SUPPOSITORIES AND PESSARIES

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COP.LUMHS

LEARNING OBJECTIVES

At the end of this topic, students will be able to:

- Define Suppositories and Pessaries
- List the properties of an ideal suppository base
- Discuss the shapes, uses and actions of different suppositories
- Select an appropriate package in which to package suppositories
- Prepare an appropriate label for suppositories and Pessaries

SUPPOSITORIES

Suppositories are solid medicated preparations designed for insertion into the rectum where they melt, dissolve or disperse and exert a local or systemic effect.

SUPPOSITORIES

Suppositories that are produced extemporaneously are usually prepared by pouring molten mass into suitable moulds to produce rounded cone, bullet or torpedo shapes suitable for retention by the rectum.

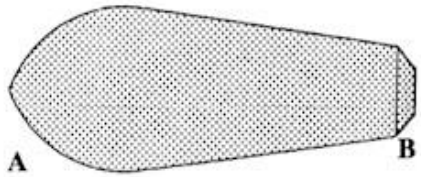


Figure 1 Diagram of a torpedo-shaped suppository (adapted from Abd-El-Maeboud *et al.* 1991, p. 798).

PESSARIES

Pessaries are similar solid medicated preparations designed for insertion into the vagina, usually to exert a local effect.

Moulded Pessaries are prepared in a similar way to suppositories and are usually cone shaped with a rounded tip.

USES OF SUPPOSITORIES

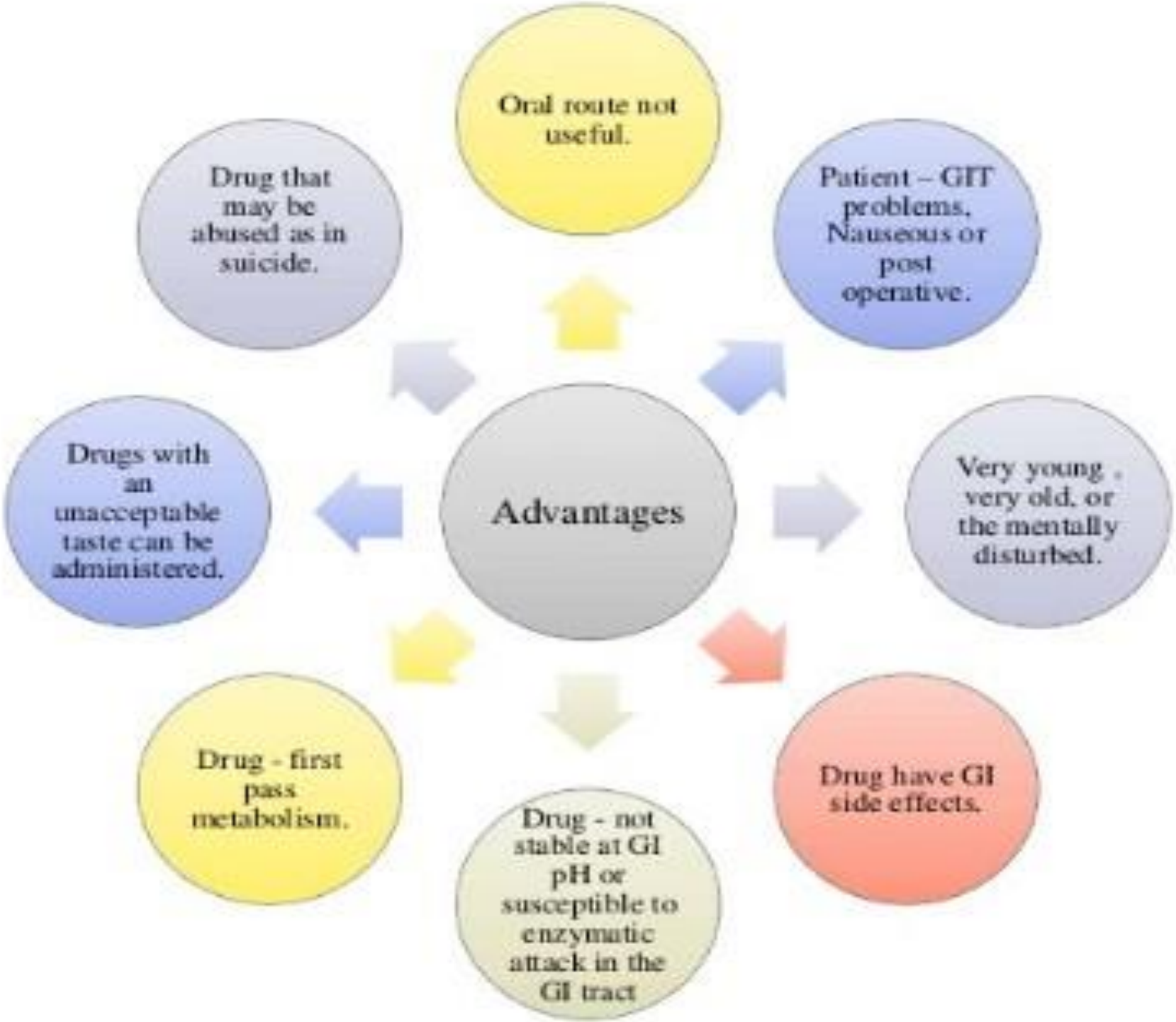
- Using rectal administration to achieve systemic activity is preferred when:

