Myocardial T2 star (T2*) relaxation time is a well-validated and widely used noninvasive imaging biomarker to follow the disease course in cardiac hemochromatosis. T2* measures decay of transverse magnetization (iron causes faster decay). Myocardial T2* falls with increasing iron deposition, heralding cardiac toxicity and left ventricular failure. Myocardial iron overload is present when T2* is <20 msec in the setting of reduced left ventricular ejection fraction (LVEF). Congestive heart failure (CHF) usually occurs only when myocardial T2* is <10 msec.

Case
A 28-year-old white male with hypoplastic anemia managed with repeated blood transfusions since age 5 developed systemic iron overload with liver involvement and polyendocrinopathy. He was started on deferoxamine for iron chelation. An echocardiogram done at that time showed normal left ventricular function. However, CHF ensued over time, and repeat echocardiogram showed moderate biventricular failure with global hypokinesis and a restrictive filling pattern.

Cardiac magnetic resonance (CMR) imaging confirmed biventricular failure with a LVEF of 33% and right ventricular ejection fraction (RVEF) of 35%. T2* was reduced (8 msec) suggesting severe myocardial iron deposition, with no late gadolinium enhancement to suggest scarring or infarct. His deferoxamine regimen was intensified and deferiprone was added for iron chelation. His clinical course was complicated by multiple admissions for decompensated CHF and atrial arrhythmias. He was treated with guideline-based medications for his systolic dysfunction, warfarin for anti-coagulation and careful titration of diuretics. Prednisone and cyclosporine were continued for his immune-mediated anemia. Because of his persistently high ferritin values, the patient also underwent periodic phlebotomies.

Repeat CMR scans done after 3 and 7 months were unchanged for cardiac function and T2* values. An echocardiogram done after the patient spent 9 months on the above regimen showed improved biventricular function. CMR done at this point revealed a dramatic improvement in his cardiac function, with LVEF of 49% and RVEF of 52%. Interestingly, there was still no change in T2* value.

Discussion
Development of CHF caused by myocardial iron overload in transfusion-dependent anemias heralds a poor prognosis. Longitudinal studies in patients with secondary hemochromatosis and CHF who undergo iron chelation with deferoxamine and deferiprone have shown improvement in LVEF, and this is tracked well by improvements in T2*. To the best of our knowledge, this is the first reported case showing improvement in CHF and LVEF, despite no change in T2*. It is possible that iron deposition acts as the initial insult, which then sets off a cascade of inflammation/injury that is independent of further changes in iron deposition. The anti-inflammatory therapy, especially cyclosporine, could have played a role in reversing cardiac dysfunction in this patient. This case highlights the need to explore other putative mechanisms of injury and therapy in cardiac hemochromatosis.

REFERENCES