COMPUTERIZED VISUALIZATION OF BRAINSTEM RESPIRATORY AREAS INVOLVED IN GENERATION OF TIDAL BREATHING, COUGH, ASPIRATION AND EXPIRATION REFLEX

Gavliakova Silvia, Poliacek Ivan, Tomori Zoltan, Buday Tomas, Plevkova Jana

Jessenius Faculty of Medicine in Martin, Comenius University in Bratislava

D2.3 SERIOUS GAMES, SIMULATION AND MODELS FOR MEDICAL EDUCATION

Keywords: *brainstem, model, reflex, tidal breathing, cough*

Recent scientific papers showed that respiratory reflexes like cough, aspiration and expiration reflex do not only have a salient role in airway defence but they also have a resuscitation potential and are able to reverse some of the functional disorders like for instance apnoea or cardiac arrhythmia. On the other hand, the respiratory centre involved in generation of these respiratory patterns is not a specific nucleus of neurons but a distinct network distributed in the brainstem and its intricate spatial organization is hard to comprehend.

The aim of our work was to summarize and in a three-dimensional view graphically visualize the data on neurons, which are active in relation to generation of given respiratory reflexes and tidal breathing. The graphical tool and the user interface was designed using Matlab® environment.

In the tabular database we included data on feline brainstem studies from relevant literature sources listed in Scopus and PubMed. Actual database contains entries for spontaneous inspiration, spontaneous expiration, cough, aspiration and expiration reflex but more respiratory reflexes can be added in the future. Each entry holds data on number, reflex or spontaneous character and type of neurons assigned to particular anatomic region and the corresponding literature reference. Visualized data locations differ in marker type, size and colour, allowing easier orientation for the user.

This graphical tool was designed for students and researchers to improve their spatial orientation of distinct brainstem respiratory areas involved in different functions e.g. reflexes.

The database designed in Microsoft Excel® is simple and flexible so users can apply their own entries, resulting from variable procedures, anytime.