Visual P3a in Male Alcoholics and Controls

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The goal of this study was to assess the P3a component of event-related potentials in a population of abstinent, chronic alcoholics. A three-stimulus visual oddball paradigm was used to elicit robust P3a components in a large group of well-characterized male alcoholics (n = 44) and controls (n = 28). The task required subjects to make a difficult perceptual discrimination between randomly presented, frequently occurring vertical lines (.80) and infrequent target lines that were tilted 2^o to the right of vertical (.10) by only responding with a button press to the target stimuli. A nontarget infrequent horizontal line occurred (.10) randomly to which no response was made. The target stimulus elicited robust late P3b components with a parietal maximum amplitude, and the nontarget stimulus elicited reliable P3a components with a fronto-central maximum amplitude distribution. Group differences in P3a were assessed using repeated measures ANCOVA analyses in five scalp regions. Alcoholic subjects produced smaller P3a amplitudes over the central, parietal, temporal, and occipital areas compared with controls. Current source density analyses supported these findings with extension of the differences between the groups to the frontal region. The results suggest that the P3a may be important in the evaluation of alcoholism and its heritability. Theoretical implications are discussed.

Key Words: Alcoholism, Visual Event-Related Potentials (ERPs), P300, P3a, Current Source Density (CSD).