Automated Segmentation and Quantification Cardiac MR
Hypertrophic Cardiomyopathy

- 1 in 500 individuals have hypertrophic cardiomyopathy (HCM)
- While the majority of patients are asymptomatic, serious consequences are experienced in a subset of affected individuals
- Currently known clinical risk markers are only modestly effective at identifying those at highest risk for severe adverse cardiac event such as cardiac death or heart failure
- Cardiac magnetic resonance (CMR) for assessment of left ventricular mass, volumes and replacement scarring is critical to risk stratification in HCM patients
- **Technical Problem:**
  - Segmentation is currently performed manually by experienced cardiologists which is
    - Time consuming (150-200 images per patient)
    - Subject to variability among clinicians
Highly irregular left ventricle wall thickness in HCM patients poses segmentation challenges

Patient A with Hypertrophic Cardiomyopathy

Patient B with Hypertrophic Cardiomyopathy

Patient C with normal heart function
Novel cardiac magnetic resonance segmentation techniques

Solution: UVA researchers have developed methods for automated segmentation of cardiac magnetic resonance to improve risk stratification in individuals with hypertrophic cardiomyopathy. Data from a 2674-patient Hypertrophic Cardiomyopathy Registry was used to train the neural network model.

Comparison of the ground truth contour (blue) to the trained neural network model output (yellow)
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- Title: Automatic quantification of cardiac MRI for hypertrophic cardiomyopathy with GPU
- Provisional Patent Application filed March 7, 2018