



# HEPARIN COATED IOLs



**Eye Learn**  
All about the Eye

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## Heparin coated IOL

### 1. HSM PMMA

- Heparin-surface-modified (HSM) PMMA was formed by a radical polymerization of methyl methacrylate (MMA) from oxidative reaction initiated by  $Ce^{4+}$  ions in the presence of heparin in 1979s, it has been in use for nearly 36 years.
- Heparin is a type of anticoagulant, which has an effect on the expression of adhesion molecules and matrix degrading enzymes.
- The heparin modification of PMMA IOL changed the surface property from hydrophobic to hydrophilic, which resulted in a reduced inflammatory cell adhesion and, therefore, a better uveal biocompatibility.

### 2. HSM silicone IOL

- The HSM silicone IOL solved the problem of implanting silicone IOL in patients needing vitrectomy with silicone oil

### 3. F-heparin surface modification PMMA Intraocular lenses

- Fluoride (F) is a hydrophobic molecule.
- IOLs treated with F had a higher contact angle and became more hydrophobic.
- On the other hand, heparin is hydrophilic, and when grafted on a substrate, the heparin could make it more hydrophilic.
- When PMMA was treated with F, part of the hydroxyl on PMMA surface cracked and chemical bond dissociated, which made PMMA easier to integrate with heparin.
- This F-HSM PMMA possessed a composition of hydrophilic radical and hydrophobic groups phase separation, which made PMMA a balanced surface of hydrophilic and hydrophobic.
- Platelet and macrophages in rat abdominal cavity were less adhesive on F-heparin PMMA compared with the PMMA.

#### • Benefits of Heparin Surface Modification

1. Heparin surface-modification (HSM) reduces postoperative inflammatory responses in the early postoperative period.\*
2. HSM posterior intraocular lenses result in less cellular response observed one year after extra-capsular cataract extraction.\*
3. HSM results in reduced foreign-body reaction as measured by specular micro-graphy and slit-lamp examination, especially in the early postoperative period.\*
4. Patients who are diabetic or have glaucoma can definitely benefit from an HSM acrylic IOL compared to a non-HSM PMMA IOL, according to a multi-center study.\*
5. HSM coating appears to be a valuable tool to decrease implant-associated bacterial endophthalmitis.\*

#### Disadvantage

HSM PMMA IOL had a significantly higher PCO rate.