Object. Intraoperative histopathological investigation plays an important role during surgery for gliomas. To facilitate the rapid characterization of resected tissue, an original technique of intraoperative flow cytometry (iFC) was established. The objective in this study was evaluation of this technique's efficacy for rapidly determining tumor presence in the surgical biopsy sample and WHO histopathological grade of the neoplasm.

Methods. In total, 328 separate biopsy specimens obtained during the resection of 81 intracranial gliomas were analyzed with iFC. The evaluated malignancy index (MI) was defined as the ratio of the number of cells with greater than normal DNA content to the total number of cells. The duration of iFC in all cases was approximately 10 minutes. Each sample was additionally investigated histopathologically on frozen and permanent formalin-fixed paraffin-embedded tissue sections. The latter process was used as a "gold standard" control for evaluation of the diagnostic efficacy of iFC analysis.

Results. The MI differed significantly between neoplastic and perilesional brain tissue (25.3% ± 22.0% vs 4.6% ± 2.6%, $p < 0.01$). Receiver operating characteristic curve analysis revealed a corresponding area under the curve value of 0.941. The optimal cutoff level of the MI for identification of tumor in the biopsy specimen was 6.8%, which provided 0.88 sensitivity, 0.88 specificity, 0.97 positive predictive value, 0.60 negative predictive value, and 0.88 diagnostic accuracy. Additionally, the MI showed a significant association with WHO histopathological grades of glioma ($p < 0.01$), but its values in Grade II, III, and IV tumors overlapped prominently and were on average 13.3% ± 11.0%, 35.0% ± 21.8%, and 46.6% ± 23.1%, respectively.

Conclusions. Results of this study demonstrate that iFC with the determination of the MI may be feasible for rapidly determining glioma presence in a surgical biopsy sample.