Cognitive Function in ME/CFS

Cognitive Function in ME/CFS: Information for ME/CFS Physicians
Medical literature review (July 2001)

Eleanor Stein, MD FRCP(C), Psychiatrist

Quest 57

Subjective cognitive dysfunction is a complaint of over 80% of patients with CFS and is adiagnostic criteria in all 4 of the extant working definitions.

What we know: Based on a thorough literature review it is agreed that persons with CFS (various definitions) show:

1. normal global intellectual functioning
2. normal receptive functioning
3. normal ability to focus and sustain attention for low effort tasks but reaction times and information processing are slowed
4. impaired concentration and memory for tasks requiring greater mental effort, less benefit from cueing, increased sensitivity to interference and slowed processing which limits elaboration of information during encoding
5. normal ability for verbal and non verbal conceptualization.

The cognitive deficit in CFS is not a structural one in any particular part of the brain. It is a functional disorder of information processing speed and efficiency. Emotional factors influence subjective report of cognitive difficulty, whereas their effect on objective performance remains uncertain. (Moss-Morris & Petrie, 1996; Tiersky et al, 1997)

Neuropsychological Findings:

- Cognitive deficits can be elicited more easily after aerobic exercise (LaManca et al, 1998; Blackwood et al, 1998).
- Cognitive changes are not due to psychiatric comorbidity (Johnson et al, 1996; Kane et al, 1997; Blackwood et al, 1998; Vercoulen et al, 1998; Michiels et al, 1996; Joyce et al, 1996; Michiels et al, 1999). DeLuca et al have found that cognitive impairment is greater in the absence of psychiatric diagnosis (DeLuca et al, 1997).

- ven groups who in other papers posit a psychological cause for CFS have found objective cognitive changes. eg. Vercoulen et al found that 80% of test subjects could be correctly classified as CFS or control based on the cognitive test results. Joyce et al (Wessely's group) found deficits in many aspects of function.
- Cognitive dysfunction in CFS is not due to lack of effort during testing (Blackwood et al, 1998) (Schmaling et al, 1994).
- Cognitive dysfunction in CFS is not due to somatic over concern (Vercoulen et al, 1998).
- Christodoulou et al report that CFS patients with failing scores (> 2SD below the mean) on verbal memory were more functionally disabled however the correlation between subjective and objective disability is still debated (Christodoulou et al, 1998).

Brain Imaging Findings:

- SPECT cerebral blood flow studies of persons with CFS show decreased blood flow in several key areas such as frontal lobes and brain stem which are different from both healthy controls (Barnden et al, 2001; Costa et al, 1995) and depressed subjects (Schwartz et al, 1994;Fischler et al, 1996). PET scan studies have reached similar conclusions (Tirelli et al, 1998).
- QEEG has also shown several abnormalities in brain function in CFS and neurophysiological differences between subjects with CFS and depression (Flor-Henry et al, 2001).

Tests which most commonly discriminate CFS from controls:

- any test measuring functioning before and after exertion
- Psychomotor speed - Finger Tapping Test (Halstead 1947), slower and decreasing speed across trials

- Memory - Selective Reminding Task (Rey 1964) delayed recall and long term storage
- Auditory processing speed - PASAT (Stuss et al 1987)
- Attention - Digit span forwards and backwards (Wechsler 1955), Trail making test parts A&B (Reitan & Davidson 1974)

Conclusions

As a group persons with CFS have measurable cognitive impairment which is made worse by physical exertion and cannot be attributed to comorbid conditions or attitudes. In individual patients cognitive deficits are difficult to prove with neuropsychiatric testing since there are rarely premorbid test results with which to compare. Never the less, findings which are out of keeping with known levels of premorbid functioning and decreased functioning after aerobic exercise are consistent with a diagnosis of CFS. Healthy controls and persons with depression generally do better on neuropsychiatric tests after exercise.

References

Barnden L, Kitchener M, Casse R, Burnet R, Delfante P, & Kwiatek R. Regional cerebral blood flow in chronic fatigue syndrome (CFS). Unpublished presentation 2001.

Blackwood,S.K., MacHale,S.M., Power,M.J., Goodwin,G.M., & Lawrie,S.M. (1998) Effects of exercise on cognitive and motor function in chronic fatigue syndrome and depression. *Journal of Neurology, Neurosurgery & Psychiatry*, **65**, 541-546.

Christodoulou C, De Luca J, Lange G, Johnson SK, Sisto SA, Korn L, & Natelson BH. (1998) Relation between neuropsychological impairment and functional disability in patients with chronic fatigue syndrome. *Journal of Neurology, Neurosurgery & Psychiatry*, **64**, 431-434.

