

Repetitive, subconcussive head impacts from football associated with short-term changes in eye function

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In a study that included 29 NCAA football players, repetitive subconcussive impacts were associated with changes in near point of convergence (NPC) ocular-motor function among players in the higher-impact group, although NPC was normalized after a 3-week rest period, according to a study published online by *JAMA Ophthalmology*. The NPC measures the closest point to which one can maintain convergence (simultaneous inward movement of eyes toward each other) while focusing on an object before diplopia (double vision) occurs.

Subconcussion can be defined as a low-magnitude head impact that does not result in clinical signs of concussion but potentially causes significant long-term neurological defects. Given the concern regarding concussion, understanding the effects of repetitive subconcussive impacts is critical because subconcussive impacts occur more frequently than concussions. American football, especially at the college level, is the sport associated with the highest incidence of concussion; in addition, [college football players](#) are reported to endure from 950 to 1,353 subconcussive head impacts per season.

Dianne Langford, Ph.D., of Temple University, Philadelphia, and colleagues examined whether repetitive subconcussive head impacts during preseason football practice caused changes in NPC of 29 National Collegiate Athletic Association (NCAA) Division I [football players](#). The study included baseline and preseason practices (1 noncontact and 4

contact), and postseason follow-up; outcome measures were obtained for each time. An accelerometer-embedded mouthguard measured head impact kinematics. Based on the sum of head impacts from all 5 practices, players were categorized into lower or higher impact groups.

A total of 1,193 head impacts were recorded from the practices in the 29 players; 22 were categorized into the higher-impact group and 7 into the lower-impact group. There were significant differences in head impact kinematics between lower- and higher-impact groups (number of impacts, 6 vs 41). "The first notable finding was that subconcussive head impacts were not associated with noticeable changes in players' symptom reports, regardless of frequency and magnitude of impacts. Second, consistent with previous studies, we found that exposure to repetitive subconcussive impacts compromised NPC function, but only among players in the higher-impact group. Lastly, after a 3-week rest period, postseason NPC was normalized to the preseason baseline in the higher-impact group, suggesting that ocular-motor function has the potential to reflect subclinical brain damage and its recovery," the authors write.

"The increase in NPC highlights the vulnerability and slow recovery of the ocular-motor system following subconcussive head impacts. Changes in NPC may become a useful clinical tool in deciphering brain injury severity."

"Further work is necessary to show reproducibility and generalizability of the authors' work and whether other factors could be contributing to the slight and transient worsening of the NPC observed in this study," write Andrew G. Lee, M.D., of Houston Methodist Hospital, Houston, and Steven L. Galetta, M.D., of the New York University Langone Medical Center, New York, in a commentary.

"Nonetheless, we are entering an era where we can begin to correlate data from telemetry devices, clinical outcome measures, biomarkers, and

imaging studies to guide our advice to the many stakeholders that cherish the value of our sports. If the findings of this study are confirmed, it will provide further impetus to limit full-contact practices in collision sports."

More information: *JAMA Ophthalmol.* Published online May 12, 2016.[DOI: 10.1001/jamaophthalmol.2016.1085](https://doi.org/10.1001/jamaophthalmol.2016.1085)

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