

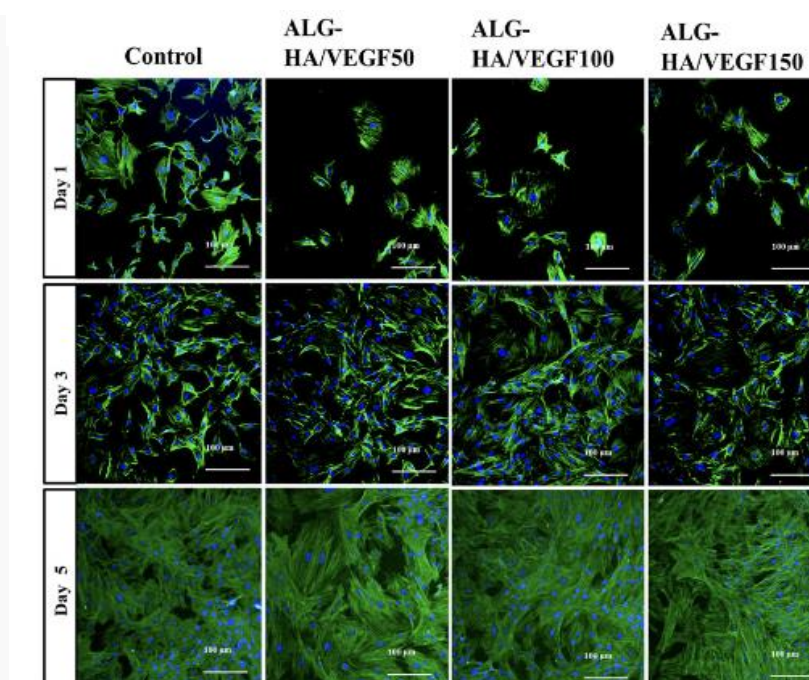
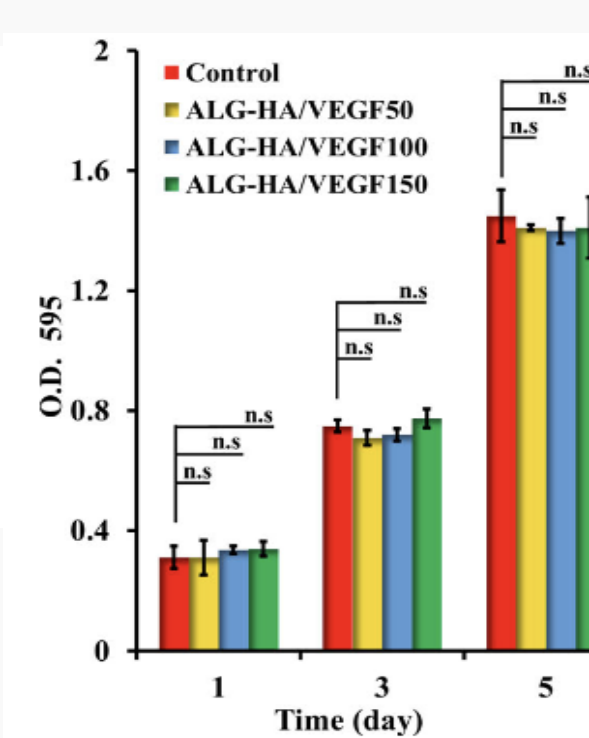
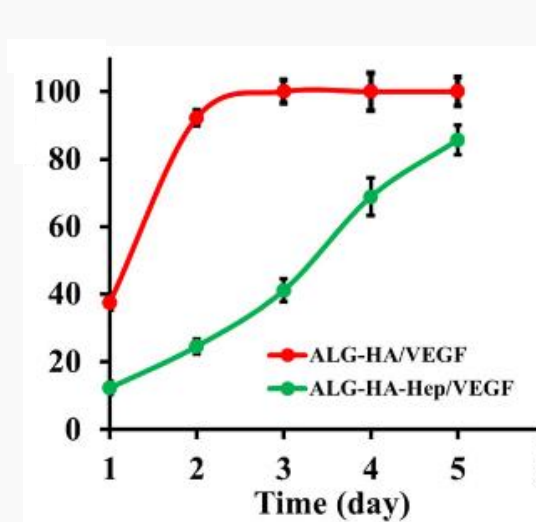
Controlled slow release of vascular endothelial growth factor (VEGF) in alginate and hyaluronic acid bead system to promote wound healing in punch-induced wound rat model

