

# TOP Nutrition Newsletter

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### Role of biological modifiers regulating the immune response after trauma.

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Trauma induces a profound immunological dysfunction. This is characterised by an early state of hyperinflammation, followed by a phase of immunosuppression with increased susceptibility to infection and multiple organ failure. Therapeutic strategies directed at restoring immune homeostasis after traumatic injuries have largely failed in translation from "bench to bedside". The present review illustrates the role of biological modifiers of the posttraumatic immune response by portraying different modalities of therapeutic immune modulation. The emphasis is placed on anti-inflammatory (steroids) and immune-stimulatory (interferon) pharmacological strategies and modified resuscitative strategies, as well as more unconventional immunomodulatory approaches, such as immunonutrition.

### Immunomodulatory effects of probiotics in different stages of life.

*Br J Nutr. 2007 Oct;98 Suppl 1:S90-5*

The immunomodulatory properties of lactic acid bacteria (LAB) and foods containing them (e.g., fermented milks) is a topic currently under investigation. Individuals could potentially benefit from the inclusion of LAB in the diet at different times during the life cycle. One of the most accepted specific uses of probiotic bacteria is the prevention of atopic eczema in infants with family history of the disease who receive the probiotic bacteria early, through supplementation of the gestating mother and orally after birth. Immune enhancing effects have also been suggested to be beneficial in diarrhoea treatment, especially in children infected with rotavirus and in malnourished patients, infants and adolescents, whose capacity to produce IFN-gamma can be increased after LAB-containing yoghurt intake. Regarding young people and adults, investigations have been conducted exploring the immunomodulation by LAB in subjects under stressful situations, in the prevention of urinary tract infections in fertile women and in the treatment of allergy. However, the beneficial effects of probiotics in these conditions remain controversial and the scientific evidence provided so far is not considered to be conclusive. The elderly population has been the focus of investigations aimed at identifying the capacity of probiotics to counteract the immunosenescence process by increasing phagocytic and natural killer (NK) cell activities and to protect against infection. The mechanisms involved in the different effects attributed to LAB remain to be clarified. Moreover, considering that the immunomodulatory properties are strain-specific, defining the optimal dose of a certain bacteria or combination of bacteria strains and the duration of treatment for a desired effect in a target population group is essential in order to substantiate health claims.

### Significance of olive oil in the host immune resistance to infection.

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The effects exerted by polyunsaturated fatty acids (PUFA) on immune system functions have been investigated in recent years. These studies have reported the important role that n-3 PUFA play in the diminution of incidence and severity of inflammatory disorders. Nevertheless, less attention has been paid to the action of monounsaturated fatty acids (MUFA) upon the immune system. The administration of a diet containing a high amount of olive oil in experimental animals produces a suppression of lymphocyte proliferation, an inhibition of cytokine production and a reduction in natural killer (NK) cell activity. Despite these alterations in immune functions, it has been reported that olive oil-rich diets are not as immunosuppressive as fish oil diets. An important aspect in immunonutrition is focused on the relationship between fats, the immune system and host resistance to infection, particularly when these nutrients are supplied to patients at risk of sepsis. Different studies have determined that olive oil-rich diets do not impair the host resistance to infection. Therefore, olive oil constitutes a suitable fat that may be applied in clinical nutrition and administered to critically ill patients. In the present review, we summarize the current knowledge on olive oil and immune system functions, the biological

consequences derived from the administration of diets containing olive oil and the impact of olive oil on immune defence.

## **Immunonutrition in surgical and critically ill patients.**

*[Br J Nutr. 2007 Oct;98 Suppl 1:S133-9](#)*

Surgery, trauma, burns and injury induce an inflammatory response that can become excessive and damaging in some patients. This hyperinflammation can be followed by an immunosuppressed state which increases susceptibility to infection. The resulting septic syndromes are associated with significant morbidity and mortality. A range of nutrients are able to modulate inflammation (and the associated oxidative stress) and to maintain or improve immune function. These include several amino acids, antioxidant vitamins and minerals, long-chain n-3 fatty acids and nucleotides. Experimental studies support a role for each of these nutrients in surgical, injured or critically ill patients. There is good evidence that glutamine influences immune function in such patients and that this is associated with clinical improvement. Evidence is also mounting for the use of long-chain n-3 fatty acids in surgical and septic patients, but more evidence of clinical efficacy is required. Mixtures of antioxidant vitamins and minerals are also clinically effective, especially if they include selenium. Their action appears not to involve improved immune function, although an anti-inflammatory mode of action has not been ruled out. Enteral immunonutrient mixtures, usually including arginine, nucleotides and long-chain n-3 fatty acids, have been used widely in surgical and critically ill patients. Evidence of efficacy is good in surgical patients. However whether these same mixtures are beneficial, or should even be used, in critically ill patients remains controversial, since some studies show increased mortality with such mixtures. There is a view that this is due to a high arginine content driving nitric oxide production.

## **Lifestyle-related determinants of inflammation in adolescence.**

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Inflammatory processes are involved in the pathogenesis of the most common chronic non-communicable diseases and may also play an important initiating role in their development. Only recently have inflammatory markers been included in epidemiological studies focusing on nutritional status, body composition and physical activity. We are just starting to understand how different lifestyles can determine basal levels of inflammatory biomarkers in early ages. This review aims to summarise what is known about the relationships between lifestyle-related determinants (focusing on overweight, physical activity and dietary habits) and inflammatory markers in apparently healthy young populations. Obesity is the most widely studied determinant. Several large-scale studies have now demonstrated that healthy young subjects with more body fat or higher BMI have moderately higher concentrations of inflammatory markers than their leaner peers, supporting the idea that obesity should be considered as a state of chronic low-grade inflammation. Less data is available to allow us to elucidate how physical activity/fitness or dietary patterns may have a direct effect on inflammation in apparently healthy, disease-free young populations.