  the drug is destroyed in the GI tract

  the patient is unconscious or

  incapable of swallowing oral formulations.

  - E.g. a patient who is vomiting would probably be unable to swallow (and retain) a tablet or capsule.


Advantages
Oral route not useful.
Patient – GIT problems, Nauseous or post operative.
Very young , very old, or the mentally disturbed.
Drug have GI side effects.
Drug - not stable at GI pH or susceptible to enzymatic attack in the GI tract
Drug - first pass metabolism.
Drugs with an unacceptable taste can be administered.
Drug that may be abused as in suicide.

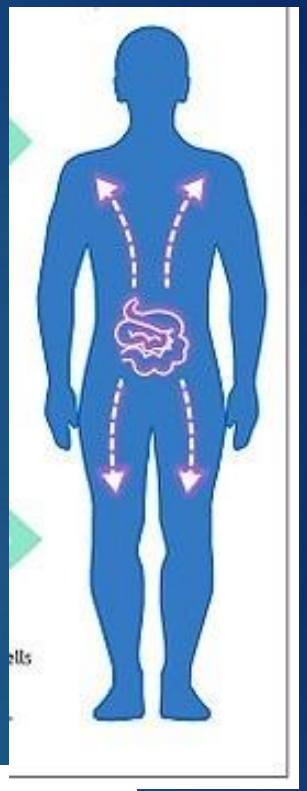
DISADVANTAGES

The major disadvantages of rectal suppositories:

They are not preferred by patients; they are inconvenient.

Rectal absorption of most drugs is frequently erratic and unpredictable.

Some suppositories "leak" or are expelled after insertion.



DISADVANTAGES

- Irritant drug can not be admininstered
- Need to store at low temperature
- Can not be easily prepared
- Defecation may interrupt the absorption process

FORMULATION OF SUPPOSITORIES

- DRUG + SUPPOSITORY BASE

ADDITIVES:

- Surfactants
- Preservatives
- Antioxidants
- Buffers
- Penetration enhancers
- lubricants

Properties of an ideal suppository base:

- Melts at body temperature or dissolves in body fluids
- Non-toxic and non-irritant
- Compatible with any medicament
- Releases any medicament readily
- Easily moulded and removed from the mould
- Stable to heating above the melting point
- Easy to handle
- Stable on storage

