

IMPLANTABLE DRUG DELIVERY SYSTEM

CONTENT:

- Introduction
- Advantage of implantable drug delivery system
- Disadvantage of implantable drug delivery system
- Concept of implant and osmotic pump
- Marketed product

INTRODUCTION:

- Implants are small sterile solid masses consisting of a highly purified drug made by compression or moulding or extrusion.
- Implants are drug delivery system which provide controlled delivery of drug over a period of time at the site of implantation.
- Implant drug delivery system are very attractive for a number of classes of drug particularly those that cannot be delivered via the oral route are irregularly absorbed via the gastrointestinal track or that benefit from its site specific targeting.

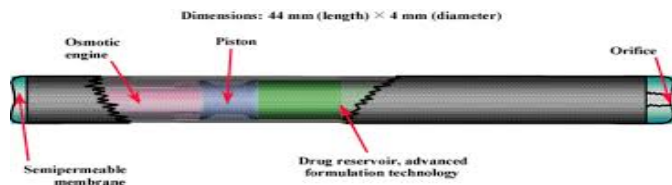


Fig.1. Implantable drug delivery system

TYPES OF IMPLANTS

A) BIODEGRADABLE IMPLANTS:

A major advantage of biodegradable system is that the biocompatible polymer used for fabricating this delivery system are eventually broken down into safe metabolites and absorbed or excreted by the body.

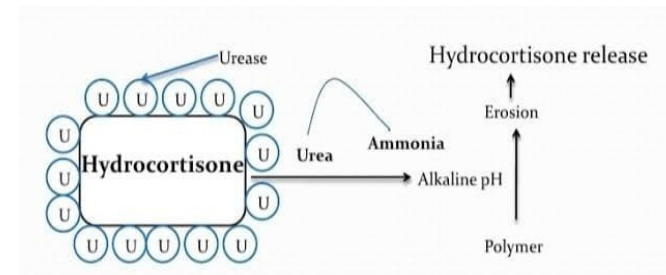


Fig 2 Biodegradable implants

B) NON-BIODEGRADABLE IMPLANTS:

It is membrane enclosed reservoir and matrix controlled system which are by far the most common. They include silicins and urethanes acrylates and their copolymers vinylidene fluorides vinyl acetate PEVA.

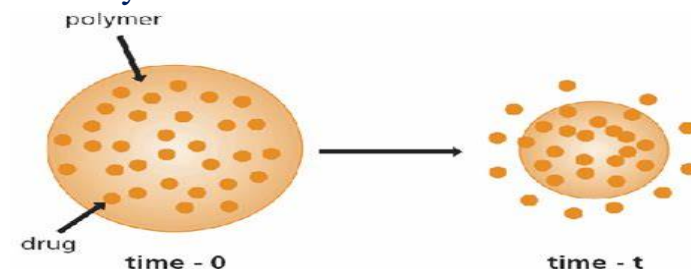


Fig.3 Non-Biodegradable Implants

APPROACHES OF IMPLANTABLE DRUG DELIVERY SYSTEM

Diffusion controlled system

1) Membrane permeation controlled system containing-

- Non porous membrane
- Microporous membrane
- Semipermeable membrane

2) Matrix diffusion controlled system containing

- Lipophilic polymer
- Hydrophilic polymer
- Porous polymer

3) Micro reservoir dissolution controlled system containing

- Hydrophilic reservoir/lipophilic matrix
- Lipophilic reservoir/hydrophilic matrix

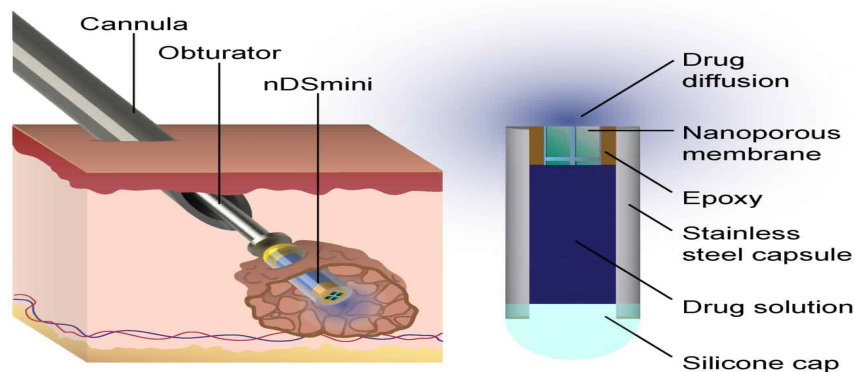
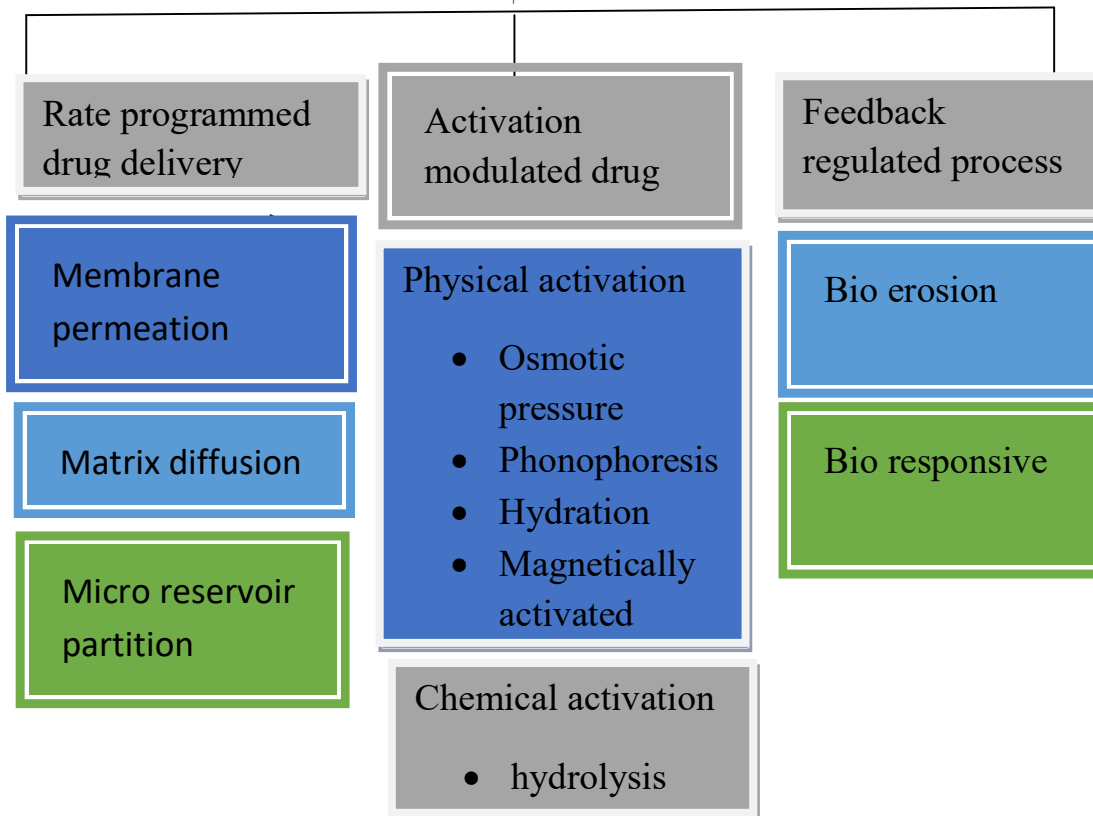


