Vasodilation in Mature Arterialized Collateral Capillaries Increases Flow in Ischemic Arterial Tree

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Introduction
- Collateral vessel growth is thought to better the prognosis for patients with ischemic disease.
- In animal models lacking preexisting collaterals, collateral capillaries can arterialize and function as collaterals.
- Arterialized collateral capillaries (ACCs) exhibit restored vasodilatory function once they have matured.
- It is not known how vasodilation in ACCs changes flow in the ischemic tree.
- Project goal: test the hypothesis that vasodilation in ACCs increases flow in the ischemic tree.

Spinotrapezius Feed Artery Ligation
The lateral feed artery in the spinotrapezius muscle was ligated to model arterial occlusion and stimulate arterialization of collateral capillaries (see Figure 1).

Laser Speckle Flowmetry
Laser speckle flowmetry (LSF) was used to measure relative changes in flow in the ischemic arterial tree before and after application of smooth muscle-dependent vasodilator, sodium nitroprusside (SNP, 10^{-6} M).

ACCs in Spinotrapezius
Spinotrapezius muscles were resected and stained for presence of smooth muscle actin to verify arterialization of collateral capillaries.

Vasodilation Leads to Comparable Increase in Blood Flow in Ischemic Arterial Tree
Relative changes in blood flow after application of SNP in sham-operated and ligated spinotrapezius vasculatures were quantified to assess the impact of flow from arterialized collateral capillaries on the ischemic arterial tree.

Conclusion
Comparable increase in blood flow in ischemic arterial tree indicates restored function to the arterialized collateral capillaries 21 days post-ligation.

Future Work
Examine similar conditions at an earlier time point (7 days post-ligation) to determine function of non-mature arterialized collateral capillaries.

Optimize laser speckle imaging protocol to measure changes in flow in smaller diameter vessels (e.g. in the arterialized collateral capillaries).

References
[3] Shpyrko Research Group, UCSD.

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