Suppository base

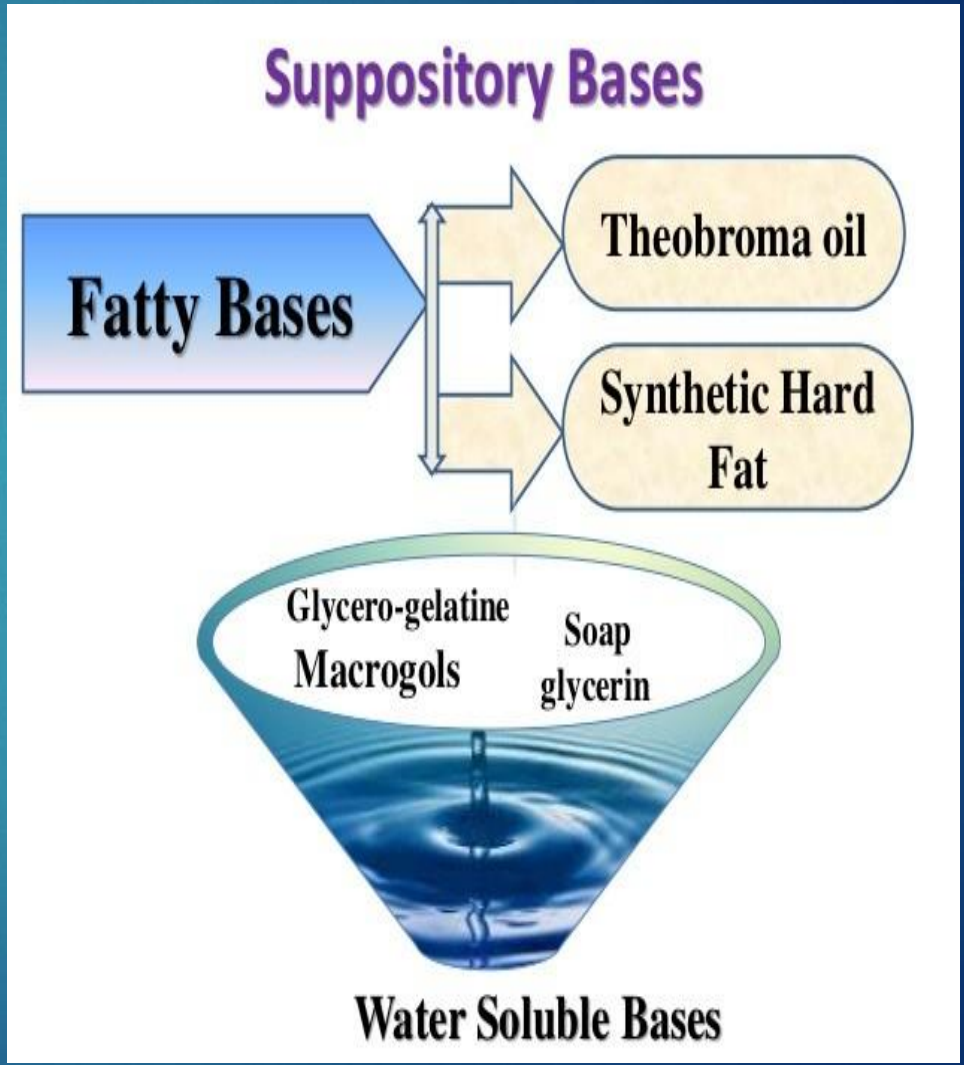
- There are two main classes of suppository base:

Fatty bases

- Designed to melt at body temperature.

Water-soluble or water-miscible bases

- Designed to dissolve or disperse within the body



FATTY BASES

- Theobroma oil (cocoa butter)
- Synthetic hard fat
- Fractionated Palm Kernel oil B
- Compounds of glycerin
  - Glyceryl monostearate
  - Glyceryl monopalmitate

Theobroma oil (cocoa butter)

- M.P range- 30-36^{o}C
- Readily melted on warming and sets rapidly when cooled
- Miscible with many ingredients
- Bland and non irrritating

Theobroma oil (cocoa butter)

- Prone to oxidation
- Rancidity on storage
- Does not contract sufficiently on cooling and therefore tends to stick to the suppository mould
- For this reason, the mould must be lubricated before use

COCOA BUTTER EXITS IN FOUR CRYSTALLINE STATE

α form

- melts at 24°C
- Obtained by suddenly cooling melted cocoa butter to 0°C.

ß form

- Crystallizes out of the liquefied cocoa butter with stirring at 18 to 23°C.
- Its melting point lies between 28 and 31°C.

ß` form

- changes slowly into the stable ß form.
- Melts between 34 and 35°C.
- Change is accompanied by volume contraction.

