Abstract:

OBJECTIVE: The newly developed conjugate 5-aminofluorescein (AFL)-human serum albumin (HSA) was investigated in a clinical trial for fluorescence-guided surgery of malignant brain tumors to assess its efficacy and tolerability. METHODS: AFL, covalently linked to human serum albumin at a molar ratio of 1:1, was administered intravenously 0.5 to 4 days before surgery at 0.5 or 1.0 mg/kg of body weight to 13 patients aged 38 to 71 years who were suspected of having malignant gliomas. Fluorescence guidance using a 488-nm argon laser was performed during surgery at will. The extent of tumor resection was verified by early postoperative magnetic resonance imaging. Fluorescent and nonfluorescent samples were collected for neuropathology. Blood samples for laboratory and pharmacokinetic analyses were taken over the course of 4 weeks. RESULTS: Fluorescence staining of tumor tissue was bright in 11 patients (84%), resulting in complete resection of fluorescent tumor tissue in 9 patients (69%). In 2 patients, residual fluorescent tumor tissue was also confirmed by magnetic resonance imaging. Neither bleaching nor penetration of AFL-HSA into the surrounding brain edema or into necrotic tissue was seen. The agreement between fluorescence and histopathology in tumor samples and samples of the tumor border was 83.3%. There were no toxic side effects. The quality of fluorescence
was independent of the dose administered. The optimal time for surgery is between 1 and 4 days after AFL-HSA administration. CONCLUSION: Tumor fluorescence using AFL-HSA made fluorescence-guided brain tumor resection possible, demonstrating that albumin is a suitable carrier system for selective targeting of aminofluorescein into malignant gliomas.