

Nutritional Therapy in Myalgic Encephalomyelitis or Chronic Fatigue Syndrome (ME/CFS): A Case Study

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Abstract

The Optimum Health Clinic (OHC) is a specialist, private tertiary healthcare provider that offers psychological, nutritional and combined interventions for individuals with myalgic encephalomyelitis or Chronic Fatigue Syndrome (ME/CFS) and fibromyalgia. A single biomarker has not been identified for this illness and therefore more complex and multidisciplinary models have been suggested, for instance the biopsychosocial model¹⁻³ and psychoneuroimmunological model⁴. The OHC has also developed a model in an attempt to describe the development and maintenance of this condition; this integrative model takes into account predisposing factors, triggers, perpetuating factors and clinically-defined sub-types (please see Howard and Arroll⁵ for a full discussion of this model). An important aspect of the treatments on offer at the OHC is the nutritional therapy. Indeed, for some of the OHC's clients, this will be their chosen route and they will receive this type of intervention in isolation. This article aims to outline the nutritional approach used at the OHC and link the nutritional interventions with the existing evidence base. To achieve this, we present the case study of 'Darren', a 37 year old gentleman who had been experiencing the symptoms of ME/CFS for 15 years and for which he had a medical diagnosis, who first consulted the OHC in November 2010.

Introduction

ME/CFS is a condition characterised by prolonged and debilitating fatigue, although the exact cause of this disorder is still under debate. Due to the lack of a definitive biological marker, diagnosis is made on the basis of the exclusion of any other explanatory conditions. The most widely used case definition by the Centers for Disease Control (CDC)⁶ states that there must be at least six months' severe fatigue of new and definite onset, not the result of ongoing exertion, not alleviated by rest and resulting in reduced levels of physical activity. The CDC definition also sets out a series of minor complaints that must accompany the fatigue (cognitive impairment, sore throat, tender cervical or axillary lymph nodes, muscle pain, multi-joint pain, headaches of a new type, pattern or severity at onset, unrefreshing sleep and post-exertion malaise), with individuals needing to have the occurrence of four or more symptoms to be diagnosed with ME/CFS. More recently, Carruthers et al.⁷ devised a set of guidelines in a bid to set out criteria that reflected ME/CFS as a distinct entity and distinguish it from other fatiguing disorders; this definition insists that for individuals to meet the criteria they must exhibit fatigue, post-exertional malaise, sleep dysfunction and pain for at least six months, usually of distinct onset but it can be gradual. However, individuals must have additionally suffered from two or more neurological or cognitive complaints and also have presented with at least one symptom from two of the following

categories: autonomic, neuroendocrine or immune manifestations. Estimates of the prevalence of ME/CFS have been made as low as 3 and as high as 2,800 per 100,000.⁸

Darren's Background

As previously mentioned, Darren was at the time of first consultation, a 37 year old man with four children who was working in the field of information technology. Although he had suffered from ME/CFS for 15 years, he felt that his symptoms were constantly improving and was able to work full-time, which infers that Darren was at the high functioning end of the ME/CFS spectrum as in the UK unemployment levels due to the condition were found to range from 35-69%, with little change over time⁹. Indeed, considering that less than 6% of ME/CFS patients have been seen to improve significantly over a five-year period in terms of physical functioning¹⁰, Darren's progress can be viewed as promising. However, Darren needed to monitor his activities and endeavoured to not 'overdo it', especially in the evenings and weekends and this was causing him to be frustrated as he wanted more energy to interact with his children and engage in exercise. Darren noted that this was currently unobtainable as when he had tried to take his son to rugby on Saturday mornings and followed this by a gentle afternoon walk it had 'pushed him over the limit'. Darren stated that exercise resulted in low mood, extreme fatigue and worsening of symptoms the following day. In this sense, Darren's improvements may be viewed as an adaptation to the illness, rather than actual recovery.

