Background: Although venous congestion is a hallmark of heart failure (HF)—and one that is associated with worse renal function and poor outcomes—the deleterious impact of the congested state on abdominal hemodynamics, gut epithelium (particularly the intestinal Na⁺/H⁺ exchanger [NHE3]), the gut microbiome, and markers of intestinal barrier integrity have not been fully explored. Further understanding of these mechanisms may offer an exciting avenue for therapeutic intervention in patients with HF, particularly right-sided heart failure (RHF).

Methods: In a prospective pilot study of 40 consecutive hospitalized ADHF patients, we performed echocardiography and blood sampling. We are currently in the process of conducting an ongoing, prospective, single-center study of consecutive ADHF patients (and non-HF controls) admitted to Northwestern Memorial Hospital. Study procedures (to be completed within 48 hours of admission) include echocardiography with quantitation of right ventricular (RV) structure/function, hemodynamics, and mechanics (speckle-tracking); non-contrast abdominal MRI with liver/kidney imaging and 4D flow analysis of the splanchnic vessels; arterial tonometry; blood/urine sampling; and stool sampling for microbiome and colonocyte extraction for analysis of NHE3. Circulating biomarkers of intestinal barrier function (I-FABP, plasma citrulline, and plasma endotoxins) will also be measured. All measurements are repeated at 30 days after hospitalization. In our study, RHF is defined as the combination of RV fractional area change < 35% and estimated right atrial pressure > 5 mmHg on echocardiography. Once all data have been collected, we will compare the aforementioned metrics among patients with vs. without evidence of RHF, and vs. non-HF controls.

Results: In our pilot study (n=40), mean LVEF=33±15%, and 58% had evidence of RHF. Biomarkers of intestinal integrity in our pilot study are in the process of being measured. In our ongoing study, we have enrolled n=9 patients with ADHF and n=2 controls as of April 1, 2017, with an enrollment target of n=100 ADHF and n=25 non-HF controls.

Conclusions: The VICTORY study will provide insight into the relationship between RHF, splanchnic hemodynamics, and the intestinal microenvironment in the setting of ADHF.