

The Clinical Features of Myalgic Encephalomyelitis  
Melvin Ramsay, M.D., 1986

The onset of the disease is similar to those described in the various recorded outbreaks. Thus it may be sudden and without apparent cause, as in cases where the first intimation of illness is an alarming attack of acute vertigo, but usually there is a history of infection of the upper respiratory tract or, occasionally, the gastrointestinal tract with nausea and/or vomiting.

Instead of an uneventful recovery the patient is dogged by

Persistent and profound fatigue accompanied by a medley of symptoms such as

Headache

Giddiness

Muscle pain, cramps, or twitchings

Muscle tenderness and weakness

Paraesthesiae (numbness or tingling in the extremities)

Frequency of micturition (urination)

Blurred vision and/or diplopia

Hyperacusis (sensitivity to noise sometimes alternating with deafness or normal hearing)

Tinnitus (constant sound in the ears), and a

General sense of "feeling awful."

Some patients report the occurrence of fainting attacks relieved by a small meal or just eating a biscuit; these attacks were the result of hypoglycaemia ...

All cases run a low-grade pyrexia (fever), seldom exceeding 100°F (c. 38°C) and usually subsiding within a week.

A very thorough examination of the central nervous system should be made and this should be accompanied by a careful estimation of muscle power, especially in the limbs and neck.

A search for enlarged lymph nodes should never be omitted.

If muscle power is found to be satisfactory, a re-examination should be made after exercise; a walk of half a mile is sufficient, as very few ME cases can make more.

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Once the syndrome is fully established the patient presents a multiplicity of symptoms which can most conveniently be described in three groups.

### 1. Muscle phenomena

[Fatiguability]: Muscle fatigability, whereby, even after a minor degree of physical effort, three, four or five days, or longer, elapse before full muscle power is restored and constitutes the sheet anchor of diagnosis. Without it I would be unwilling to diagnose a patient as suffering from ME, but it is most important to stress the fact that cases of ME or mild or even moderate severity may have normal muscle power in a remission. In such cases, tests for muscle power should be repeated after exercise.

[Pain:] In severe cases of ME, muscle spasms and twitchings are a prominent feature and give rise to swollen bands of tissue which are acutely tender. In less severe cases, muscle tenderness may not be so readily elicited but careful palpation of the trapezii and gastrocnemii (the muscle groups most commonly involved) with the tip of the forefinger should enable the examiner to detect minute foci or exquisite tenderness....

[Clumsiness:] In the aftermath of the disease patients frequently fumble with relatively simple manoeuvres such as turning a key in a lock or taking the cork of a bottle.

2. Circulatory impairment. Most cases of ME complain of

Cold extremities and

Hypersensitivity to climactic change ...

Ashen-grey facial pallor, some twenty or thirty minutes before the  
Patient complains of feeling ill

3. Cerebral dysfunction

The cardinal features:

Impairment of memory,

Impairment of powers of concentration and

Emotional lability

[Other] common deviations from normal cerebral function:

Failure to recall recent or past events,

Difficulty in completing a line of thought ...

Becoming tongue-tied in the middle of a sentence, and a

Strong inclination to use wrong words, saying "door" when they  
mean "table" or "hot" when they mean "cold" ...

Complete inability to comprehend a paragraph even after  
re-reading it

Bouts of uncontrollable weeping...

Alterations of sleep rhythm or vivid dreams, or both ...

[Accompanying] features [that] can only be attributed to involvement of the  
Autonomic nervous system:

Frequency of micturition (urination)

Hyperacusis (hypersensitivity to noise)

Episodic sweating

Orthostatic tachycardia ...

Variability and fluctuation of both symptoms and physical findings in the course of a day is a constant feature in the clinical picture of myalgic encephalomyelitis.