By the time he had reached the OHC, Darren had seen ten health practitioners in addition to his GP and had tried a range of complementary and alternative therapies including psychotherapy, meditation, the Emotional Freedom Technique, the Gupta Amygdala Retraining Programme, the Perrin Technique and nutritional therapy; hence Darren was eager and determined to improve his health status. When asked the symptoms he would most like resolved, Darren stated fatigue (especially in relation to exercise), food intolerances, aching muscles and joints (particularly achy thighs and poor muscle stamina) and sensations related to a racing mind and anxiety including palpitations, perpetually feeling in 'fight or flight' mode and waking up early in the morning with an 'adrenalin kick'. It should be noted that Darren was categorised as a high achiever with tendencies towards anxiety from the responses provided in the OHC's clinical questionnaire.

1st Consultation

Darren had a good diet when he came to the OHC; he was eating an adequate amount of whole foods, no processed foods, caffeine, dairy or wheat. However, from the analysis of baseline questionnaire measures (the OHC has developed a set of measures that seeks to capture various aspects of the illness; in this specific instance, Darren had scored high on the glucose handling questions) he presented as a 'fast oxidiser metabolic type' based on the theory that individuals can be grouped into specific metabolic types, either fast or slow oxidisers, and certain foods aggravate or benefit each type^{11,12}. In Darren's case, although he was eating protein with every meal, it was not in sufficient quantities and was not eaten with snacks; i.e. he wasn't eating enough protein for his body type. In order to rectify this, Darren was given a fast oxidiser metabolic diet programme to follow, which focused on increasing the quantity of protein he was eating, especially dense protein such as red meat and oily fish and whey protein with breakfast, in addition to reducing carbohydrates overall. Darren was also advised to have a snack before bed to help control his blood sugar throughout the night, for instance oat cakes with nut butter. Furthermore, Darren was given supplements for increased energy including a supplement formulated by Dr Teitelbaum, which contains high levels of B vitamins, minerals, malic acid, whey protein and tyrosine amongst other components). To deal with the difficulties in maintaining sleep and his symptoms of anxiety, supplements of GABA and L-Theanine were suggested to Darren, as the former is an inhibitory neurotransmitter that has an important role in sleep regulation¹³ and the latter is an amino acid (found in green tea) which has been shown to reduce physical and psychological stress¹⁴. Indeed, it has been shown that there is a positive correlation between β -alanine, a structural analogue of GABA, and ME/CFS symptomatology¹⁵, at least in a sub-group of patients¹⁶. Antioxidants in the form of a blend of super-foods containing grasses, algae and sea vegetables were also suggested to deal with Darren's muscle aches and pains as oxidative damage has been observed in the DNA and

lipids in muscle biopsies of those with ME/CFS. It was also advised that Darren undertake an Adrenal Stress Index test and a stool test to investigate adrenal and gastrointestinal abnormalities and that he ask his GP to perform standard blood tests.

2nd Consultation

In the interim between the first and second consultations, Darren began the OHC online support programme 'Secrets to Recovery' which consists of a range of symptom management techniques and advice on increasing activities and relaxation. During this time, Darren had also continued with the Gupta Amygdala Retraining Programme. Regarding his symptoms, Darren's levels of energy had improved, to the extent that he starting jogging for seven minutes, three times per week without incurring undue post-exertional fatigue. Darren reported that the high-protein diet had significantly helped his energy and reduced energy slumps during the day; his muscle aches were steadily decreasing. In terms of Darren's anxiety, he noted that he was feeling less anxious at night with the help of the supplements, but he still felt very 'high' during the day, particularly at work and he was still waking up early, limiting the total amount that he slept. Darren also reported that after attending a special occasion at which he consumed three glasses of wine, he was 'completely wiped out' for the following two days, i.e. his intolerance to alcohol remained.