γ form

- melts at 18°C
- Obtained by pouring a cool cocoa butter, before it solidifies, into a container which is cooled at deep freeze temp.

Synthetic hard fat

- Prepared by hydrogenating suitable vegetable oils
- The viscosity of melted fats is lower than that of theobroma oil
- Resulting in greater risk of drug particles sedimentating during preparation leading to lack of uniform drug distribution which can give localized irritancy
- Partly compensate- these bases set very quickly
- Become brittle if cooled too rapidly
  - So should not be refrigerated during preparation

Fractionated palm kernel oil BP

- white, brittle, odourless, solid fat
- M.P= 31 – 36^{o}C
- Obtained from palm kernel oil

WATER-SOLUBLE AND MISCIBLE BASES

WATER-

- Glycero-gelatin bases
- Macrogols (polyethylene glycols)

Glycero-gelatin bases

- Mixture of glycerol and water stiffened with gelatin
- Glycerol suppository base BP
  - 14% w/w gelatin and 70% w/w of glycerol
- Gelatin content 18% w/w in hot weathers
- Can cause rectal irritation because of small amount of liquid present
- Contamination by microorganism is more likely. Preservatives may be added

Glycero-gelatin bases

Glycerol suppositories have a laxative action

Glycerinated gelatin–based suppositories have a tendency to absorb moisture as a result of the hygroscopic nature of glycerin, they must be protected from atmospheric moisture , the suppository may have a dehydrating effect and irritate the tissues upon insertion.

water in the formula for the suppositories minimizes this action; however, if necessary, the suppositories may be moistened with water prior to insertion to reduce the initial tendency of the base to draw water from the mucous membranes and irritate the tissues.

Glycero-gelatin bases

- The base is more time consuming to prepare than the fatty bases and may be difficult to remove from the mould
- Lubrication of the mould is essential

Macrogols

- Absence of physiological effect
  - No laxative effect
- Not prone to microbial contamination
- Have a high water absorbing capacity
- As they dissolve, a viscous solution is produced so less chances of leakage from the body
- High melting point
  - Base donot melt in the body but dissolve and disperse the medication slowly, providing a sustained effect
- Base contract on cooling so no lubrication is necessary

Macrogols

- Hygroscopic- must be carefully stored
- Lead to irritation of the rectal mucosa
- Become brittle if cooled too quickly

LUBRICATION OF MOULD – MUST PROVIDE A BUFFER FILM BETWEEN THE SUPPOSITORY AND THE METAL

Synthetic fat or macrogol base	Glycero-gelatin base	Theobroma oil
Contract significantly on cooling	Sticky nature	Oily lubricant cannot be used
Lubrication is not needed	Oily lubricant – liquid paraffin or arachis oil	Soft soap -10 g Glycerol – 10 ml Alcohol(90%) – 50 ml

OTHER ADDITIVES

- Antioxidants
- Preservatives
- Emulsifiers- to facilitate incorporation of aqueous solution
- Hardening agents- to raise the melting point of the base
- Viscosity modifiers- required to reduce the sedimentation rate of insoluble medicaments

The preparation of suppositories invariably involves some wastage and therefore it is recommended that calculations are made for excess.

For example, if you are required to dispense six suppositories, to include a suitable excess, calculate for 10.

SHAPES AND WEIGHTS

The shapes and weights of suppositories depend upon the route of administration.

Rectal Suppositories

- The most suitable shape for rectal suppositories is that of a bullet tapered on one or both ends with the base longer and more tapered than the head.
- This shape allows easy insertion and helps prevent accidental expulsion of the suppository before it has the time to melt.

Rectal Suppositories

- Rectal suppositories weigh about 2 gm
- Suppositories for children should be smaller, longer, and narrower than adult suppositories.
- Infant rectal suppositories usually weight about 1 gram or about half that of adult suppositories.

