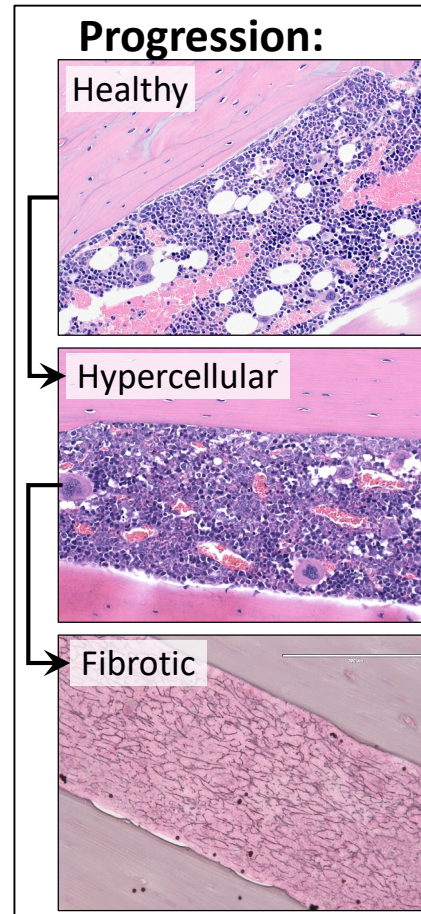# MRI Assessment of a Mouse Model of Myelofibrosis
Tanner Robison, University of Michigan

Myelofibrosis Overview

- 1 per 100,000 persons

- Median Age: 65 years

- Median Survival: < 6 years

- Characterized by:
  - Progressive bone marrow fibrosis
  - Hepatosplenomegaly
  - Dysregulated JAK-STAT signaling
  - Severe symptoms

Progression:

Healthy

Hypercellular

Fibrotic

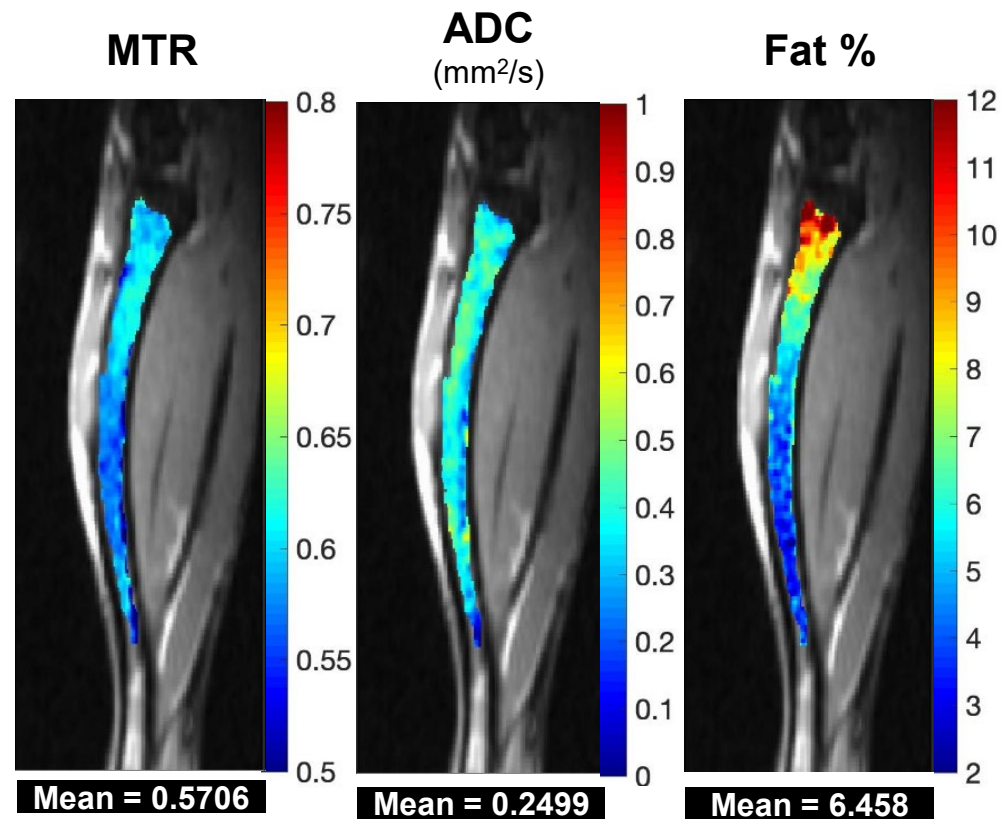## Clinical Assessment Techniques are Inadequate

