

**Hindlimb Ischemia
IACUC Standard Procedure
Effective Date: January 2023**

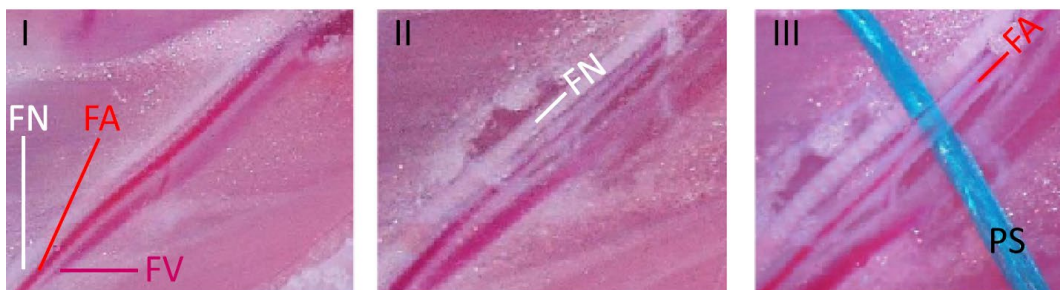
Description of Procedure:

Hindlimb ischemia models are used to study peripheral artery disease and vascular remodeling among other things. One limb per animal may be used for the ischemia model unless scientific justification and subsequent IACUC approval is obtained. The protocol must detail the experimental endpoints, analgesia regime, and monitoring parameters. Animals undergoing this procedure are to be classified as category E animals.

Follow anesthesia and analgesic regimens as outlined in Section I and the [UCSF Rodent Anesthesia Guidelines](#). A surgical plane of anesthesia is required and multimodal analgesia is recommended. Sterile survival surgery needs to be in accordance with the [UCSF Guidelines for Survival Rodent Surgery](#).

Anesthetize the animal, secure the hindlimb and perform aseptic technique. Infiltrate the inguinal area of interest with 0.25% bupivacaine or 0.5% lidocaine (not to exceed 7-8 mg/kg). Additional analgesia will be provided as detailed in Section I. (Analgesic Agents).

1. Make an incision of the skin parallel to the femoral vascular bundle from the medial thigh towards the knee.
2. Dissect the inguinal subcutaneous fat tissue using blunt forceps to reveal the underlying neurovascular bundle containing the femoral artery, vein and nerve.
3. Carefully dissect the superficial fascia layers to visualize the femoral artery and vein and any branches.
4. Isolate the femoral nerve from the bundle bluntly using fine forceps, separate the femoral artery from the vein distal of the superficial epigastric artery.
5. Ligate the femoral artery between the superficial epigastric artery and the saphenous-popliteal bifurcation.
6. For studies requiring permanent occlusion, ligate all intervening branches of the femoral artery between the excision sites or ligate the artery proximal/above of the superficial epigastric artery.
7. Close the incision using suture or wound clips. Recover the animal per [UCSF IACUC Surgery Guidelines](#).



FN: Femoral Nerve; FA: Femoral Artery; FV: Femoral vein; PS: Suture

Femoral ligation site and duration of ischemia: Proximal locations may be more difficult to access, which may increase potential for resultant surrounding tissue injury. If a proximal versus

distal location site for nerve ligation is necessary, the protocol must describe the desired proximal location, provide scientific justification and be approved by the IACUC. The protocol must detail the duration of the ischemia study and the time point at which reperfusion occurs.

Agents: This procedure requires anesthetics and analgesics. All agents administered to animals should be listed in the “Agents” section of RIO.

Potential Adverse Effects: Pain, paresis, gangrene, weight loss, wound infection, and hemorrhage.

References:

N Matthias, S. D .Hunt, J. Wu, R. Darabi; Skeletal muscle perfusion and stem cell delivery in muscle disorders using intra-femoral artery cannulation in mice; *Exp Cell Res.* 2015 Nov 15; 339(1):103-11 (images used)

Yu J, Dardik A. A Murine Model of Hind Limb Ischemia to Study Angiogenesis and Arteriogenesis. *Methods Mol Biol.* 2018;1717:135-143. doi:10.1007/978-1-4939-7526-6_11

Aref Z, de Vries MR, Quax PHA. Variations in Surgical Procedures for Inducing Hind Limb Ischemia in Mice and the Impact of These Variations on Neovascularization Assessment. *Int J Mol Sci.* 2019 Jul 29;20(15):3704. doi: 10.3390/ijms20153704. PMID: 31362356; PMCID: PMC6696155.

T. Kochi, Y. Imai, A. Tekada, Y. Watanbe, S. Mori, M. Tachi, T. Kodema; Characterization of the arterial anatomy of the murine hindlimb: functional role in the design and understanding of ischemia models, *PLoS One* 8 (12)(2013)e84047