Impaired Joint Attention in Cocaine Users

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Background

Social cognition is an important factor in the development, progress and treatment of psychiatric disorders and presumably plays a crucial role in the development of drug dependence. The ability and motivation to share attention (joint attention) is a central element of social interactions (see Fig. 1). It is usually perceived as pleasant and rewarding and has been shown to activate the mediofrontal cortex (MPFC) and the ventral striatum (reward system) [1] (see Fig. 2).

As imaging studies revealed neurochemical and functional modifications of the MPFC and the reward system in chronic cocaine users [2], we are currently investigating if social gaze perception is altered in occasional and chronic cocaine users. An interactive research paradigm is used in which the participants’ gaze is recorded by an eye-tracking device and used to control the gaze of an anthropomorphic virtual character. This paradigm provides the potential to capture the reciprocal, interactive nature of joint attention and to detect subtle impairments in social functioning.

Methods

To date 53 occasional and non-dependent cocaine users (min. 1g/month), 32 dependent cocaine users (DSM IV) and 39 drug-naive controls interacted with the avatar. Demographic information and drug consumption variables are displayed in Tab. 1.

Drug-naive controls perceived joint attention trials as more pleasant than non-joint-attention trials (p=0.05), while dependent and non-dependent cocaine users differentiated to a lesser extent between joint and non-joint attention trials in the valence ratings (see Fig. 4A). Arousal ratings showed a significant group x condition (joint- vs. non-joint) interaction (F(2,121)=4.089, p=0.019). Control participants experienced joint attention as less arousing than non-joint attention trials (p<0.05), whereas cocaine users demonstrated no significant difference between joint- and non-joint trials in the arousal ratings (see Fig. 4B). Pupillary responses to joint- and non-joint attention trials revealed a significant group x condition interaction (F(2,114)=4.025, p=0.020) with control subjects showing a greater pupil dilation during non-joint attention trials than cocaine users (see Fig. 4C).

Discussion

The preliminary data analysis revealed that cocaine users differentiate less efficiently between joint- and non-joint attention regarding arousal and valence of social interactions. This finding suggests that social interaction might have less rewarding value for cocaine users than for control subjects. Pupil size data provide an autonomic measure for arousing emotional stimulation and confirm that cocaine users engage in the coordination of social perspectives in a different way than do drug-naive controls. These results indicate that neurochemical and functional alterations of the ventral striatum and the MPFC in cocaine users affect the processing of social situations and the ability and motivation to share attention.

Conclusion: Changes in the reward system of cocaine users appear to be related to modified processing of social interaction and impaired joint attention abilities. Thus social functioning might be altered in cocaine users.

Disclosure

The authors declare no conflict of interests.

References
