

Histochemical and Stereological Characterization of Vascular Remodeling with Age

Abstract:

The incidence of venous thrombosis is approximately 1:1000 per year in men and women up to 50 years of age and increases exponentially to 1:100 per year in ages > 50. The causes of this age related risk for venous thrombosis is unknown. The vein wall is composed of three layers: the tunica intima, tunica media, and tunica externa (adventitia). In a sample of saphenous vein, we noticed intimal thickening with smooth muscle cell proliferation, increased intimal mucopolysaccharide, as well as increased fibrosis of the intima and media, which appeared greater in older individuals. Similar findings noted in arteries have been associated with risk for atherosclerosis (ASCVD). The presence of ASCVD is associated with an increased risk for venous thrombosis. Thus, in this study we apply a morphometrical approach to address the hypothesis that vascular remodeling of venous structure correlates with age as a first step to unraveling the relationship between ageing and venous thrombosis.

For this study, paraffin sections of saphenous veins, a by-product of coronary bypass grafting, from 86 patients between the ages of 45-91 were stained with various histochemical stains including Movat pentachrome, picosirius red and alcian blue/aldehyde fuchsin elastic stain. Bright field light microscopy and linearly polarized light analysis will be used to collect digital images, followed by computer-assisted image analysis using Universal Imaging MetaMorph, MicroBrightfield Stereo Investigator software and Adobe Photoshop. Stereological methods will be employed to ensure random sampling parameters and statistical significance.

Preliminary results suggest a correlation between age and neo-intimal thickening, increased mucopolysaccharide content of the intima, as well as increased fibrosis in the intima and media. If our morphometric assessment supports a strong association between the changes we have observed and aging the next steps in the study will be to investigate the venous endothelial phenotype as a function of aging.