An alarming tendency to become chronic. [Added in the 2<sup>nd</sup> edition, 1988]

[A. Melvin Ramsay, M.A., M.D. Myalgic Encephalomyelitis and Postviral Fatigue States: The saga of Royal Free disease (London, 1<sup>st</sup> ed. 1986, 2<sup>nd</sup> ed. 1988). Ramsay died in 1990. Thanks to Connie Nelson of the UK for making this available to me.]

Canadian Consensus Document for Diagnosing and Treating M.E./CFS (2003)  
Overview; Bruce M. Carruthers, MD and Margorie I. van de Sande, Bed

Short Version Bibliography

Ablashi DV, Eastman HB, Owen CB et al. Frequent HHV-6 antibody and HHV-6 reactivation in multiple sclerosis (MS) and chronic fatigue syndrome (CFS) patients. *Clin Virol* 16(3):179-191, May 1, 2000.

Boda WL, Natelson BH, Sisto SA, Tapp WN. Gait abnormalities in patients with the chronic fatigue syndrome. *J Neurol Sci* 131(2):156-161, Aug. 1995.

Bouholaigah I, Rowe PC, Kan J, Calkins H. The relationship between neurally-mediated hypotension and the chronic fatigue syndrome. *Journal of the American Medical Association* 274 (12):961-967 Sept. 27, 1995.

Buchwald D, Cheney PR, Peterson DL, et al. A chronic illness characterized by fatigue, neurologic and immunologic disorders, and active human herpes virus type 6 infection. *Ann Intern Med* 116(2):103-113, 1992.

Codero DL, Sisto SA, Tapp WN, et al. Decreased vagal power during treadmill walking in patients with chronic fatigue syndrome. *Clin Auton Res* 6(6):329-333, 1994.

Costa DC, Tannock C, Brostoff J. Brainstem perfusion is impaired in chronic fatigue syndrome. *Q J. Med* 88:767-773, 1995.

De Becker, P, Roeykens J, Reynders M, et al. Exercise capacity in chronic fatigue syndrome. *Arch Intern Med* 160 (21):3270-3277, Nov. 27, 2000.

De Lange F, Kalkman J, Bleijenberg G, et al. Gray matter volume reduction in the chronic fatigue syndrome. *NeuroImage* 26:777-781, 2005.

De Meirleir K, Bisbal C, Campine I, et al, a 36 kDa 2-5A binding protein as a potential biochemical marker for chronic fatigue syndrome. *Am J Med* 108 (2):99-105, 2000.

Demitrack MA, Crofford LJ. Evidence for and pathophysiologic implications of hypothalamic-pituitary-adrenal axis dysregulation in fibromyalgia and chronic fatigue syndrome. *Ann NY Acad Sci* 840:684-697, May 1, 1998.

Fischer B., Le Bon O, Hoffmann G, et al. Sleep anomalies in the chronic fatigue syndrome. A comorbid study. *Neuropsychobiol* 35(3):115-122, 1997.

Fukuda K, Straus SE, Hickie I et al. Chronic Fatigue Syndrome: a comprehensive approach to its definition and study. *Annals Med* 121:953-959, 1994.