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Introduction

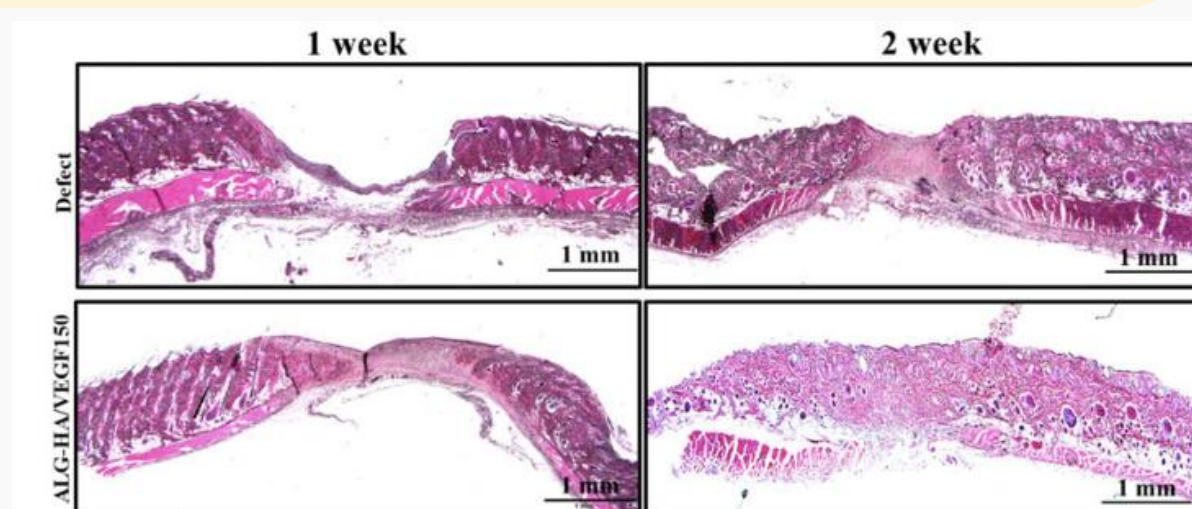
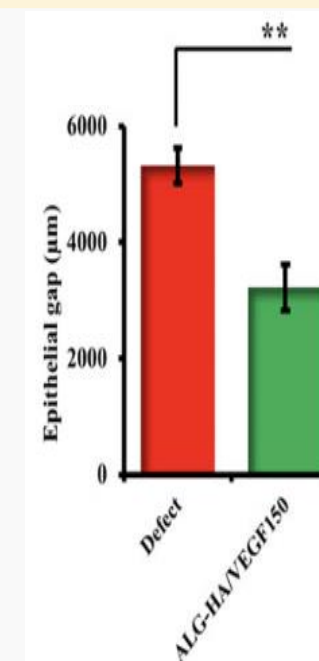
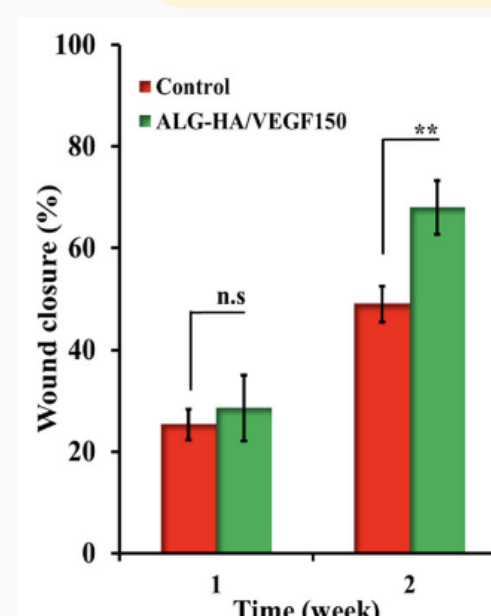
- Background**
 - Wound Healing Challenges: Angiogenesis is crucial for wound repair but often delayed, leading to poor outcomes.
 - VEGF: Stimulates blood vessel formation, essential for tissue regeneration.
- Objective**
 - Develop a controlled-release bead system with alginate (ALG) and hyaluronic acid (HA).
 - Test its efficacy in accelerating wound healing in a rat model.
- Key Components**
 - Materials: ALG, HA, VEGF, Heparin.
 - Method: Crosslinked beads for gradual VEGF release to promote vascularization.



