



## Fluorescein-guided frameless stereotactic brain biopsy<sup>☆</sup>

Marcos Dellaretti<sup>a,b,\*</sup>, Franklin Bernardes Faraj de Lima<sup>a</sup>, Matheus Tavares de Melo<sup>a</sup>, Hian Penna Gavazza Figueiredo<sup>a</sup>, Natália Dilella Acherman<sup>b</sup>, Bárbara Caroline Dias Faria<sup>b</sup>

<sup>a</sup> Neurosurgery and Neurology Department. Santa Casa de Belo Horizonte, 1111 Francisco Sales Avenue, 30150-221, Belo Horizonte, MG, Brazil

<sup>b</sup> Federal University of Minas Gerais, 190 Professor Alfredo Balena Avenue, 30130-100, Belo Horizonte, MG, Brazil

### ARTICLE INFO

#### Keywords:

Brain biopsy  
Fluorescein  
High grade glioma  
Glioblastoma  
Fluorescein-guided surgery  
Stereotactic biopsy

Stereotactic brain biopsy remains the main procedure for histopathological diagnosis in patients with intracranial lesions without indication for surgical resection.<sup>1</sup>

Stereotactic brain biopsy utilizes the concept of minimally invasive surgery,<sup>2</sup> and the advantages of this approach are several, including shorter surgical time, more precision, less damage in eloquent areas; and, consequently, lower morbidity.<sup>2-4</sup>

The use of fluorescence-based technology (5-aminolevulinum and fluorescein) represents a very promising methodology in this field.<sup>5</sup> However, the fluorescein application is still underreported. Some technical and clinical aspects (such as assessment of operative times, performance in an awake patient and impact on morbidity and hospitalization) still need to be better evaluated.<sup>6</sup>

Marbacher et al published a series of 82 biopsies using fluorescence for various tumor types. They observed a high positivity for high-grade gliomas (84.6%).<sup>7</sup> Von Campe et al, demonstrated that the use of fluorescence reduced surgical time by 30–45 mm.<sup>8</sup> In these two studies, the drug used was 5-ALA.

The first work published on the use of fluorescein was by Rey-Dios et al, with 6 patients with glioblastoma multiforme, the sensitivity rate was 100% in contrast-enhancing lesions. Overall, a sensitivity rate of 79% and a specificity of 100% were obtained.<sup>5</sup>

We present in this video a step-by-step clinical case performing a stereotactic brain biopsy with the aid of fluorescein in a philanthropic hospital in Brazil.

The use of fluorescein biopsy could be routine practice in large centers, especially in less developed countries.

### CRediT authorship contribution statement

**Marcos Dellaretti:** Conceptualization, Methodology, Supervision, Writing – original draft. **Franklin Bernardes Faraj de Lima:** Conceptualization, Project administration, Visualization, Writing – original draft. **Matheus Tavares de Melo:** Investigation, Visualization, Writing – review & editing. **Hian Penna Gavazza Figueiredo:** Data curation, Investigation. **Natália Dilella Acherman:** Writing – original draft, Visualization. **Bárbara Caroline Dias Faria:** Conceptualization, Data curation, Visualization.

### Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.wnsx.2024.100322>.

<sup>☆</sup> This abstract and operative video demonstration are original and have not been submitted elsewhere in part or in whole.

\* Corresponding author. Neurosurgery Department. Santa Casa de Belo Horizonte, 1111 Francisco Sales Avenue, 30150-221, Belo Horizonte, MG, Brazil.

E-mail address: [mdellaretti@mac.com](mailto:mdellaretti@mac.com) (M. Dellaretti).

## References

1. Parney IF, Berger MS. Principles of brain tumor surgery. *Handb Clin Neurol*. 2012;104:187–213.
2. Barnett GH, Miller DW. Brain biopsy and related procedures. In: Roberts DW, Barnett GH, Maciunas RJ, eds. *Image-guided Neurosurgery: Clinical Applications of Surgical Navigation*. St. Louis: Quality Medical Publishing; 1998:181–191.
3. Epstein F, Wisoff J. Intrinsic brain-stem tumors of childhood: surgical indications. *J Neuro Oncol*. 1988;6:309–317.
4. Millesi M, Kiesel B, Wöhrer A, et al. Is intraoperative pathology needed if 5-aminolevulinic-acid-induced tissue fluorescence is found in stereotactic brain tumor biopsy? *Neurosurgery*. 2020;86(3):366–373.
5. Rey-Dios R, Hattab EM, Cohen-Gadol AA. Use of intraoperative fluorescein sodium fluorescence to improve the accuracy of tissue diagnosis during stereotactic needle biopsy of high-grade gliomas. *Acta Neurochir*. 2014;156:1071–1075.
6. Catapano G, Sgulò FG, Seneca V, Iorio G, de Notaris M, di Nuzzo G. Fluorescein-assisted stereotactic needle biopsy of brain tumors: a single-center experience and systematic review. *Neurosurg Rev*. 2019;42:309–318.
7. Marbacher S, Klinger E, Schwyzer L, et al. Use of fluorescence to guide resection or biopsy of primary brain tumors and brain metastases. *Neurosurg Focus*. 2014;36:E10.
8. von Campe G, Moschopoulos M, Hefti M. 5-Aminolevulinic acid-induced protoporphyrin IX fluorescence as immediate intraoperative indicator to improve the safety of malignant or high-grade brain tumor diagnosis in frameless stereotactic biopsies. *Acta Neurochir*. 2012;154:585–588.

## Abbreviation list

- FS -: Fluorescein  
GCS -: Glasgow Coma Scale  
MRI -: Magnetic resonance imaging  
CT -: Computed Tomography  
5-ALA -: 5-Aminolevulinic acid