Disability and Chronic Fatigue Syndrome

A Focus on Function

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Background: Evidence was sought in the published literature on how best to measure, monitor, and treat disability in patients with chronic fatigue syndrome (CFS).

Methods: A systematic review was performed of English-language literature published between January 1, 1988, and November 15, 2001. Interventional and observational studies of adults with CFS were eligible if they reported measures of disability and employment. A qualitative synthesis of results relating impairment measures to employment was performed.

Results: Of 3840 studies identified, 37 reported employment status and some measure of mental or physical impairment associated with disability. Most patients with CFS in these studies were unemployed. In 22 studies, the employment status of control subjects was also available. Only depression seemed to be associated with unemployment in patients with CFS. No other measurable impairment seemed to be consistently associated with disability or work outcomes. Only cognitive behavior therapy, rehabilitation, and exercise therapy interventions were associated with restoring the ability to work. No specific patient characteristics were identified as best predictors of positive employment outcomes. No quantitative syntheses of results were performed.

Conclusions: For questions of disability and employment in CFS, the limitations inherent in the current literature are extensive. Methodologically rigorous, longitudinal, and interventional studies are needed to determine baseline characteristics that are associated with the inability to work and interventions that are effective in restoring the ability to work in the CFS population. Simple and consistent evaluations of functional capacity in patients with CFS are needed.

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C H R O N I C F A T I G U E S Y N D R O M E (CFS) poses a difficult challenge to the medical community. Although there are at least 4 different and well-accepted operational definitions of CFS, all rely on subjective reports, and there are no objective diagnostic findings. Chronic fatigue syndrome is defined by the Centers for Disease Control and Prevention (CDC) as a syndrome of severe, disabling physical and mental fatigue lasting for at least 6 months, exacerbated by minimal exertion, and unexplained by a conventional medical diagnosis. As such, CFS is a purely subjective condition and is a diagnosis of exclusion because no diagnostic laboratory marker or pathognomonic biopsy specimen has yet been identified. The prevalence of CFS is difficult to quantify owing to the lack of validated diagnostic tests and the heterogeneity of the CFS population. No treatment for CFS has proved to be effective at reversing the condition, although cognitive behavior therapy may provide symptomatic improvement.

The objective of this study is to evaluate the best available evidence on detecting and managing disability in persons with CFS. This topic was funded by the Agency for Healthcare Research and Quality after nomination by the Social Security Administration, which defines disability as "the inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment (or combination of impairments) which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than twelve months." Patients with disabilities must have a severe impairment that makes them "unable to do (their) previous work or any other substantial gainful activity." The impairment "must result from anatomical, physiological, or psychological abnormalities which can be shown by medically accept-
able clinical and laboratory diagnostic techniques. A physical or mental impairment must be established by medical evidence consisting of signs, symptoms, and laboratory findings, not only by a statement of symptoms.8 8

Although these requirements may be readily documented for some illnesses, the assessment and documentation of disability in CFS present an enormous challenge. The core complaint, fatigue, is entirely subjective, and it does not readily fit the Social Security Administration definition of “anatomical, physiological, or psychological abnormalities”8 that can be demonstrated by objective testing. The goal of this study, therefore, is to review the best available evidence regarding questions of disability in persons with CFS.

**METHODS**

In general, standard best methods of systematic review research were used.9,10 With the help of a multidisciplinary expert panel, 4 specific questions were developed to guide the review: (1) What is the evidence that some individuals with CFS have discrete impairments that are associated with disability? (2) What is the evidence that in the CFS population, current neuropsychological tests reliably detect cognitive or affective impairments associated with decreased ability to work? (3) What is the evidence that in individuals with CFS, treatments are effective in restoring the ability to work? (4) What are the patient characteristics that best define improvement or positive outcomes in the CFS population such that they experience improvement in functioning? Where it occurs, how is this improvement in functioning related to the ability to engage in work activity?

The published literature between January 1, 1988 (the year the first operational definition of CFS was published by the CDC), and November 15, 2001, was searched using the MEDLINE, Current Contents, Cochrane Library, and PsychINFO databases. In addition, the bibliographies of all accepted studies and review articles from January 1, 1999, through December 31, 2001, were searched for potentially relevant citations. The retrieval cutoff date was March 15, 2002.

