Comparison of National Football League Linemen Versus Nonlinemen of Left Ventricular Mass and Left Atrial Size

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Retired National Football League (NFL) linemen have higher cardiovascular mortality compared with nonlinemen. We examined echocardiographic characteristics of retired NFL linemen compared with nonlinemen to determine if position-dependent cardiac remodeling resulted in increased left ventricular (LV) mass and left atrial (LA) size. We performed echocardiography in 487 retired NFL football players. Demographic, medical, and professional career information was collected. Interventricular septal and posterior wall thickness, LV end diastolic diameter, and LA area were measured. Body mass index (BMI) and LV mass were calculated. Retired linemen had significantly higher LV mass (234.8 ± 65.8 g) than nonlinemen (199.8 ± 55.4 g, $p < 0.0001$). LA area was higher in linemen versus nonlinemen (22.5 vs 20.1 cm2, $p < 0.0001$). Independent predictors of increased LV mass were BMI ($p < 0.003$), linemen position ($p < 0.024$), and systolic blood pressure ($p < 0.005$). In former players with BMI <35 kg/m2 there was a difference between linemen and nonlinemen in LV mass (219.9 ± 44.3 vs 182.6 ± 44.3 g, $p = 0.004$) and LV mass/height (114.3 ± 23.5 vs 98.8 ± 25.2 g/m, $p = 0.005$). In former players with BMI >35 kg/m2, there was no difference. There was no difference in LA area between linemen and nonlinemen in both BMI groups. In conclusion, LV mass and LA area size were highest in retired linemen. Player BMI, position, and systolic blood pressure were significant predictors of LV mass. In retired linemen compared with retired nonlinemen, the persistence of these cardiac adaptations may contribute to the higher cardiovascular mortality seen in retired linemen.

In 1992, at the request of the National Football League (NFL) Players Association, the National Institute of Occupational Safety and Health conducted a mortality study of 6,848 retired professional football players to investigate concerns that retired players were dying prematurely. Overall professional football players had a 46% lower mortality rate than age-,gender-, and race-matched population. However, when the cohort was stratified by position, linemen had a 52% greater risk of cardiovascular mortality compared with the general population and a 3.7 fold greater risk of death from heart disease compared with other position players. the National Institute of Occupational Safety and Health concluded that body mass index (BMI) and position contributed to this higher cardiovascular mortality. Although higher BMI may have contributed to the higher cardiovsacular mortality of retired linemen, other unmeasured cardiac risk factors may also play a role. For instance, increased left ventricular (LV) mass is a well established cardiovascular risk factor in the general population and is prevalent in elite college players. Additionally, left atrial (LA) size is directly associated with the risk of cardiovascular death and has been partially related to LV mass. Retired professional football players have not undergone cardiac studies to assess cardiac morphology. We hypothesized that position-dependent cardiac modeling, due to differences in training patters and lifestyle of linemen versus nonlinemen, may result in increased LV mass and LA size.