

**METHODS:** 10 min resting HRV data and heart rate (HR) were measured in college aged students (n=17,9F age=20±1.7yrs, BMI 23±3kg·m<sup>2</sup>) at 300m in Oxford Ohio,1900m, and 4500m above sea level in Nepal. 1 min average oxygen saturation (pO<sub>2</sub>) was measured at 4500m via fingertip pulse oximetry. Root-mean-squared of the successive differences (RMSSD ms), percent of successive R-R intervals varying>50ms (pNN50), and Poincare- plot SD1(ms) and SD2(ms) describe time variation between adjacent R-wave-to-R-wave intervals. Low-Frequency and High-Frequency Power Spectral Analysis (LFP,HFP), which describe the balance of sympathetic and parasympathetic drive to the heart, were other HRV variables of interest.

**RESULTS:** RMSSD and pNN50 were highly correlated (r=0.90). Most HRV variables responded similarly to altitude, decreasing at 1900m and partially returning towards baseline as the trek continued to 4500m. Initial graphical analysis revealed an apparent relationship between log(RMSSD) and heart rate at 1900m and 4500m, though the relationship was less pronounced at 300m. Linear mixed effects modeling of log(RMSSD) provided evidence of a fairly strong interaction between altitude and HR (p=0.005 for 1900m vs. 300m; p=0.002 for 4500m vs. 300m). This model predicts that for lower HR (e.g. 75 bpm) RMSSD increases as a function of altitude, while at median (82.5 bpm) and higher (90 bpm) HR, RMSSD is lower at 1900m than at the other two altitudes. Oxygen saturation mean was 87±3 at 4500m.

**CONCLUSIONS:** Evidence of a substantial altitude by HR interaction on log(RMSSD) suggest that HRV is sensitive to an altitude stressor, but also that subjects with lower resting heart rates at altitude presented with more favorable HRV.

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### Ageing Alters Right Ventricular But Not Left Ventricular Myocardial Mechanics

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(No relevant relationships reported)

**Introduction:** Ageing is associated with a progressive stiffening of the pulmonary vasculature that causes an increase in pulmonary vascular resistance and a decrease in compliance. It remains unclear if right ventricular myocardial mechanics adapt in response to age-related remodeling in the pulmonary vasculature.

**PURPOSE:** Accordingly, this study examined global and transmural longitudinal myocardial tissue deformation (strain) in a cohort of healthy young and middle-aged men to characterize age-related changes in myocardial tissue mechanics.

**METHODS:** Two-dimensional echocardiography was used to measure left (LV) and right (RV) ventricular strain in 10 young men (YM; Age: 27 ± 2yr, BMI: 23.2 ± 2.4m<sup>2</sup>) and 10 middle aged men (MAM; Age: 61 ± 7yr, BMI: 25.9 ± 3.2m<sup>2</sup>). A transmural strain gradient was calculated as the difference between endocardial and epicardial strain as an index of regional non-uniformity.

**RESULTS:** Systemic blood pressure was similar in young and middle aged men (YM: 118 ± 4mmHg vs MAM: 122 ± 4mmHg, p > 0.05), while echocardiographic estimates of pulmonary blood pressure via the tricuspid regurgitation pressure gradient were greater in middle aged men (YM: 17 ± 4mmHg vs MAM: 25 ± 6mmHg, p < 0.05). LV and RV dimensions were similar (p > 0.05) in young (LV EDV: 118 ± 19mL; RV EDA: 18.3 ± 2.2cm<sup>2</sup>) and middle aged men (LV EDV: 118 ± 17mL; RV EDA: 17.3 ± 3.8cm<sup>2</sup>). LV global longitudinal strain (YM: -17.5 ± 1.0% vs MAM: -18.0 ± 1.0%, p > 0.05) was similar in young and middle aged men, while RV global longitudinal strain (YM: -27.3 ± 1.8% vs MAM: -22.5 ± 1.7%, p < 0.01) was lower in middle aged men. LV transmural strain gradient (YM: -4.6 ± 0.4% vs MAM: -4.6 ± 0.4%, p > 0.05) was similar in young and middle aged men, while RV transmural strain gradient (YM: -1.1 ± 0.4% vs MAM: -5.5 ± 0.5%, p < 0.01) was higher in middle aged men.

**CONCLUSION:** Ageing was associated with global and regional alterations in RV myocardial mechanics, while LV function was unaltered. Specifically, ageing resulted in a decrease in RV global strain and an increase in transmural non-uniformity (i.e., increased transmural strain gradient). Differences in LV and RV myocardial architecture and age-related changes in the pulmonary vasculature are possible explanations for opposing LV and RV functional remodeling in response to ageing.

