



MANAGEMENT FILE

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MEA membership costs £18 a year for people living in the UK/BFPO.
For contact details, see foot of this page.



COGNITIVE DYSFUNCTION also known as 'BRAIN FOG'

Often referred to as 'brain fog' by people with ME/CFS, cognitive dysfunction is how doctors refer to problems with normal mental functioning – concentration and short-term (working) memory in particular. It's a worrying and often very frustrating part of having ME/CFS. The symptoms can fluctuate and vary from mild to severe. The cause remains uncertain and there is no effective form of drug treatment available – although self-help coping strategies can be helpful.

WHAT IS COGNITIVE DYSFUNCTION?

Typical symptoms include:

- Short-term memory lapses
- Difficulty in concentrating or sustaining attention
- Difficulty with processing incoming information and retrieving stored information
- Trouble finding the right word, remembering or mixing up commonly used words
- Problems with carrying out everyday tasks that involve any form of sustained mental activity

Short-term memory – sometimes referred to as working memory – refers to information that has been passed to the brain via your ears or eyes within the past few seconds, minutes or hours. So it mainly relates to things you have recently been told, or been asked to do, or are about to go and do.

Results from an MEA website survey on cognitive dysfunction that was carried out in March 2019:

Overall, how would you describe the effect that cognitive dysfunction ("brain fog") has on your ability to function on a day-by-day basis?

- Constant and very disabling (16%, 126 Votes)
- Constant and moderately disabling (17%, 132 Votes)
- Constant and mildly disabling (5%, 42 Votes)
- Varies between moderate and severe (23%, 180 Votes)
- Varies between mild and moderate (23%, 178 Votes)
- Varies between mild and severe (15%, 119 Votes)
- No longer suffer with cognitive dysfunction (0%, 3 Votes)
- Never had cognitive dysfunction (1%, 5 Votes)

Total Voters: 785

Cognitive dysfunction in ME/CFS does not normally affect medium or long-term memory – so recall of information and events from weeks, months or years ago is not normally a problem.

Problems with short-term memory and poor concentration inevitably lead to other cognitive difficulties. Therefore people with ME/CFS normally find that their attention span becomes shorter; they have difficulty with processing, storing and retrieving information – especially during conversations; – and they cannot do more than one task at a time when it comes to mental activity.

On the other hand, it's reassuring to note that cognitive dysfunction in ME/CFS is not a progressive or dementing process. And there isn't normally any significant effect on higher mental functions such as intellect or IQ that inevitably start to progressively deteriorate in any form of dementia.

From the research point of view, there is no evidence that cognitive dysfunction in ME/CFS is associated with the sort of progressive loss of vital brain tissue (cerebral atrophy) that occurs in dementia.

HOW COMMON IS COGNITIVE DYSFUNCTION IN ME/CFS?

Most doctors regard cognitive dysfunction as a very characteristic feature of ME/CFS and would be reluctant to make a diagnosis of ME/CFS in anyone who does not report this key symptom to some degree. People with ME/CFS normally report that cognitive dysfunction forms a very significant part of their range of symptoms. For some, it's the most debilitating and frustrating part of their whole illness.

Just like other ME/CFS symptoms, cognitive dysfunction can be very

variable and may well fluctuate according to how you feel generally.

So in the same way that too much physical activity will quickly produce muscle fatigue, prolonged or intense mental activity will bring on or exacerbate brain fatigue and the cognitive problems that accompany it. But physical activity will also produce cognitive dysfunction.

Other medical problems such as frequent headaches, pain, sleep disturbance, anxiety and depression can all cause cognitive dysfunction – regardless of whether or not you have ME/CFS. So, if any of these are present, they are likely to be exacerbating the problem.

Some types of medication can also cause cognitive dysfunction as a side-effect.

Examples of drugs that can cause cognitive dysfunction and may be prescribed to people with ME/CFS include anticholinergics (drugs that are used to treat an overactive bladder, nausea and breathing problems), anticonvulsants, antidepressants, hypnotics and sedatives, non-steroidal anti-inflammatory drugs (NSAIDs) such as Brufen/ibuprofen and steroids.

WHAT RESEARCH HAS BEEN CARRIED OUT INTO COGNITIVE DYSFUNCTION IN ME/CFS?