- Bone Marrow Aspiration
  - Gold-Standard for measuring bone marrow fibrosis
  - Extremely painful
  - Sampling error

- Spleen Volume
  - Used to measure disease burden.
  - Doesn't correlate to bone marrow fibrosis
  - Single measurement for systemic, heterogeneous disease

Characterizing the bone marrow with MRI
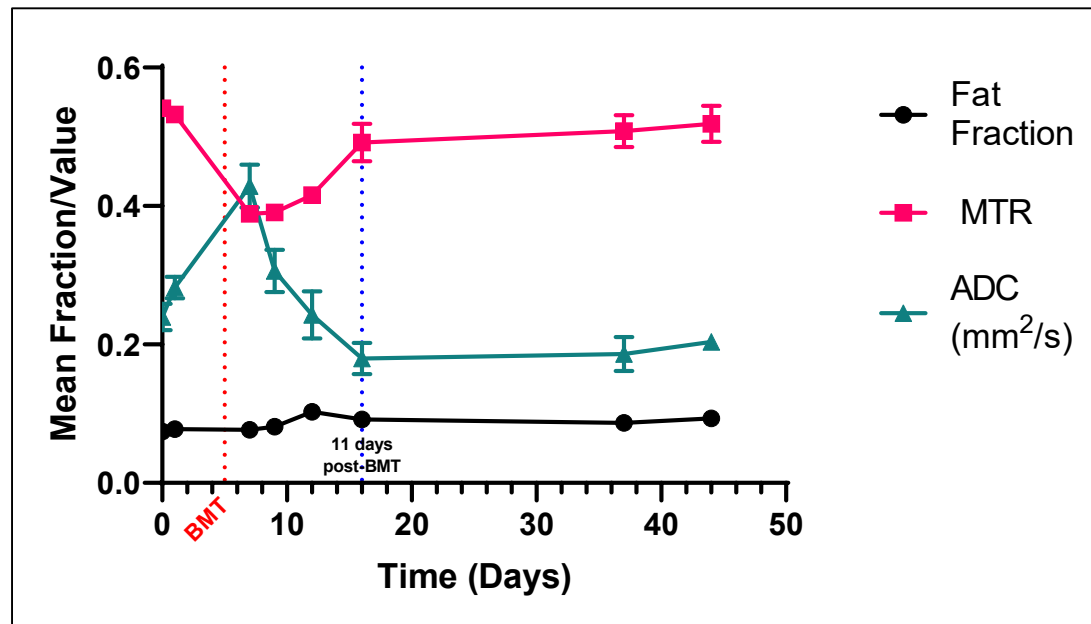
MRI Metrics for Bone Marrow Assessment

- Fat Percent—Dixon technique

- Apparent Diffusion Coefficient
  - Measure of water diffusion

- Magnetization Transfer Ratio
  - Measure of macromolecular structure, including fibrosis

