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Instituto de Instrumentación
para Imagen Molecular

VI Trobada d'Estudiants de Doctorat

VI Encuentro de Estudiantes de Doctorado



Demyelinating and ischemia brain diseases detection through magnetic resonance images processing



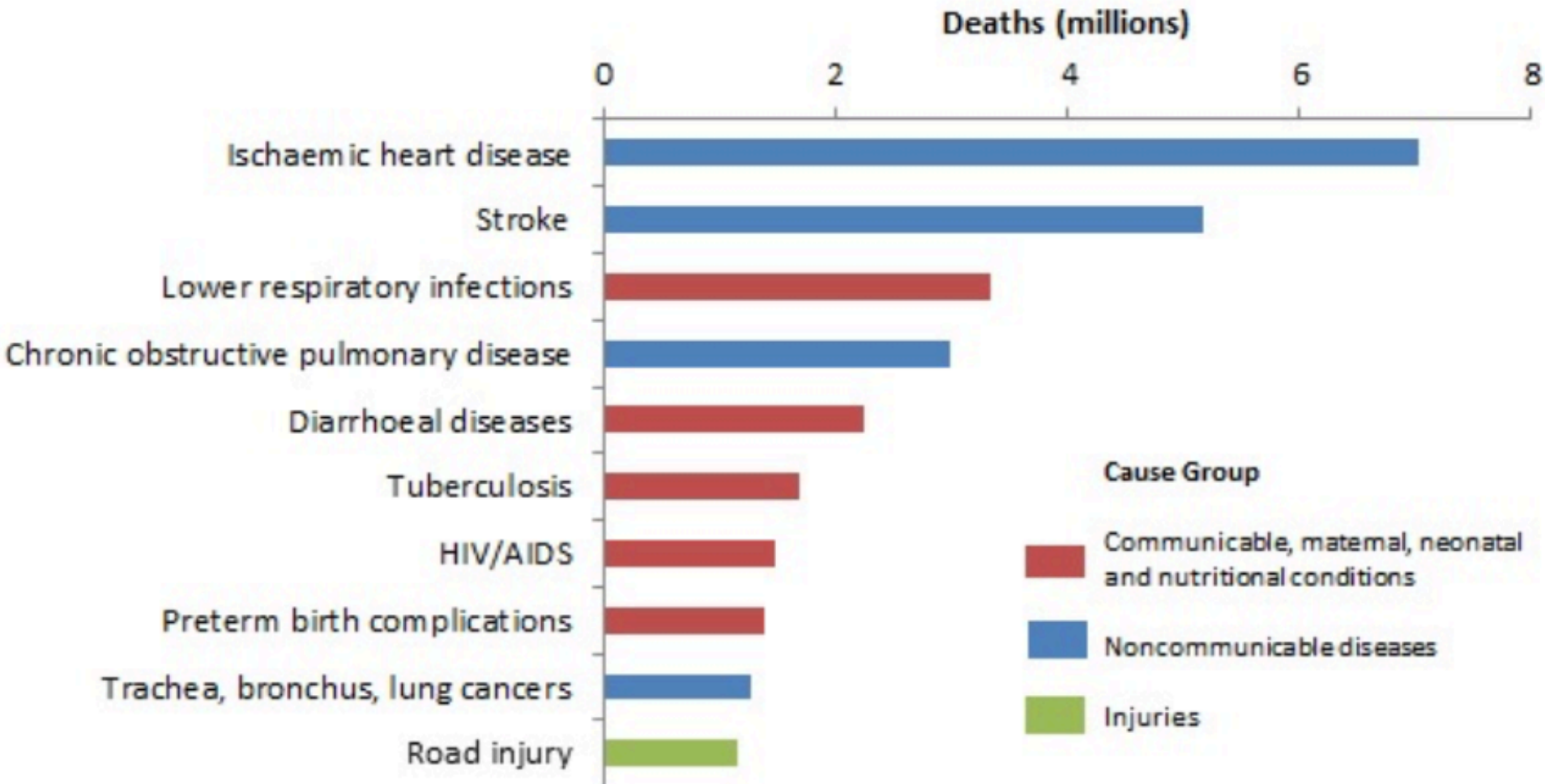
Darwin Patricio Castillo Malla
René Samaniego
María José Rodríguez Álvarez
Vasudevan Lakshminarayanan