Only English-language literature was sought, using the following search strategy: fatigue syndrome, chronic (MeSH) or chronic fatigue (syndrome). Limitations were English language and human subjects.

The following study designs were accepted: observational (prospective, retrospective, and cross-sectional) and interventional. To be accepted for this review, studies were required to report CFS diagnosed according to 1 of the 4 CFS definitions (CDC 1988,2 CDC 1994,4 Oxford 1991,3 or Australia 19905) in adults. Studies had to report at least 1 medically determinable measure of physical or mental impairment (measures of symptom severity, functional or cognitive impairment, physical activity, exercise testing, general health, or psychiatric impairment related to disability) per Social Security Administration guidelines in relation to work or employment status.

Key data from each eligible study were extracted by one reviewer (R.P.E. or L.R.S.) and reviewed by another (C.B.L.), checking all data elements against the published article. Data elements sought for extraction from each study included study characteristics (such as location and design), patient characteristics (such as age, sex, and duration of CFS), and previous interventions (pharmacologic treatment, cognitive or exercise therapy, etc.). Impairment scale results were captured for baseline and follow-up observations. The reviewers categorized each scale according to 1 of 7 impairment domain categories: cognitive, symptoms, exercise, functional, general health, mental, or physical. Some scales, such as the Checklist of Individual Strength,11 the Sickness Impact Profile,13 and the Medical Outcomes Study 36-Item Short-Form Health Survey (MOS SF-36)13 had subscales in multiple domains.

Because many articles used different scales, organizing them by domain was a necessary first step before attempting to combine data from different studies. For each study, results from a maximum of 3 scales in each of the domains available were extracted; when more than 3 scales in a given domain were reported for the same study, the scales chosen for extraction were those with the highest number of patients evaluated, those with group means and measures of dispersion, and those with named scales previously published or validated. When, in a single domain, total and component scale results were reported, the total was extracted preferentially.

Study quality was graded according to design (Table 1). A scale to measure the internal and external validity of all eligible studies was developed. For internal validity, points were awarded (0 indicates absent; 1, present) if the following criteria were met: all patients with CFS studied were diagnosed according to at least 1 of the acceptable criteria, tests for medically determinable physical or mental impairment were specified and reported, control groups were similar to patients with CFS in clinically important demographic factors at the start of the study, all patients and controls enrolled were accounted for in follow-up, 95% confidence intervals or P values were reported for numerical results, and work activity or disability status was reported. For external validity, studies received points depending on whether the patient sample was self-selected (0 points), a random sample from a CFS cohort (1 point), or all patients from a CFS cohort (2 points).

**RESULTS**

From a total of 3840 abstracts identified from electronic searches and bibliography checks, 53 studies and 19 kin studies met all of the eligibility criteria (see Box). The most common reason for rejection was lack of data on work or disability status (124 studies).

Table 2 summarizes the main study-level characteristics of the 53 accepted studies (4558 patients). Con-
Several studies used more than 1 set of criteria. Only 1 study fulfilled the 1994 CDC diagnostic criteria, and 18 required the 1988 CDC criteria for CFS, 20 required that patients sat-
Patients with CFS in these studies thus seem to have a higher lifetime incidence of psychiatric diagnoses than controls. However, no relationship of psychiatric diagnoses to disability can be established in these studies. Therefore, we next explored the subset of studies that reported employment status and either physical or mental impairment scales, after categorizing the scales by domain. Using scatterplots, we observed no apparent association between work status and any single impairment domain (data not shown). We then further grouped studies by similar impairment domains.

Table 4 displays the 8 studies17-24 that reported impairment in any physical domain (physical, general health, symptoms, or exercise) and the percentage of individuals employed for patients with CFS and controls. Statistically significant differences were found between patients with CFS and controls on several scales in the physical domain.
domain: the MOS SF-36 for physical function,18-21 general health,22 and health perception23; the Profile of Mood States (POMS) for fatigue and vigor17-19,21; the Profile of Fatigue-Related Symptoms for fatigue and somatic symptoms22; the Sickness Impact Profile for mobility and walking24; and the Checklist of Individual Strength for activity.24 Although patients with CFS had statistically significantly different scores from controls in these studies, it should be remembered that all of these scores may be abnormal in patients who are fatigued for any reason. In all but 3 of these 8 studies, estimates of physical impairment are based only on self-reported scales by the patient. Only 2 of the 8 studies described formal exercise testing. No statistically significant differences were found between patients with CFS and controls in maximum oxygen consumption18 or maximal voluntary contraction during hand grip exercises.21 The percentage of patients with CFS who were employed ranged from 13% to 49% in these studies, whereas the percentage of controls who were employed ranged from 71% to 100%. Most of these employment rates include full-time and part-time work, but the lowest values, for patients with CFS and controls, were from a study22 that limited employment in these few studies. It is not possible, however, to relate these physical or mental impairments to employment in these few studies.