Healthy Bone Marrow

MTR — Mean = 0.5706

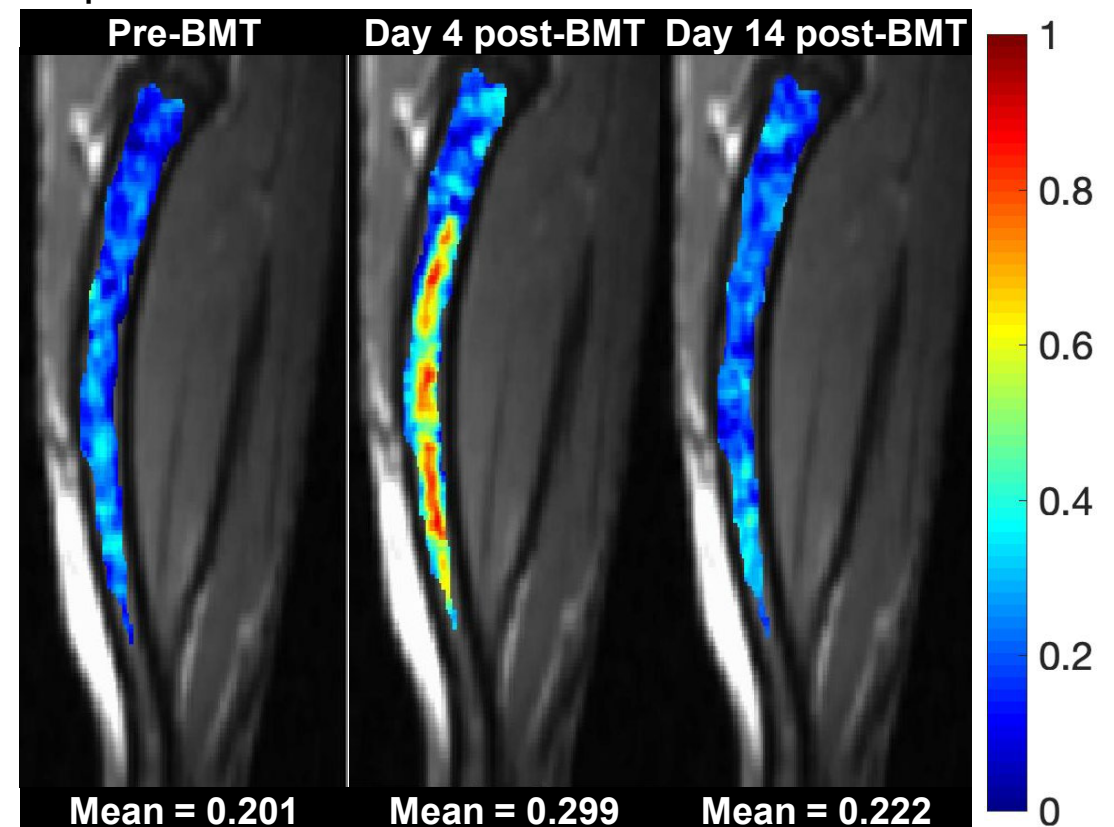ADC (mm^2/s) — Mean = 0.2499

Fat % — Mean = 6.458