UNIVERSITY OF
WATERLOO

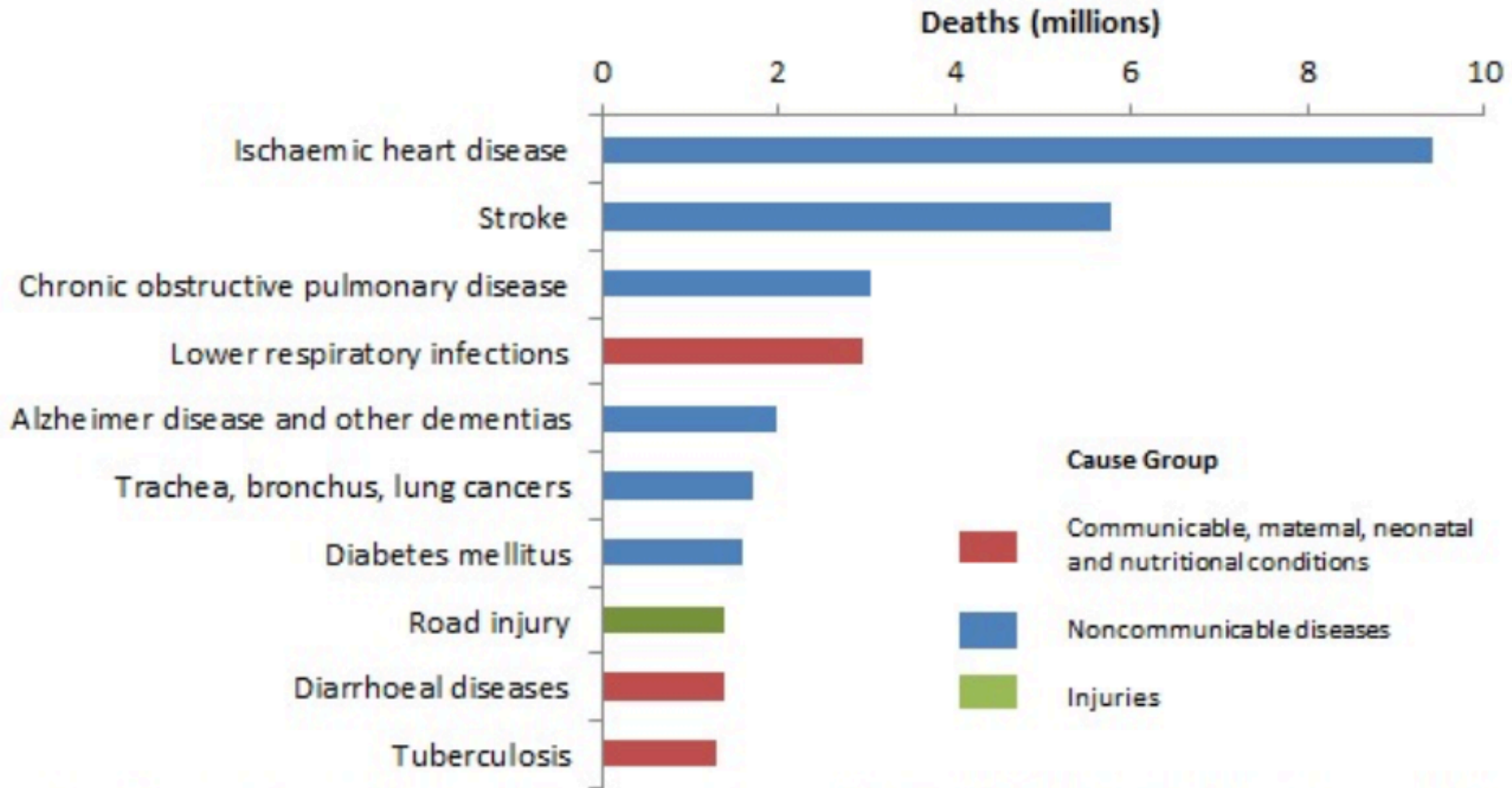


CONTEXT – MOTIVATION

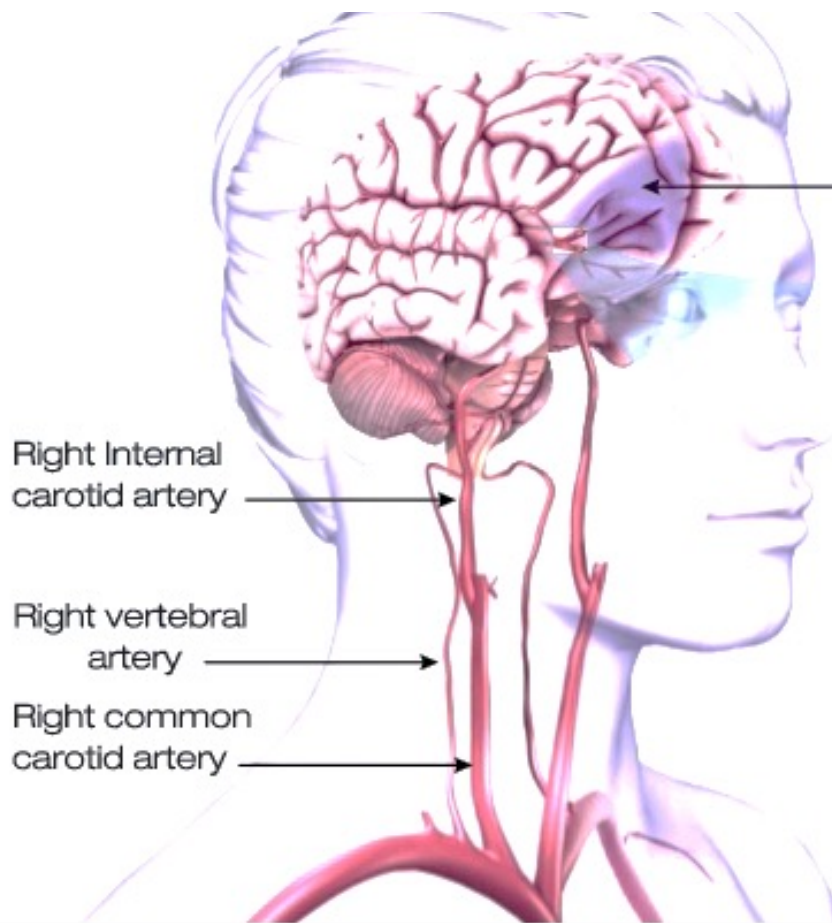
Top 10 global causes of deaths, 2000



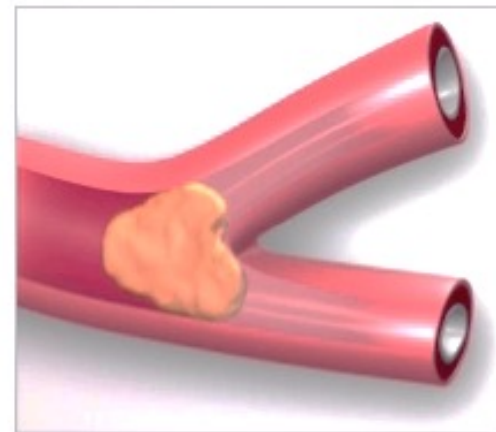
Top 10 global causes of deaths, 2016



ISCHEMIC BRAIN DISEASE



Brain tissue affected by blockage.



A foreign mass traveling through the bloodstream is called an embolus. If it lodges in a small artery, blood flow to part of the brain stops.

