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LEFT VENTRICULAR REMODELING IN RESPONSE TO PRESSURE LOAD: CHANGES IN MYOCARDIAL FIBER ARCHITECTURE AS ASSESSED BY DIFFUSION MRI

ACC Poster Contributions
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Background: Diffusion spectrum MRI (DSMRI) was used to study myocardial fibre structural changes in response to pressure load.

Method: Dahl salt sensitive (HTN) rats (n=22) were fed salt diets to produce hypertension over 6-10 weeks. Dahl salt resistant (CTRL) rats (n=14) were controls. They had echo (baseline & sacrifice), serial blood pressure (BP) & invasive hemodynamics. DSMRI studies were performed on selected ex vivo hearts.

Results: HTN had higher LV pressure (173±35 vs 123±20 mmHg, p<0.001), DP/DT (8021± 348 vs 6434±1342, p=0.003) & heart mass/body weight (420±46 vs 305±36 mg/gm, p<0.001). HTN had greater relative wall thickness (0.89±0.29 vs 0.68±0.08, p=0.004), but similar ejection fraction & fractional shortening. Panel A shows 3D heart reconstruction. Right handed helical fibres (sub endocardium) = pink, left handed helical fibres (sub epicardium) = yellow & transverse fibres (mid wall) = blue. Panel B shows graphs quantifying fibre distribution (Y axis = number of fibres; X axis = helical angle of fibres relative to a set reference oriented along LV long axis & sampled at mid ventricle). Compared to CTRL, HTN had increase in mid wall transverse fibre (helix angle -90° to 90°) & decrease in mid wall longitudinal fibre (helix angle -135° to -180°, 135° to 180°).

Conclusion: An increase in mid wall transverse fibres & decrease in longitudinal fibres of LV architecture is seen with pressure loaded LV remodeling. This may reflect an adaptive response to altered wall stress distribution with pressure load.