



ABSTRACT

Value of fish oil in nutrition therapy in Covid-19 illness

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Our expertise in the medical treatment of COVID-19 infections has grown with time and experience, resulting in the development of a cohesive overall therapeutic strategy for control of the viral infection from supportive measures for mild to moderate illness, to the full range of relevant organ support in critical illness in ICU. In parallel, our strategies for providing nutrition therapy have also evolved beyond the mere delivery of macronutrients (calories and protein) to the utilization of specific nutritional substrates that may play an important role in modifying the course of the disease and optimizing clinical outcomes.

There are recommendations from global experts and international society guidelines supporting the use of EN enriched with omega-3 FA in case of ARDS, as well as the use of fish oil-enriched IV lipid emulsions when PN is required. The rationale for the role of omega-3 FA as part of nutrition therapy in COVID-19 patients is based on several therapeutic concepts that apply to different phases of a severe viral infection. The most prominent is the concept of fish oil-mediated resolution of the hyperinflammatory response that triggers “cytokine storm”, leading to multi-organ dysfunction, and eventually multi-organ failure. Omega-3 FAs are incorporated into the bi-phospholipid layer of the cell membrane of neutrophils, producing mediators such as resolvins, protectins, and maresins (referred to as specialized pro-resolving mediators or SPMs) derived from EPA and DHA that bring about modulation or resolution of inflammation, without immunosuppression.

In addition, omega-3 FAs upregulate the activation of immune cells specifically in macrophages, neutrophils, T-cells and B-cells. Specifically regarding viral infections, studies have reported that fish oil enhances the antiviral response by inducing interferon which inhibits viral replication. Also, in response to the surge of inflammatory cytokines stimulated by viral infections, omega-3 FAs modulate the antiviral response by CD8 T-cells that could potentially cause unintended damage to the lungs. After the acute phase, when nutritional support is crucial to promote recovery and rehabilitation, and minimize loss of muscle mass, the role of omega-3 fatty acids would be to promote protein synthesis by modulating inflammation to the extent that protein anabolism can proceed optimally, by facilitating entry of leucine

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and other amino acids through the cell membranes to participate in the MTORC1 pathway of protein synthesis, and by inhibiting NFkB mechanisms that lead to protein breakdown.

These concepts are based on well-elucidated biological mechanisms supported by small studies (pre-clinical and clinical), reviews of literature, systematic reviews, and meta-analyses. While awaiting confirmation by more definitive RCTs, there is sufficient evidence to support the selection of EN and PN formulations containing fish oil because of the compelling scientific rationale, relatively low cost, and established safety, with considerable potential benefit.

Keywords: fish oil, nutrition therapy, covid-19
