseases.
10. A mouth wash full of smart nano machines could identify and destroy pathogenic bacteria while allowing the harmless flora of the mouth to flourish in a healthy ecosystem

#### ADVANTAGES

1. Foster diagnosis of many ailments.
2. More precise treatments of conditions are used for curing cancer.
3. Target only diseased organs without destroying healthy tissue.
4. No surgery required.
5. No side effects.

#### DISADVANTAGES

1. Not practical yet.
2. High cost.
3. Implementation difficulties.

#### CONCLUSION

Nano medicine will change the history of medicine in future years, to get the full potential of nano medicine it takes years of research, recent advances in nanotechnology will change the landscape of medicine. In future long term nano therapies could be more economical, effective and safe to all. We even hope that it could decrease the cost of current medical procedures. In future nano medicine is everything in medical field.

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