What Is the Evidence That in the CFS Population, Current Neuropsychological Tests Reliably Detect Cognitive or Affective Impairments Associated With Decreased Ability to Work?

Table 5 lists the 9 studies17-25 that reported neuropsychological impairment scales and work data in patients with CFS and controls. Statistically significant differences were found between patients with CFS and controls on MOS SF-36 mental health,20,21 POMS confusion and depression,17,19,21 Everyday Attention Questionnaire and Profile of Fatigue-Related Symptoms for emotional distress and cognitive difficulty,22 Symptom Checklist-90-Revised depression,23 and Sickness Impact Profile and Checklist of Individual Strength concentration.24 The POMS scores for anger/hostility and tension/anxiety were statistically significantly different in patients with CFS vs controls in one study27 but not in another.19 Cognitive function was statistically significantly different in patients with CFS vs controls in the Wechsler Adult Intelligence Scale digit span forward in one study25 but not in Hopkins verbal learning in another study.18 One study19 reported that the POMS tension/anxiety and anger/
hostility scores were not significantly different between patients with CFS and controls. These data suggest that patients with CFS have a higher frequency of abnormalities on confusion, depression, and concentration scales and lower levels of employment compared with controls. However, no statistical pooling is possible in these studies owing to widely divergent study designs and outcome measures.

Although no single neuropsychological test has been validated to reliably detect either cognitive or affective impairments associated with employment status in patients with CFS, 2 measures may have promise. In 2 studies, MOS SF-36 mental health scores revealed consistent differences between patients with CFS and controls. In 3 other studies, POMS confusion scores and differences with controls were also of similar magnitude. The POMS depression score was comparable in only 2 of these 3 studies. This best available evidence thus suggests that MOS SF-36 mental health and POMS confusion may be the most promising measures of neuropsychiatric status in patients with CFS and may relate to employment status.

What Is the Evidence That in Individuals With CFS, Treatments Are Effective in Restoring the Ability to Work?

Among the 14 interventional trials with work or impairment outcomes in the CFS population. In a US study, patients with CFS were contacted 1 1/2 years after their initial evaluation to report on their work and functional status. None of the baseline demographic, clinical, or psychosocial characteristics were predictive of returning to work. In another US study, 32 patients with CFS were evaluated to identify traits associated with working. Working patients with CFS were more likely to be men, younger, and never married, and they had less severe muscle and joint pain, higher activity levels, and better physical functioning than nonworking patients. In the third study, 39 from New Zealand, 53 patients with CFS were questioned regarding their perceptions of health, illness attributions, self-esteem, and coping skills, and they were followed for 6 months. Work dysfunction was associated with increased somatic illness identity and limited coping skills. Last, in a multinational study, 1744 patients with CFS filled out questionnaires that included questions about functional impairment and the ability to work. Greater severity of symptoms was associated with inability to work, but depression was not.

In summary, no patient characteristics in any impairment domain have been consistently identified that best define or predict improvement or positive work or functional outcomes in the CFS population.

Table 6. Interventions Restoring the Ability to Work in Patients With Chronic Fatigue Syndrome