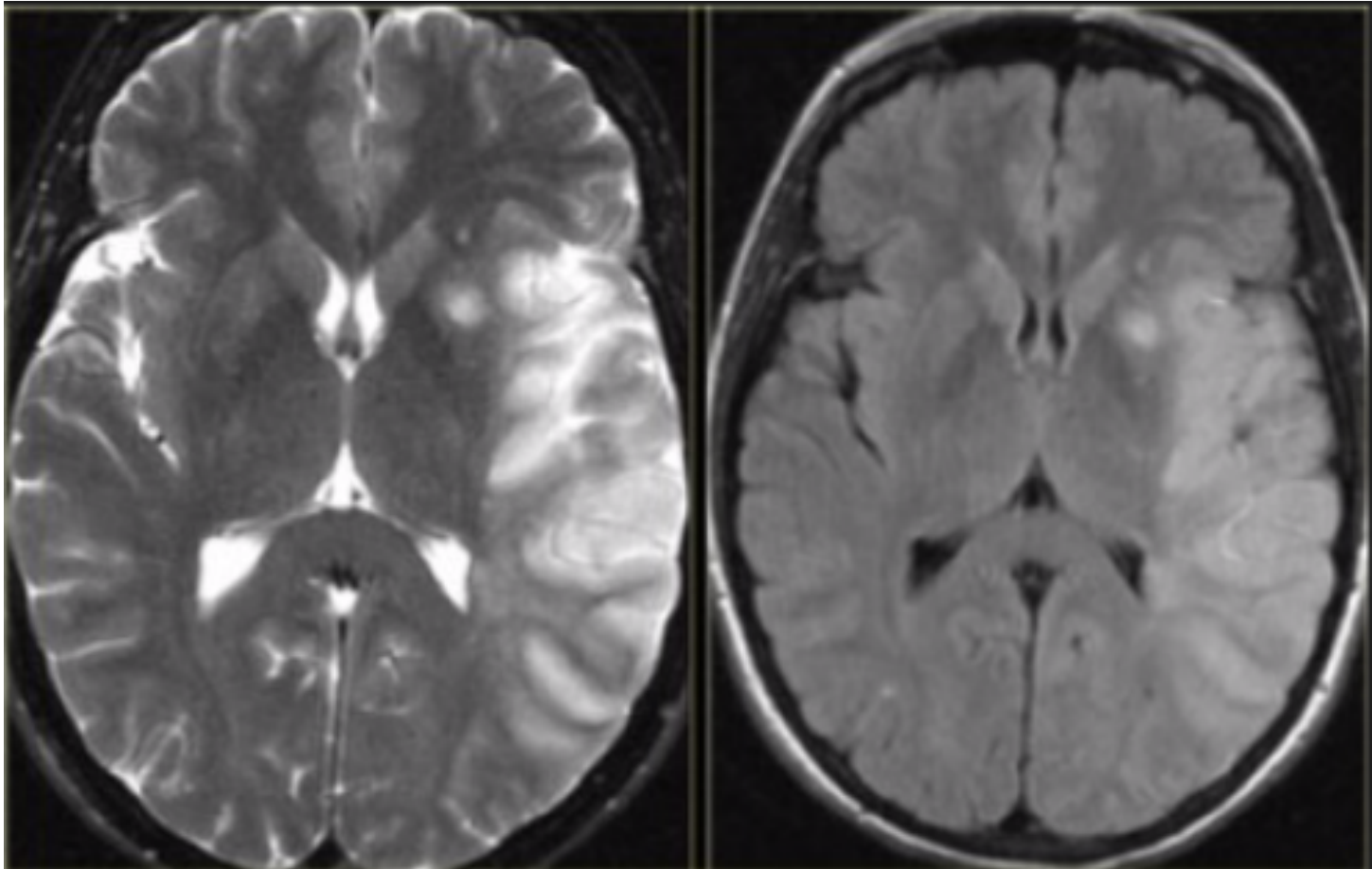
Source: American Stroke Association, <https://www.strokeassociation.org>

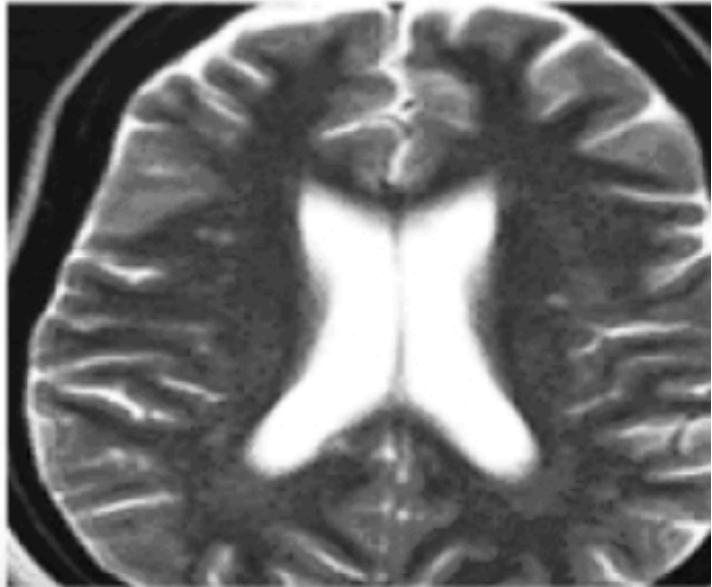
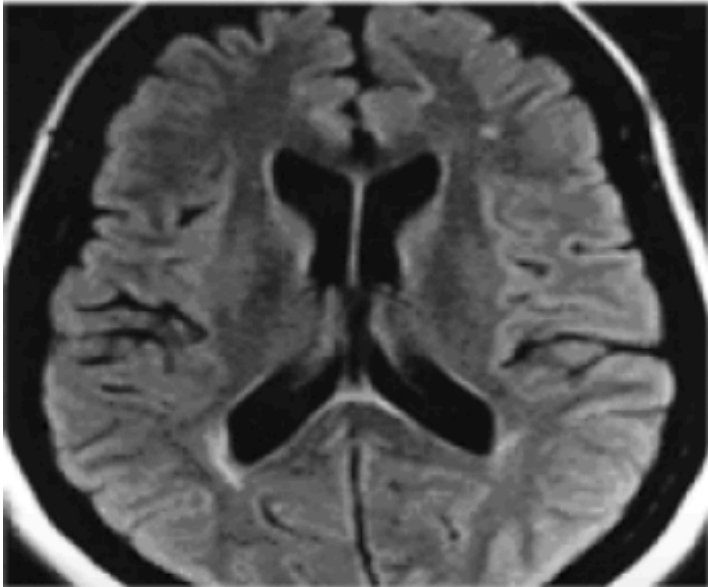
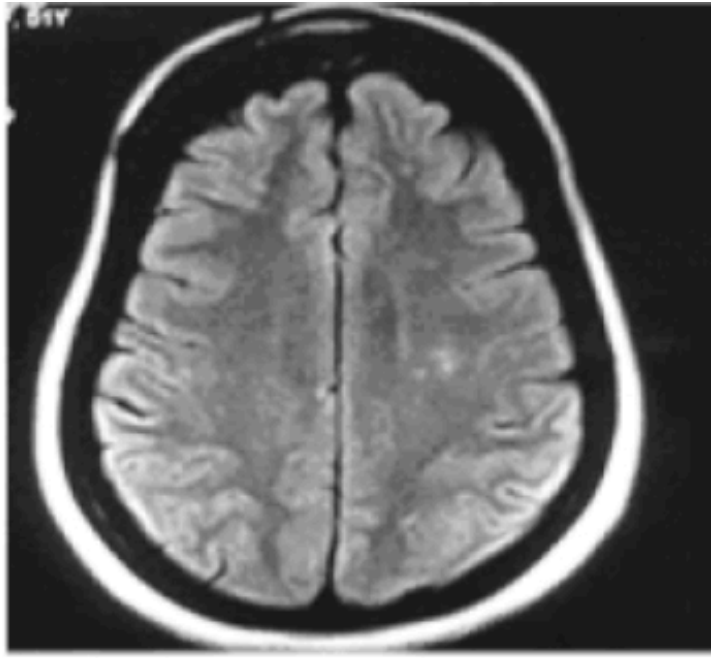
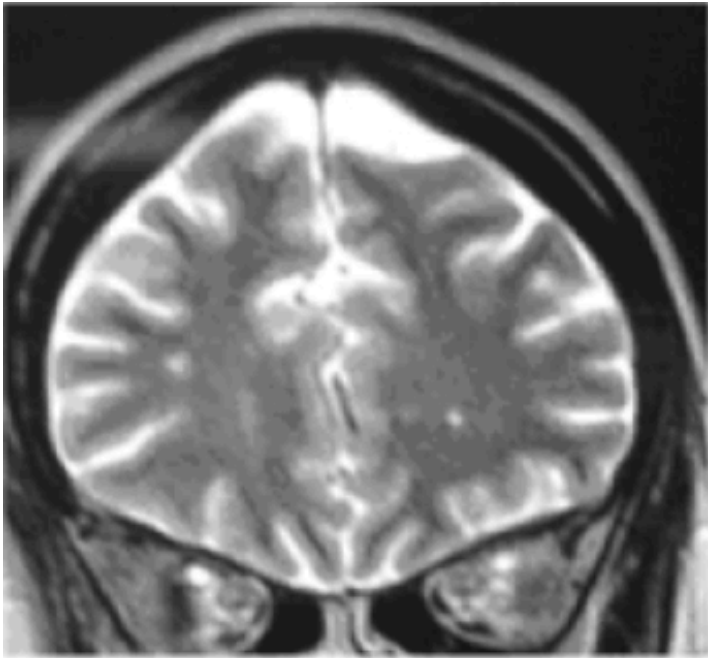
DEMYELINATING BRAIN DISEASE



