

Injectable hydrogels for tissue bulking

Summary

CPG scientists have developed a formulation of injectable hydrogel that can be used to reinforce human tissue, acting as a bulking agent. CPG hydrogels use a well-recognized biocompatible synthetic polymer, polyvinyl alcohol (PVA) that can be physically crosslinked after injection. Alternate tissue bulking materials are particle-based or are chemically crosslinked. These techniques pose potential health risks as chemical by-products can cause cell necrosis and particles can migrate. CPG hydrogels offer a safe tissue bulking agent that can be formulated for specific tissue applications.



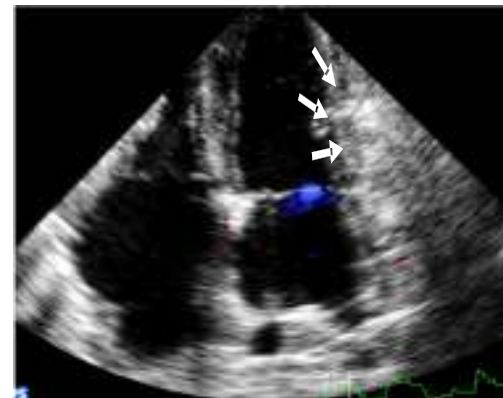
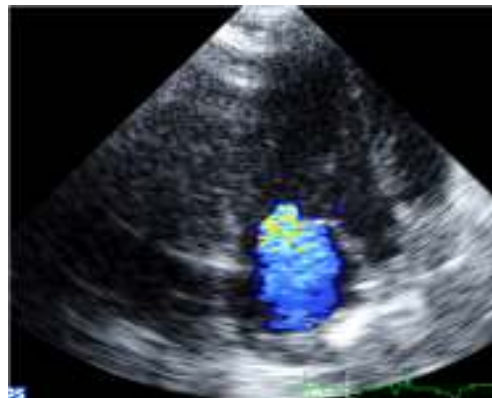
Hydrogel implant injected in rat subcutaneous tissue after 12 weeks implantation.

Description

CPG offers a permanent, non-migrating, biocompatible material suitable for percutaneous injection. In collaboration with the Massachusetts General Hospital, this hydrogel has been used to treat mitral valve regurgitation in an ovine model. Additionally, CPG is investigating the use of this formulation for urinary incontinence and gastroesophageal reflux disease (GERD). The formulation can be injected through a long, narrow gauge catheter, and will gel in vivo without a chemical reaction. Different requirements for a specific application, including delivery systems, stiffness, and gelation time, can be met by formulation adjustment. New delivery mechanisms are currently being researched to facilitate surgical techniques and aid in patient recovery.

Discussion

Injection of hydrogel into the infarcted heart muscle allows stiffening of the dead muscle and restoration of the geometry of the valve tethers. Chronic regurgitation is therefore reduced or removed with a simple, minimal access treatment. Long-term animal studies are currently ongoing but data at 6 months is highly encouraging.



Moderate MR resulting from an infarction (left ultrasound) is reduced by injection of hydrogel into the myocardial wall (arrows)

Applications

- Augmentation and support of human tissue
 - Urinary
 - Esophageal
 - Cardiovascular
 - Cosmetic



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