Index of ME/CFS Published Research
An A-Z index of the most important published research

1st November 2022  The ME Association
Foreword

Welcome to the ME Association Index of Published ME/CFS Research.

This is an A-Z index of the most important published research studies and selected key documents and articles, listed by subject matter, on myalgic encephalomyelitis or chronic fatigue syndrome (ME/CFS). It is correct to 1st August 2021.

The Index is updated at the end of each month and we publish a weekly update of recent research publications that are also available on the MEA website and social media.

The Index adopts the subject headings used in the MEA Clinical and Research Guide which provides a review of current clinical knowledge and research evidence and is updated annually.

This authoritative and very popular book is written by Dr Charles Shepherd, Hon. Medical Adviser to the ME Association.

The latest edition is available to order from the MEA website shop. We are pleased to be able to offer free hard copies to health professionals upon application and it is also available on Kindle.

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ME CONNECT

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Please note: Research published after May 2022 (the date of the last update to the MEA Clinical and Research Guide or ‘Purple Book’) is denoted by *NEW in purple following the citation in the listing below.

1. Nomenclature and definition


Brurberg et al. (2013) Case definitions for chronic fatigue syndrome/myalgic encephalomyelitis (CFS/ME): a systematic review. BMJ Open 4 (2). Link: https://bmjopen.bmj.com/content/4/2/e003973


1.1 Prevalence


2. Epidemiology


3. Co-morbidity


Maes M et al. (2022) In Schizophrenia, Chronic Fatigue Syndrome- and Fibromyalgia-Like Symptoms are Driven by Breakdown of the Paracellular Pathway with Increased Zonulin and Immune Activation-Associated Neurotoxicity. *CNS & Neurological Disorders - Drug Targets* 21. Link: doi.org/10.2174/1871527321666220806100600 (*NEW*)


4. Biomedical Research

4.1 Biobank UK ME/CFS


Lacerda EM et al. (2017) The UK ME/CFS Biobank for biomedical research on Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) and Multiple Sclerosis. Open Journal of Bioresources 4: 4. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5482226/


4.2 Biomarker Identification


**Hanevik K et al.** (2022) No difference in serum levels of B-cell activating receptor and antibodies against cytolethal distending toxin B and flagellin in post-infectious irritable bowel syndrome and chronic fatigue syndrome after *Giardia* infection. *JGH Open* (2022):1-4. Link: doi.org/10.1002/jgh3.12724


**Nunes M et al.** (2022) The occurrence of hyperactivated platelets and fibrinoid microclots in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS). ResearchSquare [Preprint]. Link: doi.org/10.21203/rs.3.rs-1598634/v1 (**NEW**)

**Patterson BK et al.** (2022) Cytokine Hub Classification of PASC, ME-CFS and other PASC-like Conditions. ResearchSquare [Preprint]. Link: doi.org/10.21203/rs.3.rs-1727226/v1 (**NEW**)


Sepúlveda N et al. (2022) Revisiting IgG antibody reactivity to Epstein-Barr virus in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome and its potential application to disease diagnosis. medRxiv [Preprint]. Link: [https://www.medrxiv.org/content/10.1101/2022.04.20.22273990v1](https://www.medrxiv.org/content/10.1101/2022.04.20.22273990v1)

### 4.2.1 Biomarker Landscape Project


### 4.3 Cardiac Function


Campen CM and Visser FC (2018) The Abnormal Cardiac Index and Stroke Volume Index Changes During a Normal Tilt Table Test in ME/CFS Patients Compared to Healthy Volunteers, are Not Related to Deconditioning, *Journal of Thrombosis and Circulation* 107. Link: https://tinyurl.com/y5nb9dyr


4.4 Endothelial cells

Blauensteiner J et al. (2021) Altered endothelial dysfunction-related miRs in plasma from ME/CFS patients. *Scientific Reports* 11: 10604. Link: https://www.nature.com/articles/s41598-021-89834-9#citeas


Cambras T et al. (2022) Circadian skin temperature rhythm and dysautonomia in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: the role of endothelin-1 in the vascular dysregulation. ResearchSquare [preprint]. Link: doi.org/10.21203/rs.3.rs-2044838/v1 (*NEW) Comment


