

# Computer-assisted cognitive function assessment in fibromyalgia, chronic fatigue syndrome and multiple chemical sensitivity patients

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## **Introduction and aim:**

Clinical descriptions of Fibromyalgia (FM), Chronic Fatigue Syndrome (CFS) and Multiple Chemical Sensitivity (MCS) always include a certain degree of cognitive alteration which is reported by the patient in terms of symptoms, and while this may be very striking at times, it is difficult to assess and monitor. Establishment of this cognitive impact is interesting for diagnosis, differential diagnosis, clinical decisions and prognosis.

The tests currently used to establish this cognitive alteration are complex, time-consuming, require constant supervision by a trained examiner, exhaust the patient and are in general costly and therefore difficult to repeat.

The CogHealth test, however, is a tool which is sensitive to cognitive changes in time in different clinical situations, is self-administered and takes between 15 and 25 minutes to run on a computer.

Our aim is to establish the usefulness of the CogHealth test in determining the cognitive function in patients with FM, CFS and MCS.

## **Patients and method**

Our study, which was approved by Clínica CIMA's ethical committee with protocol number 005, included 96 patients between the ages of 30 and 55 (82 women and 14 men) and 25 healthy controls, with no abnormal signs of pain or tiredness in the same age range. All read and signed the detailed informed consent document for the study.

The patients were selected from among those diagnosed at our FM/CFS/MCS Unit displaying pure illness profiles, with the least possible overlap. Thirty-eight (38 patients) were therefore chosen with FM according to ACR 1990 criteria, 41 patients with CFS according to 1994 CDC criteria (Fukuda et al.) and 17 patients with MCS meeting the consensus criteria of Bartha et al. and obtaining a "Very Suggestive" level of severity for the high selection range according to the Quick Environmental Exposure and Sensitivity Inventory V-1 (Q-EESI). The 25 healthy controls were provided by the patients themselves.

The CogHealth computer test was used in its clinical form to determine speed of processing, simple attention, working memory and executive function, card-based episodic memory and attention task, divided and spatial attention, contextual memory and learning and finally another speed of processing. The patient was trained and supervised for the test. All the patients completed the study, but one (MCS) was rejected for analysis due to signs of arthritis in the hands which could have altered the results. The cognitive impact was classified as "none", "moderate" or "severe" according to the standard deviations of the

normality values for each parameter assessed. We used Cronbach's alpha, rank comparisons and AUROC measures for the statistical analysis.

## **Results**

CogHealth's internal consistency is good (Cronbach alfa = 0.79). The discrimination between people with no cognitive impairment and those with slight or moderate impairment is good (AUROC = 0.940) and also with severe impairment (AUROC= 0.923). Neither age nor sex or level of studies appear to affect the results.

The patients with fibromyalgia present a discrete alteration of divided and spatial attention ( $p < 0.01$ ) and they are indistinguishable in the remaining control population tests. There was an overall change in the response speed of CFS and MCS patients with a special impact on the reaction time ( $p < 0.0001$ ), working memory and executive function ( $p < 0.0001$ ) and contextual memory ( $p < 0.001$ ). There was also a very significant change in reaction times of MCS patients at the start and end of the test ( $p < 0.0001$ ).

Sensitivity (90.48-92.31%) and specificity (80.77-82.70%) were high in all the tests.

## **Conclusions**

Our data prove the CogHealth test to be a simple tool with suitable sensitivity for clinical application and for research, enabling detection and monitoring of the cognitive impact in patients diagnosed with CFS/MCS.

While there was a significant overall cognitive impact in the functions analyzed in CFS and MCS, there were no differences in FM with the control group.

## **Thanks**

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