

SPMs are Different from Omega-3 Fatty Acids

For the past 40 years, clinical research in inflammation has been focused on blocking, suppressing or inhibiting an inflammatory response. This focus was largely driven by an interest to facilitate recovery, modulate a better immune response and to minimize or manage pain responses. And, while these approaches have resulted in symptomatic relief, unknowingly, blocking the inflammatory response resulted in suppression of an active process now known to fully resolve the inflammatory response. The outcome of this has since been shown to actually contribute to chronic inflammation with progression to chronic disease states.

Today, fortunately, we now know that an independent active process of resolution is required to bring about recovery from the inflammatory process. And as inflammation is an underlying cause of chronic disease, we now also know that if left unaddressed, inflammation cannot resolve itself and progression of chronic disease may in fact be accelerated. Recent studies have revealed when patients are deficient in their ability to resolve inflammation, there is a progression in chronic disease states – this deficiency has been described in an increasing number of chronic disease states including obesity or metabolic syndrome, diabetes, cardiovascular diseases, mild cognitive impairment, compromised digestive function (IBS, IBD, SIBO etc), certain auto-immune conditions, Lyme Disease, chronic obstructive pulmonary disease, arthritis (rheumatoid and osteoarthritic), and a variety of other chronic conditions often complicated by chronic pain. Managing the resolution of inflammation can be supported by increasing the availability of specialized pro-resolving mediators (SPMs) through exogenous nutritional support. In so doing, the body's own levels of these active mediators can be increased and reversal of the chronic conditions can more effectively be managed.

As underlying inflammation is the basis of chronic disease, it is critical to evaluate how resolution of inflammation can be effectively addressed and how specific care regimen options differ both in use and outcome. Below are some general clinical insights important to consider when creating a care program for patients with chronic disease.

SPMs and Inflammation Resolution

Inflammation is an immune response to insults such as injuries (e.g., cuts and wounds), infections (e.g. bacterial, viral or fungal), or unhealthy dietary patterns. The ideal outcome of inflammation is resolution and a return to homeostasis. Although an inflammatory response is an essential, protective response, it can give rise to chronic inflammation if left unresolved.¹

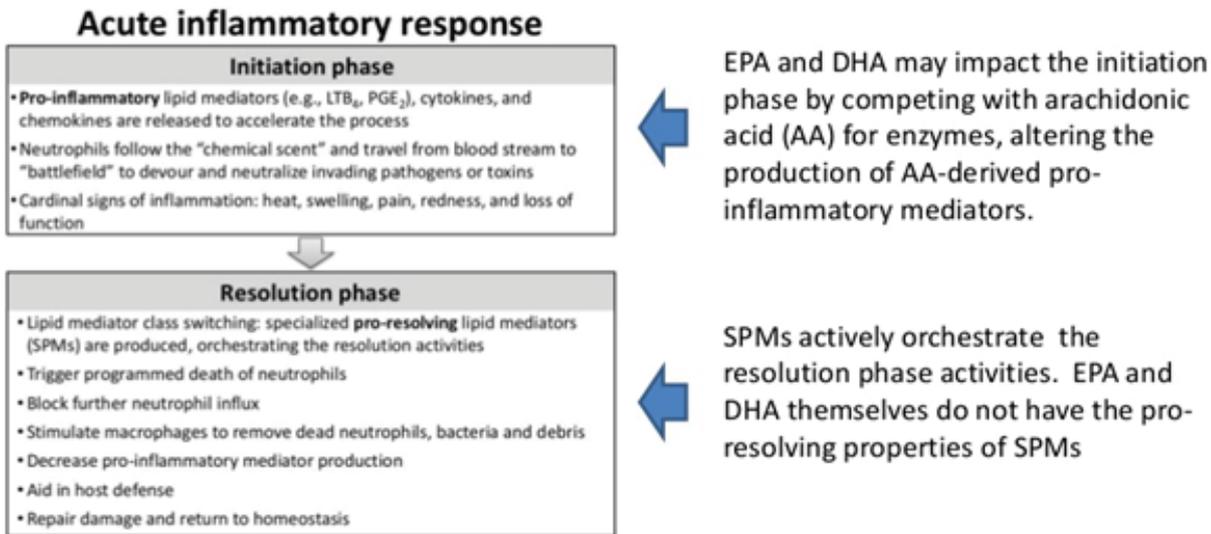
After an inflammatory response is in progress, specialized pro-resolving mediators (SPMs) are produced to actively orchestrate activities during the resolution phase to accelerate the return to homeostasis. SPMs are essential in resolution activities, shutting down inflammation, expediting the complete return to homeostasis, and promoting tissue repair.^{2,3}

SPMs Are Structurally Different from Omega-3 Fatty Acids

During the resolution phase of an inflammatory response, SPMs are biosynthesized (through multiple steps of enzymatic reactions) from long-chain polyunsaturated fatty acids and especially omega-3 fatty acids EPA and DHA.^{2,3} SPMs themselves are structurally different from omega-3 fatty acids.