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### Risk Factors of Hypertension Among Different Adult Groups in the Tujia-nationality Settlement of China Xiaoli

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relationships reported)

**PURPOSE:** Hypertension as a well-known major independent risk factor for cardiovascular disease and stroke has had great impact on health outcomes. However, few studies focus on the different risk factors of hypertension among various age groups in the Tujia-Nationality settlement of China. The study aimed to investigate the different risk factors of hypertension among different adult groups in this area.

**METHODS:** Demographics questionnaires and fitness tests were utilized to identify the risk factors of hypertension among different adult groups in the years 2010 and 2014 in China's southwest province of Hubei.

**RESULTS:** Of the 5,646 individuals aged 20-69 years (age=42.7±13.7 years) people, 1,219 were classified as hypertensive, giving an overall prevalence of hypertension of 21.6%. The prevalence of hypertension was 13.5% in 2010, before doubling to 29.0% by 2014. For all age groups, testing time (i.e., 2014) and overweight/obesity were significant factors associated with hypertension. In addition, the risk factors for the young adult group (31.9±7.2 yr, n = 2039?) included age, gender (men>women), lower level of education, and lower cardiorespiratory function (CRF), with ORs of 1.214 (CI, 1.116-1.320), 0.365 (CI, 0.285-0.466), 0.720 (CI, 0.625-0.829), and 0.603 (CI, 0.498-0.731), respectively, and for the middle-aged group (51.7±4.3 yr, n = 1795), included Tujia nationality, white collar workers, and lower CRF, with ORs of 1.076 (CI, 1.056-1.095), 1.612 (CI, 1.390-1.871), and 0.780 (0.631-0.963), respectively.

**CONCLUSIONS:** The prevalence of hypertension increased dramatically in this area during 2010-2014. BMI was the common risk factor of hypertension in all adult groups. For both young and middle-aged adults, low CRF was a common risk factor associated with hypertension.

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### Risk of Cardiovascular Disease in American Firefighters: An Intervention is Warranted

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(No relevant relationships reported)

Cardiovascular disease (CVD) is the most common cause of job-related mortality among firefighters in the United States. Although age, family history, and work environments cannot be controlled, other predictors are modifiable. If solutions are to be implemented, it is important to know which health parameters are responsible for the elevated CVD risk in this population.

**PURPOSE:** To examine the cardiovascular health of California firefighters.

**METHODS:** We measured physiological CVD risk factors in 35 firefighters from Northern California. Assessments were age, anthropometry, blood lipids, blood pressure, and blood glucose. Risk factors were summed according to the American College of Sports Medicine guidelines. We evaluated the frequency of individual risk factors and used regression analyses (logistic, negative binomial, and linear as appropriate) to test the effect of age on risk.

**RESULTS:** Firefighters were 33.5 ± 11.8 years old, had a body mass index (BMI) of 26.6 ± 3.4, body fat percent (BF%) of 21.2 ± 6.0%, waist circumference (WC) of 90.3 ± 10.4 cm, and waist-hip ratio of 0.87 ± 0.10. Systolic blood pressure (SBP) was 122.5 ± 8.0 mmHg, diastolic pressure (DBP) was 78.1 ± 10.3 mmHg, fasted blood glucose (FBG) was 98.5 ± 14.3 mg/dL, LDLs were 128.9 ± 40.1 mg/dL, HDLs were 31.6 ± 12.5 mg/dL, triglycerides were 116.8 ± 90.3, and the average number of risk factors was 1.8 ± 1.2. There were 32 firefighters (91.4%) with ≥ 1 risk. The proportion of at-risk firefighters for each variable was: lipid profile (77.1%), obesity (65.7%), FBG (37.1%), blood pressure (34.3%), and age (14.3%). Most of the lipid profile was met by low HDLs (65.7% of all firefighters). Age was a significant predictor of BMI (p=0.001), BF% (p=0.003), WC (p=0.001), and waist-hip ratio (p=0.047), but not SBP (p=0.553), DBP (p=0.590), FBG (p=0.961), HDLs (p=0.369), LDLs (p=0.593), or triglycerides (p=0.688). Increased age significantly predicted an increased number of CVD risk factors (p=0.003).

**CONCLUSION:** As firefighters advanced in age, they experienced elevations in CVD risk, mostly as a consequence of increasing adiposity. Weight loss interventions aimed at improving lipid profile, blood glucose, and blood pressure may help reduce job-related CVD mortality in American firefighters.