Chapter 8

Evaluation of visual focus in cirrhotic patients

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1. INTRODUCTION

A number of studies have supported the hypothesis that the main impairments of cognitive function in cirrhotic patients involve attention and psychomotor speed.1-5 Cognitive neuropsychologists have proposed that many subsystems contribute to attention. Each subsystem may be involved in different functions, such as: visual focusing, visual-spatial orienting, response selection in interference situations and executive control.

The most important model of attention was proposed by Posner and Petersen.6 They postulated the existence of three systems in the human brain concerned with attention: an anterior attention system (AAS), involved in response selection and executive control; a posterior attention system (PAS), implicated in visual focus and visual-spatial orienting; and an arousal system that maintains vigilance. The three networks are interconnected, and the actions of each influence all the cognitive domains.6

Visual focus is the ability of a human observer to focus attention on a restricted area of the visual field: the smaller the area, the faster the detection of a stimulus within it.

This study was designed to assess the ability of cirrhotic patients to focus attention on a small area of the visual field.
2. PATIENTS AND METHODS

Forty-five consecutive cirrhotic patients (40 males) aged 53.5 ± 8.0 (SD) years were entered into the study. The median duration of education was 8 years: 18 patients had had five years of education; 27 had had at least 8 years of education.

The diagnosis of cirrhosis was based on history, clinical examination, serum biochemical, endoscopic and ultrasound findings, or on liver biopsy. Exclusion criteria included: chronic obstructive lung disease or other severe lung disease with respiratory failure, renal insufficiency, coronary heart disease or heart failure of any etiology, previous neurological illness, a history of overt hepatic encephalopathy (HE) in the previous month, bleeding or infections in the preceding 15 days, a history of psychiatric disease or consumption of psychotropic drugs (except alcohol), and a lack of informed consent.

The etiology of cirrhosis in 12 patients was alcohol and/or chronic viral hepatitis. Patients with alcoholic cirrhosis had abstained from drinking for at least 6 months; the results of each interview with such patients was confirmed by a relative.

Fifteen patients were Child-Pugh class A, 17 class B, and 13 class C. A group of 20 healthy controls (11 males), aged 59 ± 7.5 years, with a median duration of education of 13 years, was also enrolled. One control had had five years of education; 19 had had at least 8 years of education. Patients and controls gave their informed consent to participate in the study, the protocol of which had been approved by the local Medical Ethics Committee.

2.1 Focus task: apparatus and procedure

Each experimental session took place in a dimly lit room. The stimulus was displayed on a 14" monitor and reaction times were recorded. Mean reaction times under all test conditions were calculated, excluding those more than 2 SD above or below the mean. The task measures the capacity to concentrate attention on a small portion of the visual field. The apparatus and stimuli were based on those used in the study of Benso and co-workers (experiment 1).7

Each experiment consisted of two sessions of 80 trials. Each trial of the task started with the presentation of a focus cue in the centre of the display. The cue was a circle of 2.5 or 7.5 degrees of visual field, which remained on the screen until the end of the trial. After a stimulus onset asynchrony (SOA) of 200, 500 or 700 ms. the imperative target stimulus (1° diameter circle) appeared in the centre of the cue. In about 20% of the trials (catch trials) no imperative stimulus appeared. The patients and the control subjects were instructed to press the key as fast as possible in response to the appearance