Electrophysiological correlates of response inhibition toward alcohol-related cues in heavy and light drinkers

Fanny Kreusch, Fabian Verkenne, Michel Hansenne & Etienne Quertemont
Quantitative Psychology, University of Liège, Belgium

**Introduction**

Addictive behaviors are strongly associated with poor response inhibition (Noël et al., 2008) as well as attention bias and automatic approach tendencies for alcohol-related stimuli (Wiers et al., 2007).

Identical behavioral pattern for heavy and light drinkers associated with different ERPs responses were previously observed in heavy drinkers (Maurage et al., 2009; Oddy and Barry, 2009).

Lower P300 amplitude, reflecting inhibition deficit, has been reported in classical GO/NOGO paradigm with alcoholic subjects (Kamarajan et al., 2005).

Higher P300 amplitude for alcohol-related cues is observed in alcoholics and heavy drinkers (Herrman et al., 2001; Herrman et al., 2000) during alcohol-related cues presentation, suggesting an alcohol-cue reactivity.

Do heavy drinkers show a deficit in the inhibition of an automatic response for alcohol-related cues?

Which are the cerebral components associated to alcohol-related cues inhibition?

Is there any difference between light and heavy drinkers in ERP’s responses?

**Method**

**Participants:**
- 15 heavy drinkers students (HD)
- 15 light drinkers students (LD)

**Tasks:**
- Classical GO/NOGO with letter
  - 75% go trial (25% no go trial)
- GO/NOGO modified for alcohol
  - 75% go trial (25% no go trial)
  - Stimuli: alcohol vs neutral object
- Simple presentation
  - 50% of alcohol and 50% of neutral objects

**Electrodes:**
- PF1, PF2, Fz, F3, F4, Cz, C3, C4, Pz

**Results**

**Reaction time in GO trials**

- Faster for alcohol-related cues

**False alarm (FA) in NOGO trials**

- No difference in GO/NOGO modified for alcohol
  - More FA for HD in classical GO/NOGO

**ERPs in GO trials**

- Higher P300 amplitude and lower N200 amplitude among HD in GO/NOGO modified for alcohol and no difference in classical GO/NOGO
  - Shortening P300 latency for alcohol stimuli

**ERPs in NOGO trials**

- No group difference
  - Shortening P300 latency and reduced N200 amplitude for alcohol stimuli

**Conclusions**

A similar behavioral pattern for heavy and light drinkers was observed in the GO/NOGO modified for alcohol

- Heavy drinkers show more false alarms in the classical GO/NOGO
  - Heavy drinkers are impaired in their ability to refrain a response to a stimulus unrelated to alcohol

- Faster responses and shortening P300 latency during processing of alcohol related cues
  - Increased reactivity for alcohol-related cues

- No P300 amplitude reduction in classical GO/NOGO in heavy drinkers
  - This might be explained by a shorter history of alcohol consumption relative to alcohol dependent patients

- Increased P300 amplitude and decreased N200 amplitude in heavy drinkers in the GO/NOGO modified for alcohol
  - Higher elaborating responses in heavy drinkers when the task involved alcohol cues

Contact information: f.kreusch@ulg.ac.be