VAGINAL SUPPOSITORIES (PESSARIES)

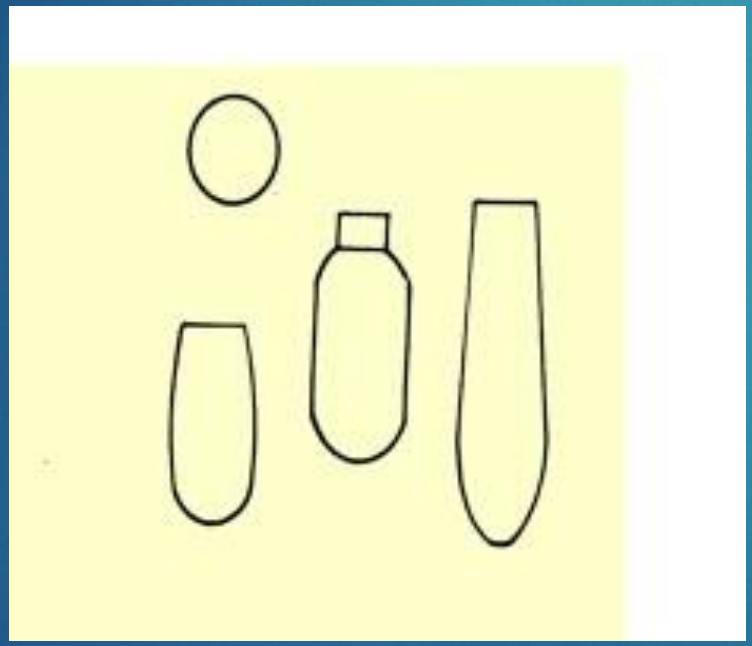
- Vaginal suppositories are employed as:
  contraceptives
  feminine hygiene antiseptics
  antibiotics
  or to restore the vaginal mucosa.

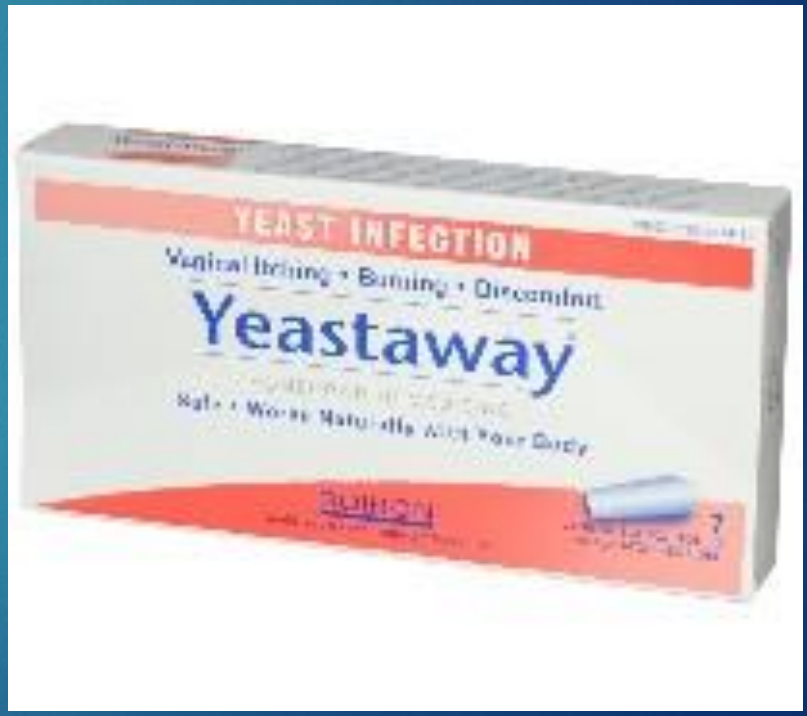
VAGINAL SUPPOSITORIES (PESSARIES)

Vaginal suppositories are inserted high in the vaginal tract with the aid of a special applicator.

