IDIOPATHIC CHRONIC FATIGUE, MICROSCOPIC AND ENZYMATIC MITOCHONDRIAL STUDY

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INTRODUCTION

The role of mitochondria in human illness has recently become one of the most developed medical fields. Mitochondrial respiratory chain malfunction is apparent from a very wide range of symptoms, and abnormal tiredness and intolerance to exercise are common symptoms in mitochondrial disorders, chronic fatigue syndrome (CFS) and idiopathic chronic fatigue (ICF). Mitochondrial respiratory chain dysfunction can result in a wide range of symptoms which include serious fatigue and intolerance to exercise, even in patients without specific phenotypical expression.

OBJECTIVE

The objective of our study was to evaluate signs of mitochondrial dysfunction in ICF patients.

MATERIAL AND METHODS

This study was approved by the Ethical Committee and conducted at the Clínica CIMA with 15 patients with well-documented chronic fatigue who did not satisfy the strict criteria for chronic fatigue syndrome or other causes of fatigue. Personal and maternal records regarding possible mitochondrial impairment were collected (height, weight, hearing problems, alcohol intolerance and maternal history of below average height, headaches, abnormal fatigue and hearing loss).

Each patient exercised on a treadmill using Bruce protocol to establish their MET value and theoretical maximum cardiac frequency according to AMA guidelines. An open deltoid muscle biopsy was then performed and the sample analyzed under an optical microscope with Gomori tint to identify ragged red fibers. Structural mitochondrial changes (e.g. number, size and location, presence and accumulation of glycogen, lipofuscin or lipids) were evaluated with an electronic microscope.

Mitochondrial function was studied by assessing 5 enzymatic complexes in mitochondria and homogenate. Their oxidation activity was also studied.

RESULTS

The heights of the patients and their mothers, other phenotypical variables and MET values for the treadmill test are recorded in Table 1.

When viewed under the optical microscope, not one patient presented ragged red fibers with Gomori tint. Using the electronic microscope, we observed an increase in the number of mitochondria in 60% of patients, with a tendency to subsarcolemmal (see Image 1).

Glycogen and lipofuscin accumulation increased in 87% and 53% of patients, respectively.

There was an alteration of the mitochondrial function in mitochondria and homogenate in 60% and 40% of patients, respectively. Oxidation activity was different in 40% of patients.

CONCLUSION

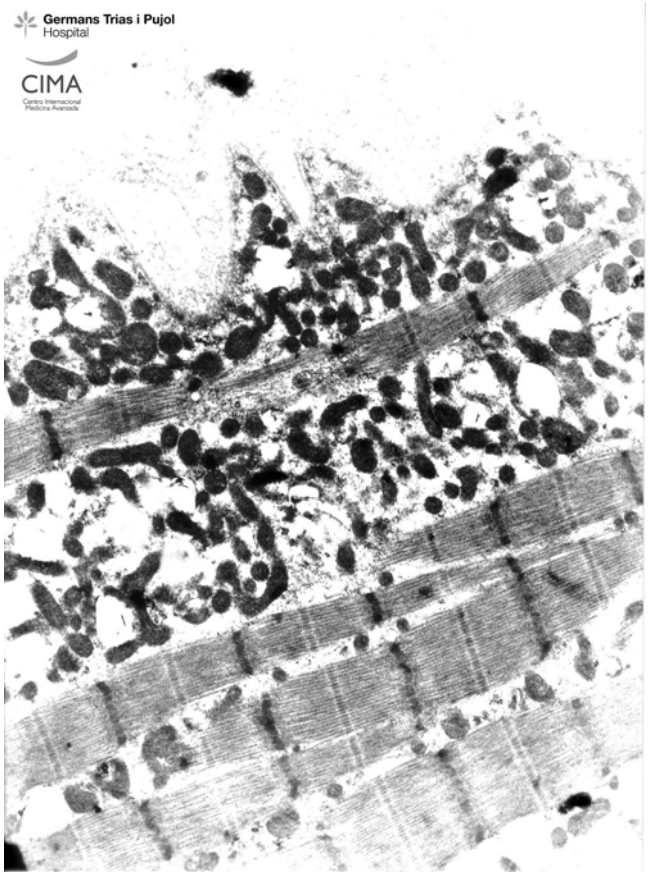
The study detected an increased number of mitochondria, glycogen and lipid accumulation, and a change in mitochondrial enzymatic activity. There was a correlation between the presence of lipofuscin accumulation and the presence of lipid accumulation, patients' ages and MET values. The main correlation was the presence in 33% of patients of a greater alteration of mitochondrial function, mitochondrial pleomorphism, cephalalgia in their mothers, and hearing loss in the patients.

Our study suggests that those patients suffering from severe, persistent and objective ICF of unknown cause and who display the phenotypical characteristics of hearing disorders and a maternal history of both cephalalgia and hearing problems are the best subjects for the biopsy in order to study mitochondrial function. Furthermore, patients with abnormal biopsy results are perfect for genetic study (DNA mitochondrial).

Table -1

N=15	Average	Median	Standard deviation
Age	49.3	51	12.5
Height	161.3	158	7.3
Weight	67.1	66	11.0
METS	5.4	5.3	1.9
Mother's height	157.4	158.0	5.6

Image -1



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