- Ichise M, Salit I, Abbey S, et al. Assessment of regional cerebral perfusion by Tc-HMPAO SPECT in Chronic Fatigue Syndrome. *Nuclear Med Commun* 13:767-772, 1992.
- Inbar O, Dlin R, Rotstein A, et al. Physiological responses to incremental exercise in patients with chronic fatigue syndrome. *Med Scie Sports Exer* 33(9):1463-1470, Sept. 2001.
- Jason LA, Richman, JA, Rademaker AW et al. A Community-based study of Chronic Fatigue Syndrome. *Arch Intern Med* 159:2129-2147, Oct. 1999.
- Jason LA, Torres-Harding SR, Jurgens A, Helgerson J. Comparing the Fukuda et al. Criteria and the Canadian Case Definition for Chronic Fatigue syndrome, *JCFS* 12 (1):27-52, 2004.
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- Kaushik N, Fear D, Richards SCM et al. Gene expression in peripheral blood mononuclear cells from patients with chronic fatigue syndrome *J Clin Pathol* 58:826-832, 2005.
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- Lange G, Holodny AI, Lee HJ, et al. Quantitative assessment of cerebral ventricular volumes in chronic fatigue syndrome. *Appl Neuropsychol* 8(1):23-30, 2001.
- Lange G, Stefferne J, Cook DB, et al. Objective evidence of cognitive complaints in Chronic Fatigue Syndrome: A BOLD fMRI study of verbal working memory. *Neuroimage* 26(2):513-24, June 1, 2005.
- Lange G, Wang S, DeLuca J, Natelson BH. Neuroimaging in chronic fatigue syndrome. *Am J Med* 105(3A):50S-53S, 1998.
- Lerner AM, Zervos M, Dworkin HJ, et al. New cardiomyopathy: pilot study of intravenous Ganciclovir in a subset of the chronic fatigue syndrome. *Infec Dis in Clin Pract* 6:110-117, 1997.
- Okada T, Tanaka M, Kuratsune H, et al. Mechanisms underlying fatigue: A voxel-based morphometric study of chronic fatigue syndrome. *BMC Neurol* 4:14, 2004.

**Handout 3 – U.S. CDC CFS Website – Bibliography**  
(As of 11 November 2006)

Research: New Knowledge and Publications:

<http://www.cdc.gov/cfs/cfsresearch.htm>

"Listed below are a variety of publications addressing the research, definition, and treatment of Chronic Fatigue Syndrome (CFS)."

1. Publications: New

"New publications on Chronic Fatigue Syndrome (CFS)."

Jones JF, Reeves WC. GBV-C -w a virus without a disease: we cannot give it chronic fatigue syndrome  
*BMC Infectious Diseases* 5:78, 2005.

Jones JF, Nicholson A, Nisenbaum R, Papanicolaou DA, Solomon L, Boneva R, Heim C, Reeves WC  
Orthostatic instability in a population-based study of chronic fatigue syndrome  
*American Journal of Medicine* 118:1415.e19-1415.e28, 2005.

Capuron L, Welberg L, Heim C, Wagner D, Solomon L, Papanicolaou DA, Craddock RC, Miller AH, Reeves WC  
*Neuropsychopharmacology Online* publication: 10 November 2005 at  
<http://www.acnp.org/citations/Npp111005050502/default.pdf>

L Capuron, G Pagnoni, M Demetrashvili, BJ Woolwine, CB Nemeroff, GS Berns, and AH Miller. Anterior Cingulate Activation and Error Processing During Interferon-Alpha Treatment. Dept of Psych and Behavioral Sciences, Emory University Sch of Med, Atlanta, Georgia. *Biol Psychiatry*. 2005 August 1; 58(3): 190-196.

Reeves WC, Wagner D, Nisenbaum R, Jones JF, Gurbaxani B, Solomon L, Papanicolaou DA, Unger ER, Vernon SD, Heim C; Chronic fatigue syndrome - a clinically empirical approach to its definition and study  
*BMC Medicine* 3:19, 2005

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2. Economic Impact

[http://www.cdc.gov/cfs/publications/economic\\_impact.htm](http://www.cdc.gov/cfs/publications/economic_impact.htm)

Reynolds KJ, Vernon SD, Bouchery E, Reeves WC. The economic impact of chronic fatigue syndrome.  
*Cost Effectiveness and Resource Allocation* 2:4, 2004.

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3. Case Definition

[http://www.cdc.gov/cfs/publications/case\\_definition.htm](http://www.cdc.gov/cfs/publications/case_definition.htm)

"This section contains reviews and abstracts of articles covering the chronic fatigue syndrome (CFS) case definition."

