Fluorescence guidance with microscope and endoscope in cranio-cerebral tumors
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**Background:** According to published data, intraoperative fluorescence-guided resection allowed two-fold increase of six month survival and radical removal, but did not influence overall survival of patients with glioblastoma. Absence of accumulation of 5-aminolevulinic acid (5-ALA) by brain tissue may theoretically increase specificity up to 100%.

**Materials and methods:** The series included gliomas of different grade and cerebral metastases, and malignant skull base tumors: carcinoma, olfactory neuroblastoma and chordoma. All patients were given 25 mg/kg of preparation Alasens (5-ALA, producer FSUE “SSC “NIOPIK”, Moscow, Russia) orally prior to surgery and all of them previously signed informed consent. We performed 28 tumor resections and 2 endonasal biopsies. We used Carl Zeiss OPMI Pentero microscope and special Karl Storz device for endoscopic fluorescence-guided resection. The decision of using an endoscope was based on necessity to visualize hidden and obscured areas inaccessible for microscope. Immediate surgical results were evaluated by contrast-enhanced MRI during 24 hours after tumor removal.

**Results:** Positive fluorescence was observed in glioblastoma, metastases of carcinoma and low-pigmented melanoma. Negative fluorescence was typical for esthesioneuroblastoma and black (pigmented) melanoma. In all cases dural invasion and fibrous stroma of tumor were negative. Also two cases of clival chordoma were operated: in the 1<sup>st</sup> we observed strong positive fluorescence, and in the 2<sup>nd</sup> case no fluorescence was visible. Interviewing the surgeons who applied endoscopic-assisted fluorescence-guided resection showed that overall impression was positive. Negative moments were associated with timing, additional instrumentation and necessity to correlate endoscopic and microscopic views. We find that a hemostyptic agent Tachocomb does not oxidize hemoglobin and provides clear view of tumor remnant without additional high signal areas.

Fluorescent-guided resection allows to differ tumor tissue or borderline zone from normal of ischemic brain, and multiple biopsies confirm high specificity of the technique.

**Conclusion:** We are convinced that fluorescent guidance should be applied in every case of GBM to determine tumor borders and if necessary to know where to stop. Obviously, only a small number of 'nice' removable tumors may be maximally respected without danger to a patient. We believe that in the future it will be necessary to use all available methods – neuroimaging, electrophysiological and metabolic. This combined approach may be the best choice.