4.5 Exercise physiology/testing

Baraniuk JN et al. (2021) Differential Effects of Exercise on fMRI of the Midbrain Ascending Arousal Network Nuclei in Myalgic Encephalomyelitis / Chronic Fatigue Syndrome (ME/CFS) and Gulf War Illness (GWI) in a Model of Postexertional Malaise (PEM). Preprints: 2021110420. Link: https://www.preprints.org/manuscript/202111.0420/v1


4.6 Extracellular vesicles


4.7 Gastrointestinal and microbiome


Hanevik K et al. (2022) No difference in serum levels of B-cell activating receptor and antibodies against cytolethal distending toxin B and flagellin in post-infectious irritable bowel syndrome and chronic fatigue syndrome after Giardia infection. JGH Open (2022):1-4. Link: doi.org/10.1002/jgh3.12724

Kenyon J et al. (2019) A Retrospective Outcome Study of 42 Patients with Chronic Fatigue Syndrome, 30 of Whom had Irritable Bowel Syndrome. Half were treated with oral approaches, and half were treated with Faecal Microbiome Transplantation. Human Microbiome Journal 13. Link: https://tinyurl.com/y2cqxzgf


4.8 Gene expression

Asad HN et al. (2022) A Causal-Pathway Phenotype of Chronic Fatigue Syndrome due to Hemodialysis in Patients with End-Stage Renal Disease. CNS & Neurological Disorders Drug Targets. [Epub ahead of print.] Link: doi.org/10.2174/1871527321666220401140747

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**Wang Z et al.** (2022) Autoimmune Gene Expression Profiling of Fingerstick Whole Blood in Chronic Fatigue Syndrome. *ResearchSquare* [Preprint]. Link: [doi.org/10.21203/rs.3.rs-1942047/v1](https://doi.org/10.21203/rs.3.rs-1942047/v1)


4.8.1 Epigenetics

Almenar-Perez et al. (2019) miRNA profiling of circulating EVs in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS). *Journal of Extracellular Vesicles*, 7: 139. Link: https://tinyurl.com/y4b8durc


4.9 General reviews


Kuvyani B et al. (2022) Could the kynurenine pathway be the key missing piece of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) complex puzzle? Cellular and Molecular Life Science 79 (8): 412. Link: doi.org/10.1007/s00018-022-04380-5 (**NEW)


Walker MOM et al. (2022) The significance of oxidative stress in the pathophysiology of Long COVID and Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS). *Medical Research Archives* 10 [9], Link: doi.org/10.18103/mra.v10i9.3050 (*NEW*)


4.10 Genetic predisposition


Kendler K et al. (2022). A distinctive profile of family genetic risk scores in a Swedish national sample of cases of fibromyalgia, irritable bowel syndrome, and chronic fatigue syndrome compared to rheumatoid arthritis and major depression. Psychological Medicine: 1-8. Link: doi.org/10.1017/S0033291722000526


4.11 Immunology


Dibnah B et al. (2019) Investigating the role of TGF-B and fatigue in Chronic Fatigue Syndrome. *Annals of the Rheumatic Diseases* 78 (2). Link: [https://ard.bmj.com/content/78/Suppl_2/1495.2.abstract](https://ard.bmj.com/content/78/Suppl_2/1495.2.abstract)


Hornig M et al. (2015) Distinct plasma immune signatures in ME/CFS are present early in the course of illness. *Science Advances* 1(1): e1400121. Link: http://advances.sciencemag.org/content/1/1/e1400121


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Comment


4.12 Infection


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Fevang B et al. (2022) Lasting Immunological Imprint of Primary Epstein-Barr Virus Infection With Associations to Chronic Low-Grade Inflammation and Fatigue. Frontiers in Immunology 12: 715102. Link: doi.org/10.3389/fimmu.2021.715102


Hanevik K et al. (2022) No difference in serum levels of B-cell activating receptor and antibodies against cytolethal distending toxin B and flagellin in post-infectious irritable bowel syndrome and chronic fatigue syndrome after Giardia infection. JGH Open (2022):1-4. Link: doi.org/10.1002/jgh3.12724


