

6. SUMMARY

Acute effects of ethanol on anxiety and on serotonin release in the medial prefrontal cortex of rats.

Alcohol dependence and anxiety disorders are in our society of great social, clinical and economic importance. A large portion of the neurobiological research therefore endeavours to clear up the central nervous mechanisms of anxiety disorders, the effects of alcohol as well as its connections.

In the clinic a high comorbidity exists between alcohol dependence and anxiety disorders. The anxiolytic effect of alcohol has been known generally for a long time and anxious people use the anxiolytic effect of alcohol according to a selfmedication in which the stimulating effect of alcohol could serve as an amplifier for the continuation of alcohol consumption. Altogether, the scientific pieces of evidence do not exist sufficiently for the clarification of the comorbidity between alcohol dependence and anxiety disorders.

There are references in neurobiological studies that the serotonergic transmission system has an important role in the pathogenesis of alcohol dependence and in the development of anxiety states.

The aim of the study was to establish a relation of anxiety like behaviour, acute alcohol effects and the extracellular release of serotonin in the brain.

The effect of acute ethanol on the anxiety like behaviour of two rat strains and one stock as well as on the extracellular serotonin release in the medial prefrontal cortex of a select rat strain was examined.

At first the elevated plus maze-test, an animal model of anxiety, was performed to find out whether the anxiety like behaviour of the Wistar/Winkelmann- Wistar/BgVV- and Fischer/Winkelmann-rats differs. After that it was verified how acute ethanol affects the anxiety like behaviour of the animals during the elevated plus maze-test. Due to differences in the effect of ethanol between the rat strains and stocks, blood serum concentrations of ethanol were measured at the time the elevated plus maze test took place. In the final *in vivo* microdialysis studies the influences of acute ethanol during the elevated plus maze-test on the extracellular serotonin release were examined in the medial prefrontal cortex of a selected rat strain, the Wistar/BgVV-rats.

The results showed clear differences in the anxiety like behaviour between the rat strains and stocks. In the elevated plus maze-test the Wistar/Winkelmann rats revealed a significantly less anxious behaviour compared to Wistar/BgVV- and Fischer/ Winkelmann rats. The behaviour of the Wistar/BgVV-rats was comparable to that of the Fischer/ Winkelmann-rats.

The behavioural effects of acute ethanol also found its expression differently in the examined rat strains and stocks. After ethanol at a dose of 1.0 g/kg a clear anxiolysis could be observed in the less anxious Wistar/Winkelmann-rats. The anxious Wistar/BgVV- and Fischer/Winkelmann-rats showed by contrast no significantly anxiolytic behaviour to ethanol. The present results indicate that an anxiolytic effect of ethanol can be detected only in animals with slight anxiety on the elevated plus maze. On the other hand there were no anxiolysis in the animals which were considerably more anxious in there source behaviour.

It can be excluded that the different effects of ethanol on the rat strains and stocks were caused by differences in the pharmaceutical concentration of ethanol since the Wistar/Winkelmann-, Wistar/BgVV- and Fischer/Winkelmann-rats did not differ in the metabolism of ethanol.

In the *in vivo* microdialysis studies only a slight increase in the release of extracellular serotonin in the medial prefrontal cortex of the Wistar/BgVV rats could be ascertained during the elevated plus maze-test. However, acute ethanol could not influence the extracellular serotonin release in the medial prefrontal cortex neither if the animals were in their home cage nor during the elevated plus maze-test.

Summarizing it can be stated, that strain and stock differences have a great influence on the anxiety like behaviour of rats and that the behavioural effect of ethanol has a different impact in the examined rat strains and stocks.

An assumed connection between anxiety, the anxiolytic effect of alcohol and the release of extracellular serotonin in the medial prefrontal cortex of the Wistar/BgVV rats could not be clarified in our examinations.

Our results reveal that the relations between the anxiety, an anxiolytic effect from alcohol and the extracellular release of serotonin in the medial prefrontal cortex of rats are very complex and it requires further examinations. The Wistar-and Fischer rats examined here can be considered suitable.