MRI enable monitoring of changes in the bone marrow
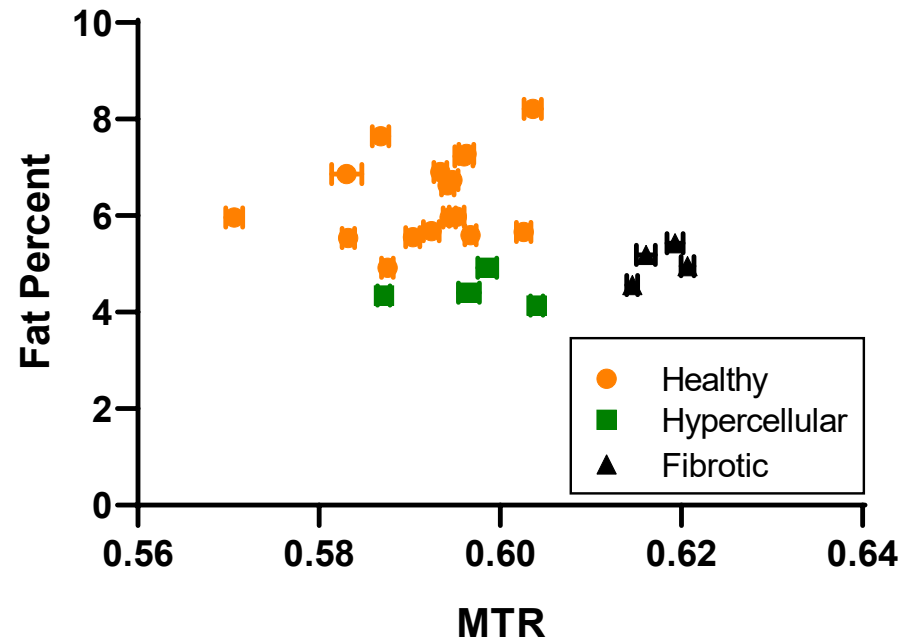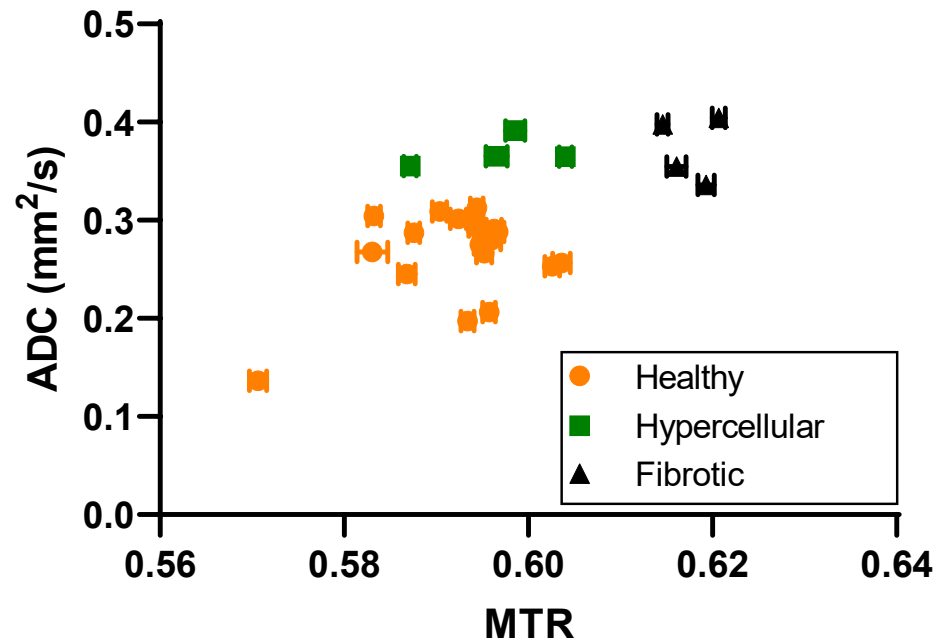
Healthy Bone Marrow Transplant

