

DEGREE OF DEGRADED COLLAGEN IN ARTERIOVENOUS FISTULA VESSELS IN CHRONIC KIDNEY DISEASE RAT MODEL

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Introduction: The arteriovenous fistula (AVF) is vital for patients with stage 5 chronic kidney disease (CKD) to receive hemodialysis. Unfortunately, AVFs often fail to mature to be usable for hemodialysis. Collagen may play an important role in AVF maturation. Degradation and re-synthesis of medial collagen fibers are likely needed for the AVF vessel wall to dilate, in order to achieve high blood flow for hemodialysis, as well as to sustain such state thereafter. We hypothesized that the toxic CKD milieu disturbs the balance of collagen metabolism in the AVF setting, thereby contributing to maturation failure.

Methods: Fluorescent-tagged collagen hybridizing peptides (CHPs) were used to detect degraded collagen fibers in our CKD-AVF rat model. Thin sections of the formalin-fixed, paraffin-embedded AVF tissues (harvested 1 week after AVF creation surgery) were probed with the CHPs. CHP signals, which indicated the degraded collagen fibers, were visualized via confocal microscope. Signal intensities were quantified. A 2-paired, heteroscedastic, t-test was used for statistical analysis.

Results: The arteries were from 4 conditions: healthy-pre-surgical, healthy-AVF, CKD-pre-surgical, and CKD-AVF (Fig. 1A). We observed stronger CHP signals in the healthy-AVF artery than in the healthy-pre-surgical artery, suggesting that surgery may cause collagen degradation. Stronger CHP signals were observed in the CKD-pre-surgical artery compared to the healthy-pre-surgical artery, suggesting that CKD may cause collagen degradation. The CKD-AVF artery also showed stronger CHP signal than the healthy-pre-surgical artery, but its CHP signal was similar to the healthy-AVF or CKD-pre-surgical artery (Fig. 1B).

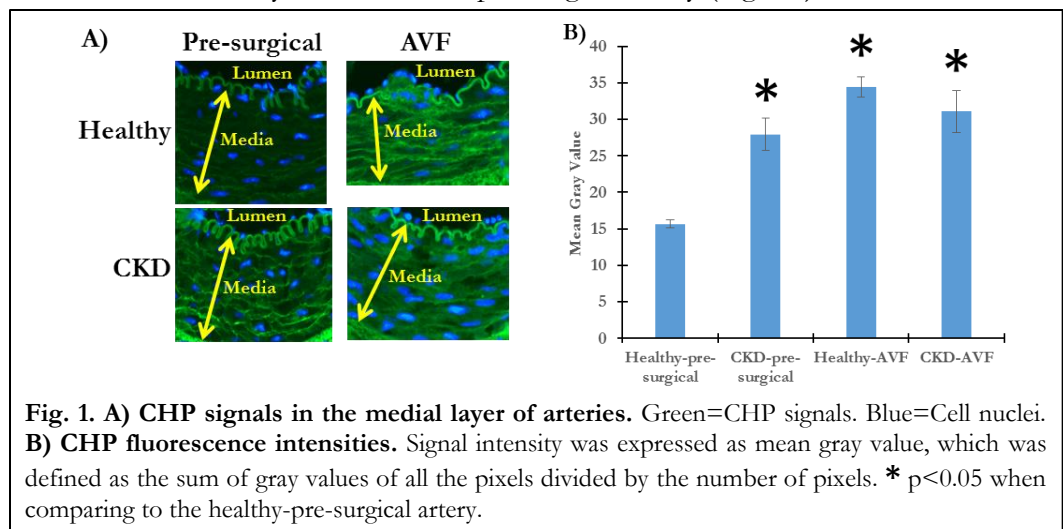


Fig. 1. A) CHP signals in the medial layer of arteries. Green=CHP signals. Blue=Cell nuclei. **B) CHP fluorescence intensities.** Signal intensity was expressed as mean gray value, which was defined as the sum of gray values of all the pixels divided by the number of pixels. * $p < 0.05$ when comparing to the healthy-pre-surgical artery.

Conclusion: CKD increased medial collagen fiber degradation in pre-AVF surgical arteries. CKD could, in turn, affect how the collagen fibers remodel in the AVF vessels after creation. We will continue to investigate the interplay of both the CKD milieu and AVF settings on collagen fiber degradation in the artery and the vein.

