Ocular Occlusives as Alternative Therapy for Eye Conditions

كلية الصيدلة
COLLEGE OF PHARMACY

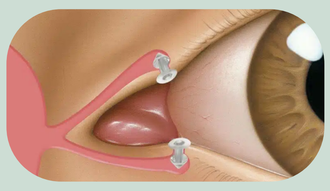
جامعة الشارقة
UNIVERSITY OF SHARJAH

DONE BY : RAWAN AWAD / HAYA FARAJ /SARA MOHAMMAD
SUPERVISED BY : PROF. MARK RAWAS QALAJI , HEAD OF PHARMACEUTICS & PHARMACEUTICAL TECHNOLOGY, COLLEGE OF PHARMACY , UNIVERSITY OF SHARJAH.

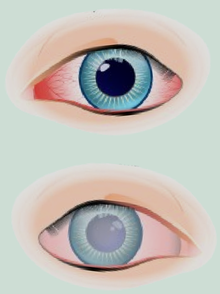
Abstract

This comprehensive and insightful abstract meticulously explores the dynamic landscape of punctal and canalicular plugs, positioning them as revolutionary delivery systems within the realm of ophthalmology. These ingenious plugs have not merely gained recognition but have become indispensable tools in the therapeutic arsenal for managing a spectrum of ocular diseases. Their profound impact is rooted in the dual advantages of enhancing drug bioavailability and prolonging therapeutic effects, marking a paradigm shift in the approach to ocular healthcare. A key focal point of the discussion centers on the plugs' unique ability to regulate tear drainage, consequently elevating their significance in the context of ocular health. By extending the ocular surface residence time, these plugs contribute substantially to improving patient compliance, a critical aspect in the effective treatment of ocular conditions. The versatility of punctal and canalicular plugs is underscored by their diverse applications, ranging from addressing the challenges posed by dry eye syndrome to offering innovative solutions for conditions like glaucoma. Furthermore, the review delves into the cutting-edge advancements in plug materials and designs, leveraging the transformative capabilities of 3D printing technology. This not only propels the field forward but also facilitates a more personalized approach, catering to the unique needs of individual patients. The intersection of individualized medicine and plug development emerges as a pivotal theme, emphasizing the role of these plugs as both medicated and non-medicated drug delivery systems. A significant aspect explored in this review is the nuanced exploration of mechanisms that underpin the functionality of these plugs. This extends to an in-depth analysis of their clinical outcomes, offering a comprehensive understanding of the implications of these innovative technologies in the current landscape of ocular drug delivery.

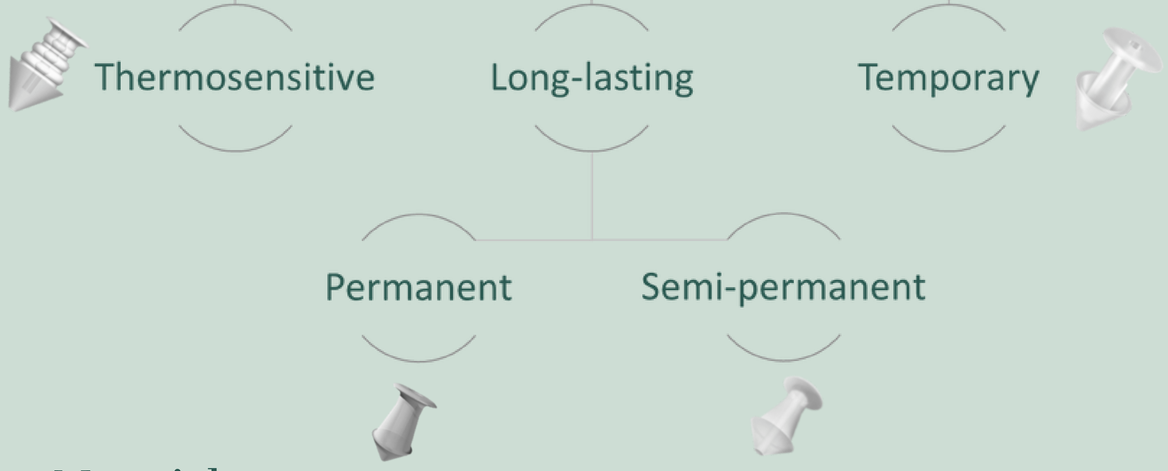
Punctal plugs



- **Site of Insertion**
  Inside the puncta (tear duct)
- **Characteristics**
  - Blocks drainage channel
  - Increasing tear retention time
  - Moistens the eyes and reduces dryness.
- **Indications**
  - Dry eye syndrome.
  - Glaucoma



- **Size**
  0.2 mm (X-small) - 2 mm (X-large)
- **Types**



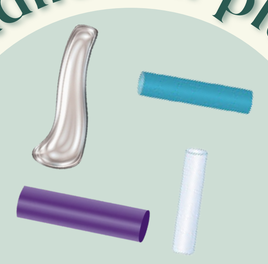
- **Materials**

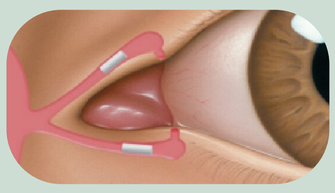
Collagen | Hydrogels | PMMA | Silicone | Acrylics