<table>
<thead>
<tr>
<th>Source</th>
<th>Validity Score</th>
<th>Intervention</th>
<th>Time of Follow-up</th>
<th>Patients Enrolled, No.</th>
<th>Dropouts, %</th>
<th>Patients Employed at Baseline, %</th>
<th>Patients Employed at Follow-up, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akagi et al, 2001</td>
<td>6</td>
<td>Cognitive behavior therapy</td>
<td>6</td>
<td>51</td>
<td>0</td>
<td>29</td>
<td>53</td>
</tr>
<tr>
<td>Dyck et al, 1996</td>
<td>3</td>
<td>Rehabilitation program</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>50</td>
</tr>
<tr>
<td>Fulcher and White, 1997</td>
<td>5</td>
<td>Exercise therapy</td>
<td>15</td>
<td>66</td>
<td>29</td>
<td>39</td>
<td>47</td>
</tr>
<tr>
<td>Marlin et al, 1998</td>
<td>2</td>
<td>Individualized programs</td>
<td>6</td>
<td>71</td>
<td>28</td>
<td>0</td>
<td>44</td>
</tr>
<tr>
<td>Tiersky et al, 2001</td>
<td>4</td>
<td>None</td>
<td>42</td>
<td>47</td>
<td>26</td>
<td>32</td>
<td>23</td>
</tr>
<tr>
<td>Vercoulen et al, 1994</td>
<td>7</td>
<td>None</td>
<td>18</td>
<td>298</td>
<td>17</td>
<td>31</td>
<td>24</td>
</tr>
</tbody>
</table>

*Based on the number of patients enrolled.

What Are the Patient Characteristics That Best Define Improvement in the CFS Population Such That They Experience Improvement in Functioning That Is Related to Ability to Engage in Work Activity?

Table 7 describes the 9 studies that reported the proportion of patients with CFS in whom symptomatic improvement was noted over time. Specific characteristics of interest were mean age, sex, mean duration of CFS symptoms, mean number of years of education, and incidence of depression. Studies did not show any consistent trend with regard to these baseline variables as predictors of improvement. For example, shorter duration of disease was associated with improvement in 2 studies but not in 3 others. Sex was associated with improvement in 2 studies but not in 2 others. Age was associated with improvement in 1 study but not in 2 others. Education was not associated with improvement in 2 studies and marital status was not associated with improvement in 1 study.

Last, in 4 studies, work status was examined with regard to patient characteristics. These studies were examined to seek characteristics associated with positive work outcomes in the CFS population. In a US study, patients with CFS were contacted 1 1/2 years after their initial evaluation to report on their work and functional status. None of the baseline demographic, clinical, or psychosocial characteristics were predictive of returning to work. In another US study, patients with CFS were evaluated to identify traits associated with working. Working patients with CFS were more likely to be men, younger, and never married, and they had less severe muscle and joint pain, higher activity levels, and better physical functioning than nonworking patients. In the third study, from New Zealand, 53 patients with CFS were questioned regarding their perceptions of health, illness attributions, self-esteem, and coping skills, and they were followed for 6 months. Work dysfunction was associated with increased somatic illness identity and limited coping skills. Last, in a multinational study, 1744 patients with CFS filled out questionnaires that included questions about functional impairment and the ability to work. Greater severity of symptoms was associated with inability to work, but depression was not.

In summary, no patient characteristics in any impairment domain have been consistently identified that best define or predict improvement or positive work or functional outcomes in the CFS population.
For patients with CFS, we have no diagnostic tests and no proven treatments. Yet, “whatever one presumes CFS to be, people suffer with it and because of it.”40 Can we serve patients with CFS better by focusing less on the medical mystery per se and more on the functional consequences? This is the main premise underlying this review. This best available evidence suggests that unemployment in patients with CFS is high. Physical and mental impairments are demonstrable, albeit with instruments that have not been validated in a compensation setting, or as measures of disability, or in patients with CFS. The MOS SF-36 physical and mental functions and the POMS confusion, fatigue, and depression scales provide the strongest evidence in this regard. It is not possible, however, to yet determine whether patients with CFS who have discrete impairments are those who are unemployed. Also, no specific demographic, clinical, or psychiatric traits have been shown to be consistently predictive of the ability of patients with CFS to return to work.