In Vivo Results

- Wound Healing Efficacy**
 - Significant Wound Closure:** After 14 days, the wounds treated with VEGF-loaded ALG-HA beads showed approximately 70% closure, compared to 50% in the control group.
 - Key Finding:** The sustained release of VEGF enhanced wound healing, accelerating tissue repair and reducing the epithelial gap in the treated wounds.
- Histological Analysis**
 - Enhanced Vascularization:** Histological studies revealed significantly improved vascularization in the treatment group, indicating better blood supply to the wound area.
 - Collagen and Fibronectin Development:** Immunohistochemistry showed increased collagen type-1 and fibronectin expression in the treated wounds, supporting tissue regeneration.

The VEGF-loaded beads not only promoted **faster wound closure** but also enhanced tissue quality through **improved vascularization and extracellular matrix formation**.



Conclusion

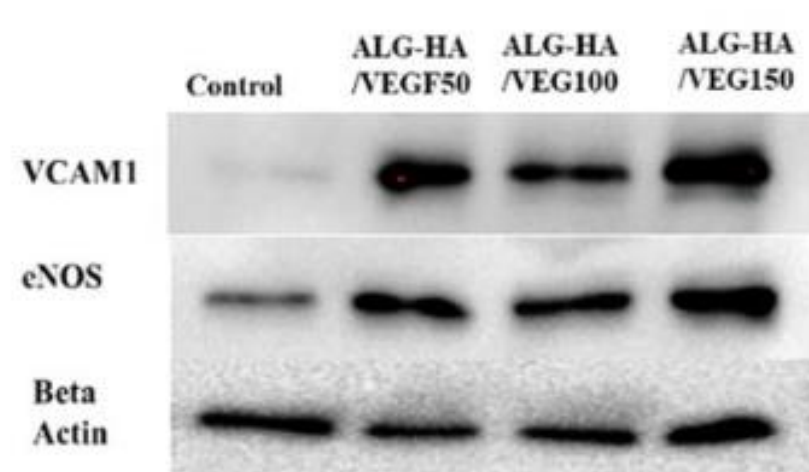
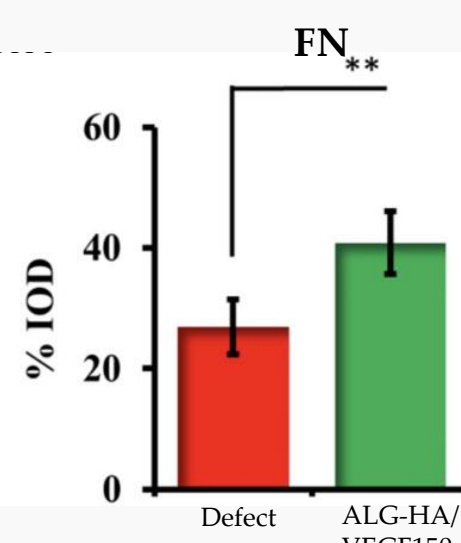
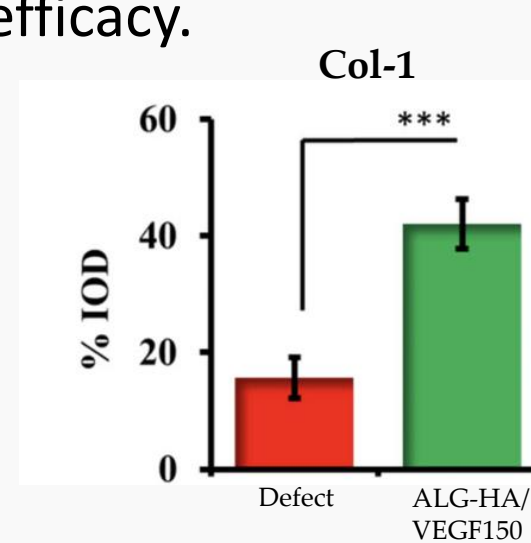
- Key Findings:** The controlled VEGF release from ALG-HA beads significantly enhanced wound healing, promoting faster closure, better vascularization, and increased collagen and fibronectin deposition.
- Mechanism:** Sustained VEGF release stimulated angiogenesis, supporting tissue regeneration and wound recovery.

Clinical Implications

- Suitable for treating chronic wounds or surgical recovery, offering a biodegradable and biocompatible solution.

Future Directions

- Optimization:** Fine-tuning VEGF release for different wound types.
- Next Steps:** Expanding to human clinical trials to assess safety and efficacy.



The VEGF-loaded beads not only **support cell growth** but also **promote endothelial cell proliferation**, essential for angiogenesis and wound healing.