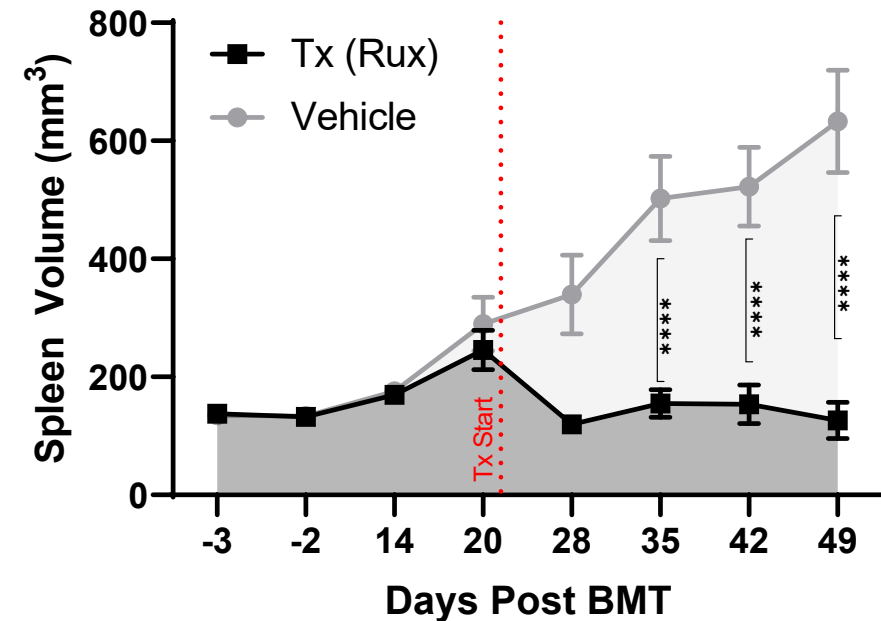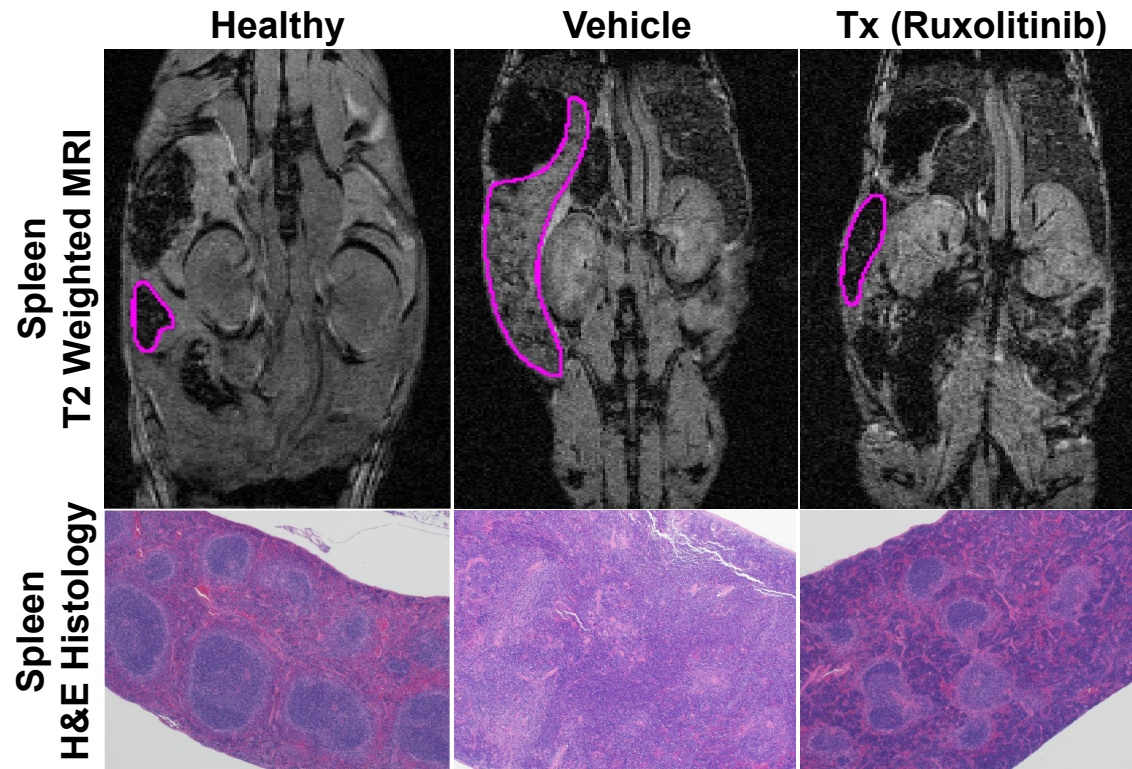Mean MRI metric trajectory for Balb/c mice transplanted with healthy bone marrow (n=5).

Representative ADC

Bone marrow states cluster with MRI metrics

Ruxolitinib reduces spleen volume in mouse models of myelofibrosis

Healthy   **Vehicle**   **Tx (Ruxolitinib)**

Spleen T2 Weighted MRI

Spleen H&E Histology

Tx (Rux)
Vehicle

Spleen Volume (mm^3)

Tx Start

Days Post BMT

**** indicates $p < 0.0001$ by two way ANOVA with multiple comparisons with Bonferonni correction