The results of Darren's adrenal test illustrated hypocortisolemia; morning cortisol was within the normal range (but this may have been due to a fall in blood sugar through the night), however cortisol levels at lunch, mid-afternoon and the evening were very low and with low DHEA. (It should be mentioned here that earlier in the year Darren had taken a medical adrenal test and the results were within the normal range for blood cortisol.) In a review of the neuroendocrinology of ME/CFS, Cleare¹⁷ notes that the balance of evidence shows that those with ME/CFS have lowered levels of cortisol output and this has been linked with symptom occurrence and persistence. This hypocortisolism may be due to high levels of stress, triggering hyperactivity of the hypothalamic-pituitary-adrenal axis¹⁸. To address Darren's adrenal dysfunction, an adrenal glandular supplement was implemented. Darren's stool test showed light *Candida* overgrowth and saprophytic fungi, high level of dysbiosis with rare levels of gram positive and negative bacteria and low serum IgA (total of 36, range 400 – 880). Although Darren's SIgA measure was low, it has been shown that an increased IgA response to commensal bacteria in ME/CFS patients has been linked to inflammation and cell-mediated immune activation and that the heightened translocation of such bacteria may be an important factor in the symptomatology of those with the condition¹⁹. Indeed, the link between gram-negative enterobacteria and increased gut-intestinal permeability (or leaky gut) and its association with ME/CFS symptoms and severity has been proposed as a causative factor in the illness²⁰. Darren was recommended high strength probiotics which have had some promising results in reducing ME/CFS symptoms^{21,22} and an anti-*Candida* supplement (the impact of an overgrowth of *Candida albicans* and its relationship with ME/CFS has been theorised for some time, e.g. Cater²³).

3rd Consultation

In Darren's third consultation with the OHC, he reported that he 'felt toxic' due to *Candida* die-off associated with the anti-*Candida* supplement; therefore he was advised to reduce the dosage and then very slowly build it up again over the course of two weeks. Nevertheless, Darren was feeling more robust, less tired and he had been going out and doing more in the evenings/weekends including trampolining and playing football with his children, increased walking and isometric exercises (20 minutes, three times per week). Darren stated that his sleep had improved due to the psychological techniques he was using from the online support programme and the inclusion of protein with his evening snack resulted in longer sleep duration with later waking times. Darren had also experimented with the occasional 'treat' with foods such as cake, and hadn't experienced any ill effects as he had previously. The blood test results from Darren's GP had arrived by this consultation and showed an electrolyte imbalance and low B12 and folate. To compensate for this Darren was advised to take folic acid (in addition to the B12 supplement that he was currently taking) and to add half a teaspoon of sea salt to a glass of water in the morning.

4th Consultation

By the time Darren had his fourth consultation with his practitioner, he had resumed the Perrin Technique, which resulted in severe fatigue and frustration. However, overall Darren's symptoms were greatly improved apart from the anxiety and associated palpitations. Within this session Darren's adrenal protocol was altered as he was tolerating the supplements well (the dosage was increased) and additional gut support was included to heal and repair Darren's leaky gut, linked to the *Candida* overgrowth, in the form of a different strain of probiotics.

5th Consultation

In Darren's fifth consultation the palpitations had diminished and he had observed overall improvements in energy and intolerances; however he was still experiencing anxiety and this was the main symptom at this time that Darren wanted to tackle. In an attempt to progress Darren's treatment, we turned to an investigation of his mitochondrial function as this has been shown to be a component of the ME/CFS both in our clinical practice and in the exact body of research, particularly regarding the function of neutrophil cells which are key in terms of immune response^{24,25}. (When Darren started treatment at OHC, he had the results of an ATP-profile test (for details of this test please see Myhill et al²⁵) that was conducted with a previous practitioner; as a result of this Darren had been taking mitochondria-specific support, but his functioning had not been re-tested since. As we had initially decided to concentrate on correcting his adrenal and gut function before re-testing the mitochondria and related markers, it was not until this fifth consultation that we focused on the mitochondria.

Darren's first mitochondria test demonstrated very low whole-cell ATP, very poor ADP–ATP re-conversion and poor ATP-related availability. On re-test of related markers, Darren's red cell magnesium was low (1.9, reference range 2.08–3), his coenzyme Q10 (CoQ10) was low (0.29, reference range 0.55–2), his cell free DNA was raised (14.5, reference range below 9.5) and his niacin was within range (16.4, reference range 14–30). These findings are consistent with the literature, as red cell magnesium has been observed to be low in patients with ME/CFS and appears to respond to supplementation-based treatment²⁶. CoQ10, which is an important nutrient in the production of ATP within the mitochondrion, has been shown to be low in those with ME/CFS²⁷; in fact, 44.8% of the ME/CFS participants in this study exhibited rates of CoQ10 lower than the lowest values within the healthy control participants. Darren's raised cell-free DNA could be seen as indicative of disease and infection²⁸, although significant differences between ME/CFS patients and healthy controls have not been found.²⁹

