Protoporphyrin (PpIX) fluorescence allows discrimination of tumor and normal brain tissue during neurosurgery. A hand-held fluorescence (HHF) probe can be used for spectroscopic measurement of 5-ALA induced PpIX to enable objective detection compared to visual evaluation of fluorescence. However, current technology requires that the surgeon either views the measured values on a screen or employs an assistant to verbally relay the values. To facilitate the communication, an auditory feedback system was developed and evaluated for displaying measured fluorescence intensity values directly to the surgeon. An auditory display was programmed to map the values measured by the HHF probe to the playback of tones that represented three fluorescence intensity ranges and one error signal. Twenty persons with no previous knowledge of the application took part in the evaluation. The participants were able to identify the played tone accurately for 98% of measurements and no significant influence of the musical proficiency of the participants was observed on the function responses. The employed auditory display was shown to be intuitive, easy to learn, fast to recognize, and accurate in providing users with measurements of fluorescence intensity or error signal. The results of this work establish a basis for implementing and further evaluating auditory displays in clinical scenarios involving optical guidance or other relevant technology that requires display of information.

This study was a collaboration between MEVIS Fraunhofer and Linköping University. An article on this study is published in the International Journal of Computer Assisted Radiology and Surgery, September 2017 and received > 200 reads in the first week published on research gate.