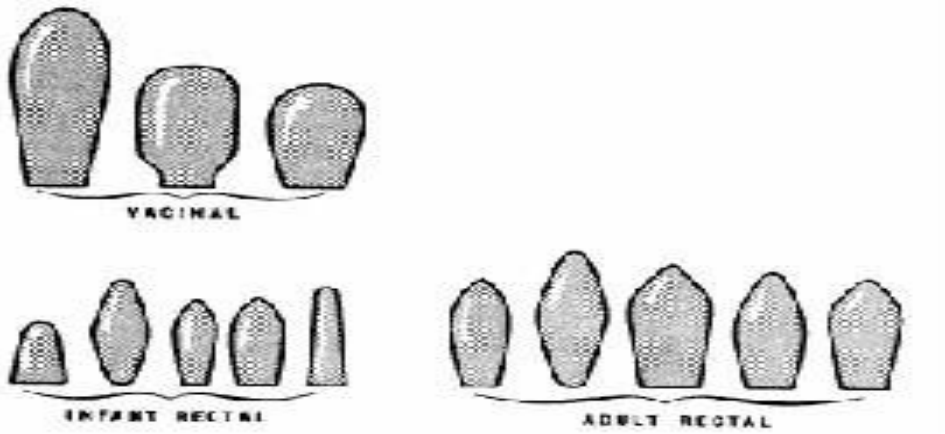
VAGINAL SUPPOSITORIES (PESSARIES)

The vaginal suppositories are usually globular, oviform, or cone-shaped and weigh between 3 - 5 grams.





SHAPES



ACTION

Suppositories have a local effect or a systemic effect, depending upon the active ingredient in the suppository.

LOCAL EFFECT

Drugs that are not absorbed from the site to which they are introduced can exert only a local effect.

Those that absorbed may exert both a local and a systemic action

Local effects may include:

the soothing of inflamed hemorrhoidal tissues

promoting laxation

SYSTEMIC EFFECT

- The systemic actions for which suppositories are used are limited only by the drug's solubility and absorption.
- Rectal administration has been used to treat a variety conditions such as:

  Asthma

  Nausea

  Motion sickness

  Anxiety

  Bacterial infections.

