

IN THIS EDITION

Healthy and balanced nutrition is essential to our health.

A clear relation has been demonstrated in third world countries between PEM (Protein Energy Malnutrition) and respiratory and gastrointestinal infections.

Yet, the current nutritional habits in Western countries very often violate the rules of balanced and varied nutrition.

Both a shortage and an excess of nutrients can affect health, in every age category. The results of this are not limited to only Western diseases. The optimum introduction of nutrients is also essential for the proper functioning of the immune system. Disruption of the immune system can lead to infections and other disorders.

Three periods in life require particular attention: babies, adolescents and the elderly. In addition to balanced nutrition, the right vitamin and trace-element supplements can help.



The Alpro Foundation is an independent non-profit organisation, supporting and promoting scientific research in the field of health and nutrition.

For more information:

T +32 (0)56 43 22 11, info@alprofoundation.org

NUTRITION AND IMMUNITY

FUNDAMENTAL FOR HUMAN SURVIVAL AND HEALTH

Prof. R.K. Chandra, Université Internationale des Sciences de la Santé, Crans-sur-Sierre, Switzerland.

For millenia, humans have recognized the importance of dietary intake and protection from infection. In modern terms, this has now been translated into the role of nutrition on immune responses.



It is recognized that both nutrient deficiencies and excess impair the function of immune system and makes the host vulnerable to

infectious disease and other disorders (1-3). This selective review highlights the established findings and provides a few practical recommendations.

Early epidemiologic studies in Asia, Africa and South America established the relationship between overt protein-energy malnutrition (PEM) and increased incidence and severity of common respiratory and gastrointestinal infections resulting in higher mortality among young children (4). PEM results in a reduction in cell-mediated immunity, fewer T lymphocytes, phagocyte dysfunction, reduced levels of complement proteins, and decreased production of interferons and interleukins. Similar findings have been noted in deficiency of individual nutrients such as zinc, iron, vitamins A, B6, folic acid, and E. For example, zinc deficiency results in impaired delayed hypersensitivity reactions, decreased neutrophil chemotaxis, and reduce

cytokine production. Iron deficiency decreases the ability of phagocytes to kill ingested bacteria and fungi; it also reduces natural killer (NK) cell activity. The data have been replicated in all age groups and in laboratory animals.

Common types of deficiencies are protein-energy malnutrition, reduced availability of trace elements (e.g. zinc, iron) and vitamins A, B6, folic acid and E.

The importance of nutrition for immunity has been demonstrated for all age groups but three periods of life need particular attention.

Low birth weight infants

In different parts of the world, the incidence of low birth weight defined as weight less than 2.5 kg for babies born after 37 weeks, varies from 7 to 41 percent (5). In addition to other physiologic handicaps, these infants are prone to infections. This may well be due to impaired immune responses. In many infants, problems with immunity may

last for several years, and this has also been documented in animal models of intrauterine malnutrition. The provision of extra amounts of zinc and/or iron improves immune responses but the best result is observed when all essential vitamins and trace elements are given as a supplement for the first 6-12 months of life. Such an intervention results in enhanced immune responses and reduced morbidity (6).

Adolescents

Another vulnerable population group are adolescents. In many countries, the prevalence of eating disorders such as anorexia nervosa and bulimia have reached epidemic proportions. In these individuals, evidence of nutritional deficiencies and of impaired immunity parallels what had been observed in young children with PEM (7). Iron deficiency is rampant among teenagers and affects several physiological systems including immunity, cognition, gastrointestinal function, scholastic performance, and temperature homeostasis (8). Once again, the provision of a suitable supplement containing optimum amounts of trace elements and vitamins is associated with heightened immune responses and reduced occurrence of infection. Improved cognitive function is an added benefit.