- **Duration**

1-2 weeks/3 months	6 months- 1 year	Indefinitely

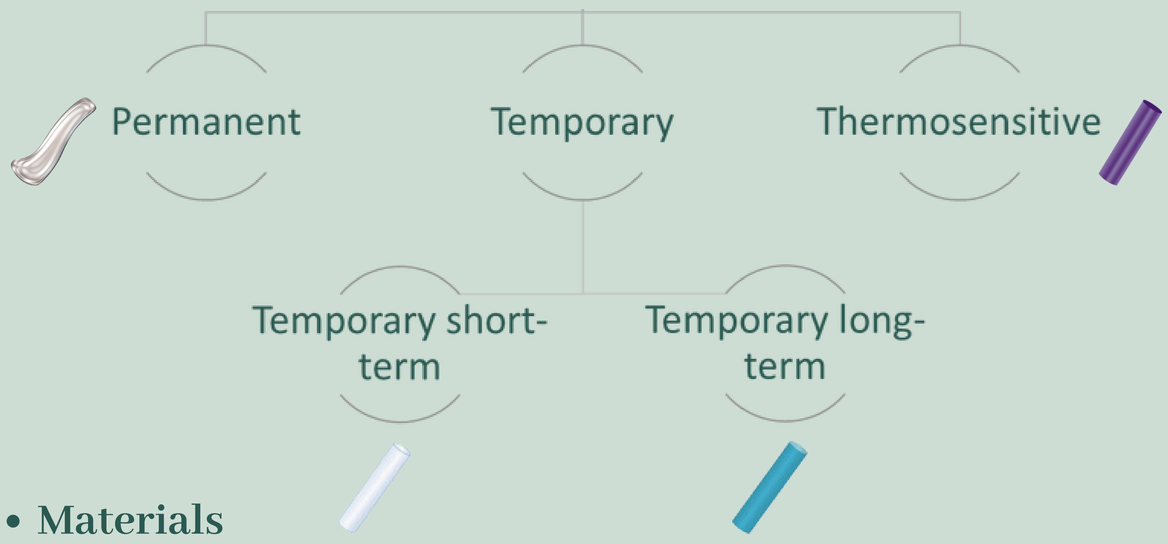
Canalicular plugs





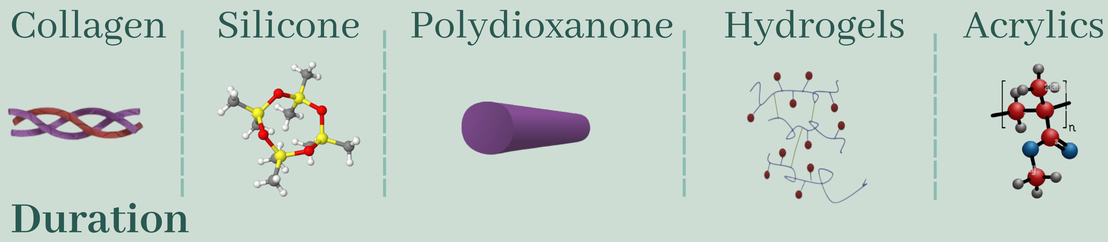
- **Site of Insertion**
  Inside the upper & lower canalicular ducts.
- **Characteristics**
  -Less surface exposure and irritation.
  - Helps increase eye lubrication.
- **Indications**
  Dry eye syndrome.

- **Size**
  Width 0.3, 0.5, 0.7mm x **Length** 0.84, 1.40, 1.95, 6mm
- **Types**



- **Materials**

Collagen | Silicone | Polydioxanone | Hydrogels | Acrylics



- **Duration**

1-2 weeks	3-6 months	Indefinitely

Comparison

TREATMENT TYPE	ADVANTAGES	DISADVANTAGES	COST
Traditional treatments	• Various formulations • Available OTC • Convenient application • Tolerated temporary SE	• Clearance mechanism • Reflex reaction • Non-adherence • Limited efficacy in sever cases	• More cost effectiveness. • Long term accumelation
Advanced occlusives	• Longer lasting / more compliance • Benefiting from natural tears • Effective in moderate to sever dry eyes • Customized	• Migration risk. • Irritation • Discomfort while removing • Healthcare professional need	• High initial cost • Lower cost on long term

Advancement

Digital Light Processing method using 002R printer

Photopolymer liquid resin

- Polyethylene glycol diacrylate (PEGDA)
- Polyethylene glycol (PEG 400)
- Ratio determine drug release

- Resin slidefy amoung light exposure

End product

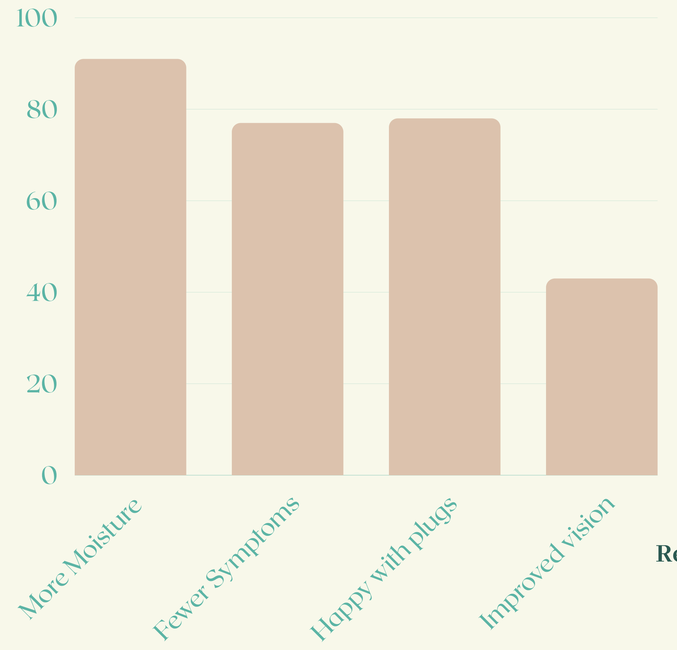
- Personalized
- Enhansed thermal stability

Graphical figures

Traditional Treatments

Amount absorbed

Advanced occlusives convenience



References