4.13 Ion channels


**Nguyen T et al.** (2016) Impaired calcium mobilization in natural killer cells from chronic fatigue syndrome/myalgic encephalomyelitis patients is associated with transient receptor potential melastatin 3 ion channels. *Clinical and Experimental Immunology* 187 (2): 284-293. Link: [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5217865/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5217865/)


4.14 Microclots

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4.15 Metabolomics


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Yamano E et al. (2016) Index markers of chronic fatigue syndrome with dysfunction of TCA and urea cycles. Science Reports doi: 10.1038/srep34990. Link: https://www.nature.com/articles/srep34990


4.16 Miscellaneous


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4.17 Mitochondria and energy production


Kuvyani B et al. (2022) Could the kynurenine pathway be the key missing piece of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) complex puzzle? *Cellular and Molecular Life Science* 79 (8): 412. Link: doi.org/10.1007/s00018-022-04380-5 (*NEW*)


Schoeman EM et al. (2017) Clinically proven mtDNA mutations are not common in those with chronic fatigue syndrome. *MBC Medical Genetics* 18: 29. Link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5356238/


4.18 Muscle


4.19 Neurology: Autonomic nervous system (ANS) dysfunction


**Cambras T et al.** (2022) Circadian skin temperature rhythm and dysautonomia in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome: the role of endothelin-1 in the vascular dysregulation. ResearchSquare [preprint]. Link: doi.org/10.21203/rs.3.rs-2044838/v1 (*NEW) Comment


**Eccles J et al.** (2022) Mechanistic factors contributing to pain and fatigue in fibromyalgia and me/cfs: autonomic and inflammatory insights from an experimental medicine study. *Annals of the rheumatic diseases* 81: 1719. Link: https://ard.bmj.com/content/81/Suppl_1/1719.2 (*NEW)


Lee J et al. (2020) Clinically accessible tools for documenting the impact of orthostatic intolerance on symptoms and function in ME/CFS. Work [Epub ahead of print]. Link: https://content.iospress.com/articles/work/wor203169

Li H et al. (2014) Autoimmune Basis for Postural Tachycardia Syndrome. Journal of the American Heart Association 3: e000755. Link: http://jaha.ahajournals.org/content/3/1/e000755


Morrow AK et al. (2022) Long-Term COVID 19 Sequelae in Adolescents: the Overlap with Orthostatic Intolerance and ME/CFS. Current Paediatric Reports. Link: doi.org/10.1007/s40124-022-00261-4


Wheeler C et al. (2022) Cardiovascular Autonomic Regulation, ETCO2 and the Heart Rate Response to the Tilt Table Test in Patients with Orthostatic Intolerance. Applied Psychophysiology and Biofeedback. Link: doi.org/10.1007/s10484-022-09536-4


4.20 Neurology: Central nervous system and neuroimaging


Baraniuk JN et al. (2021) Differential Effects of Exercise on fMRI of the Midbrain Ascending Arousal Network Nuclei in Myalgic Encephalomyelitis / Chronic Fatigue Syndrome (ME/CFS) and Gulf War Illness (GWI) in a Model of Postexertional Malaise (PEM). Preprints: 2021110420. Link: https://www.preprints.org/manuscript/202111.0420/v1


Martinez ARM et al. (2012) Sensory Neuronopathy and Autoimmune Diseases. Autoimmune Diseases. Link: https://www.hindawi.com/journals/ad/2012/873587/


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4.21 Neurology: Hypothalamic and neuroendocrine function


4.22 Neurology: Neuropsychology and cognitive function


4.23 Neurology: Neurotransmitter function


4.24 Pain


Barhost EE et al. (2021) Pain-related post-exertional malaise in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) and Fibromyalgia: A systematic review and three-level meta-analysis. *Pain Medicine*: pnab308. [Epub ahead of print.] Link: doi.org/10.1093/pm/pnab308


Eccles J et al. (2022) Mechanistic factors contributing to pain and fatigue in fibromyalgia and me/cfs: autonomic and inflammatory insights from an experimental medicine study. *Annals of the rheumatic diseases* 81: 1719. Link: https://ard.bmj.com/content/81/Suppl_1/1719.2 (*NEW*)