A large number of research studies have now been carried out into these problems. Using various types of complex neuro-psychological assessment tests, and neuro-imaging techniques (ie. brain scans) that 'light up' parts of the brain during various mental tasks, these studies have confirmed that this is a very genuine problem in ME/CFS. However, the research findings often fail to demonstrate the severity of cognitive dysfunction reported by people with ME/CFS.

Unfortunately, the two key aspects of cognitive dysfunction that this research hasn't really examined in any detail are what causes cognitive dysfunction in

ME/CFS and whether there could be effective forms of treatment in the form of drugs or supplements.

Professor Julia Newton's research group in Newcastle recently published findings from a study into cognitive dysfunction (Robinson *et al* 2019).

They concluded that cognitive dysfunction was not being caused by co-morbid depression and that autonomic dysfunction could be an important causal factor. The autonomic nervous system plays an important role in the regulation of blood flow to most parts of the body, including the brain.

WHAT CAUSES COGNITIVE DYSFUNCTION IN ME/CFS?

The simple answer is that in our current state of research knowledge we just don't know. However, there is clearly an abnormal pattern of brain activity taking place. Among the possible explanations are:

- Changes that involve chemicals (neurotransmitters) and hormones that transmit messages and information from one part of the brain to another. We already know that alterations in the level of a chemical transmitter called serotonin may be involved
- Alterations in blood flow to key parts of the brain, which could be reducing the supply of oxygen. This is supported by the new research from Professor Newton and from research involving neuroimaging blood-flow scans (SPECT scans)
- Raised levels of immune system chemicals called cytokines that produce fatigue and flu-like feelings. This is supported by recent research that has found evidence of low-level inflammation (neuroinflammation) in specific areas of the brain.

It is also interesting to note that cognitive dysfunction also occurs in other inflammatory, autoimmune and infective illnesses, as well as in cancer (where it's often referred to as 'chemo brain' because chemotherapy seems to make it worse) as well as fibromyalgia (where it is known as 'fibro fog').

Again, there's no simple explanation as to why this happens in cancer and affects some people more than others.

MANAGEMENT CHECK LIST

Six key aspects to managing cognitive dysfunction in ME/CFS are:

- Excluding and treating other conditions that can cause cognitive dysfunction – eg. depression, hypothyroidism (low thyroid function)
- Treating any other condition or symptom that is likely to be exacerbating the problem – in particular depression, headaches, pain, stress and sleep disturbance
- Asking your doctor or pharmacist to go through your current medication list to see if you are taking anything with side-effects that effect mental functioning and if so possibly switching to another form of treatment
- Pacing your mental activities – just as you do for physical activities
- Making use of simple aids and support techniques
- Having a further assessment and investigations if there are any 'red flag' features that suggest there could be another neurological explanation – such as a progressive deterioration in mental functioning or forgetting familiar things like dates, names, locations and problems affecting long-term memory

PACING MENTAL ACTIVITIES

Just like pacing physical activities, pacing mental activities is a key aspect of management. Overall, this means finding a comfortable baseline of mental activity and splitting mental activity up into small, manageable chunks – with rest or relaxation periods in between.

As with physical pacing, stop any activity before you start to become mentally tired and don't push yourself beyond your limitations.

PRACTICAL TIPS

To help with short-term memory problems:

- Use a notepad or wall planner to jot down important 'things to do' each day – appointments, phone calls to make and, very importantly, refer to it regularly
- Prepare a written check-list of things you need to do on a day-to-day basis.
- Always make a shopping list when you go out
- Make use of post-its and other simple written props to remind you about important events or 'must-dos'
- Don't attempt to multi-task when it comes to mental activity – focus on one task at a time
- Make use of the new technology – an electronic organiser for information on things you are likely to forget: a beeper on a mobile phone to remind you to attend a meeting or take medication
- Allocate set places for important items such as glasses, keys and medication
- Write down names of new acquaintances matched to obvious features as soon as possible
- Learn new skills with brain-training activities – such as playing sudoku, puzzles or computer card games
- Stay calm and patient if you misplace or lose something. Try picturing what you normally do when you put them down
- Avoid distractions – for example, being hungry can be a huge distraction

To help with word-finding and concentration problems:

- Ask people to give you more time to explain yourself if you are having word-finding difficulties
- Try visual imagery by painting a picture in your mind to help prompt the missing words

CO-ENZYME Q10 AND COGNITIVE DYSFUNCTION

Coenzyme Q10 (CoQ10), also known as ubiquinone, is often referred to as a vitamin. However, this isn't strictly true as it is made in the liver from an amino acid called tyrosine. CoQ10 is also present in a wide variety of foods. So deficiency can occur as a result of reduced dietary intake, decreased production, or increased usage – or a combination of all three.