Source: <https://www.shutterstock.com>

MRI VIEW

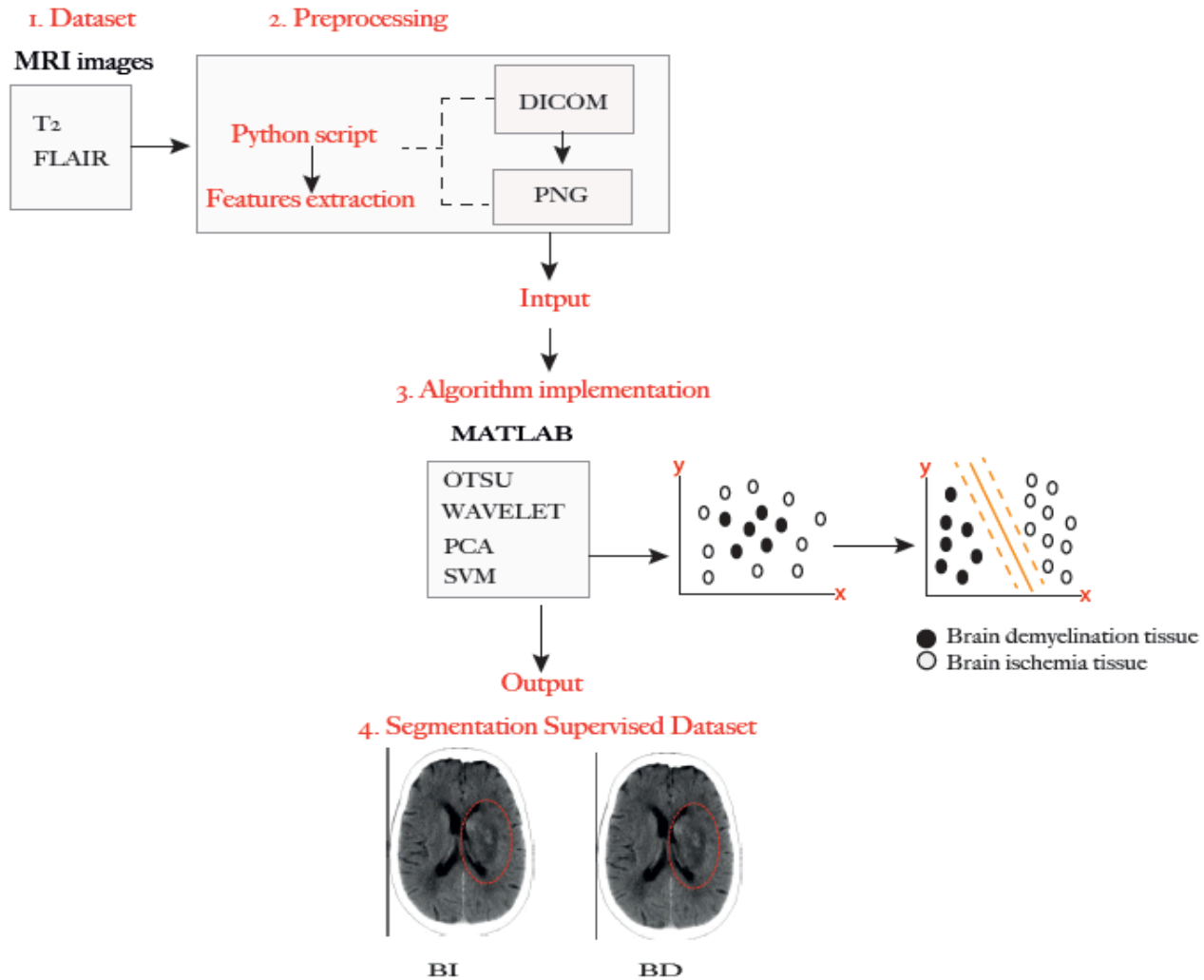




FINAL PURPOSE PROJECT

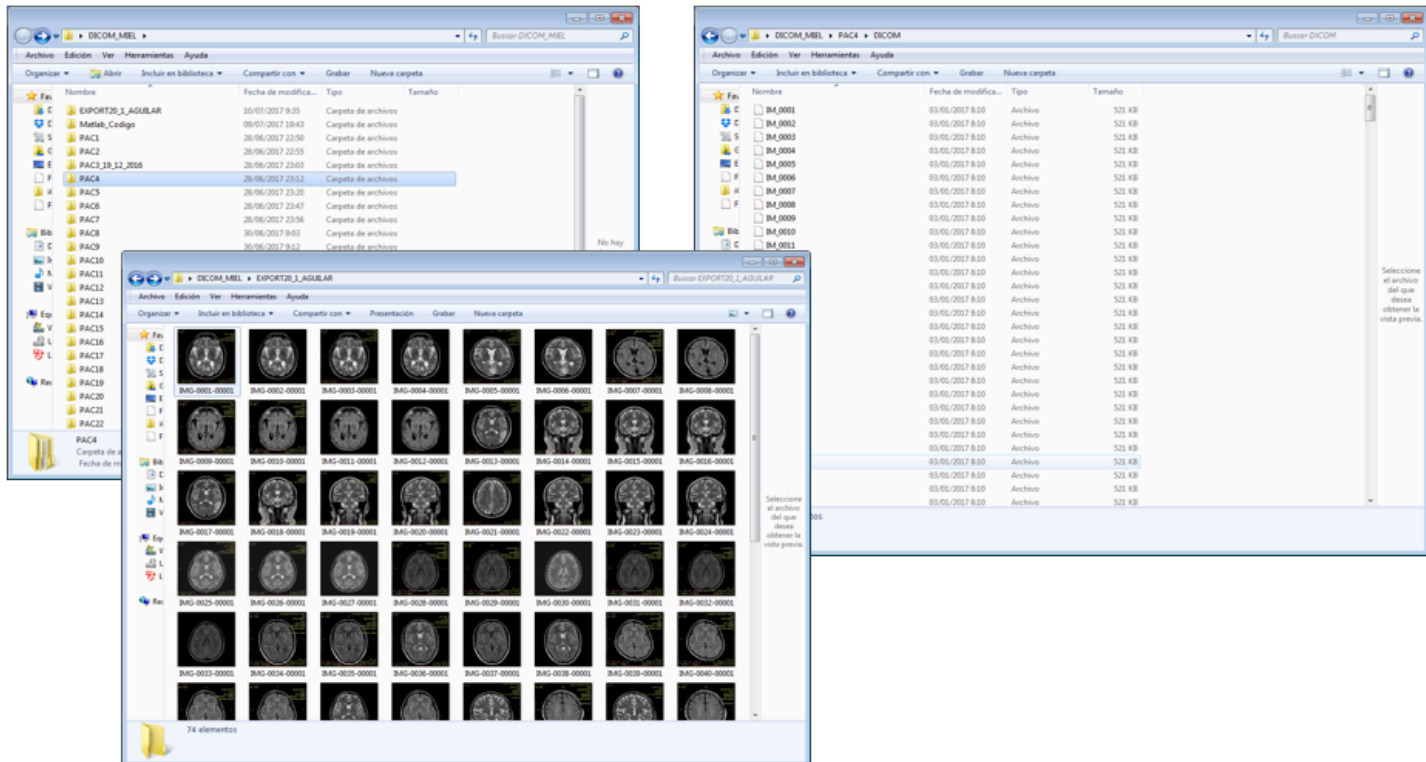
Identify and differentiate the demyelinating