Costa DC, Tannock C, & Brostoff J. (1995) Brainstem perfusion is impaired in chronic fatigue syndrome. *QJM*, **88**, 767-773.

DeLuca J, Johnson SK, Ellis SP, & Natelson BH. (1997) Cognitive functioning is impaired in patients with chronic fatigue syndrome devoid of psychiatric disease. *Journal of Neurology, Neurosurgery & Psychiatry*, **62**, 151-155.

Fischler B, D'Haenen H, Cluydts R, Michiels V, Demets K, Bossuyt A, Kaufman L, & De Meirleir K. (1996) Comparison of 99m Tc HMPAO SPECT scan between chronic fatigue syndrome, major depression and healthy controls: an exploratory

study of clinical correlates of regional cerebral blood flow. *Neuropsychobiology*, **34**, 175-183.

Flor-Henry PI, Lindl J, Morrison J, Pazderka-Robinson H, & Kolas Z. Chronic fatigue syndrome versus depression. 2001. ref Type: Unpublished Work

Johnson SK, DeLuca J, Diamond BJ, & Natelson BH. (1996) Selective impairment of auditory processing in chronic fatigue syndrome: a comparison with multiple sclerosis and healthy controls. *Perceptual & Motor Skills*,**83**, 51-62.

Joyce E., Blumenthal S., & Wessely S. (1996) Memory, attention, and executive function in chronic fatigue syndrome. *Journal of Neurology,Neurosurgery & Psychiatry*, **60**, 495-503.

Kane RL, Gantz NM, & DiPino RK. (1997) Neuropsychological and psychological functioning in chronic fatigue syndrome. *Neuropsychiatry, Neuropsychology, & Behavioral Neurology*, **10**, 25-31.

LaManca JJ, Sisto SA, DeLuca J, Johnson SK, Lange G, Pareja J, Cook S, & Natelson BH. (1998) Influence of exhaustive treadmill exercise on cognitive functioning in chronic fatigue syndrome. *American Journal of Medicine*,**105**, 59S-65S.

Michiels V, Cluydts R, Fischler B, Hoffmann G, Le Bon O, & De Meirleir K. (1996) Cognitive functioning in patients with chronic fatigue syndrome. *Journal of Clinical & Experimental Neuropsychology*, **18**, 666-677.

Michiels V, de GV, Cluydts R, & Fischler B. (1999) Attention and information processing efficiency in patients with Chronic Fatigue Syndrome. *Journal of Clinical & Experimental Neuropsychology*, **21**, 709-729.

Moss-Morris R. & Petrie KJ. (1996) Functioning in Chronic Fatigue Syndrome: Do illness perceptions play a regulatory role? *British Journal of Health Psychology*, **1**, 15-25.

Schmaling KB, DiClementi JD, Cullum CM, & Jones JF. (1994) Cognitive functioning in chronic fatigue syndrome and depression: a preliminary comparison. *Psychosomatic Medicine*, **56**, 383-388.

Schwartz RB, Komaroff AL, Garada BM, Gleit M, Doolittle TH, Bates DW, Vasile RG, & Holman BL. (1994) SPECT imaging of the brain: comparison of findings in patients with chronic fatigue syndrome, AIDS dementia complex, and major unipolar depression. *AJR Am.J Roentgenol.*, **162**, 943-951.

Tiersky LA, Johnson SK, Lange G, Natelson BH, & DeLuca J. (1997) Neuropsychology of chronic fatigue syndrome: a critical review. *Journal of Clinical & Experimental Neuropsychology*, **19**, 560-586.

Tirelli U, Chierichetti F, Tavio M, Simonelli C, Bianchin G, Zanco P, & Ferlin G. (1998) Brain positron emission tomography (PET) in chronic fatigue syndrome: preliminary data. *American Journal of Medicine*, **105**, 54S-58S.

Vercoulen JH, Bazelmans E, Swanink CM, Galama JM, Fennis JF, van de Meer JW & Bleijenberg G. (1998) Evaluating neuropsychological impairment in chronic fatigue syndrome. *Journal of Clinical & Experimental Neuropsychology*, **20**, 144-156.

*[**Eleanor Stein MD FRCP(C), Psychiatrist,** 4523 16 A St. SW, Calgary, AB T2T 4L8 - Tel: (403) 287-9941 FAX: (403) 287-9958 E-mail:espc@telus.net]*