CoQ10 is known as a coenzyme because it helps other enzymes in the body to carry out their normal functions. In relation to muscle and brain fatigue, it is involved in energy-producing chemical pathways inside the mitochondria – parts of the cell where energy in the form of a chemical called ATP is produced. It also has antioxidant activity. So there are some theoretical reasons why CoQ10 might be helpful in ME/CFS.

However, despite all the claims being made for CoQ10, there is very little scientific evidence linking deficiency with disease. Neither is there much evidence of benefit in diseases where it is sometimes recommended such as heart failure, mitochondrial muscle diseases, and Parkinson's disease (where decreased levels have been found in the spinal fluid). The same situation applies to ME/CFS.

Results from a mice model research study (Sumien N et al, 2009) suggest that prolonged intake of CoQ10 in low amounts has no discernable impact on cognitive and motor functions whereas intake at higher amounts exacerbates cognitive and sensory impairments encountered in old mice. The researchers concluded that these findings do not support the notion that CoQ10 is a fitness-enhancing or an "anti-aging" substance under normal physiological conditions.

As far as side-effects are concerned, CoQ10 is normally well tolerated with no serious side-effects. But it has not been properly assessed in pregnancy.

One additional note relates to use of CoQ10 with statins – prescription-only drugs used for lowering blood cholesterol levels. Statins can lower the levels of CoQ10, and it has been suggested that this could make people more liable to develop statin-induced myopathy (muscle damage). This is a well recognised side-effect of statins, and is something that is occasionally reported by people with ME/CFS. So there may be a case for taking CoQ10 if you have ME/CFS and are also taking a statin.

It has also been reported that CoQ10 can interfere with anticoagulants (blood-thinning drugs such as warfarin) at high doses.

Overall, CoQ10 is a supplement that may be worth a try – bearing in mind that reports of benefit are speculative rather than scientifically proven.

- Don't focus too hard on trying to find the correct or missing word – it may well appear later
- Leave any difficult mental tasks to the time of day when you normally function best

To help improve the processing of new information:

- Minimise external noise and distractions – TV and radio, etc –and

work in an environment that helps you concentrate

- Ask people to speak slowly
- Repeat new information to yourself to help retain it
- Print information off the computer rather than reading it on a screen
- Break up written print into shorter, well-spaced paragraphs

- Use a pencil or highlighter to mark important bits of text
- Bullet point or number new ideas or information
- If your sense of concentration is weakening, move around and have a break from mental activity

In addition, it's important to make family, friends and work colleagues aware of the sort of practical difficulties you are having with normal mental functioning and explain how they can also help you to cope.

DRUG TREATMENTS

Antidepressants (at a low dose) may be helpful when used to treat associated pain, sleep disturbance or (at a normal dose) depression. But there is no evidence to indicate that they are otherwise helpful for improving cognitive function in ME/CFS.

Drugs used to treat cognitive problems associated with dementia have not been assessed in ME/CFS in clinical trials. Their use is not therefore usually recommended.

There are a number of drugs that stimulate the nervous system and some of them would be worth researching in ME/CFS. One example is **modafinil/Provigil**, an effective treatment for narcolepsy which, in one published report, has been shown to be helpful in ME/CFS.

PSYCHOLOGICAL SUPPORT

If cognitive dysfunction is having a significant effect on your ability to cope,

it may be worth asking your GP for a referral to a clinical psychologist.

ALTERNATIVE AND COMPLEMENTARY TREATMENTS

Various vitamins (especially those in the B group), minerals (eg. magnesium and zinc) and supplements are often recommended by alternative practitioners and nutritionists to improve cognitive function. However, there is no sound scientific evidence to support their use.

Possible exceptions are **carnitine, co-enzyme Q10** and **eicosapentaenoic acid (EPA)**. Carnitine and EPA have been shown to be of some limited benefit in small clinical trials in ME/CFS. So they may be worth a try if you can afford the cost.