and ischemic brain diseases through the automatic classification and identification of their features in the magnetic resonance images.

METHODOLOGY



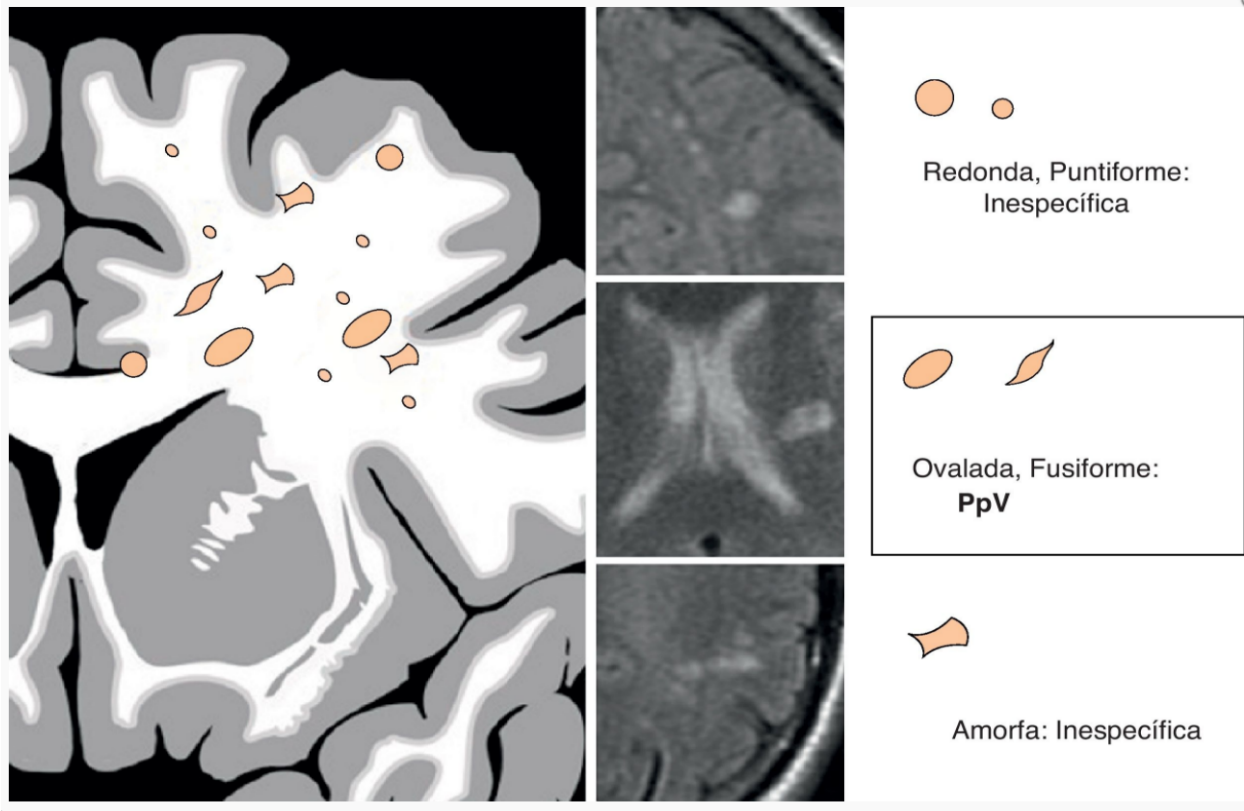
Dataset:

