SUMMARY

The present thesis deals with the electrophysiological and behavioral correlates of the effects of serotonergic psychedelics in an animal model of psychosis. In the general part, we describe the phenomenology and neurobiology of psychotic diseases and the altered states of consciousness induced by serotonergic psychedelics. Furthermore, we outline the pharmacological models of acute psychosis with a focus on serotonergic substances, particularly the active substances from hallucinogenic mushroom – the indolamine psilocybin and its active metabolite psilocin. We briefly explain the method of quantitative electroencephalography (QEEG) and summarize the main findings of QEEG in animals and humans intoxicated by serotonergic psychedelics. The experimental part of the thesis describes the pharmacokinetics of psilocin, its effects on the behavioral pattern, locomotion and sensorimotor processing of information, as well as sex differences in the behavioral response. A medium dose of psilocin caused atypical behavioral figures, decreased locomotion and disturbance in sensorimotor processing of information, with the females being more resistant to this effect. Another focus of the thesis is the dynamics of QEEG changes in time (EEG absolute power spectra and EEG coherences), as recorded from the cortex of freely moving laboratory brown rats during behavioral inactivity resulting from intoxication by psilocin and other serotonergic hallucinogens. All serotonergic hallucinogens caused a decrease in the absolute EEG spectral power and a decrease in EEG coherences, more prominent in the lower frequency bands. Psilocin, apart from an overall decrease of EEG power, also effected a local increase of power in the theta and gamma bands in the temporoparietal region. Cluster analysis of EEG connectivity after psilocin found 4 independent connective networks. The thesis also describes the mechanisms of behavioral and QEEG changes using selective antagonists of serotonin receptors (5HT1A, 5HT2A, 5HT2B, 5HT2C) and certain antipsychotics (clozapine and haloperidol). Selective antagonists of 5HT receptors have a significant impact on the psychedelic effects induced by psychedelics (hypolocomotion, absolute EEG power, EEG coherences). Antipsychotics normalize absolute EEG power, but not psilocin-induced EEG disconnection. The final part of the thesis proposes the translational validity of the animal model of psilocin-induced psychosis by comparing animal data with data from human volunteers intoxicated by psilocybin, showing the same decrease in basal activity and disconnection. However, there are differences in the higher frequency bands.

Keywords: serotonergic hallucinogens, psychedelics, psilocybin, psilocin, schizophrenia, altered states of consciousness, model of acute psychosis, phenomenology, quantitative EEG.