# The Parietal Atrophy Score (PAS) on brain magnetic resonance imaging is a reliable visual scale

David Šilhán , Jana Mrzílková , Olga Pashkovska, Ibrahim Ibrahim,
Jaroslav Tintera, Aleš Bartoš

***Supervisor**: doc. MUDr. Aleš Bartoš, Ph.D.*
*Neurologická klinika 3. lékařské fakulty Univerzity Karlovy a Fakultní nemocnice Královské Vinohrady*

## Introduction:

Parietal atrophy with a relatively preserved structure of a mediotemporal region is an often sign of early-onset Alzheimer's disease (AD). Atrophy of these brain structures can be evaluated on brain magnetic resonance imaging (MRI) by quantitative techniques using manual and automatic segmentation, which are often time-consuming or require specialized software and skills. Visual scales represent a simple option to evaluate brain atrophy quickly and thus are more suitable for clinical practice.

## Aim:

The purpose of the study was to evaluate reliability of our new visual scale for a quick atrophy assessment of parietal lobes on MRI among different professionals. A good agreement would justify its use for differential diagnosis of neurodegenerative dementias, especially early-onset AD, in clinical settings.

## Methods:

The visual scale named Parietal Atrophy Score (PAS) is based on a semi-quantitative assessment ranging from 0 (no atrophy) to 2 (prominent atrophy) in three parietal lobe structures (sulcus cingularis posterior, precuneus, parietal gyri) on T1-weighted MR coronal slices through the whole lobes. We used kappa statistics to evaluate intra-rater and inter-rater agreement between four raters who independently scored parietal atrophy using PAS. Rater 1 was a neuroanatomist (JM), rater 2 was an expert in MRI acquisition and analysis (II), rater 3 was a medical student (OP) and rater 4 was a neurologist (DS) who evaluated parietal atrophy twice in a 3-month interval to assess intra-rater agreement. All raters evaluated the same brain MR images of 25 cognitively normal individuals with even distribution across all atrophy degrees from none to prominent according to the neurologist's rating.

## Results:

Intra-rater agreement was almost perfect with kappa value of 0.90. Inter-rater agreement was substantial with kappa value ranging from 0.60 - 0.86.

## Conclusion:

The Parietal atrophy score is the reliable visual scale among raters of different profession for a quick evaluation of parietal lobes on brain MRI. It can be used as an adjunct measure in differential diagnosis of dementias, especially early-onset AD.