P0034 - Can Digital Biomarkers Acquired on a Smartphone Distinguish Healthy Controls from Radiologically Isolated Syndrome Subjects? (ID 238)

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Abstract

Background

Radiologically isolated syndrome (RIS) is defined by the incidental finding of MRI lesions suggestive of multiple sclerosis in subjects with a normal neurological examination. Some studies suggested that the use of wearables could unveil infra-clinical differences between RIS subjects and healthy controls (HC).

Objectives

To demonstrate that digital biomarkers collected by a smartphone application can distinguish healthy controls (HC) from subjects with radiologically isolated syndrome (RIS).

Methods

We created a mobile app called MS Screen Test (MSST) that contains:

- Finger tapping speed test: during this task, we measure the mean tapping speed for the dominant hand and the non-dominant hand
- Level test: the subject is asked to tilt the phone to move a ball inside a target, then maintain it inside the target for 10 seconds. We measure the required time to bring the ball to the target, then the proportion of time during which the ball is maintained inside the target
- Low contrast vision (LCV) test: letters with varying contrast randomly appearing on the screen. The subject has to tap on the screen each time a letter is seen. The number of good answers is collected
- Cognition test: letters or digits randomly appear on the screen. The subject has to tap on the screen only if a letter is seen. The mean tap latency in milliseconds is collected as well as bad answers

A cohort of HC and RIS subjects were evaluated to compare performances on MSST.

Results

60 HC and 16 RIS subjects were prospectively included (F/M 3.15, mean age 41.6 yrs)

Compared to HC, RIS subjects had a lower tapping speed on both dominant (5.6 Hz vs 6.5 Hz, p=0.001) and non-dominant hand (5.1 Hz vs 5.6 Hz, p=0.04), fewer detected letters on the LCV test (10 vs 13, p=0.001) and a higher latency of response on the cognitive test (731 ms vs 599 ms, p<0.0001).

On the level test, the time during which the ball was maintained is the target was shorter for RIS subjects (3 sec vs 4.9 sec, p=0.05).
Conclusions

Our study confirms that digital biomarkers collected by a smartphone can unveil differences between HC and subjects at a presymptomatic stage of MS.

It would be relevant to evaluate whether those biomarkers could predict the risk of conversion to multiple sclerosis, as well as to evaluate their potential predictive value in early diagnosed MS patients.