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Gellan gum/gamma-polyglutamic acid and glycerol composited membrane for guiding bone regeneration

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Periodontal disease, oral cancer relating trauma is the prominent factor devastating bone tissue that is crucial to reestablish in clinical. As we know, common symptom, osteoporosis and infection limiting the ability of the bone tissue to recover cause difficulty before implantation therapy. Regeneration of bone tissue is the fundamental therapy before surgical processes. To promote the growth of bone tissue, many commercial products still have sophisticated problems that need to overcome. Regrettably, there is no available material which is apparently preferable for releasing and controlling of loading dosage, or mitigating inflammation. In our study, a hydrogel-based composite membrane has been prepared by using Gellan gum (GG), gamma-polyglutamic acid (γ-PGA) and glycerol. GG is a natural material that are massively adopted in cartilage. Unfortunately, the strength of pure GG film is a manifest weakness especially under simulating body fluidic conditions. We utilize another biocompatible material, γ-PGA as cross-linker which can be formed tri-dimension structure enhancing the strength. Our result indicated the strength of pure GG membrane can be obviously improved by cross-linked with γ-PGA (0.5, 0.6, 0.7, 0.8, 0.9, 1.0 w/v%). Besides, blending with glycerol (0, 1.0, 2.0, 3.0 w/v%) can significantly improve membrane toughness that correspond to practicality use. The innovative composited hydrogel made of GG, γ-PGA and glycerol is attested with neat results including elongation and biocompatibility that take the advantage in extension covering major trauma. Recommendations are made for treatment to build up the foundation of bone tissue that would help patients escape the suffering and shorten the amount of time in recovery.

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