Systemic Markers of Bone Health in Aging Kidney Disease

In previous research at Indiana University School of Medicine, aging rats with chronic kidney disease (CKD) demonstrated higher parathyroid hormone (PTH) levels, cortical bone porosity, and osteoclast-covered bone surfaces compared to young rats with CKD. However, it is unclear if systemic markers, those usually measured in a clinical setting, are associated with these skeletal changes. This study aimed to evaluate systemic markers, including bone turnover and oxidative stress, and their correlation with tissue-specific markers of bone health.

To investigate this, serum assays were employed to measure serum calcium, phosphorus, 8-hydroxy-2'-deoxyguanosine (8-OHdG), tartrate-resistant acid phosphatase (TRAcP 5b) and pro-collagen type 1 N-terminal propeptide (P1NP).

Preliminary findings revealed that phosphorus levels were elevated due to aging and due to CKD in the young rats; however, there was no impact of CKD in the aging rats. Calcium levels were not significantly different across groups. While oxidative stress, measured by 8-OHdG, was significantly elevated in CKD rats regardless of age with no age-dependent differences. Ongoing studies of serum TRAcP 5b, a systemic marker of osteoclasts, and P1NP, a systemic marker of bone formation, are expected to show higher osteoclasts and altered bone formation in aging CKD rats similar to the tissue-specific histological data already generated.

These results suggest that systemic markers of CKD do not completely explain the bone phenotype in aging as phosphorus had a CKD effect only in young and oxidative stress was not different due to aging. . These data indicate that systemic markers of CKD may not directly correspond with bone alterations highlighting the need to further understand the CKD bone phenotype in aging.