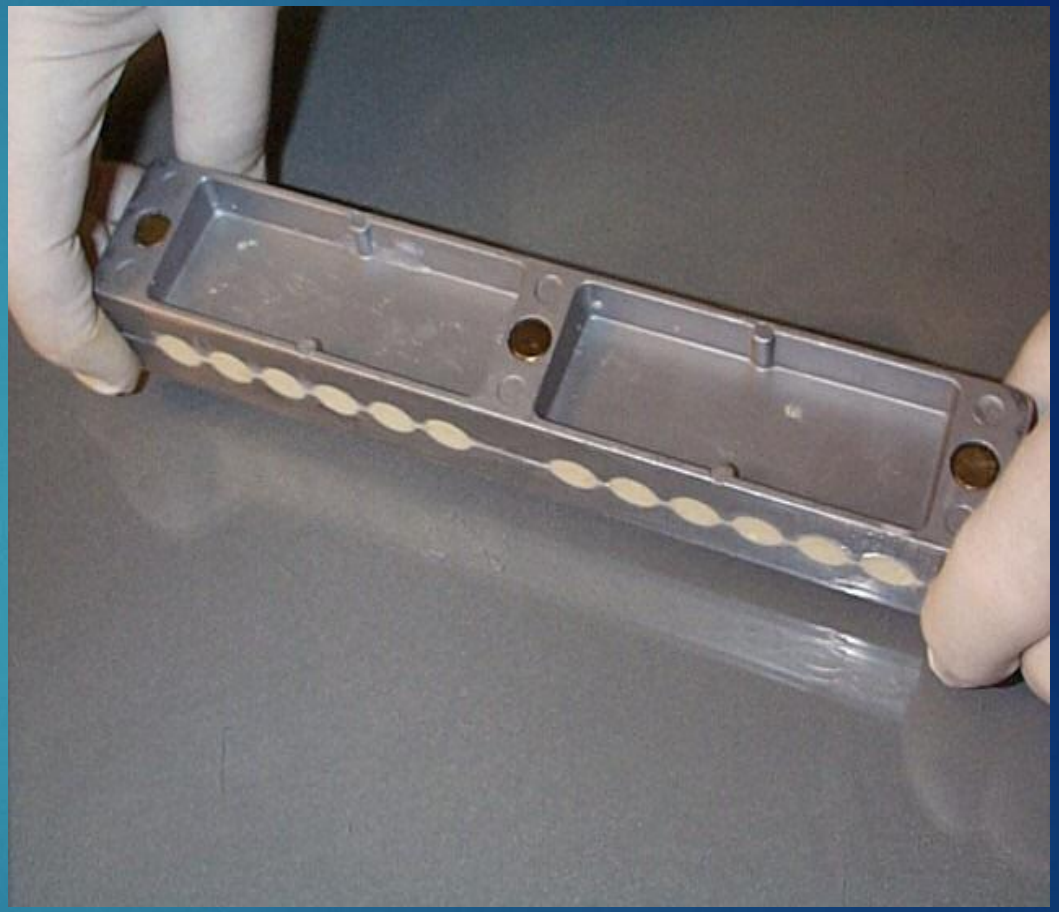
Suppository moulds

OPENING A SUPPOSITORY MOLD

The suppository mixture is poured into the cavities of a closed mold. When the suppository mixture has congealed, the excess mass is removed from the top surface of the mold and the mold is separated into the two halves.

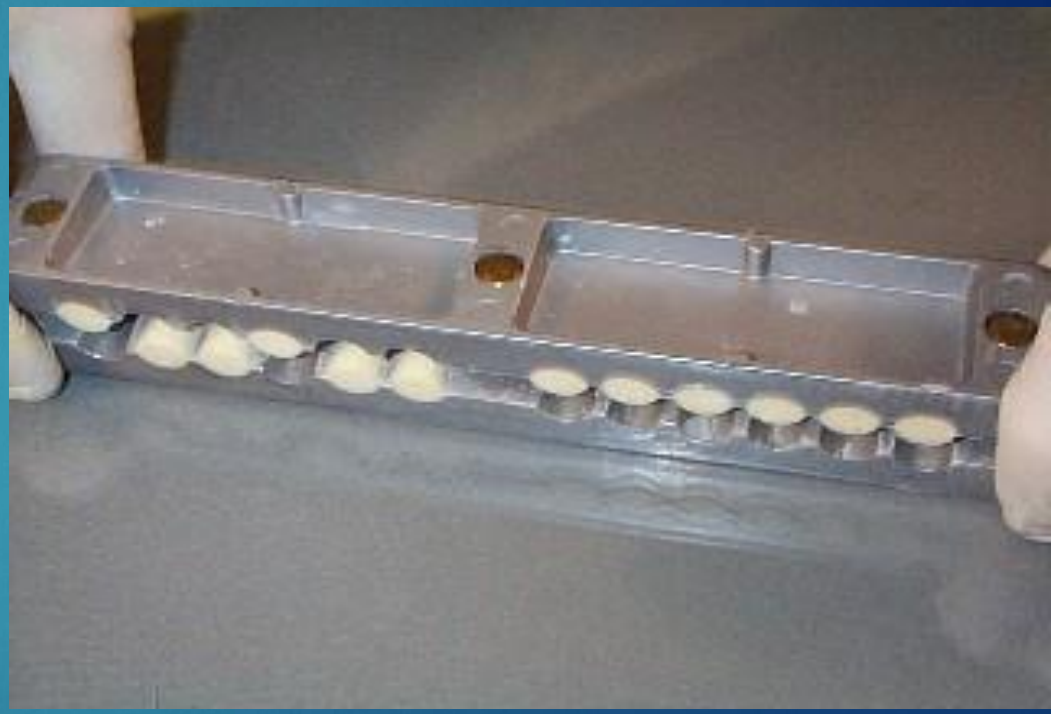
OPENING A SUPPOSITORY MOLD

An efficient way to separate the mold is to remove the wing nuts or loosen the centered screw and place the mold so that the posts rest on the table top.



OPENING A SUPPOSITORY MOLD

Then apply a downward pressure only on the bottom half of the mold.



OPENING A SUPPOSITORY MOLD

A knife or spatula should not be used to pry the two halves apart. This will damage the matching mold faces which have been accurately machined to give a tight seal.

SHELF-LIFE OF SUPPOSITORIES & PESSARIES

Most suppositories & Pessaries are stable preparations provided that the packaging provide adequate protection and that the storage temperature is low.