- MRI dataset of T1, T2, and FLAIR format. (91 patients)

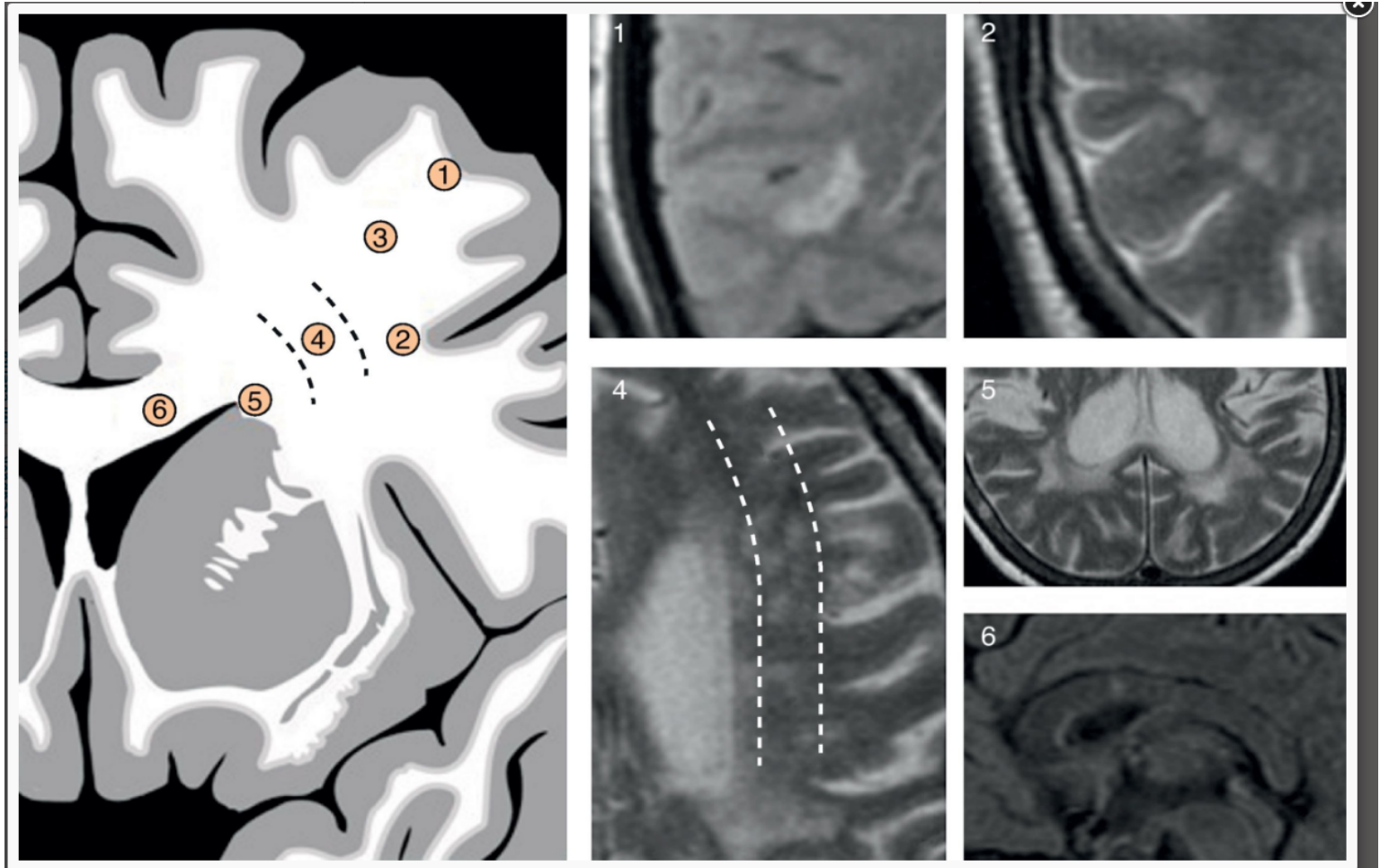


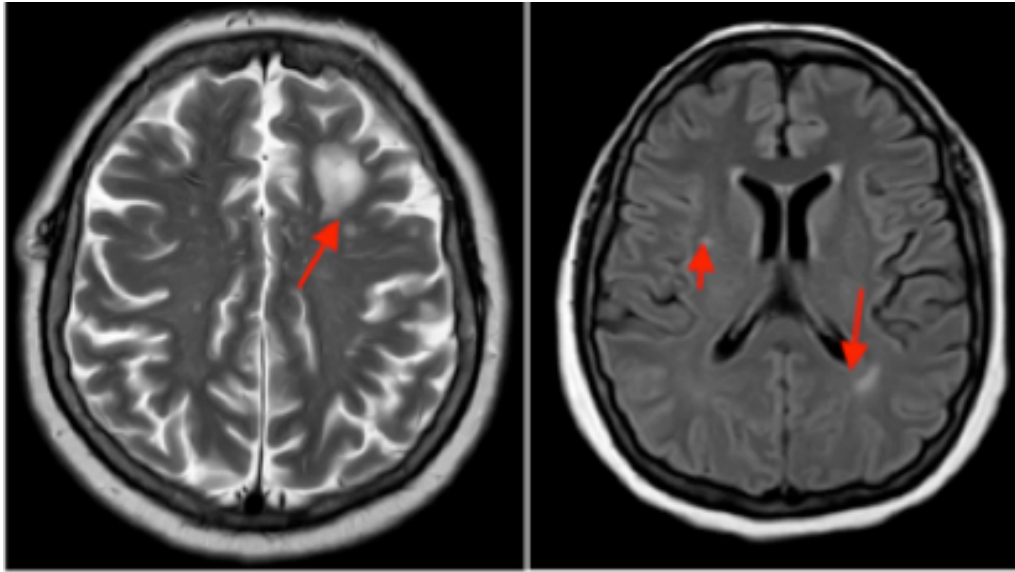
RESULTS