4.25 Phenotypes and sub-groups


4.26 Post-Exertional Malaise (PEM)

Baraniuk JN et al. (2021) Differential Effects of Exercise on fMRI of the Midbrain Ascending Arousal Network Nuclei in Myalgic Encephalomyelitis / Chronic Fatigue Syndrome (ME/CFS) and Gulf War Illness (GWI) in a Model of Postexertional Malaise (PEM). Preprints: 2021110420. Link: https://www.preprints.org/manuscript/202111.0420/v1


Davenport TE et al. (2022) Lessons from Myalgic Encephalomyelitis/Chronic Fatigue Syndrome for Long COVID: Postexertional Symptom Exacerbation is an Abnormal Response to Exercise/Activity. JOSPT. Link: doi.org/10.2519/jospt.blog.20220202


Holtzman C et al. (2019) Assessment of Post-Exertional Malaise (PEM) in Patients with Myalgic Encephalomyelitis (ME) and Chronic Fatigue Syndrome (CFS): A Patient-Driven Survey. Diagnostics 9 (1). Link: https://www.mdpi.com/2075-4418/9/1/26


4.27 Post-mortem research


4.28 Relapse and recovery cycles


4.29 Sleep disturbance


**Gotts ZM et al.** (2013) Are there sleep-specific phenotypes in patients with chronic fatigue syndrome? A cross-sectional polysomnography analysis. BMJ Open 3(6): e002999. Link: [http://bmjopen.bmj.com/content/3/6/e002999](http://bmjopen.bmj.com/content/3/6/e002999)


**4.30 Vision**


5. Psychiatry and psychology


Loades M (2022) Improving the identification and treatment of co-morbid depression and/or anxiety in adolescents with Chronic Fatigue Syndrome (CFS/ME). [Doctoral dissertation, University of Bristol] Link: [https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.852541](https://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.852541)


6. Sociology


Murray R et al. (2019) Duvet woman versus action man: the gendered aetiology of Chronic Fatigue Syndrome according to English newspapers. Feminist Media Studies. Link: https://tinyurl.com/yyfayo7v


7. Future research recommendations


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Tokunaga K et al. (2020) Inclusion of family members without ME/CFS in research studies promotes discovery of biomarkers specific for ME/CFS. Work 66 (2): 327-337. Link: doi.org/10.3233/WOR-203177


7.1 Platforms to facilitate research


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Rekeland IG et al. (2022) Activity monitoring and patient-reported outcome measures in Myalgic Encephalomyelitis/Chronic Fatigue Syndrome patients. *PLOS ONE* 17(9): e0274472. Link: [doi.org/10.1371/journal.pone.0274472 (*NEW*)](https://doi.org/10.1371/journal.pone.0274472)

Comment


8. Clinical assessment, symptoms, and diagnosis

8.1 General


Newton JL et al. (2008) Fatigue in non-alcoholic fatty liver disease (NAFLD) is significant and associates with inactivity and excessive daytime sleepiness but not with liver disease severity or insulin resistance. Gut 57(6): 807-813. Link: https://www.ncbi.nlm.nih.gov/pubmed/18270241


**Tokumasu K et al.** (2022) Clinical Characteristics of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome (ME/CFS) Diagnosed in Patients with Long COVID. *Medicina* 58: 850. Link: [doi.org/10.3390/medicina58070850 (*NEW*)](https://doi.org/10.3390/medicina58070850)


8.2 Investigations


8.3 Physical examination


8.4 Symptoms

Pain – see Biomedical Research, 4.21 above.
Post-Exertional Malaise – see Biomedical Research, 4.23 above.
Sleep disturbance – see Biomedical Research, 4.26 above.
Vision – see Biomedical Research, 4.28 above.

