MSCI Independent Project, 1 course credit

**Project:** Evaluation of association between chronic kidney disease (CKD) and heart failure with preserved ejection fraction (HFpEF) using echocardiographic strain parameters to evaluate cardiac mechanics.

**Scope:** Using the Northwestern University HFpEF program, a systematic, prospective observational trial, we will evaluate the 299 patients included in the cohort with complete renal function data. For this clinical trial, patients were recruited after hospitalization for heart failure and subsequently followed up in a specialized HFpEF program clinic where their eligibility was confirmed. Baseline clinical characteristics were obtained as well as comprehensive 2-dimensional echocardiography with Doppler and tissue Doppler imaging which will be used for this study. Patients were seen at least every 6 months (or more frequently if clinically indicated) and antecedent hospitalizations were reviewed at every clinic appointment. Participants and/or their proxies were contacted to determine vital status and deaths were verified through query of the Social Security Death Index. We will stratify the cohort based on renal function (the exposure variable) using the creatinine based CKD-Epi equation.

**Goals/measured outcomes**:

1. Evaluate the association between echocardiographic characteristics in patients with HFpEF with and without CKD. In particular, we will evaluate left ventricular (LV) global longitudinal strain, longitudinal right ventricular free wall strain, left atrial (LA) reservoir, conduit and booster strains in HFpEF patients by presence or absence of CKD.
2. Evaluate clinical outcomes (HF hospitalization and death) by presence or absence of CKD in HFpEF patients.
3. Submit a manuscript including the above goals/outcomes to a cardiology journal

**Research proposal:**

Due to a variety of factors, chronic kidney disease (CKD) and heart failure with preserved ejection fraction (HFpEF) are becoming more prevalent. Whether due to a common etiology or arising independently, CKD and HFpEF are often coincident in patients. Furthermore, the patient population with both problems is expanding. Importantly, renal dysfunction has been associated with worse outcomes and higher mortality in HFpEF patients. The trajectory of renal dysfunction may also contribute to outcome differences. Despite the association between CKD and adverse outcomes, the interplay between CKD, clinical characteristics, and cardiac structural and functional abnormalities in HFpEF, particularly indices of cardiac mechanics, have not been well described.

Recent literature suggests that indices of cardiac mechanics (e.g., speckle tracking echocardiography strain parameters) are superior to conventional echocardiographic measures for evaluation of subclinical cardiac disease and abnormalities in cardiomyocyte calcium homeostasis. Furthermore, abnormalities in LV global longitudinal systolic strain occur in HFpEF despite a normal ejection fraction. HFpEF has also been shown to be associated with abnormalities in left atrial mechanics.

Despite the growing body of literature evaluating speckle tracking in HFpEF patients, there has been limited evaluation of speckle tracking parameters in patients with concurrent CKD. Therefore, we aim to better characterize the association between CKD and abnormalities in cardiac structure and function in HFpEF. We hypothesize that presence of CKD is associated with worse cardiac mechanics in HFpEF independent of other comorbidities, cardiac structural parameters, and indices of volume overload.

**Mentor:** XXXX