

Induction Techniques For Hind Limb Ischemia In Mouse Models

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Introduction

- Hind limb ischemia (HLI) models mimic peripheral artery disease (PAD) in humans.
- Peripheral artery disease (PAD) is a common circulatory disorder characterized by a narrowing of the peripheral arteries, most commonly caused by atherosclerosis.
- In patients with PAD, revascularization is the preferred therapeutic strategy, and the main strategy in therapeutic angiogenesis is to promote the development of new arterial vessels and improve perfusion of ischemic tissue
- mouse models are preferred for their genetic manipulability and cost-effectiveness.

Purpose of the Model

- • Investigate mechanisms of vascular growth.
- • Evaluate gene therapies, cell therapies, and pharmacologic agents.
- • Study diabetic and atherosclerotic complications.

Common Induction Techniques

1. Femoral Artery Ligation (FAL)
2. Excision of the Femoral Artery
3. Electrocoagulation
4. Ablation with Laser or Chemical Agents

Femoral Artery Ligation (FAL)

- Most commonly used method.
- Procedure:
- Anesthetize mouse.
- Make incision in the hind limb.
- Expose and ligate femoral artery at two points.
- Cut between the ligatures.
- Advantages: Simple, reproducible.
- Limitations: May allow collateral blood flow.

Femoral Artery Excision

- Artery is ligated and completely removed.
- Results in more severe ischemia.
- Better model for chronic ischemia.
- Requires more surgical skill.

Electrocoagulation & Other Methods

- Electrocoagulation: Uses electrical current to coagulate the artery.
- Laser or Chemical Ablation: Rarely used due to complexity or variability.
- These methods are less common but may produce specific ischemic patterns.

Evaluation of Ischemia

- Laser Doppler Perfusion Imaging (LDPI)
- Histology & Immunostaining
- Functional tests (e.g., treadmill, limb use scoring)
- Biomarkers and gene expression studies.

Factors Influencing Outcomes

- Mouse strain
- Age, sex, comorbidities (diabetes, obesity)
- Surgical precision
- Post-operative care

Conclusion

- Mouse hind limb ischemia models are vital for vascular research.
- Technique selection depends on research goals and desired ischemia severity.
- Standardization is key for reproducible and translatable results.