



**Title**      **Perfusion MR Imaging in Differentiating Brain Gliomas; Meta-Analysis and Economic Assessment**

**Agency**    **AETSA, Andalusian Agency for Health Technology Assessment**  
Av. Innovación s/n. Edificio Renta Sevilla, 2ª planta, 41020 Sevilla, Spain;  
Tel: +34 955 407 233, Fax: +34 955 407 238;  
leda.ojeda.ext@juntadeandalucia.es, www.juntadeandalucia.es/salud/aetsa

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## Aim

To estimate the following parameters for perfusion MR imaging (pMRi): sensitivity, specificity, positive probability rate, and negative probability ratio. To estimate cost-effectiveness ratios for perfusion MR imaging.

## Conclusions and results

We retrieved 15 studies that compared the results from pMRi with those of histology (reference test). Main threats to internal validity in most studies included small sample sizes and the lack of knowledge about the time elapsed between testing, the experience of pathologists and radiologists, and handling of difficult-to-assess results. We found no important threats to external validity.

Results concerning the estimated parameters were:

- Sensitivity: 0.958.
- Specificity: 0.806.
- Positive probability ratio: 3.923.
- Negative probability ratio: 0.086.

Sensitivity analysis did not change the results. Cost-effectiveness analysis of the strategies, using life-years as effectiveness, yielded an average cost per patient that was 147.36 higher with pMRi. The incremental cost-effectiveness ratio (ICER) of pMRi compared to biopsy is 788.22 per life year.

PMRi can provide good results in differentiating the malignancy grade of brain gliomas. Further, and better, research is needed to provide scientific evidence of the role that pMRi should play in differentiating the malignancy grade of brain gliomas. Using the incidence estimated for the Spanish population (3.5 per 100 000 pop.) and the sensitivity and specificity parameters of the test, the use of pMRi would mean diagnosing 51 patients with a grade lower than what they actually have. However, the use of biopsy would yield an additional 14 cases of complications and 20 cases of death.

The average cost per patient of pMRi was 147.36 higher than in biopsy, albeit effectiveness measured in life years was also higher with pMRi (0.19 years). Cost-effectiveness analysis yielded 776 as a result of cost per life-year ratio (ICER) for pMRi compared to biopsy. Likewise, the results are sensitive due to probability of death caused by biopsy. The reason lies in the fact that when the biopsy is lower than 0.005, then pMRi becomes a dominant alternative.

The use of pMRi would entail an additional annual cost of approximately 444 000 euros.

Until better scientific evidence is obtained, pMRi can serve as an additional test in cases where previous diagnostic testing has not clarified the grade of glioma malignancy.

## Methods

We systematically reviewed the literature, searching reference databases, agencies on health technology assessment, scientific societies, scientific journals, and ongoing research registries. Studies were selected based on the inclusion criteria, scoring their quality by QUADAS and statistically treating the data extracted by means of quantitative meta-analysis.