SPMs are Functionally Different from EPA and DHA

EPA and DHA are important nutrients for health; EPA is especially good at lowering serum triglycerides.^{4,5} During the initiation phase of inflammation, potent pro-inflammatory mediators such as PGE2 and LTB4 are derived from arachidonic acid (AA). EPA and DHA themselves can affect the initiation phase by competing with AA for enzymes, leading to production of metabolites with lower biological potency than AA metabolites.⁶ EPA and DHA do not have the pro-resolving properties of SPMs.



SPMs (not EPA and DHA) Lead and Orchestrate the Resolution Phase of Inflammation

SPMs do not inhibit the initiation phase of inflammation. Rather, SPMs help facilitate the clearance of inflammatory components and thus resolve the inflammatory response. SPMs limit the further recruitment of neutrophils (immune cells) but stimulate the recruitment of pro-resolving macrophages that organize the clearance of inflammatory exudates containing microbes and dying neutrophils.³

To learn more about SPMs vs. fish oil, please view the link below:

Fish Oils vs SPMs: What's the Difference?

Selection of a Standardized and Active SPM Fraction from Selected Oil Sources

Prior to understanding the pro-resolving capability of an SPM supplement in clinical studies, selection of SPM supplements based on standardization of concentration and biological activity is important. The effective use of SPM supplements requires a standardization of key actives as well as availability of full resolving activity from the product. Specialized form of the oils differ from omega-3 oils, and are the only product forms demonstrated to have the standardized level and activity of SPMs needed to support the resolution of inflammation.

The selection of an active fraction of marine oil is critical, as not all fractions of marine oil show pro-resolving activity in pre-clinical models (Figure 1).

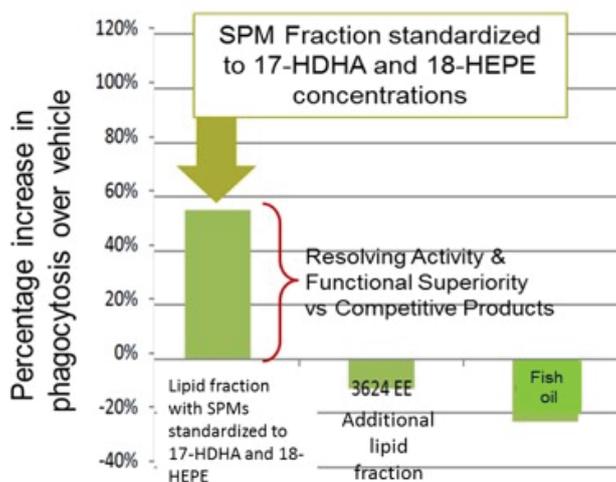


Figure 1: Choosing a fraction based on resolution activity: variability in phagocytic response of oils and oil fractions. In a pre-clinical model, the phagocytic response of immune cells (Thp-1 cells, a human monocyte cell line) was examined after treatment with various oil fractions and SPMs. Results are shown as increase in phagocytosis compared to control. Treatment with the SPM maresin-1, and separate treatment with an SPM-enriched fraction of fish oil standardized to 17-HDHA and 18-HEPE concentrations increased phagocytic activity. No increase in phagocytic activity was seen with direct fish oil treatment. The increase in phagocytosis activity is reflective of a key mechanism of SPM pro-resolving activity.

Direct SPMs Supplementation as a more Targeted Approach

When inflammation is not resolved and becomes chronic, it is understood that cellular responses leading to resolution have failed. In these situations, and when there are many pro-inflammatory mediators resulting in chronic inflammation, the production of SPMs leading to resolution is compromised and inefficient. Recent studies discovered that some health conditions lead to deficiencies of SPMs. For example, in the experimental setting of obesity, the formation of SPMs is severely deregulated, 7,8 and the enzyme that inactivates SPMs is markedly up-regulated.⁹ Although EPA and DHA are the substrates of SPMs, the biological effects of EPA and DHA are subject to multiple downstream metabolic checkpoints (e.g., receptors and enzymatic activities). Thus, researchers have suggested that direct supplementation of SPMs may represent a more targeted, effective approach than supplementing the parent omega-3 fatty acids, especially when chronic inflammation is already present.⁸

References

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