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Altered regional cerebral blood flow patterns in NFL offensive linemen and defensive backs

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Abstract No. 1880

Objectives: To examine regional patterns of cerebral blood flow (rCBF) associated with offensive line and defensive back positions played by professional football players.

Methods: A total of 71 men (mean age 57 y.o, range 26-82) with a history of playing in the NFL as offensive linemen (OL, n=44) or as defensive backs (DB, n=27) underwent 99mTc-HMPAO SPECT with a Picker 3-headed camera as they performed the Conners' Continuous Performance Task-II, an attention-focusing cognitive task. A sex-matched control group of non-players (NC, age range 19-84) was studied under identical conditions. The regional pattern of blood flow in the brain of each player and control subject was assessed by quantification of mean activity in each of 47 standardized volumes of interest, relative to mean whole brain activity, and between-group differences were considered statistically significant after Bonferroni-type correction for multiple comparisons ($p \leq 0.001$ before adjustment) by two-tailed Student t-test.

Results: In comparing all players to NC, significant diminished rCBF was seen in the right medial anterior temporal (rMAT, $p=0.0007$) and left anterior cingulate (lGCa, $p=0.0002$) regions, and significant elevated rCBF was seen in left lentiform nucleus (ILN, $p=0.0000006$). The significance of diminished rCBF in lGCa was primarily driven by a 3% decrease among OL ($p=0.0002$), while only 1% decrease ($p>0.10$) was seen among DB; significance of diminished rCBF in rMAT was primarily driven by a 4% decrease in DB ($p=0.0007$). The magnitude of rCBF in ILN reflected significant increases of 2-3% in both DB ($p=0.0006$) and OL ($p=0.000002$).

Conclusions: History of NFL play is associated with alterations in cerebral blood flow in a regionally specific

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manner, with significant decreases seen in a medial frontal region important for executive functions in offensive linemen, and in a medial temporal region important for memory function especially in defensive backs.

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