

Authors:

Mdm. Maharita Ab Rahman (main-author)
Dr. Foo Sze Shir (Co-author)
Dr. Izzuna Mudla Mohamed Ghazali

External Reviewer:

Dr. Liew Boon Seng
Neurosurgeon
Hospital Sg. Buloh

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For further information, please contact:

Malaysian Health Technology Assessment
Section (MaHTAS)
Medical Development Division
Ministry of Health Malaysia
Level 4, Block E1, Precinct 1
Government Office Complex
62590 Putrajaya.

htamalaysia@moh.gov.my
Tel: 603 8883 1229

Available at the following website:
<http://www.moh.gov.my>

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Background

Brain tumour is a growth of malignant cells in brain tissue and the tumour that start in the brain is called primary brain tumour. World Health Organisation's Globocan 2012 database reported that a total number of 786 cases of brain BT and cancers were reported in Malaysia; representing 2.1% of all reported cancers of the same year. The most common types of brain tumour among adults in Malaysia between 2011 to 2018 were meningioma and glioma.

Removing the brain tumour can be challenging for the surgeons because it is difficult to see the difference between the tumour and healthy brain tissue especially with conventional surgery using white-light. Alternative surgery with fluorescence agent under special light may guide the surgeon during tumour tissue resection to maximize the extent of resection. There are limited number of fluorophores currently used in clinical practice and one of it is 5-aminolevulinic acid (5-ALA). Fluorescence guided resection of malignant gliomas using 5-ALA was first approved in 2007 by the European Medical Agency, and in 2013 by the Pharmaceutical Affairs of Japan. Since then, this procedure has been widely used in clinical settings.

A technology review was requested by neurosurgeon of Ministry of Health (MOH) to assess the efficacy, safety and cost-effectiveness of the 5-ALA.

Objective

To assess the efficacy/effectiveness, safety and cost-effectiveness of 5-ALA in brain tumour surgery.

Methods

The following electronic databases were searched through the Ovid interface: MEDLINE® In-Process and Other Non-Indexed Citations and Ovid MEDLINE® 1946 to March 2022. Other databases: PubMed and websites: US FDA, INAHTA, CADTH. General databases such as Google and Google Scholar were used to search for additional web-based materials and information. Additional articles retrieved from reviewing the bibliographies of retrieved articles. The search was limited to articles on human. There was no language limitation in the search. The last search was conducted on March 2021.

Results and conclusion:

Based on the review 5-ALA improved progression free survival (PFS), gross total resection (GTR) and overall survival (OS) as compared to conventional treatment or white light surgery in high grade glioma (HGG). However, when compared with iMRI and fluorescein sodium, the difference was not significant. There was no difference in the outcome measure with low- or high-dose of 5-ALA. Overall, the used of 5-ALA was safe although there were a few incidence of transient elevation of liver enzymes and skin sensitivity which later on resolved without further treatment. On the economic side, 5-ALA have a potential of cost-effective as compared to white-light microscopy for HGGs. As for financial implication, the neurosurgical centre with the existing microscope system for 5-ALA will incur additional cost of RM6,800 per patient per year. Meanwhile, the neurosurgical centre with newly set-up microscope system for 5-ALA will require the treatment cost per patient per year range from RM13 000 to RM72 000.