The determining factors of orbitofrontal cortex associated decision-making skills in alcohol-dependence

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Background

The core feature of alcohol dependence (AD) is the myopic decision-making (DM) strategy. This phenomenon is similar to decisions made by patients with orbitofrontal cortex (OFC) lesion, indicating dysfunctional OFC cortex in substance-dependent individuals. However, further factors might underlie the DM deficit in AD such as certain genetic variations of dopaminergic and serotonergic systems. The aim of this study was to reveal the effect of length of abstinence, specific genetic polymorphisms and impulsivity related traits on the adequacy of DM in AD.

Identifying the underlying mechanisms of myopic DM strategy in AD could contribute to the better understanding of this core feature of addictive behavior.

Participants

Alcohol-dependent patients (ADPs) with different lengths of abstinence were involved from alcohol inpatient centers and from AA groups [N=124 (87 male); mean age=46.33; S.D.=9.33; mean length of abstinence=123 weeks, min.: 0, max.: 732; 0-2 weeks: N=35, 2-26 weeks: N=40, 26-weeks: N=48].

Conclusion

1. The adequacy of DM is independent from the length of abstinence, and from the short-term negative consequences of alcohol consumption.

2. Earlier studies show that A1 allele of the DRD2 gene is associated with the more severe forms of AD and with increased mortality over a 10-year period among ADPs.

3. Impulsivity has a gender specific effect on the adequacy of DM in AD.

Results

IGT 'ABCD' (Rho=0.41, p=0.651) and 'EFGH' (Rho=0.152, p=0.092) performance did not correlate significantly with the length of abstinence. The patients were included into one single group representing patients with lifetime diagnosis of AD. In this sample the effect of DRD2 A1/A2 and SHTTLR polymorphisms on DM were assessed. SHTTLR had no significant influence on IGT 'ABCD' (F=0.632, p=0.533) and 'EFGH' (F=0.180, p=0.835) performance.

However, patients with DRD2 A2A2 genotype performed significantly better than A1A2 carriers on the 'EFGH' version of IGT (F=5.57, p=0.020) (see Table 1 and Figures 1 and 3). Furthermore, A1 carriers are more frequent among ADPs under inpatient treatment compared to patients with long-term abstinence, this leads to the phenomenon that they showed significantly shorter period of abstinence (Table 1 and Figure 2).

Impulsivity had a gender specific effect on DM. Among men the nonplanning aspect of impulsivity was the most significant correlate of the 'ABCD' version of IGT (r=0.233, p=0.030).

Measurements and statistics

Addiction Severity Index was used to reveal demographical variables. Iowa Gambling Task (IGT) was used to examine DM mechanisms: „ABCD” (reward sensitivity) and „EFGH” (punishment sensitivity) versions were administered.

Wechsler Adult Intelligence Scale was administered to screen out patients with IQ lower than 80.

Barratt Impulsivity Scale-II was used to assess the following aspects of impulsivity: motor, attentional, nonplanning.

DRD2 Taq A1/A2 and SHTTLR polymorphisms were determined by the means of PCR-RFLP. For statistical analysis t-probe, chi²-test, univariate ANOVA, Spearman and Pearson correlation analysis were applied.

No potential conflict of interest.

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References

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