

Pathogenesis of depression and anxiety evidenced by MRI in animals experiencing heart disease



Amanda M. Dossat^{1,2}, Marcos A. Sanchez-Gonzalez³, Andrew P. Koutnik¹, Stefano Leitner¹, Edda L Ruiz¹, Brittany Griffin¹, Jens T. Rosenberg⁴, Samuel C. Grant⁴, Francis D. Fincham⁵, Jose R. Pinto¹, Mohamed Kabbaj^{1,2}
1. Biomedical Sciences, FSU; 2. Neuroscience, FSU; 3. Division of Clinical and Translational Research, Larkin Hospital, Miami; 4. NHMFL, FSU; 5. Family Institute, FSU



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Cardiovascular dysfunction is associated with mood disorders, such as anxiety and depression. However, the mechanisms linking cardiovascular dysfunction with behavioral features of mood disorders remain poorly understood.

Here, a mutation was used to investigate the abnormal thickening of the heart muscle (human hypertrophic cardiomyopathy or HCM) together with behavioral, biochemical and MRI techniques. For MRI analysis, a 11.75-T magnet was used for *ex vivo* volumetric measurements of mood-related brain regions. High resolution (50- μ m) 3D acquisitions were employed, and data were co-registered. Brain regions were segmented and compared to controls (Figures 1 and 2).

Results showed that aged HCM females displayed anxiety- and depression-like behaviors. Aged HCM females exhibited reduced volumes in mood-related brain regions, and reduced signaling of key hippocampal proteins such as brain-derived neurotrophic factor.

MRI analyses, together with neurochemical and behavioral indices, show that mood disorders are more common in older subjects for which the prolonged systemic stress of HCM is central to the development of these disorders. This study highlights the importance for clinicians to assess and treat mood disorders within the HCM population.

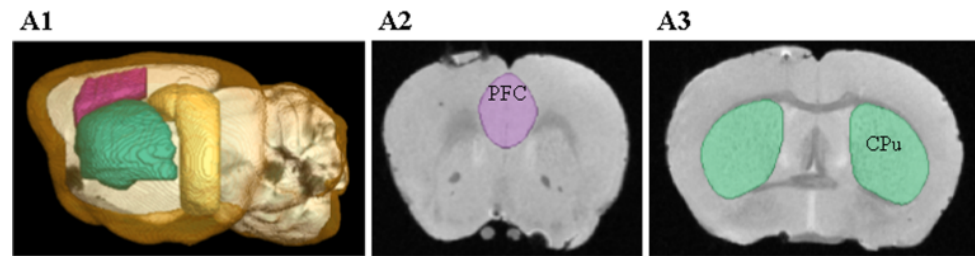


Figure 1: (A1) 3D rendering of analyzed brain regions from 50- μ m MRI. (A2) Coronal views of prefrontal cortex (PFC), and (A3) caudate putamen (CPu)

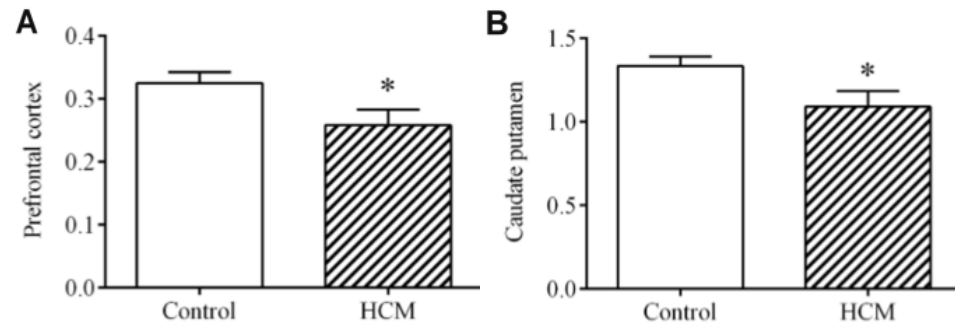


Figure 2: (A) Volume index of the PFC and (B) CPu were significantly smaller in HCM females. Mean \pm SEM. * $P < 0.05$.

Facilities: MagLab and 11.75-T magnet at the FAMU-FSU College of Engineering.

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