Numerous patients with epilepsy has simultaneously symptoms of arrhythmia. It may result from a particular functional relationship between the heart and brain - both organs consist of excitable cells that conduct electrical impulses. There are several common points in pathogenesis of epilepsy and arrhythmias. On the other hand, antiarrhythmic and antiepileptic drugs have similar mechanisms of action. This is a basis for interactions between these drugs applied concomitantly. Knowledge of such interactions can make therapy of such patients more effective and safe.

The aim of this project is to establish types of interactions between commonly used antiarrhythmics and antiepileptics, as well as the safety profile of examined drug combinations. In the last 25 years, the most thoroughly examined antiarrhythmics in seizure models were beta-blockers and calcium channel antagonists. There are few articles describing the effect of propafenone and mexiletine in animal seizure models. The influence of sotalol on seizure phenomena has not yet been revealed. Similarly, few case reports refer to positive effect of mexiletine on the course of drug-resistant frontal lobe partial epilepsy and Lennox-Gastaut syndrome. However, there are no data on the influence of mexiletine, propafenone or sotalol on the anticonvulsant action of antiepileptic drugs and potential undesired effects induced by these drugs. Also types of pharmacodynamic interactions between antiarrhythmic and antiepileptic drugs has not been determined to date.

On the other hand, there is still increasing likelihood of concomitant treatment, and, in consequence, interactions between antiarrhythmic and antiepileptic drugs. Population is aging, and the rate of patients with epilepsy and/or arrhythmias is rising. Moreover, epilepsy often co-exists with cardiac arrhythmias. Severe cardiac disorders may in turn become a reason of the sudden unexplained death in epilepsy (SUDEP). Knowledge of types of interactions between drugs will contribute to more rational and effective therapy of patients with epilepsy and cardiac arrhythmias. It was reported that the most benefitial are combinations of drugs acting synergistically or additively in respect of therapeutic effect, and antagonistically in respect of undesired effects. It is worth stressing that experimentally determined pharmacodynamic interactions can be largely extrapolated into clinical conditions. Moreover, the appropriate antiarrhythmic treatment may help to reduce the risk of SUDEP.