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British Journal of Oral and Maxillofacial Surgery xxx (2017) xxx–xxx

BRITISH  
Journal of  
Oral and  
Maxillofacial  
Surgery[www.bjoms.com](http://www.bjoms.com)

## Review

# Can dietary supplements improve a clinician's well-being and health?

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Accepted 1 December 2017

## Abstract

Many people use dietary supplements to improve their physical and mental well-being and their general health, but do not know if they really have any benefit. To our knowledge, little has been published on their use in the clinical environment, so we evaluated the evidence for their benefits in people whose work is physically and mentally challenging. Studies on nutrition and supplementation in athletes and military personnel have clearly shown that several compounds improve cognition, mental well-being, and physical performance. Based on this evidence, and with the many pressures faced by healthcare workers, as well as the need for concentration and endurance, some dietary supplements might be beneficial. Supplementation of a balanced diet with omega-3 fatty acids, vitamin B3, vitamin C and associated antioxidants, vitamin D, and protein, may improve a clinician's physical and mental health and their performance at work. Specific research is, however, needed to evaluate this more fully.

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**Keywords:** human factors; supplementation; performance; deficiency; vitamin; protein; optimisation

## Introduction

Dietary supplements can improve the performance of athletes, military personnel, and airline pilots, and the optimisation of vitamins and nutrients in the diet is thought to be essential to ensure the best performance in people who are exposed to greater levels of stress and pressure than most.

The work of doctors and surgeons is both mentally and physically challenging, but to our knowledge, little has been published about the potential benefits of supplements on clinical performance. In many respects, the pressure, concentration, physical and mental resilience, and endurance that are

required during long operating days or other clinical activities, are similar to those of the professions mentioned above. As in medicine, mistakes, can result in loss of life (military and aviation), or in the case of athletes, failure to win. We have previously found that the mental toughness and technical skills that are required by Olympic athletes (who have to perform consistently at the highest level), and their levels of stress, are similar to those of surgeons.<sup>1</sup>

We have searched published reports for evidence of improvements in physical or mental performance, or both, as a result of the use of supplements. Most studies came from fields outside medicine and surgery, but it is likely that the mental and physical challenges experienced by doctors are similar to those reported.

Medical professionals are susceptible to mental illness. It has been suggested that up to 20% of doctors have had some

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<https://doi.org/10.1016/j.bjoms.2017.12.002>

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mental health issues during their careers,<sup>2</sup> and both female and male doctors have a higher risk of suicide than the general population.<sup>2</sup> Middle-aged surgeons are most likely to present to their general medical practitioner, and the problems most commonly reported are depression, anxiety, and burnout.<sup>3,4</sup>

### What supplements might be beneficial to oral and maxillofacial surgeons (OMFS)?

#### *Omega-3 fatty acids*

Omega-3 highly unsaturated fatty acids (HUFA) such as docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) have positive effects on mental health and well-being. Found in the brain and peripheral nerves, they facilitate the function of the hypothalamic-pituitary-adrenal axis<sup>5</sup> and are required for neuronal function. They also have a crucial role in cognition, emotion, and mental well-being.<sup>5</sup>

Thirty percent of fatty acids must be acquired from the diet, as the human body cannot synthesize the essential fatty acids that are the precursors of omega-3 HUFA.<sup>6</sup> Studies have found that a low concentration of serum DHA is a strong predictor of the risk of suicide in the future, as it correlates with an increased risk of depression.<sup>5</sup>

The demands on service personnel, particularly when involved in combat, can reduce mental well-being. After deployment during the Iraq war, 19.1% reported problems with mental health,<sup>6</sup> and stress factors that contributed to this included seeing dead bodies and knowing friends or colleagues who had been killed or seriously injured.<sup>6</sup> While not immediately obvious, there is a parallel between these and the experiences of clinicians, for example, an unexpected death, the inability to offer curative treatment, or a serious surgical complication that considerably delays a patient being discharged.

Any of these situations can increase stress or anxiety, but how well do we look after ourselves and our colleagues, particularly when we have been involved in a serious event? Luftman et al recently found that up to 21% of healthcare staff who had cared for injured patients in hospital were at risk of post traumatic stress disorder (PTSD), and we must do everything we can to reduce it.<sup>7</sup>

Hibbeln et al highlighted the importance of omega-3 HUFA to maintain a healthy state of mind, and showed its effectiveness in the treatment of attention-deficit hyperactivity disorder (ADHD).<sup>6</sup> EPA supplements can significantly improve depressive symptoms, and the authors recommended a balanced fatty-acid diet for US military personnel to improve their mental health and ability to concentrate.<sup>6</sup>

Given that healthcare professionals seem to be at risk of developing PTSD,<sup>7</sup> omega-3 HUFA could help to maintain a healthy state of mind. One of the best sources is fish oil, although it is also found in some plant seeds. Fish oil has various antidepressant properties, and this further supports its

use to combat depression.<sup>8</sup> In rat studies, supplementation with omega-3 improved cognition, recognition of objects, and memory,<sup>9</sup> and in military personnel, an increased intake raised serum omega-3 concentrations after five weeks.<sup>10</sup> Since about 60% of the brain is made up of fat and lipids, adequate omega-3 HUFA is essential to maintain mental health and peak cognition,<sup>6</sup> and it is easily achieved by taking fish oil such as cod liver oil.

For those who find this unpalatable or unacceptable (even though supplements are available in capsules), other supplements such as flax seeds are readily available in gel tablets or oil capsules, and are cheaper than bespoke formulas that provide similar amounts of omega-3. Omega-6 and 9 are also beneficial for general well-being and they raise concentrations of high-density lipoprotein (HDL), the so called “good cholesterol”, which returns cholesterol to the liver to be broken down. Many products contain these HUFA as well as omega-3.

#### *Niacin (vitamin B3)*

Ionising radiation (IR) is carcinogenic. It interacts with tissue oxygen to produce reactive oxygen species (ROS) including free radicals that damage the structure of DNA.<sup>11,12</sup> While a recent study found that surgeons are within safe limits for exposure to radiation, trauma and orthopaedic specialists are exposed to more than five times as much as those in other surgical disciplines, with the dose being up to 85% of the recommended threshold for safety.<sup>13</sup>

Animal studies have shown that vitamins B3 and B12 protect the DNA against damage from ionising radiation.<sup>11</sup> Supplements of B vitamins have been used to protect airline pilots who regularly fly at high altitudes by reducing the rate of chromosomal translocations - an established biomarker of exposure to this form of radiation.<sup>11</sup> While oral and maxillofacial (OMF) surgeons are not exposed to additional radiation in the same way as those who work in orthopaedics, vitamin B3 might protect against damage to the chromosomes from background radiation. It is easily obtained as part of a vitamin B-complex tablet or as part of a multivitamin supplement.

Antioxidants such as vitamins B3 and C might also reduce the risks from radiation. As they have different mechanisms of action (the former aids the repair of DNA and the latter scavenges ROS), their combined use may be synergistic. However, in those who regularly eat a balanced diet and do not miss meals (such as during long operating days), additional supplements probably do not give any further protection.<sup>12</sup>

### Do antioxidants, including vitamin C, really benefit our health?

OMFS procedures can take from a few minutes to many hours to complete, and the physical and mental endurance of the surgeon and their team are important. To prolong endurance and

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