Thus, the major limitation of this review is that the studies we identified as the best available evidence were not designed to answer the types of questions posed in this review. And owing to the variety of study designs, scales used, and outcomes reported, results of different studies could not be combined in meaningful ways. Researchers did not report consistent information about impairment and work status at both baseline and follow-up. Neither did they consistently describe employment status as full- or part-time work, previous or new work, or duration before return to work. Standardized measurements of impairment in patients with CFS are not available, and neither is the impact of impairment on employability. The validity and reliability of self-reported measures of impairment and disability are needed specifically for patients with CFS, as they are often formerly high-functioning individuals, unlike chronically

<p>| Table 7. Baseline Characteristics Reported as Improved in Patients With Chronic Fatigue Syndrome* |</p>
<table>
<thead>
<tr>
<th>Source</th>
<th>Validity Score</th>
<th>Intervention</th>
<th>Time of Outcome Assessment, mo</th>
<th>Patients Enrolled, No.</th>
<th>Patients Evaluated for Improvement, No.</th>
<th>Patients Improved, %</th>
<th>Baseline Characteristics of Improved vs Unimproved Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombardier and Buchwald,32 1995</td>
<td>4</td>
<td>None</td>
<td>18</td>
<td>226</td>
<td>226</td>
<td>61</td>
<td>Absence of dysthymia (r = 0.15, P&lt;.03)</td>
</tr>
<tr>
<td>Butler et al,34 1991</td>
<td>5</td>
<td>CBT</td>
<td>1.5</td>
<td>32</td>
<td>27</td>
<td>85</td>
<td>Absence of treatment-resistant affective disorder (BDI: 8.3 vs 11.7)</td>
</tr>
<tr>
<td>Deale et al,35 1997</td>
<td>6</td>
<td>CBT</td>
<td>6</td>
<td>60</td>
<td>27</td>
<td>70</td>
<td>Same sex, disease severity, disease duration (number not reported)</td>
</tr>
<tr>
<td>Kruesi et al,31 1989</td>
<td>4</td>
<td>Acyclovir or placebo therapy</td>
<td>6</td>
<td>28</td>
<td>24</td>
<td>88</td>
<td>No significant difference in any pretreatment characteristic (numbers not reported)</td>
</tr>
<tr>
<td>Lerner et al,33 1997</td>
<td>4</td>
<td>Ganciclovir therapy</td>
<td>6</td>
<td>38</td>
<td>18</td>
<td>72</td>
<td>Male sex (3 men in study, all improved)</td>
</tr>
<tr>
<td>Peterson et al,36 1991</td>
<td>6</td>
<td>None</td>
<td>Onset of illness</td>
<td>177</td>
<td>177</td>
<td>12</td>
<td>Shorter mean duration of symptoms (1.6 vs 2.8 y)</td>
</tr>
<tr>
<td>Saltzstein et al,37 1998</td>
<td>4</td>
<td>None</td>
<td>24</td>
<td>15</td>
<td>15</td>
<td>12</td>
<td>Female sex: 61.9% vs 80.1% (P = .09)</td>
</tr>
<tr>
<td>Tiersky et al,30 2001</td>
<td>4</td>
<td>None</td>
<td>42</td>
<td>47</td>
<td>35</td>
<td>57</td>
<td>Employed at presentation: 66.7% vs 49.4% (P = .06)</td>
</tr>
<tr>
<td>Vercoulen et al,31 1994</td>
<td>7</td>
<td>None</td>
<td>18</td>
<td>298</td>
<td>246</td>
<td>20</td>
<td>Higher median anxiety score 38 vs 27 (P = .02)</td>
</tr>
</tbody>
</table>

Abbreviations: BDI, Beck Depression Inventory; CBT, cognitive behavior therapy; SCL-90, Symptom Checklist-90.
*Measures of dispersion are not included. P values are listed when reported.


ill patients, who have served as the benchmark population for the development and validation of existing impairment and disability measures to date. Also, further research is needed to determine whether there are characteristics of care providers or previous work experiences that relate to ongoing CFS disability. Last, longitudinal, interventional studies are mandatory to determine baseline characteristics that are associated with the ability to work and interventions that are effective in restoring the ability to work.

In conclusion, this systematic review of the current published research related to CFS disability demonstrates that some individuals with CFS have self-reported physical or mental impairments, but these results are not consistent and are not specific to CFS. The relationship of these impairments to work status has not been well demonstrated. No specific interventions have been proved to be effective in restoring the ability to work. No specific patient characteristics have been defined that best predict positive employment outcomes in patients with CFS. Nevertheless, the results of these studies suggest that some patients with CFS are impaired and that some are disabled, according to the Social Security Administration definition. In future research and practice, a routine functional capacity evaluation should prove useful in defining what a patient can or cannot do and as an objective measure of change over time, with or without specific interventions.

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