9. Management

9.1 Cognitive Behavioural Therapy (CBT)


Albers E et al. (2021) Effectiveness of Internet-Based Cognitive Behavior Therapy (Fatigue in Teenagers on the Internet) for Adolescents With Chronic Fatigue Syndrome in Routine Clinical Care: Observational Study. Journal of Medical Internet Research 23 (8): e24839. Link: https://pubmed.ncbi.nlm.nih.gov/34397389/


Clapperton B (2022) Applying latent class cluster analysis and data mining methods to identify classes of chronic fatigue syndrome patients that are predictive of treatment success. [Doctoral dissertation, King’s College London]. Link: https://kclpure.kcl.ac.uk/portal/files/181949538/2022_Clapperton_Ben_0976409_ethesis.pdf (*NEW*)


9.2 Complementary and alternative therapies


Fangfang X et al. (2021) Can prolong life with nine turn method (Yan Nian Jiu Zhuan) Qigong alleviates Fatigue, Sleep quality, Depression and anxiety on Patients with Chronic Fatigue Syndrome: a Randomized, Controlled, Clinical Study? (ResearchSquare) [Epub ahead of print.] Link: [https://www.researchsquare.com/article/rs-965010/v1](https://www.researchsquare.com/article/rs-965010/v1)


9.3 Diet and nutrition


### 9.4 Exercise, Pacing and activity management


The ME Association, 7 Apollo Office Court, Radcliffe Road, Gawcott, Bucks, MK18 4DF. ME Connect Helpline: 0344 576 5326 Available every day of the year, during the hours of 10am-12noon, 2pm-4pm and 7pm-9pm. The ME Association is a registered charity number 801279.

Clague-Baker N et al. (2021) Survey of people with Myalgic Encephalomyelitis (ME) to explore their use and experiences of physiotherapy services in the UK. *Physiotherapy* P076 113 (1): E101-E102. Link: https://www.physiotherapyjournal.com/article/S0031-9406(21)00164-4/fulltext#relatedArticles


Thompson DP et al. (2017) Symptoms of chronic fatigue syndrome/myalgic encephalopathy are not determined by activity pacing when measured by the chronic pain coping inventory. Physiotherapy. Link: https://www.ncbi.nlm.nih.gov/pubmed/28843450


Zhu Y et al. (2022) Electroacupuncture at BL15 attenuates chronic fatigue syndrome by downregulating iNOS/NO signaling in C57BL/6 mice. *Anatomical Record (Hoboken)* [Epub ahead of print]. Link: [doi.org/10.1002/ar.24953](https://doi.org/10.1002/ar.24953) (**NEW**)


9.5 General management


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### 9.6 PACE Trial


The ME Association Index of Published ME/CFS Research


Vink M. PACE trial authors continue to ignore their own null effect. Journal of Health Psychology 22 (9): 1134-1140. Link: https://www.ncbi.nlm.nih.gov/pubmed/28805519


9.7 Pharmacological treatment


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Postgraduate Medical Journal 80(942): 230-232. Link: 
http://pmj.bmj.com/content/80/942/230.info

Natelson BH et al. (1996) Randomized, double blind, controlled placebo-phase 
in trial of low dose phenelzine in the chronic fatigue syndrome. 
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9.8 Immunoadsorption/ Apheresis


9.9 Pregnancy


10. Prognosis and quality of life

10.1 Age


10.2 Carers

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10.3 Mortality


10.4 Prognosis and recovery


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10.5 Quality of life


The ME Association, 7 Apollo Office Court, Radcliffe Road, Gawcott, Bucks. MK18 4DF. ME Connect Helpline: 0344 576 5326 Available every day of the year, during the hours of 10am-12noon, 2pm-4pm and 7pm-9pm. The ME Association is a registered charity number 801279.

10.6 Severe ME


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Comment

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13. Government Documents

13.1 Disability support


13.2 Economic cost to the UK


13.3 General reports, debates, and statements

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14. Healthcare


14.1. NICE Guidelines


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15. Case studies and case reports


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### 16. Long-COVID which cover ME/CFS

#### 16.1 Children and adolescents

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#### 16.2 Endothelial cells


16.3 Evidence of overlap with ME/CFS

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### 16.4 Gene expression


**Comment**

### 16.5 Microclots


### 16.6 Miscellaneous


### 16.7 Predictors

16.8 Prognosis and quality of life


16.9 Symptoms


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