MORPHOLOGIC FEATURES: BI and BD diseases



LOCALIZATION: BI and BD diseases

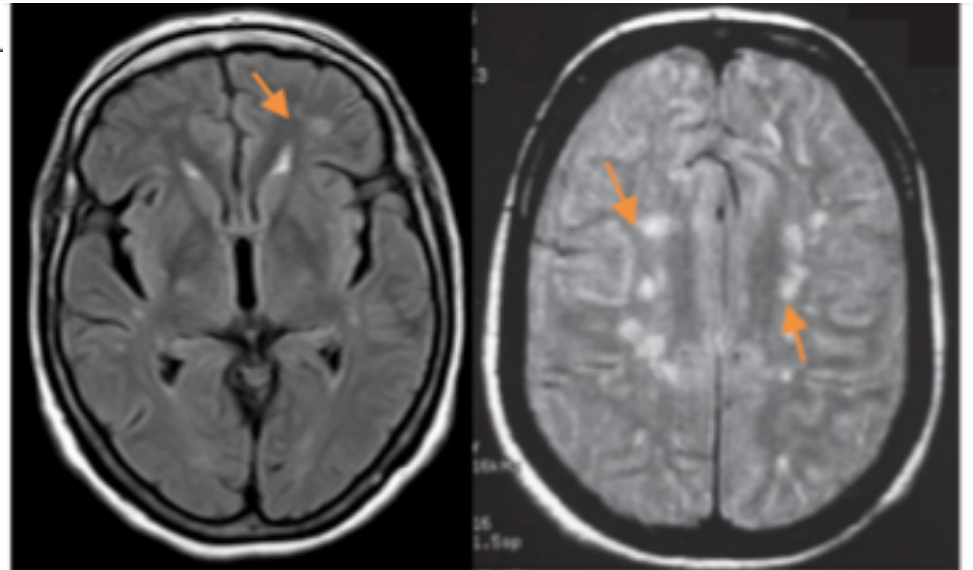




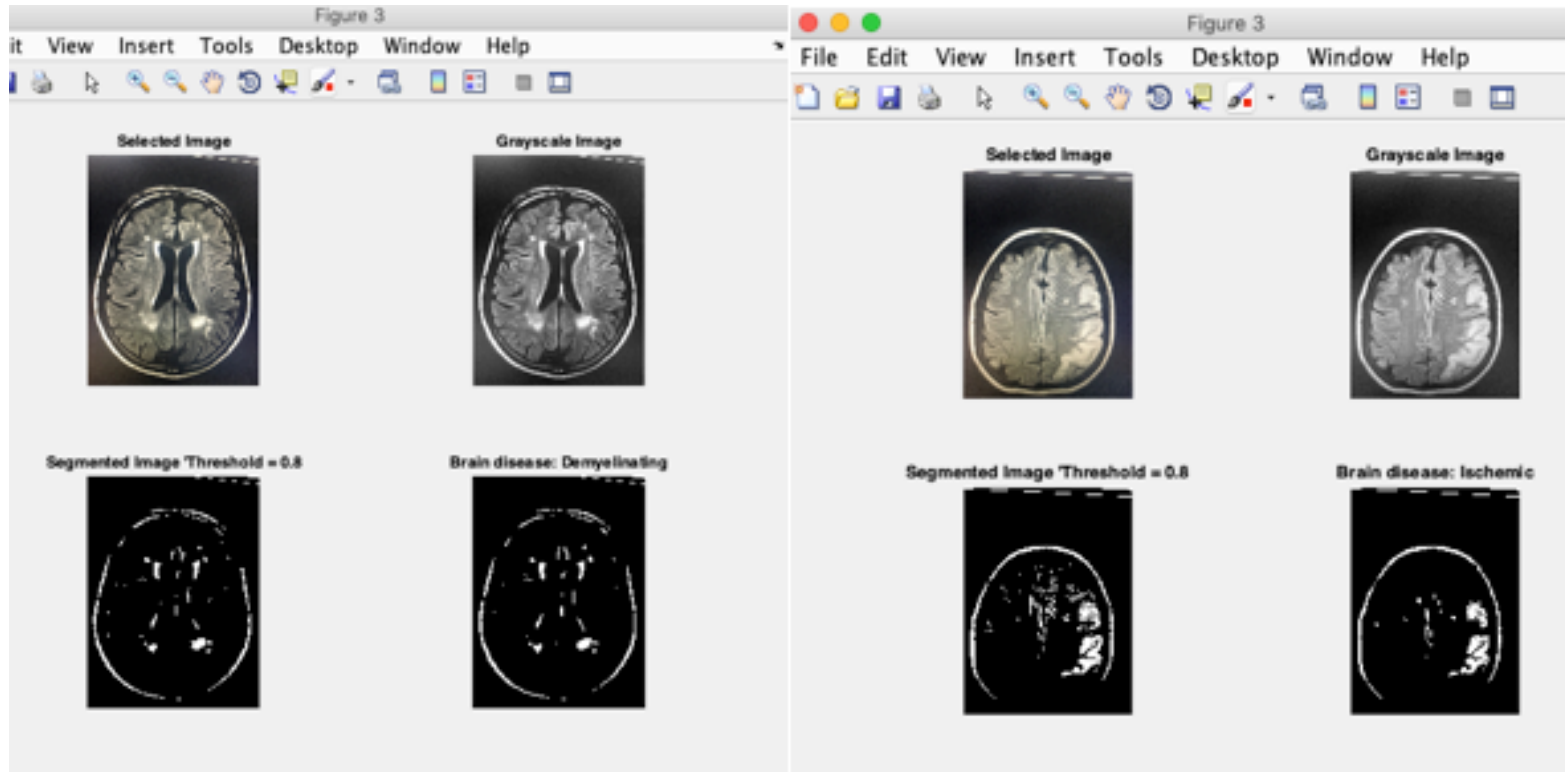
(a)