The MEA has leaflets covering the use of Muscle Energy Supplements (for carnitine, co-enzyme Q10, NADH, etc) and one for Essential Fatty Acids and EPA.

FURTHER INFORMATION

■ Section 5.4.7 of The MEA publication *ME/CFS/PVFS: An Exploration of the Key Clinical Issues* has information on over 30 research studies that have been carried out into cognitive dysfunction in ME/ CFS.

■ The MEA has a *To Whom It May Concern* letter on cognitive dysfunction. It follows on the next page. This is designed to explain the problem to people like employers, benefit assessors and lawyers who require more information on this aspect of ME/CFS.

MEDICAL REFERENCES

- Academic review of research into cognitive dysfunction: Michiels V and Cluydts R (2001) Neuropsychological functioning in chronic fatigue syndrome. *Acta Psychiatrica Scandinavica*, 103, 4-93.
- Robinson LJ et al. (2019) Impairments in cognitive performance in chronic fatigue syndrome are common, not related to co-morbid depression but do associate with autonomic dysfunction. *PLoS ONE*, 14 (2): e0210394.
- Sumien N et al. (2009) Prolonged intake of Co-enzyme Q10 impairs cognitive functions in mice. *The Journal of Nutrition*, 139 (10), 1926 – 1932.

FEEDBACK

Please let us know if you have any more useful tips to help with cognitive dysfunction. You can email: admin@meassociation.org.uk or drop us a line at 7 Apollo Office Court, Radclive Road, Gawcott, Bucks MK18 4DF.

Medical information contained in this leaflet is not intended to replace medical advice or treatment from your doctor. We recommend that you always consult your doctor or healthcare professional about any specific problem. We also recommend that the medical information we provide is shown to and discussed with your doctor, as appropriate.



Our quarterly membership magazine

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TO WHOM IT MAY CONCERN

Cognitive dysfunction in ME/CFS

Cognitive dysfunction is an important part of the illness known as ME/CFS (myalgic encephalomyelitis or encephalopathy/chronic fatigue syndrome). The presence of cognitive dysfunction as a principal symptom of this illness is recognised in all the main clinical and research definitions of ME/CFS.

In practice, cognitive dysfunction means that people with ME/CFS experience problems with a wide range of tasks that relate to normal and effective mental functioning. In particular, they experience significant difficulties with short-term memory, the learning and processing of new information, and the ability to concentrate for more than short periods of time.

The range of disablement caused by cognitive dysfunction ranges from mild to severe and, as with most other ME/CFS symptoms, there is often a fluctuation in severity. At the severe end of the spectrum, this aspect of ME/CFS may even be more disabling than pain or fatigue. As a result, the person concerned may be unable to cope with relatively straightforward and familiar cognitive tasks associated with their education, employment, or management of their personal affairs.

A large number of research studies, using complex neuropsychological testing, have been carried out into this aspect of ME/CFS and published in peer-reviewed journals, including this one which used Blood Oxygen Level Dependent (BOLD) functional Magnetic Resonance Imaging (reference: Objective evidence of cognitive complaints in chronic fatigue syndrome: ABOLD fMRI study of verbal working memory. Lange G et al. *Neuroimage* 2005; 26: 513-524).

The results of all these research studies confirm that a wide range of objective cognitive defects is frequently present in people with ME/CFS.

Although these abnormalities clearly relate to some aspects of central nervous system dysfunction in ME/CFS, the precise pathological explanation remains uncertain. However, cognitive dysfunction cannot simply be explained by the presence of co-existent psychiatric illness such as depression, where this may occur (reference: DeLuca J, et al. Cognitive functioning is impaired in patients with chronic fatigue syndrome devoid of psychiatric disease. *Journal of Neurology, Neurosurgery and Psychiatry* 1997; 62: 151-155).

Some of the more important research study findings involving cognitive dysfunction have been summarised in a review by Michiels and Cluydts (reference: Neuropsychological functioning in chronic fatigue syndrome: a review. *Acta Psychiatrica Scandinavica* 2001; 103: 84-93).

The ME Association maintains an up-to-date list of all key research studies in ME/CFS – including papers on cognitive dysfunction – on our website www.meassociation.org.uk Click on 'Research' in the upper navigation bar, then when given a choice of further areas to explore go to 'Published research'.

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