Genotype-Dependent and -Independent Calcium Signaling Dysregulation in Human Hypertrophic Cardiomyopathy

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Calcium is important for regulating contraction and electrical signals in the heart. When the amount of calcium or its movement across different compartments with the cardiac cell are altered, this can result in muscle thickening, cardiac dysfunction, and abnormal heart rhythms. SHaRe investigators from the University of Michigan recently reported a comprehensive study of the movement of calcium ions in human heart tissue from patients with hypertrophic cardiomyopathy. They found that the amount of calcium taken up into an important calcium storage unit (the sarcoplasmic reticulum) in the cell was lower in hearts from patients with HCM compared to normal hearts. This finding was true for all HCM heart samples, regardless of whether or not they had a sarcomere gene mutation. They also found increased levels and activation of a calcium-sensing molecule called Calcium/calmodulin-dependent protein kinase, or CaMKII, in HCM hearts – but only in those patients that had a sarcomere gene mutation. An important implication of their findings is that mishandling of calcium in heart cells from patients with HCM may be a potential cause of hypertrophy and arrhythmias. In addition, they were able to identify 2 potential molecules which may be targets for new therapies to treat HCM.