

Fluorescein sodium guided resection for meningioma

Surgical resections of meningiomas, the most common intracranial tumor in adults, can only be curative if radical resection is achieved. Potentially, the extent of resection could be improved, especially in complex and/or high-grade meningiomas by fluorescence-guided surgery using 5-aminolevulinic acid (5-ALA), indocyanine green (ICG), or fluorescein. This review aims to summarize and evaluate these fluorescence-guided meningioma surgery techniques. PubMed and Embase were searched for relevant articles. Additionally, we checked reference lists for further studies. Forty-eight articles were included in the final analysis. 5-ALA fluoresced with varying sensitivity and selectivity in meningiomas and in invaded bone and dura mater. Although ICG was mainly applied for video angiography, one report shows tumor fluorescence 18-28 h post-ICG injection. Lastly, the use of fluorescein could aid in the identification of tumor remnants; however, detection of dural tail is highly questionable. Fluorescence-guided meningioma surgery should be a reliable, highly specific, and sensitive technique. Despite numerous studies reporting the use of fluorescent dyes, currently, there is no evidence that these tools improve the radical resection rate and long-term recurrence-free outcome in meningioma surgery without neurological deficits. Evidence regarding the effectiveness and increased safety of resection after the application of these fluorophores is currently lacking. Future research should focus on the development of a meningioma-targeted, highly sensitive, and specific fluorophore ¹⁾

da Silva et al. present the first application of [sodium fluorescein](#) (SF) as a tool for tumor and dural tail identification in convexity meningiomas.

Five frontal convexity meningiomas operated on between December 2012 and April 2013 were included. After initial dissection a dose of 1 g of the SF, 20% was injected into a peripheral vein. Tumor and dural tail were removed using the correlation between magnetic resonance imaging (MRI) findings and transoperative SF enhancement.

Simpson Grade 1 removal was obtained in three cases, grade 2 in one atypical meningioma and grade zero in one case. SF dural tail enhancement was positive in all cases and histologic analysis evidenced involvement of the dura by tumors.

SF enhancement was evident in meningiomas and dura surrounding the lesions. Histologic analysis confirmed dural involvement. SF could represent an universally available fluorescent tool for meningioma surgery ²⁾.

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Dijkstra BM, Jeltrema HJR, Kruijff S, Groen RJM. The application of fluorescence techniques in meningioma surgery-a review. *Neurosurg Rev.* 2019 Dec;42(4):799-809. doi: 10.1007/s10143-018-01062-4. Epub 2018 Dec 6. PMID: 30519770; PMCID: PMC6821664.

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da Silva CE, da Silva VD, da Silva JL. Convexity meningiomas enhanced by sodium fluorescein. *Surg Neurol Int.* 2014 Jan 14;5:3. doi: 10.4103/2152-7806.124978. eCollection 2014. PubMed PMID: 24575318; PubMed Central PMCID: PMC3927087.

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Last update: **2024/06/07 02:54**