Reeves WC, Wagner D, Nisenbaum R, Jones JF, Gurbaxani B, Solomon L, Papanicolaou DA, Unger ER, Vernon SD, Heim C; Chronic fatigue syndrome - a clinically empirical approach to its definition and study  
*BMC Medicine* 3:19, 2005 [repeat citation]

Wagner D, Nisenbaum R, Heim C, Jones JF, Unger ER, Reeves WC  
Psychometric properties of the CDC symptom inventory for the assessment of chronic fatigue syndrome  
*Population Health Metrics* 2005:3:8.

J Nisenbaum R, Ismail K, Wessley S, Unwin C, Hull L, Reeves WC  
Dichotomous factor analysis of symptoms reported by UK and US veterans of the 1991 Gulf War  
*Population Health Metric* 2004; 2:8, 2004

Reeves WC, Lloyd A, Vernon SD, Klimas N, Jason LA, Bleijenberg G, Evengard B, White PD, Nisenbaum R, Unger ER, and the International Chronic Fatigue Syndrome Study Group.  
Identification of ambiguities in the 1994 chronic fatigue syndrome research case definition and recommendations for resolution.  
*BMC Health Services Research* 2003;3:25

**\*\* Fukuda K, Straus SE, Hickie I, Sharpe MC, Dobbins JG, Komaroff A, and the International CFS Study Group. The chronic fatigue syndrome: a comprehensive approach to its definition and study. *Annals of Internal Medicine*, Vol. 121:pages 953-959, 1994.**

This is the most current chronic fatigue syndrome (CFS) research case definition that has been published in the peer reviewed literature. A decision was made to revise the 1988 case definition of CFS because it failed to distinguish cases of CFS from other forms of chronic fatigue. The complexities of the condition and its inherent similarity to other forms of prolonged fatigue made it desirable to devise guidelines that would facilitate comparative studies, i.e. studies aimed at discerning any features of CFS that serve to distinguish it from other forms of chronic fatigue. The authors have attempted to devise a comprehensive, systematic, and integrated approach to the evaluation, classification, and study of persons with CFS and other fatiguing illnesses. The article proposes a conceptual framework and a set of guidelines for conducting CFS studies. Included among the guidelines are recommendations for the clinical evaluation of fatigued persons, and a strategy for subgrouping fatigued persons for scientific investigations.

**Note:** The above paragraph is all that is included; neither article nor definition are included or even linked.

Nisenbaum R, Reyes, M, Mawle AC, Reeves WC. Factor analysis of unexplained severe fatigue and interrelated symptoms: overlap with criteria for chronic fatigue syndrome. *American Journal of Epidemiology*, vol. 148, pages 72-77, 1998.

Holmes GP. Defining the chronic fatigue syndrome. *Reviews in Infectious Diseases*, vol. 13 (suppl 1),pages S553-S555, 1991.

**\*\*Holmes GP, Kaplan JE, Gantz NM, Komaroff AL, Schonberger LB, Strauss SE, Jones JF, Dubois RE, Cunningham-Rundles C, Pahwa S, Tosato G, Zegans LS, Purtilo DT, Brown N, Schooles RT, Brus I. Chronic fatigue syndrome: A working case definition. *Annals of Internal Medicine* 108:387-389, 1988. "Summary: This was the first research case definition for CFS published in the peer reviewed medical literature. It was completely revised in 1994."**

**Note:** The single sentence above is all that is included about the original Holmes 1988 definition. No article, no abstract, no case definition; no link to the case definition.

Fukuda K. Development of the 1994 chronic fatigue syndrome case definition and clinical evaluation guidelines. In: *Chronic Fatigue Syndrome*, edited by Yehuda and Mostofskym. Plenum Press, New York, 1997. Pages 29-94.

"Summary: This is a review chapter which discusses development of the 1994 CFS research case definition and guidelines for clinical evaluation of patients."

