

# Field position may impact blood pressure in football players

December 5 2016

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Football at the college-level is associated with increased blood pressure and changes in size, shape, structure and function of the heart, especially among linemen, according to a new study published today in *JACC: Cardiovascular Imaging*.

The study aimed to validate prior observations that football participation led to an increase in blood pressure and an enlarged heart muscle with a primary emphasis on examining the potential health implications of this form of "athlete's heart." "Athlete's heart" is a term to describe the changes seen in the heart of an athlete who engages in high-levels of physical activity.

"Our study confirmed associations between football participation, [high blood pressure](#) and cardiac remodeling. Importantly, our findings suggest that heart remodeling in this population may have some maladaptive, potentially pathologic qualities," said Aaron L. Baggish, M.D., associate director of the Cardiovascular Performance Program at Massachusetts General Hospital in Boston and the study's senior author.

Researchers analyzed data from the Harvard Athlete Initiative, an ongoing research program to address issues relevant to athlete health and exercise physiology. For this study, researchers enrolled first-year athletes to capture their initial season of college-level participation. The study period began at the time of enrollment and lasted for the entire football season—about 90 days.

Of 190 eligible football participants enrolled between 2008 and 2014, 87 were included in the study cohort. Athletes who missed more than three days of training for any reason or had echocardiographic images unsuitable for analysis were excluded. The final cohort included 30 linemen and 57 non-linemen.

Prior to the season, 57 percent of linemen and 51 percent of non-linemen met the criteria for pre-hypertension. However, after the season 90 percent of linemen met the criteria for pre-hypertension or Stage 1 hypertension while only 49 percent of non-linemen, similar to the preseason, had elevated blood pressure.

These changes in blood pressure, particularly among athletes who played at the lineman field positions, were accompanied by thickening of the heart walls and a mild but significant decline in contractile function. Contractile function was measured using strain echocardiography, a relatively new imaging technique that has been shown to predict health outcomes across numerous patient populations. Importantly, the pattern of heart remodeling seen among football lineman differs markedly from the "athletic heart" patterns common among endurance athletes and more closely approximate patterns seen in older populations with overt hypertension and hypertensive heart disease.

"While this isn't the first time we've seen that different types of sports participation results in varying forms of cardiac remodeling, this is the first time we've identified an athletic population that appears to remodel with maladaptive attributes," Baggish said. "This type of change to the [heart](#) is concerning in this population of young, otherwise healthy athletes and raises questions about long term health implications."

Study limitations include that possible confounding factors known to impact [blood pressure](#) were not standardized and the duration of the study was relatively brief as many athletes accrue many years of football

participation.

In an accompanying editorial, William A. Zoghbi, M.D., chairman of the cardiology department at Houston Methodist DeBakey Heart and Vascular Center in Houston, noted the large exclusion of players from the study but said "the findings are important and point to a different cardiac adaptive response in linemen compared to non-linemen. While questions abound, the current investigation has highlighted this unusual adverse cardiac remodeling in sports with the hope of alerting players and their health care professionals, furthering research, and ultimately addressing ways to protect and improve the health of all athletes in team sports."

**More information:** *JACC: Cardiovascular Imaging*, DOI: [10.1016/j.jcmg.2016.07.013](https://doi.org/10.1016/j.jcmg.2016.07.013)

Provided by American College of Cardiology

Citation: Field position may impact blood pressure in football players (2016, December 5) retrieved 2 May 2024 from <https://medicalxpress.com/news/2016-12-field-position-impact-blood-pressure.html>

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