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Resorbable and In Situ Forming Compositions for Local Drug Delivery

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Invention Description

Orthopedic infection of prosthetic implants can be an expensive and serious medical condition. Bone cement (poly(methyl methacrylate), PMMA) is sometimes used in orthopedic surgery as a carrier for antibiotics and antifungal agents to reduce the risk of infection. However, its effectiveness is limited because only a small fraction of the total entrapped drug is released and the elution rate is very low after the first day.

Researchers in the School of Biological and Health Systems Engineering at Arizona State University have developed novel in situ forming biomaterials which transition from liquid to solid under physiological conditions and efficiently sustain release on entrapped drugs over a 7-10 day period. This material is then degraded and elicits no immune response, permitting its use in cementless hip stems and similar applications.

This material thus has potential as a form fitting antibiotic-loaded filler for the prevention or management of prosthetic joint infections without the limitations (such as lack of degradability, inefficient drug release, unsustained drug release, and incompatibility with cementless prostheses) of current PMMA materials.

Potential Applications

- Prevention and management of orthopedic infections.
- Drug delivery

Benefits and Advantages

- Local, controlled delivery of therapeutics directly to the desired area
- Injection capability provides reduced infection risk, scar formation, and treatment cost relative to implantation
- Ease of administration and delivery
- Gel is able to conform to the shape of its local environment upon injection
- Effective time controlled drug delivery
- Resorbable