**Note:** The single sentence above is all that is included about that chapter.

Nisenbaum R, Reyes M, Unger ER, Reeves WC. Factor analysis of symptoms among subjects with unexplained chronic fatigue: what can we learn about chronic fatigue syndrome? *Journal of Psychosomatic Research* 56:171-178, 2004.

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#### 4. Studies of Causes

"This section contains reviews and abstracts of studies that cover the causes of chronic fatigue syndrome (CFS)."

Jones JF, Reeves WC. GBV-C -w a virus without a disease: we cannot give it chronic fatigue syndrome *BMC Infectious Diseases* 5:78, 2005. [repeat citation]

Jones JF, Nicholson A, Nisenbaum R, Papanicolaou DA, Solomon L, Boneva R, Heim C, Reeves WC Orthostatic Instability in a population-based study of chronic fatigue syndrome [repeat citation] *American Journal of Medicine* 118:1415.e19-1415.e28, 2005.

Capuron L, Welberg L, Heim C, Wagner D, Solomon L, Papanicolaou DA, Craddock RC, Miller AH, Reeves WC. Cognitive dysfunction relates to subjective report of mental fatigue in patients with chronic fatigue syndrome. *Neuropsychopharmacology Online* publication: 10 November 2005 at <http://www.acnp.org/citations/Npp111005050502/default.pdf> [repeat citation]

Raison CL, Broadwell SD, Borisov AS, Manatunga AK, Capuron L, Woolwine BJ, Jacobson IM, Nemeroff CB, Miller AH. Depressive symptoms and viral clearance in patients receiving interferon- $\alpha$  and ribavirin for hepatitis C. *Brain, Behavior and Immunity* 2005; 19:23-27. CDC/Emory University

- Gunn WJ, Komaroff AL, Bell DS, Connell DB, Levine SM, Cheney PR. Anterior cingulate activation and The Interferon- $\alpha$  modeling study: Inability of retroviral tests to identify persons with chronic fatigue syndrome, 1992. *Morbidity and Mortality Weekly Report*, vol. 42, pages 183-190, 1993.
- Raison CL, Broadwell SD, Borisov AS, Manatunga AK, Capuron L, Woolwine BJ, Jacobson IM, Nemeroff CB, Miller AH. Depressive symptoms and viral clearance in patients receiving interferon- $\alpha$  and ribavirin for hepatitis C. *Brain, Behavior, and Immunity* 2005;19:23-27. CDC/Emory University.
- Vernon SD, Reeves WC. Evaluation of autoantibodies to common and neuronal cell antigens in chronic fatigue syndrome. *Journal of Autoimmune Diseases* 2005;2:5.
- Raison CL, Borisov AS, Broadwell SD, Capuron L, Woolwine BJ, Jacobson IM, Nemeroff CB, Miller AH. Depression during pegylated IFN-alpha plus ribavirin therapy: prevalence and prediction. *Journal of Clinical Psychiatry* 2005;66:41-48. CDC/Emory University
- Whistler T, Jones JF, Unger ER, Vernon SD. Exercise responsive genes measured in peripheral blood of women with chronic fatigue syndrome and matched control subjects. *BMC Physiology* 2005;5:5
- Heim C, Bierl C, Nisenbaum R, Wagner D, Reeves WC. Regional prevalence of fatiguing illness in the United States before and after the terrorist attacks of September 11, 2001. *Psychosomatic Medicine* 2004;66:672-678.
- Raison CL, Miller AH. When not enough is too much: the role of insufficient glucocorticoid signaling in the pathophysiology of stress-related disorders. *American Journal of Psychiatry*. 2003;160:1554-1565. CDC/Emory University.
- Capuron L, Raison CL, Musselman DL, Lawson DH, Nemeroff CB, Miller AH. Association of exaggerated HPA axis response to the initial injection of interferon-alpha with development of depression during interferon-alpha therapy. *American Journal of Psychiatry* 2003;160:1342-1345. CDC/Emory University.
- Capuron L, Neuraeter G, Musselman DL, Lawson DH, Nemeroff CB, Fuchs D, Miller AH. Interferon-Alpha-Induced Changes in Tryptophan Metabolism: Relationship to Depression and Paroxetine Treatment. *Biological Psychiatry* 2003;54:906-914. CDC/Emory University.
- Vernon SD, Shukla S, Reeves WC. Absence of Mycoplasma species DNA in chronic fatigue syndrome *Journal of Medical Microbiology* 2003; 52:1027-1028
- Sorensen B, Streim JE, Strand M, Make B, Giclas PC, Fleshner M, Jones JF. Complement activation in a model of chronic fatigue syndrome. *Journal of Allergy and Clinical Immunology* 2003; 112:397-403.
- Gerrity TR, Bates J, Bell DS, Chrousos G, Furst G, Hedrick T, Hurwitz B, Kula RW, Levine SM, Moore RC, Schondorf R. Chronic fatigue syndrome: what role does the autonomic nervous system play in the pathophysiology of this complex illness? CDC/CFIDS Association of America Symposium *NeuroImmunoModulation* 10:134-141, 2002.
- Capuron L, Gurnick JF, Musselman DL, Lawson DH, Reemsnyder A, Nemeroff CF, Miller AH. Neurobehavioral effects of interferon-a in cancer patients: phenomenology and paroxetine responsiveness of symptom dimensions. CDC/Emory University. *Neuropsychopharmacology* 26:643-652, 2002.
- Nisenbaum R, Barrett DH, Reyes M, Reeves WC. Deployment stressors and a chronic multisymptom illness among Gulf War veterans. *J Nerv Ment Dis* 188:259-266, 2000.
- Gelman IH, Unger ER, Mawle AC, Nisenbaum R, Reeves WC. Chronic fatigue syndrome is not associated with expression of endogenous retroviral p15E. *Mol Diag* 5:155-156, 2000.
- Reeves WC, Stamey FR, Black JB, Mawle AC, Stewart JA, Pellett PE. Human herpesviruses 6 and 7 in chronic fatigue syndrome: a case-control study. *Clin Infect Dis* 31:48-52, 2000. This research repudiates any relationship between HHV-6 and CFS (n "fatigued patients" = 27).