An expiry date of 3 months is given to suppositories & Pessaries in the absence of any official guidance.

Commercially packed products carry an expiry date recommended by the manufacturer for products stored appropriately.

DISPENSING

Glycerin and glycerinated gelatin based suppositories are best dispensed in tightly closed, glass bottles with wide mouths.

They are hygroscopic (readily absorb and retain moisture) and unless protected from the atmosphere will absorb water.

DISPENSING

- Cocoa butter and carbowax based suppositories may be dispensed in cardboard boxes contain so that each suppository compartment.

DISPENSING

If the suppository is wrapped individually in foil, the need for compartments is removed and such suppositories can be dispensed in plain boxes.

DISPENSING

Suppositories containing volatile ingredients such as menthol and liquefied phenol should be dispensed in wide-mouthed, tightly closed, glass bottles

LABELING

Directions on the label should specify use of the suppositories and their site of insertion.

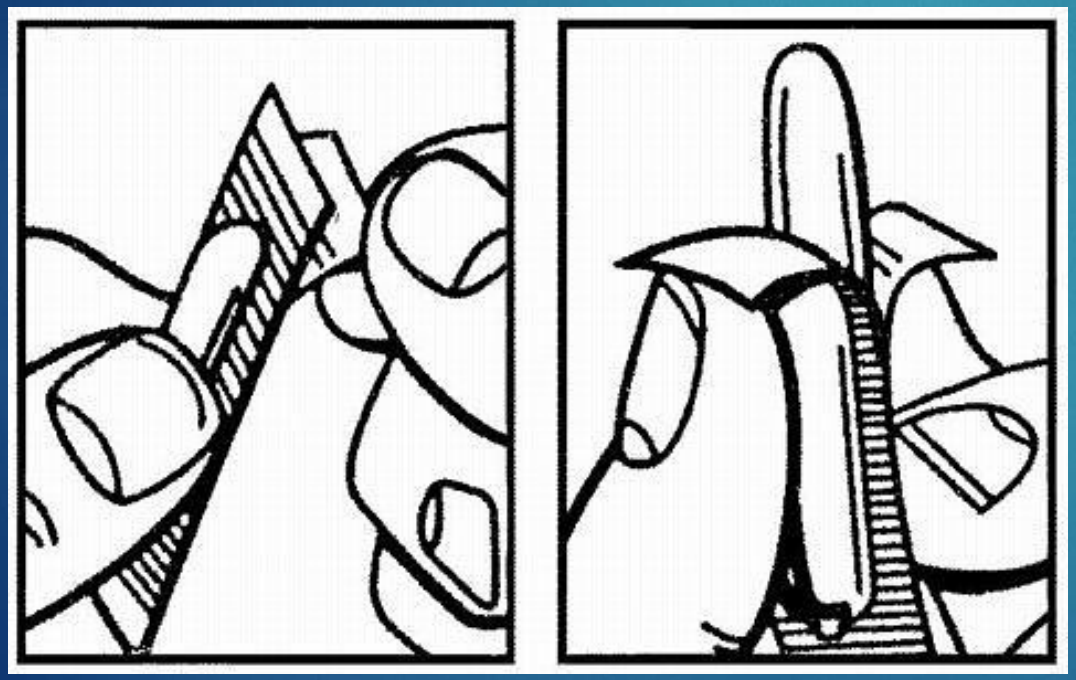
FOR RECTAL USE ONLY

FOR VAGINAL USE ONLY

STORE IN A COOL PLACE

LABELS

Patient should be advised to remove the foil wrapping before insertion of the suppository



Extemporaneous preparation of a suppository.

https://www.youtube.com/watch?v=6KR1rAJ9OUE

Different methods of preparing suppositories

https://www.youtube.com/watch?v=QNHc2JctKw0

SUPPOSITORY

https://www.youtube.com/watch?v=cBsyPhQ_4EM

GLYCERO-GELATIN BASE

REFERENCE

Pharmaceutical practice by D.M. Collette

- Ch # 15

Suggested reading

http://quizlet.com/11715989/uamscop-pharmaceutics-ii-suppositories-flash-cards/