CNS 2018 ANNUAL MEETING
HOUSTON, TEXAS
OCTOBER 6-10, 2018

Fluorescent Tracers in Neurosurgical Procedures: A European Survey

Francesco Restelli; Davide Locatelli; Camilla De Laurentis; Jacopo Falco; Paolo Ferroli MD; Francesco Acerbi MD, PhD

Introduction

In recent years several techniques have been proposed with the aim of improving tumors visualization and extent of resection and, among them, the use of photosensitive dyes is gaining great interest. Regarding the application of the two most used dyes, 5-aminolevulinic acid (5-ALA) and sodium fluorescein (SF), there is still a lack of shared and established protocols among different centers. The main objective of the present study was to evaluate the current practice of fluorescence-guided techniques in neuro-oncological surgery in Europe.

Methods

An online questionnaire consisting of 33 questions was completed by 136 European Association of Neurosurgical Societies (EANS) neurosurgeons. Responses were entered into a database and subsequently analyzed.

Results

Data were analyzed from 136 out of 1476 active European neurosurgeons which had been contacted. Based on the data from the questionnaire, Germany was the most responsive country (15% of the total respondents) and the main indications for 5-ALA and SF utilization were high-grade gliomas. 5-ALA was mainly used as defined in Gliolan® datasheet, while SF as off-label technique with a 5 mg/kg dose of injection at the end of patient intubation. Pentero Zeiss® microscope with appropriate filters loaded on it was the preferred brand for both 5-ALA and SF users. Both the dyes were mainly used in adult population, more frequently by neurosurgeons with less-than 20 cases per year expertise. Mean price per patient were 817,6 € and 7,7 € for 5-ALA and SF, respectively.

Conclusions

5-ALA is still the preferred and more established fluorescent dye used during high-grade gliomas resection, with SF as a gaining-attention, really cheaper and more ductile alternative.

[Default Poster]

References

[1]M.L. Bondy, M.E. Scheurer, B. Malmer, J.S. Barnholtz-Sloan, F.G. Davis, D. Il'yasova, C. Kruchko, B.J. McCarthy, P. Rajaraman, J.A. Schwartzbaum, S. Sadetzki, B. Schlehofer, T. Tihan, J.L. Wiemels, M. Wrensch, P.A. Buffler, Brain tumor epidemiology: Consensus from the Brain Tumor Epidemiology Consortium, Cancer. 113 (2008) 1953–1968. doi:10.1002/cncr.23741.

[2]P.Y. Wen, S. Kesari, Malignant gliomas in adults, N. Engl. J. Med. 359 (2008) 492–507. doi:10.1056/NEJMra0708126.

[3]M. Preusser, S. de Ribaupierre, A. Wöhrer, S.C. Erridge, M. Hegi, M. Weller, R. Stupp, Current concepts and management of glioblastoma., Ann. Neurol. 70 (2011) 9–21. doi:10.1002/ana.22425.

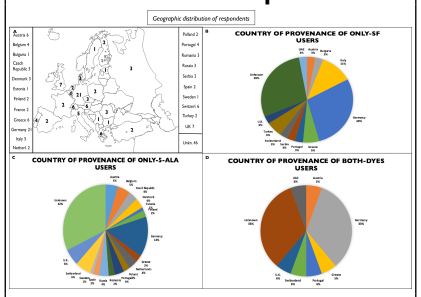
[4]R. Stupp, M.E. Hegi, W.P. Mason, M.J. van den Bent, M.J. Taphoorn, R.C. Janzer, S.K. Ludwin, A. Allgeier, B. Fisher, K. Belanger, P. Hau, A.A. Brandes, J. Gijtenbeek, C. Marosi, C.J. Vecht, K. Mokhtari, P. Wesseling, S. Villa, E. Eisenhauer, T. Gorlia, M. Weller, D. Lacombe, J.G. Cairncross, R.-O. Mirimanoff, Effects of radiotherapy with concomitant and adjuvant temozolomide versus radiotherapy alone on survival in glioblastoma in a randomised phase III study: 5-year analysis of the EORTC-NCIC trial, Lancet Oncol. 10 (2009) 459–466. doi:10.1016/S1470-2045(09)70025-7.

[5]C. Ewelt, A. Nemes, V. Senner, J. Wölfer, B. Brokinkel, W. Stummer, M. Holling, Fluorescence in neurosurgery: Its diagnostic and therapeutic use. Review of the literature, J. Photochem. Photobiol. B Biol. 148 (2015) 302–309. doi:10.1016/j.jphotobiol.2015.05.002.

[6]W. Stummer, S. Stocker, A. Novotny, A. Heimann, O. Sauer, O. Kempski, N. Plesnila, J. Wietzorrek, H.J. Reulen, In vitro and in vivo porphyrin accumulation by C6 glioma cells after exposure to 5-aminolevulinic acid, J. Photochem. Photobiol. B Biol. 45 (1998) 160–169.

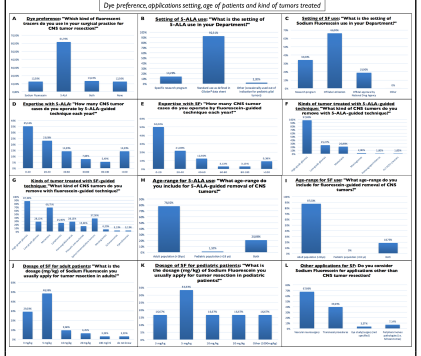
[7]J.C. Tonn, W. Stummer, Fluorescence-guided resection of malignant gliomas

Figure1. Geographic distribution of respondents



A. Number of respondents from each European country. B-D: Country of provenance with percentages referred to the total of respondents, for "only-SF users" (B), only-5-ALA users" (C), "both-dyes users" (D).

Figure 2. Preferences among fluorescent dyes users

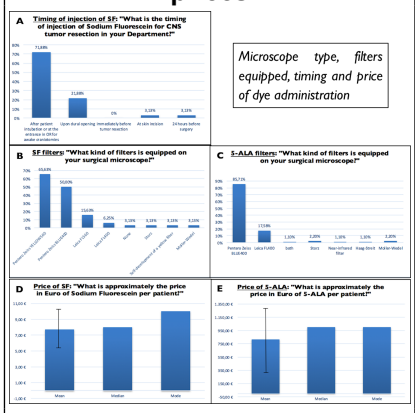


Dye preference, application settings, age of patients and kind of tumors treated (A-L).

Learning Objectives

By the conclusion of this session, participants should be able to: 1) describe the main indications and methods of use for the two most used fluorescent tracers in neuro-oncological surgery; 2) Discuss, in small groups, indications, contraindications, limits and benefits given by the use of sodium fluorescein or 5-aminolevulinic acid in neurosurgery; 3) To present a current-practice-picture of fluorescent tracers use in European neurosurgical community.

Figure3. Technical aspects and prices



Microscope type, filters equipped, timing and price of dye administration (A-E).