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- Mawle AC, Nisenbaum R, Dobbins JG, Gary HE, Stewart JA, Reyes M, Steele L, Schmid DS, Reeves WC. Immune responses associated with chronic fatigue syndrome: a case-control study. *Journal of Infectious Diseases*, vol. 175, pages 136-141, 1997. Refutes theories about different immune responses.
- [CDC as author?] Chronic fatigue syndrome. *Immunological Investigations*, vol. 26, pages 269-273, 1997. Refutes theories about different immune connection to CFS.
- Reyes M, Dobbins JG, Mawle AC, Steele L, Gary HE, Malani H, Schmid S, Fukuda K, Stewart J, Nisenbaum R, Reeves WC. Risk factors for CFS: a case control study. *Journal of Chronic Fatigue Syndrome*, vol. 2, pages 17-33, 1996.
- Mawle AC, Nisenbaum R, Dobbins JG, Gary HE, Stewart JA, Reyes M, Steele L, Schmid DS, Reeves WC. The seroepidemiology of chronic fatigue syndrome: a case-control study. *Clinical Infectious Diseases*, vol. 21, pages 1386-1389, 1995. (n (CFS) = 26) No pathogens found in CFS.
- Dobbins JG, Natelson BH, Brassloff I, Drastal S, Sisto SA. Physical, behavioral, and psychological risk factors for chronic fatigue syndrome: A central role for stress? *Journal of Chronic Fatigue Syndrome*, vol. 1, pages 43-58, 1995. Stress is probably a factor in CFS.
- Mawle AC, Reyes M, Schmid DS. Is Chronic Fatigue Syndrome an infectious disease? *Infectious Agents and Disease*, vol. 2, pages 387-389, 1994. Infectious disease cannot be dismissed.
- Heneine W, Woods TC, Sinha SD, Khan AS, Chapman LE, Schonberger LB, Folks TM. Lack of evidence for infection with known human and animal retroviruses in patients with chronic fatigue syndrome. *Clinical Infectious Diseases*, vol. 18 (Suppl 1), pages S121-S125, 1994.
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- Khan AS, Heneine WM, Chapman LE, Gary HE, Woods TC, Folks TM, Schonberger LB. Assessment of a retroviral sequence and other possible risk factors for the chronic fatigue syndrome in adults. *Annals of Internal Medicine*, vol. 118, pages 241-245, 1993. Retroviral marker test ineffective.
- Folks TM, Heneine W, Khan A, Chapman L, Schonberger L. Investigation of retroviral involvement in chronic fatigue syndrome. *Chronic fatigue syndrome* (CIBA Foundation Symposium 173); pages 160-175, 1993. No evidence for retroviral involvement in CFS.
- Gunn WJ, Komaroff AL, Bell DS, Connell DB, Levine SM, Cheney PR. Inability of retroviral tests to identify persons with chronic fatigue syndrome, 1992. *Morbidity and Mortality Weekly Report*, vol. 42, pages 183-190, 1993. [repeat citation]