Ischemia

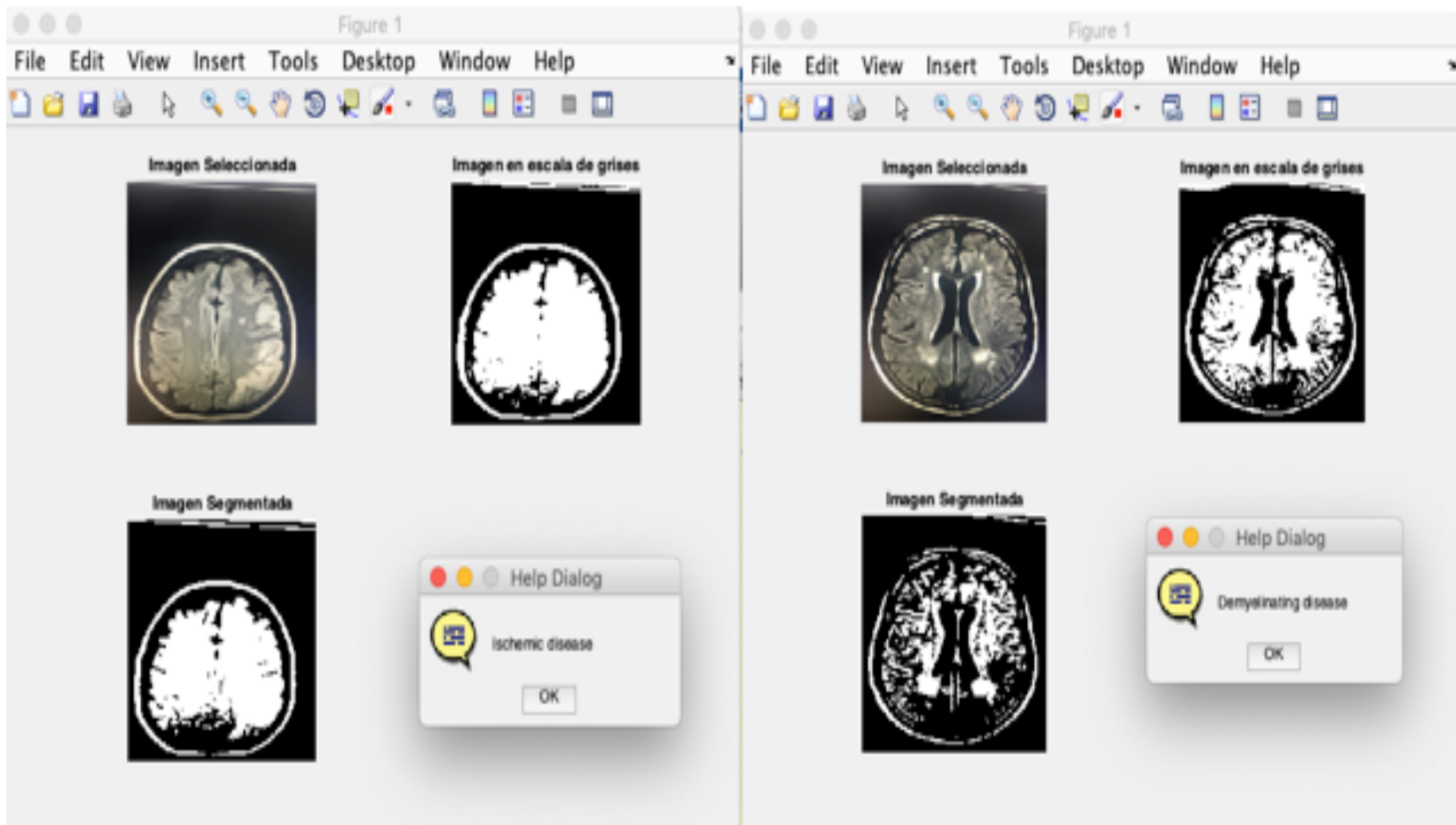
Demyelinating



(b)



Pre-processing of MRI using an automatic threshold based in morphology for identifying the disease patterns (region of interest) (a) Ischemic disease and (b) Demyelinating disease.



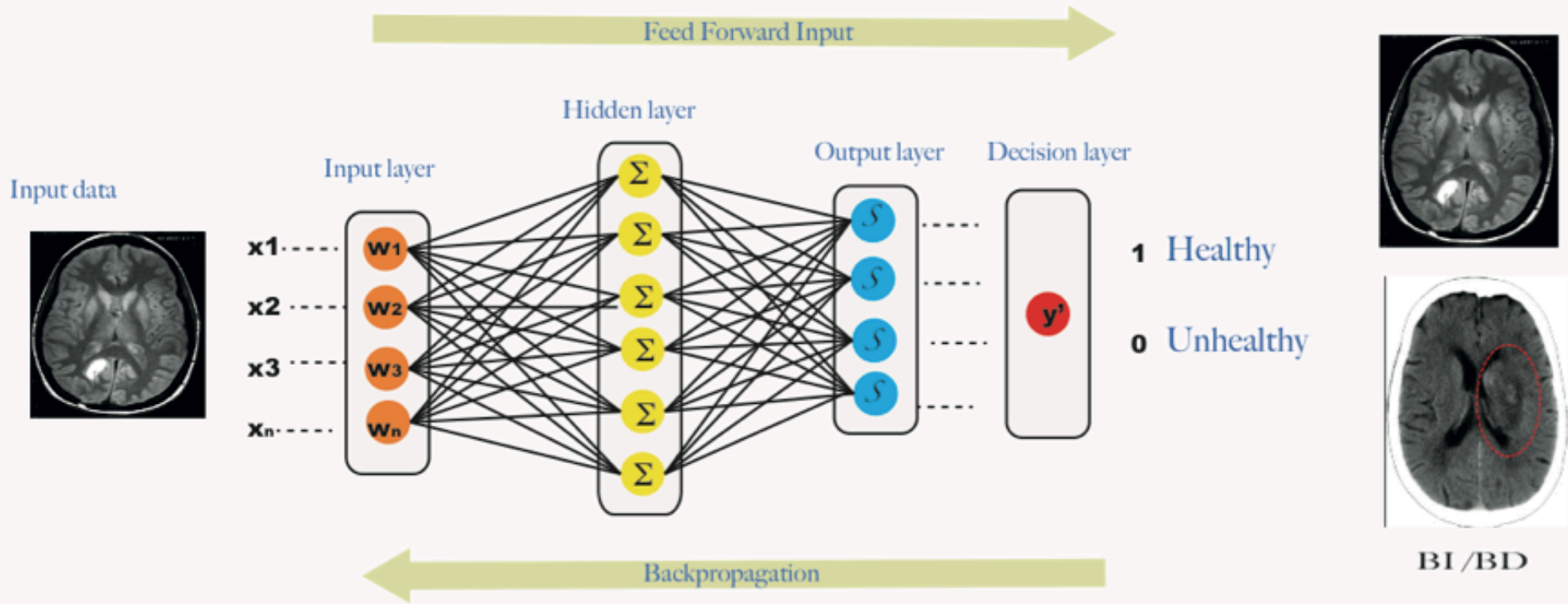
Results of MRI processing algorithm proposed for detection of the features and identify Demyelinating and Ischemia disease, respectively. This picture shows the selected image, the gray scale image, the segmented image and the conclusion of the processing.

CONCLUSIONS – FUTURE WORK

- At the moment, the algorithm proposed have an accurate of the 70%. Need optimization for to do a real diagnostic.
- The algorithm help and allow train to students of medicine careers in order to identify the diseases trough images.

FUTURE WORK

Multilayer perception for an image classification problem





**Thanks for
attention**

Questions?

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