Darren had been taking magnesium and CoQ10 supplementation for many months; therefore other reasons as to why these markers might have been low, such as high acidity, excretion of minerals, increased demand and poor absorption were discussed. The option of changing the method of magnesium intake from capsule to nebulizer (only available on prescription) was offered, but Darren suggested he try another magnesium supplement for three months and re-test before switching to the nebuliser. An alternative and higher dose of CoQ10 was given as well as a high dose antioxidant to address the potential oxidative damage, as indicated by the high cell-free DNA in Darren's sample. Participants with ME/CFS have shown significantly increased levels of stomatocytes in their blood as compared to healthy controls and oxidative damage in the form of increased malondialdehyde (MDA), methemoglobin (metHb) and 2,3-diphosphoglyceric acid (2,3-DPG)³⁰. Additionally, lower serum zinc levels have been found in ME/CFS samples, which is a strong antioxidant; hence this is another marker for oxidative stress in ME/CFS and notably serum zinc was negatively correlated with symptom severity³¹. Increased levels of isoprostanes and oxidised low-density lipoproteins (which infers a free radical attack on lipids) and lower high-density lipoproteins have also been found in ME/CFS groups as compared to healthy controls²⁴. The body of evidence with regards to oxidative stress in this disorder is becoming convincing and it is feasible that this may be due to persistent infection and/or environmental stressors.

6th consultation

Darren reported 'a couple of break-throughs and leaps forward with energy' with the new

supplementation programme and he felt his body was beginning to be calmer in general. Between the fifth and sixth session, Darren engaged with two one-to-one sessions with an OHC psychology practitioner and wanted to reduce supplements as he didn't feel he needed a great deal of support and had regained a sense of control. This integration of the psychological and nutritional therapies is key to the OHC approach; for example perceived control has been shown to influence symptomatology^{32,33} and therefore targeting this and other intrapersonal dimensions can be of great benefit³⁴ (please see Howard and Arroll⁵ for a more in-depth discussion the role of perpetuating factors in ME/CFS). Darren's adrenal function was re-tested and the adrenal exhaustion stage that he had been in previously was now in cyclic variation, all the cortisol readings were within normal range, except the mid-afternoon observation and his DHEA was in the normal range in the morning sample, although low in the afternoon sample.

7th Consultation

During Darren's most recent consultation, he felt there had been some more steps forward especially with regard to energy levels which had been even throughout the day. Darren had been very busy with home and work life, which he had coped well with. His main remaining symptom was tension /stress in the body, in particular the muscles, especially in the morning. Darren also felt that his adrenaline was high in the morning. However, he was not experiencing bloating any longer following the exclusion of sugar and yeast which had calmed his digestion. Follow-up tests had been carried out which demonstrated that his RBC magnesium was lower (1.83) than was noted at his fifth consultation, his CoQ10 was at 0.46 low but had increased from 0.29 in session 5 and his cell-free DNA was raised to 15.6 from 14.5 in the summer, possibly due to his increased activity. To address these results magnesium crystals were added to the nebuliser and transdermal magnesium was introduced to by-pass the gut to help increase absorption. Additional mitochondrial support in the form of CoQ10 and coenzyme A were advised and an anti-oxidant complex was suggested to help with high oxidative stress/high cell-free DNA. In terms of future steps, Darren agreed to do the home Ph test for the next session to see if excess acidity is causing magnesium to be lost.

Conclusion

This case study illustrates one man's nutritional journey with the OHC but as can be seen by the last session, it is not at an end. This is not to say that individuals do not leave the support of the clinic, but rather the process is complex and can take time and a series of iterative steps in order to find a satisfactory equilibrium. The patient-centred nutritional interventions offered by the OHC have been shown to reduce symptom severity, increase functional ability and reduce the maladaptive response to stressors³⁴. This case study has shown that the process of this treatment paradigm is sequential, focusing first on the areas that the patient finds most troubling and with the use of high-quality laboratory testing, treating deficiencies and abnormalities according to clear markers. This approach offers the Clinic's clients peace of mind in knowing that treatments are based on clear indicators and an emerging evidence-base in the area of ME/CFS.

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