Elderly

There is renewed interest in the health of the elderly. This is principally due to two reasons. One, the proportion and absolute number of older persons is increasing in every country. In India and China, just 1 percent increase in this age group means an increase of 10 million individuals. Two, older persons are ill more often and illness lasts longer. For example, pneumonia is usually an easily treatable illness in the young, requiring about a week of antibiotic therapy. In the seniors, pneumonia requires more aggressive and longer therapy and could be fatal. It has now been shown that aging is associated with a variety of immunologic deficiencies (9). The response to common vaccines is diminished thereby decreasing the protective efficacy of immunization that is of immense public health importance. Based on surveys of the prevalence and severity of nutritional deficiencies and on dose-response curves to find out the optimum amount of each

vitamin and trace element, supplements have been devised and tested in randomized controlled trials (10). It has been shown that the provision of such a supplement containing modest amounts of all essential micro-nutrients is associated with enhanced immune responses and reduced occurrence of respiratory and other infections. Given the high cost of health care in most countries, this is a highly cost-effective preventive strategy. At the same time, recent data suggest that mega dose of nutrients carry significant side effects and are detrimental for the immune system, resulting in more frequent and more severe infection. In addition to benefits for the immune system, the provision of micro-nutrient supplements

is advantageous for cognitive functions and for prevention of osteoporosis and muscular degeneration.

In spite of good diet, nutrient deficiencies occur often in selected age groups who would benefit from an optimum supplement.

Other disorders

Besides these age groups, the role of nutrition in the maintenance and enhancement of immunity has been examined in a number of disease states (11), including human immunodeficiency virus (HIV) infection, cancer, inflammatory

IMMUNOLOGICAL RESEARCH IN ELDERLY SUBJECTS

Table. Immunological data in elderly subjects given a placebo or a micro-nutrient supplement.

Variable	Placebo	Supplement
T cells %		
CD3+	52.8	66.1
CD4+	42.1	48.9
NK cells %	9.3	12.7
NK cell activity	27	41
IL-2 (Units/ml)	3.6	12.8
Antibody response to influenza virus vaccine	2.1*	3.2*

Data are given for observations made after 12 months of use of placebo or supplement. Data are shown as means. All values between the two groups are statistically significantly different.

NK= Natural killer
*Log reciprocal

Ref.: Chandra R. K. - Lancet 1992; 340:1124-27.

bowel diseases such as Crohn's disease and ulcerative colitis, eating disorders and chronic infection. Recent work in populations with high prevalence of HIV has shown that the provision of good diet and of nutritional supplements improves the quality of life, decreases superadded infections and increases the length of survival. Also, such interventions reduce the mother-to-infant transmission of the viral infection. In inflammatory bowel disorders, nutritional supports increases general well being and reduces the need and dose of corticosteroid therapy. In tuberculosis, the provision of an appropriate micro-nutrient supplement accelerates the conversion of sputum-positivity for acid-fast Mycobacterium tuberculosis organisms to sputum-negative status. This is of enormous public health significance and would reduce the cost of national programs for control of tuberculosis.

Obesity and excess intake of nutrients

Obesity may also be considered a form of "malnutrition" and as in PEM, there are a number of changes in immune responses (12). These include reduced lymphocyte stimulation response and phagocyte dysfunction. The incidence of upper and lower respiratory infections is increased. In addition to obesity, an excess intake of several nutrients, including zinc, iron, vitamins A and E, is associated with reduced immune responses and increased morbidity due to infection, fractures and bleeding. Thus, moderation should be the key recommendation in nutritional advice.

Excess is equally harmful and megadoses of nutrients should be avoided.

Conclusion

In conclusion, nutrition is a critical determinant of immunity and of good health. In addition to a balanced diet, many age groups require and would benefit from the regular use of a micro-nutrient supplement that would be expected to enhanced immunity and reduce infection, thereby decreasing suffering and improving survival.

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RECENT PUBLICATIONS

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Metabolism 2002 Dec;51(12):1596-604

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Setchell KD
J Nutr 2002 Dec;132(12):3577-84

Blood pressure and vascular effects of soy: how strong is the evidence?

Sheila G. West
Current Topics in Neutraceutical Research 2003 Vol.1;N°1,pp.17-30

NEWS

Alpro Foundation Information session

The healthy heart - influence of bio-active components and exercise.

It is now well accepted that vegetable food and exercise protect against cardio-vascular diseases.

Scientists, media and nutritionists want to alter the unhealthy lifestyle and bad eating habits of the population starting early in life.

We invite you to view the current scientific insight into this topic and to conclude with a 'take home' message.

Date:
Thursday, 30th October 2003, 5 pm – 8 pm

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Lectures:
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Information and subscription:
www.alprofoundation.org

For more information:

Alpro Foundation VZW
Vlamingstraat 28
8560 Wevelgem
Belgium
T +32 (0)56 43 22 11
F +32 (0)56 43 22 06
info@alprofoundation.org

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