Neuronal Structural Protein Polymorphism and Concussion in College Athletes
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Context: Neuronal structural proteins (e.g., neurofilament heavy [NEFH]) provide structural integrity to neurons. Genetic variation (e.g., single nucleotide polymorphism [SNP]) can change a protein’s structure and alter a cell’s structure and function. Carrying a rare allele for a NEFH SNP could affect a person’s susceptibility to neuronal injury following a head impact. There has been no research performed on the association between carrying a NEFH SNP rare allele and concussion occurrence or severity. Objective: Examine the association between carrying a NEFH SNP rare allele and concussion occurrence and severity in collegiate athletes. Setting: Three NCAA athletic facilities. Participants: Forty-nine athletes with self-reported history of a concussion (age 19.30 ± 1.33 years and height 179.73 ± 10.95 cm) were matched by sport, position, age, and height with 49 healthy controls (age 19.88 ± 1.42 years and height 181.30 ± 8.37 cm). Groups were based a priori on pathologic outcome of concussion. Participants completed IRB approved consent and HIPAA forms prior to data collection. Interventions: All participants completed a concussion history questionnaire and were genotyped via saliva sample for the NEFH missense SNP rs#165602 (A2414C). The independent variables were group (self reported history of concussion vs. no history of concussion) and NEFH genotype (AA vs. AC or CC, where A is the common and C is the rare allele). A 2 (group) x 2 (genotype) chi square was used to identify the association between NEFH genotype and concussion occurrence. Independent t-tests were used to assess severity data difference across genotypes (AA vs. AC or CC) within the concussed group. SPSS 17.0 was used for all analyses, and the alpha level was set at \( p \leq .05 \). Main Outcome Measure(s): Dependent variables were self-reported history of concussion occurrence and severity. Severity was assessed by examining concussion signs and symptom duration and length of time until return to play. Results: The chi-square revealed no significant association (\( x^2 = .487, p = .485 \)) between carrying the NEFH rare allele and a history of concussion. Eleven percent of those with a previous concussion carried the rare allele compared to 35% of controls. Independent t-tests revealed no significant differences in concussion signs and symptom duration (0.79 ± 2.24 vs. 1.78 ± 8.10 days), \( t(1,48) = 2.054, p = .159 \), or RTP time (2.47 ± 8.57 vs. 2.96 ± 10.52 days), \( t(1,48) = .245, p = .623 \), between NEFH rare allele carriers and non-carriers. Conclusions: This is the first examination of the possible association between an NEFH SNP rare allele and concussion. Carrying the rare allele assessed in this study does not seem to influence an athlete’s susceptibility to sustaining a concussion, or the signs and symptoms duration and return to play time following concussion. Word Count = 450