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#### 5. Publications: Surveillance

"This section contains reviews and abstracts of articles covering the chronic fatigue syndrome (CFS) surveillance studies."

- Reyes M, Nisenbaum R, Hoaglin DC, Unger ER, Emmons C, Randall B, Stewart JA, Abbey S, Jones JF, Gantz N, Minden S, Reeves WC. Prevalence and incidence of chronic fatigue syndrome in Wichita, Kansas. *Archives of Internal Medicine* 2003;163:1530-1536.
- Steele L, Dobbins JG, Fukuda K, Reyes M, Randall B, Koppelman M, Reeves WC. The epidemiology of chronic fatigue in San Francisco. *Am J Med* 105(3A):83S-90S, 1998.
- Reyes M, Gary HE, Dobbins JG, Randall B, Steele L, Fukuda K, Holmes GP, Connell DG, Mawle AC, Schmid DS, Stewart JA, Schonberger LB, Gunn WJ, Reeves WC. Surveillance for chronic fatigue syndrome - four U.S. cities, September 1989 through August 1993. *Morbidity and Mortality Weekly Report*, CDC Surveillance Summaries, vol. 46, pages , 1997.

- Nicholson AC, Vernon SD. Exploration of neuroendocrine and immune gene expression in peripheral blood mononuclear cells. *Molecular Brain Research* 2004;129:193-197.
- Ojanlehti H, Evengard B, Lee DR, Unger ER, Vernon SD. Impact of RNA extraction from limited samples on microarray results. *BioTechniques* 2003;35:968-975.
- Whistler T, Unger ER, Nisenbaum R, Vernon SD. Integration of gene expression, clinical, and epidemiologic data to characterize chronic fatigue syndromes. *Journal of Translational Medicine* 2003;1:10.
- Yan SD, Vernon SD, Unger ER, Karem KL. A simplified approach for analysis of SELDI-TOF mass spectrometry data. *Applied Genomics and Proteomics* 2003; 2:71-77.
- Rajeevan MS, Dimulescu IR, Vernon SD, Verma M, Unger ER. Global amplification of sense RNA: a novel method to replicate and archive mRNA for gene expression analysis. *Genomics* 2003; 82:491-497.
- Ranamukhaarachchi DG, Rajeevan MS, Vernon SD, Unger ER. Modifying differential display polymerase chain reaction to detect relative changes in gene expression profiles. *Anal Biochem* 306:343-346, 2002.
- Campbell C, Vernon SD, Karem KL, Nisenbaum R, Unger ER. Assessment of normal variability in peripheral blood gene expression. *Disease Markers* 18:201-206, 2002.
- Vernon SD, Unger ER, Rajeevan M, Dimulescu IM, Nisenbaum R, Campbell CE. Reproducibility of alternate probe synthesis approached for gene expression profiling with arrays. *J Mol Diag* 2:124-127, 2000.
- Dimulescu I, Unger ER, Lee DR, Reeves WC, Vernon SD. Characterization of RNA in cytologic samples preserved in a methanol based collection medium. *Molecular Diagnostics*, vol. 3, pages 67-72, 1998.
- Rajeevan MS, Ranamukhaarachchi DG, Vernon SD, Unger ER. Use of real-time quantitative PCR to validate the results of cDNA array and differential display PCR technologies. *Methods* 25:443-451, 2001.
- Rajeevan MS, Vernon SD, Taysavang N, Unger ER. Validation of array-based gene expression profiles by real-time (kinetic) RT-PCR. *J Mol Diag* 3:26-31, 2001.