## **Moderate alcohol consumption and the immune system: a review.**

*[Br J Nutr. 2007 Oct;98 Suppl 1:S111-5](#)*

Increasing evidence suggests that light to moderate amounts of polyphenol-rich alcoholic beverages like wine or beer could have health benefits. Scientists have long debated the effects of alcohol on immune function, showing on the one hand, that high doses of alcohol consumption can directly suppress a wide range of immune responses, and that alcohol abuse is associated with an increased incidence of a number of infectious diseases. On the other hand, moderate alcohol consumption seems to have a beneficial impact on the immune system compared to alcohol abuse or abstinence. Therefore, the link between alcohol consumption, immune response, as well as infectious and inflammatory processes remains not completely understood. With this in mind, it is important to realise that other factors, unrelated or indirectly related to immune function, like drinking patterns, beverage type, amount of alcohol, or gender differences, will affect the influence that alcohol consumption may have on the immune system. This review summarises published data describing the effects that light to moderate amounts of polyphenol-rich beverages like wine or beer seem to have on immunity in healthy adults.

## Early enteral supplementation with key pharmaconutrients improves Sequential Organ Failure Assessment score in critically ill patients with sepsis: Outcome of a randomized, controlled, double-blind trial.

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**OBJECTIVE::** To assess the safety and efficacy of an early enteral pharmaconutrition supplement containing glutamine dipeptides, antioxidative vitamins and trace elements, and butyrate in critically ill, septic patients. **DESIGN::** A prospective, randomized, controlled, double-blind clinical trial. **SETTING::** Adult intensive care unit in a university hospital. **PATIENTS::** Fifty-five critically ill, septic patients requiring enteral feeding. **INTERVENTIONS::** Patients received either an enteral supplement (500 mL of Intestamin, Fresenius Kabi) containing conditionally essential nutrients or a control solution via the nasogastric route for up to 10 days. Inclusion occurred within 24 hrs of intensive care unit admission. Additionally, patients received enteral feeding with an immunonutrition formula (experimental group) or standard formula (control group) initiated within 48 hrs after enrollment. **MEASUREMENTS AND MAIN RESULTS::** Organ dysfunction was assessed by daily total Sequential Organ Failure Assessment (SOFA) score over the 10-day study period in both patient groups. Patients receiving the experimental supplement showed a significantly faster decline in the regression slopes of delta daily total SOFA score over time compared with control. The difference between the regression coefficients of the two slopes was significant irrespective of the level of analysis: intent to treat -0.32 vs. -0.14,  $p < .0001$ ; per protocol -0.34 vs. -0.14,  $p < .0001$ ; and completers (patients receiving  $\geq 80\%$  of the calculated caloric target over a period of 6 days), -0.26 vs. -0.16,  $p = .0005$ . Vitamin C, as a marker of supplement absorption, increased from 10.6 (1.9-159.4)  $\mu\text{mol/L}$  (normal range 20-50  $\mu\text{mol/L}$ ) on day 1 to 58.7 (5.4-189.9)  $\mu\text{mol/L}$  by day 3 ( $p = .002$ ) in the intervention group but remained below the normal range in the control group 17.0 (2.8-78.5) on day 1 and 14.3 (2.4-179.6) on day 3. Serum levels of glycine, serine, arginine, ornithine, vitamin E, and beta-carotene all increased significantly with treatment in the supplementation group. **CONCLUSIONS::** In medical patients with sepsis, early enteral pharmaconutrition with glutamine dipeptides, vitamin C and E, beta-carotene, selenium, zinc, and butyrate in combination with an immunonutrition formula results in significantly faster recovery of organ function compared with control.

## Clinical significance of perioperative immunonutrition for patients with esophageal cancer.

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**BACKGROUND:** We hypothesized that preoperative and/or postoperative enteral immune-enhanced formulas that are supplemented with arginine, omega-3 fatty acids, and RNA may reduce postoperative complications in patients undergoing esophagectomy for thoracic esophageal squamous cell carcinoma (ESCC). **METHODS:** Forty patients who underwent esophagectomy were divided into three groups: group A ( $n = 20$ ) received a control enteral diet (Erental) through the jejunostomy after surgery. group B ( $n = 6$ ) received an enteral diet supplemented with immune-enhancing substrates (Impact) containing arginine, omega-3 fatty acids, and RNA after surgery. group C ( $n = 14$ ) received the impact before and after surgery. **RESULTS:** Lymphocyte counts in group C on postoperative day (POD) 7 were somewhat higher than that in group A ( $p = 0.07$ ) and significantly higher than in group B ( $p = 0.03$ ). Furthermore the incidence of incisional wound infection in group C was significantly lower than that in group A ( $p = 0.03$ ). Moreover, the duration of postoperative systemic inflammatory response syndrome (SIRS) was significantly shorter in group C than in group A ( $p < 0.05$ ). **CONCLUSIONS:** This study reveals that the perioperative immune-enhanced formula may be superior to postoperative control enteral formulas in terms of reducing surgical wound infection and postoperative SIRS, which may result in serious postoperative complications for patients who have undergone esophagectomy.

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