

Digital biomarkers are associated with regional brain atrophy in radiologically isolated syndrome

Mikael Cohen, Lydiane Mondot, Cassandre Landes, Salim Fakir, Christine Lebrun-Frénay

Introduction:

We previously reported that a fast digital neurological assessment using a home developed mobile application called MS Screen Test (MSST) could highlight subclinical differences between subjects with a radiologically isolated syndrome (RIS) compared to matched healthy controls (HC)

Objectives:

To evaluate whether MSST could be a relevant tool to assess RIS subjects.

Aims:

To assess correlations between digital biomarkers and MRI parameters, particularly global and regional brain atrophy.

Methods:

This is a post hoc analysis of a previously reported cross sectional, mono centric study involving RIS subjects that were evaluated with MSST application including a fast evaluation of finger tapping, hand synchronization, low contrast visual acuity (LCVA) and reaction time during a vision-based cognitive task.

Each subject had a brain MRI including a 3D T1 sequence which was analyzed using volBrain software to obtain regional volumetric measures of 135 brain structures.

Results:

21 RIS subjects were included (mean age 44 yrs (25-56); F/M 2)

Cerebellar gray matter volume was positively associated with finger tapping speed for dominant hand ($r = 0.57$; $p = 0.007$), and negatively associated with inter hand interval at the hand synchronization test ($r = -0.59$, $p = 0.03$)

Occipital lobe volume was positively associated with LCVA score ($r = 0.48$, $p = 0.02$) and negatively associated with reaction time ($r = -0.5$, $p = 0.02$)

Left thalamus volume was positively associated with LCVA score ($r = 0.49$, $p = 0.02$)

We found no other statistical correlations regarding other brain structures and observed effect was independent of age.

Conclusions:

Digital biomarkers may reflect neurodegenerative process in RIS subjects.

A prospective study is ongoing to confirm those findings on a larger cohort and evaluate the prognostic value regarding the risk on conversion to multiple sclerosis.