Background: Blood proteins may regulate the remodeling process of vein grafts (VGs) used to bypass occlusive lower extremity arteries. This study assessed the associations between blood protein levels and later VG remodeling and patency.

Methods: A prospective study was performed on 37 males undergoing autogenous VG placement. Computed tomography scans were performed at postoperative 1 week, 1 month, and 6 months to obtain VG luminal cross-sectional areas (CSA) and quantify VG remodeling at 1-mm intervals. Computational fluid dynamics simulations provided wall shear stress (WSS) and oscillatory shear index (OSI) data. Correlations between CSA changes in a period and the WSS or OSI at the beginning of the period were assessed for each VG considering spatial autocorrelation between slices of the same VG. 28 plasma proteins were measured using the LumineX xMAP platform or an analyzer (C-reactive protein [CRP]) prior to operation and after the first postoperative year.

Results: Six VGs failed within 1 year after implantation. The level of etoxacin (P = 0.026) and interleukin (IL)-2 (P = 0.009), or CD40L (P = 0.031) at 1 week and CRP (P = 0.032), IL-2 (P = 0.047), s-VCAM-1 (P = 0.037), or soluble intercellular adhesion molecule-1 (P = 0.047) at 1 month were significantly associated with VG failure within 1 year. Preoperative IL-6 level was associated with binary lumens CSA increase or decrease from 1 week to 1 month (P = 0.041). A higher postoperative 2 hour IL-1b (P = 0.031) or 1 day IP10 (P = 0.027) level was associated with a weaker positive correlation between 1 week and 1 month VG remodeling and WSS at 1 week. A higher postoperative 1 week CRP level was associated with a stronger negative correlation between 1 week and 1 month VG remodeling and OSI at 1 week (P = 0.046). A higher preoperative IP10 (P = 0.030) or E-selectin (P = 0.04) level at 1 day, a lower IL-1b (P = 0.016) or 1 day E-selectin (P = 0.015) level at 1 day, and a higher postoperative level of CRP (P = 0.004) or IL-17 (P = 0.024) or IL-7 (P = 0.022) level was associated with a weaker positive correlation between 1 month and 6 months VG remodeling and OSI at 1 month.

Conclusions: Levels of early inflammatory blood proteins after VG implantation are predictive of VG failure within 1 year. A higher inflammatory blood protein level may predict a subsequent weaker positive association between VG remodeling and initial OSI or a subsequent stronger negative association between VG remodeling and initial OSI within 6 months of VG implantation.


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Methyl Transferase Inhibitor 5-Azacytidine Suppresses Experimental Abdominal Aortic Aneurysms

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Background: Increased vascular DNA methylation is present in disease states including abdominal aortic aneurysms (AAA). The impact of dysregulated DNA methylation on aneurysm pathogenesis, however, remains uncertain. We evaluated the influence of 5-azacytidine (AZA), a methyl transferase inhibitor, on experimental AAA initiation and progression.

Methods: AAAs were induced in male C57BL/6J mice via intra-aortic porcine pancreatic elastase infusion. AZA or vehicle was administrated intraperitoneally starting 1 day before (prophylactic, 2 mg/kg), or 4 days following (therapeutic, 1 or 2 mg/kg), elastase infusion and continuing daily through 14 days. AAA development and progression were evaluated by real ultrasound aortic diameter measurements and histopathology at humane killing.

Results: Time-dependent postelastase aortic diameter enlargement was markedly reduced in mice receiving prophylactic AZA treatment. A substantial delay in AAA onset was noted as well. While therapeutic AZA tended to mitigate further aneurysmal enlargement at either dose, a significant reduction was noted only in the 2 mg/kg group at 14 days. Histopathological assessment. AZA was associated with marked attenuation of characteristic aneurysmal pathologic features including medial elastin and smooth muscle destruction, leukocyte accumulation, and neoangiogenesis in all groups.
Conclusions: AZA treatment attenuates aneurysm development and progression in the intra-aortic porcine pancreatic elastase infusion AAA model. Pharmacologic strategies effective at limiting or reducing DNA methylation may have translational applications in the medical management of AAA disease.

Methods: Hydrogel (0.5/C2) was injected in the arm and foot, and oxygen-in vivo performance with inclusion criteria of peripheral arterial disease oxygenation between tcpO2 and Lumee was assessed following sensor placement.

Results: Eleven patients had 148 occlusion modulations over 199 days. The mean score of 140 modulations was 56.9 ± 24.6% (Lumee) and 94.7 ± 9.2% (tcpO2) (R = 0.81). In the foot, modulation was 63.4 ± 22.7% (Lumee) and 80.4 ± 15.5% (tcpO2) (R = 0.79). No injection related adverse events occurred.

Conclusions: Occlusion-related changes in tissue oxygen can be detected by both tcpO2 and the Lumee sensor, which strongly correlate in both the arm and foot. This pilot phase study supports expansion of the trial. The Lumee sensor shows promise for future evaluation of tissue oxygenation in PAD patients, which could be used to assess changes in tissue oxygenation over time and following revascularization.