DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Neoplastic disease are still one of the main medical problems in the world. Statistics indicate that number of deaths caused by the malignant neoplastic disease in Poland systematically rises. Breast tumour is one of the most frequent one. On the other hand, although brain tumours are are not so frequent, they need a special care, because of theirs location, and the standard therapies have major limitations. In the framework of this project we construct and solve equations describing changes of important factors (eg. amount of tumour cells, concentrations of chemicals) in order to deepen our knowledge about this tumours and increase efficiency of theirs therapies.

Treatment protocols are built just on the basis of an experience of medical doctors and differs between clinics. Due to experience of doctors and their studies, such therapies give a chance for staying alive for many patients. However, it is not possible to verify many possible therapy schemes and/or combinations in clinical trials because of ethical and economical reasons. In this case, oncology can gain on cooperation with mathematicians. Using mathematical models, that describes rates of changes some important ingredients of biological process, an interesting information, important from biological point of view, can be found. For example we may simulate the dynamics of changes in time of tumour cells and concentration of a drug and the effects of a therapy.

On the other hand, mathematical analysis of such models is crucial. It helps to verify if a model is properly built, and also to check if numerical solutions are correct. We can more easily decided if numerically observed behaviour reflects behaviour of solutions or they are significantly disturbed by errors committed during computing numerical solutions. This is particularly important for models that have (or can have) a direct influence on the choice of treatment protocol and therapy.

In the framework of this project we are going to construct and analyse models that describes processes connects with brain and breast tumour. We hope that constructed and analysed models help in understanding cancerous processes in brain and breast. We believe that results obtained during realisation of this project helps in improving existing anti-tumour therapies or they would be inspirations for designing new, more efficient, modes to fight cancers.