- Vernon SD, Shukla S, Unger ER, Reeves WC. Analysis of 16S rDNA sequences and circulating cell-free DNA concentration from plasma of a chronic fatigue syndrome and non fatigued subjects. *Biomed Central Microbiology* 2:39, 2002.
- Vernon SD, Unger ER, Dimulescu IM, Rajeevan M, Reeves WC. Utility of the blood for gene expression profiling and biomarker discovery in chronic fatigue syndrome. *Disease Markers* 18: 193-199, 2002.
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#### 10. Medical Management

"This section summarizes a publication that offers guidelines for the diagnosis and treatment of chronic fatigue syndrome (CFS) patients.

Bleijenberg G. Chronic fatigue and chronic fatigue syndrome in the general population  
*BioMed Central Health Quality of Life Outcomes* 2003;1:52.

Jones JF, Nisenbaum R, Reeves WC. Medication use by persons with chronic fatigue syndrome: results of a randomized telephone survey in Wichita Kansas. *BioMed Central Health Quality of Life Outcomes* 2003;1:74

Fukuda K, Gantz NM. Management strategies for chronic fatigue syndrome. *Federal Practitioner* 1995;July: 12-27.

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**11. Clinical Picture**

"This section contains reviews and abstracts of articles covering the chronic fatigue syndrome (CFS) clinical picture."

Solomon L, Reeves WC. Factors influencing the diagnosis of chronic fatigue syndrome by primary health care professionals. *Archives of Internal Medicine* 2004;164:2241-2245.

Jones JF, Nisenbaum R, Solomon L, Reyes M, Reeves WC. Chronic fatigue syndrome and other fatiguing illnesses in adolescents: A population-based study. *Journal of Adolescent Health* 35:34-40, 2004.

Vollmer-Conna U, Fazou C, Cameron B, Li H, Brennan C, Luck L, Davenport T, Wakefield D, Hickie I, Lloyd A. Production of pro-inflammatory cytokines correlates with the symptoms of acute sickness behavior in humans. *Psychological Medicine* 34:1-9, 2004.

Unger ER, Nisenbaum R, Moldofsky H, Cesta A, Sammut C, Reyes M, Reeves WC. Sleep assessment in a population-based study of chronic fatigue syndrome. *BMC Neurology* 4:6, 2004.

Solomon L, Nisenbaum R, Reyes M, Papanicolaou DA, Unger ER, Reeves WC. Functional status of persons with chronic fatigue syndrome in the Wichita population. *BioMed Central Health Quality of Life Outcomes* 2003;1:48.

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**12. Provider Resource Guide**

A pamphlet for providers. The only source for information is the CDC CFS Website.

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**13. Understanding Chronic Fatigue Syndrome: A Patient's Guide**

References to CDC website, CFIDS Association of America, American Academy of Nurse Practitioners, American Academy of Physician Assistants, and American Academy of Family Physicians.

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