

Temporal changes in left ventricular mechanics: impact of bed rest and exercise

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BACKGROUND The use of more sensitive and specific echocardiographic techniques such as speckle tracking imaging may address the current limitations of conventional cardiac imaging techniques to provide insight into the extent and time course of cardiac deconditioning following spaceflight or head-down tilt bed rest (HDTBR). **METHODS** Speckle tracking assessment of longitudinal, radial, and circumferential strain and twist was used to evaluate the impact of 70 days of HDTBR (n=7) and HDTBR + exercise (n=11) on temporal changes in LV mechanics. Echocardiograms were performed pre (BR-2), during (BR31, 70), and following (BR+4hr) HDTBR. Repeated measures ANOVA was used to evaluate the effect of HDTBR on cardiac variables in control and exercise subjects. **RESULTS** After sedentary HDTBR, longitudinal ($-19.0 \pm 1.8\%$ vs. $-14.9 \pm 2.4\%$) and radial ($15.0 \pm 1.9\%$ vs. $11.3 \pm 2.2\%$) strain and twist ($18.0 \pm 4.0^\circ$ vs. $17.0 \pm 3.6^\circ$) were significantly impaired. In contrast, exercise preserved LV mechanics, and there were non-significant improvements from BR-2 to BR70 in longitudinal strain ($-18.7 \pm 1.5\%$ vs. $-20.4 \pm 2.7\%$), radial strain ($13.2 \pm 2.4\%$ vs. $14.2 \pm 1.6\%$), and twist ($16.3 \pm 3.6^\circ$ vs. $18.6 \pm 5.9^\circ$). **CONCLUSIONS** Using speckle tracking echocardiography provides important new insights into temporal changes in LV mechanics during disuse and exercise training.