Fig.4. Implantable drug delivery system



Fig.5 marketed product Preparation

CLASSIFICATION OF IMPLANTS



CONCEPT OF IMPLANTS AND OSMOTIC PUMP

- ✓ The osmotic pump can be implanted subcutaneously or intraperitoneally depending on the size of the animal. For targeted delivery, a catheter can be attached to the osmotic pump to gain access to the tissues of interest subcutaneous implantation is technically the easiest and least intrusive procedure.

PRINCIPLE

- ✓ The implantable osmotic pump employed osmotic gradient inside the lumen called the salt sleeve and the tissue condition in which the pump is implanted.
- ✓ The high osmolarity of the salt sleeve makes water flow into the pump through semipermeable film which encases the external surface of the pump.

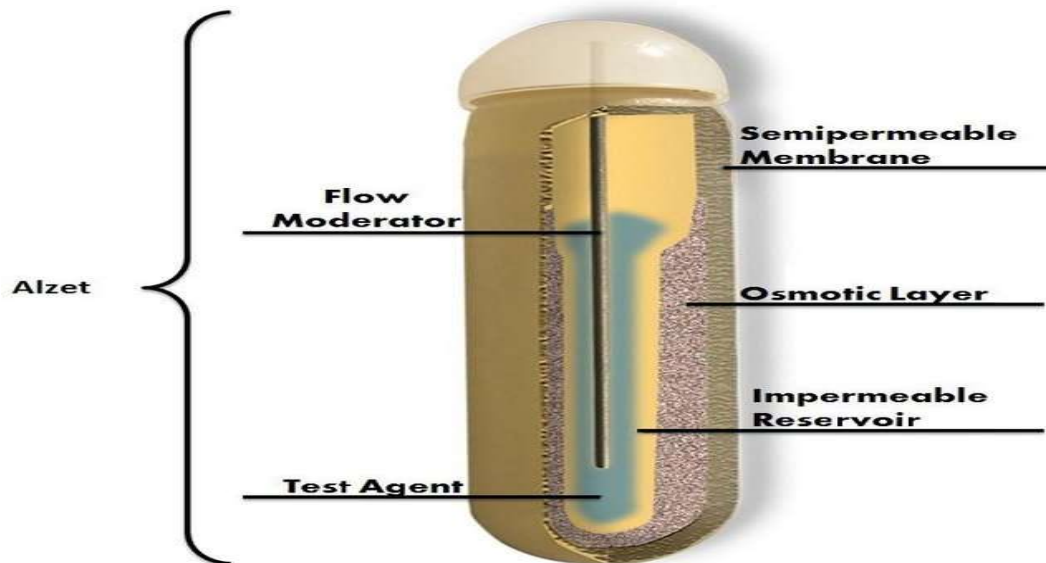


Fig 6. osmotic pump

ADVANTAGES :

- 1 • Improve drug delivery
- 2 • Potential for controlled released
- 3 • Potential for intermittent released
- 4 • Potential for bio-responsible released

DISADVATAGES:

- 1 • Danger of device failure
- 2 • Termination
- 3 • Possibility of adverse reaction
- 4 • Biocompatibility issues

APPLICATION

- ✓ Insulin
- ✓ Chemotherapeutics
- ✓ Analgesics
- ✓ Orthopedic Implants
- ✓ Contraceptive Implants
- ✓ Intraocular Implants
- ✓ Subdermal Implants
- ✓ Intravaginal Implants
- ✓ Steroids
- ✓ Antibiotics
- ✓ Heparin
- ✓ Dental Implants
- ✓ Hormonal Implants
- ✓ Orthodontic implants
- ✓ Intrauterine Implants
- ✓ Total Parenteral nutrition

MARKETED PRODUCT

Marketed product	Hormone involved	Dose	Length of duration of action
Norplant	Levonorgestrel	75mg	5 years
Nexplanon	Etonogesterol	68mg	Up to 3 years
Implanon	Progestin only	68mg	Up to 2 years

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