KIMUN®
activates the immune system

• during the natural aging process
• when under professional stress
• during reconvalescence
• when suffering from chronic recurrent infections
• for immune regeneration
  after administration of antibiotics
Recommended intake of KIMUN®

Take one capsule with some liquid a day, about one hour before a meal. In high-stress situations, take up to five capsules a day at intervals of every one to two hours. If you experience difficulty in swallowing, open up the capsule and swallow the contents with some liquid.

KIMUN® contains no lactose or yeast and is very well tolerated.

The micropellets ensure an unvarying optimal quality and bioavailability of the individual constituents and provide protection from the decomposing environment of gastric juices.
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What is immunosenescence?

Immunosenescence is the term for the age-dependent degradation of immunological competence. This syndrome includes both the capacity of the immune system to react to infections as well as the development of a long-term immunological memory, particularly with vaccinations.[1] This age-associated immunodeficiency is ubiquitous and occurs both in long-lived as well as short-lived species. Thus immunosenescence is relative to life expectancy.[2]

Immunosenescence is considered to be the most important factor for increased morbidity and mortality in old age. The term does not denote an arbitrary wear and tear phenomenon, but represents an evolutionary pattern that is repeated inversely. The majority of parameters changed by immunosenescence are therefore genetically controlled.[3]

In short, the age-dependent degradation of immunological competence is the result of the continual challenge caused by the unavoidable exposure to large numbers of diverse antigens such as viruses, bacteria or food intake.[4] Immunosenescence is hence the price paid for immunological memory. Together with the likewise age-dependent regression of the thymus, this results in the body having hardly any native T-cells available from which specific antibodies are formed. In old age, one is therefore significantly more vulnerable to a variety of infections as well as non-infectious disorders.
Fig. 1  Immunosenescence – symptoms

- Sleep issues
- Chronic tiredness
- Depression
- Nervousness
- Lack of concentration
- Loss of libido
- Premature aging
- Cardiovascular disorders
- Susceptibility of infections
- Impairment of performance
- Immune system
Old-age disorders

Disorders whose frequency dramatically increase with increasing age (Fig. 2) are designated as old-age disorders. These include atherosclerosis, cardiovascular disorders, cancer, arthritis, cataracts, osteoporosis, Type 2 diabetes, high blood pressure and Alzheimer’s. Old-age disorders are usually associated with increased cellular senescence.

With cellular senescence, the cell is in permanent cell cycle arrest. This is an essential mechanism to limit tumorigenesis and tissue damage. In healthy humans, senescent cells of the immune system are destroyed, whereby tumor suppression and wound healing are promoted. In old age senescent cells accumulate in the tissue because the aging immune system is no longer able to destroy them. The accumulation of senescent cells in the tissue promotes pathological changes and plays a role in old-age disorders.
Fig. 2  Impact of the immunosenescence on the frequency of disorders → old-age disorders

- Cancer
- Kidney disease
- Arthritis
- Heart disease
Immunosenescence reduces the effectiveness of vaccinations

Several studies have shown that vaccinating elderly people against influenza, hepatitis or pneumococci has a lower protective effect compared to younger people.[5] A reason for this is immunosenescence, which results in a reduced response of the immune system to new antigens. Particularly for the influenza vaccination, vaccination effectiveness is reduced from 70–90 % for below 65-year-olds to 50–60 % for those older.[6] Furthermore, despite an initial satisfactory rise for elderly people, the antibody titer often drops rapidly again.

A study showed that 24 weeks after the influenza vaccination, the antibody titer had fallen back to the starting level, and therefore there was no protection against influenza despite vaccination.[7]

Does the nutrient uptake change in old age?

The composition of the body changes in old age, and this directly influences nutrient uptake and the metabolism. Apart from influencing factors such as diet and exercise, factors that cannot be influenced also play a role.

A reason for the worsened acceptance of nutrients and micronutrients such as vitamins, minerals and trace elements in old age is due to age-specific changes of the gastrointestinal tract. For a third of elderly people, the degenerative mucous membrane of the stomach changes (atrophic gastritis). There are usually no clinical symptoms. The deficiency of gastric acidity, among other factors, leads to bacterial overgrowth of the gastrointestinal tract, which impairs the absorption of micronutrients.

The consequences of a lack of nutrients are often not apparent and remain unrecognized in the symptom complex of chronic disorders and the course of aging. It is therefore important to think about the challenge of nutritional deficiencies in old age well in advance, since a deficiency of nutrients may have consequences only years later, which then however are usually irreversible.
Bodily factors that cannot be influenced, but which do influence nutrition in old age

- Reduced max. oxygen supply
- Degeneration of neurons
- Loss of inner control mechanisms
- Impaired organ functions
- Atrophy of mucous membranes
- Reduced production and effect of hormones
- Max. capacity reserve
- Impaired organ functions
It has long been known that a deficiency of amino acids limits the immune function and increases one’s susceptibility for infections. Protein nutritional deficiencies reduce the concentration of most amino acids in the blood plasma. Numerous studies have shown that the supplementation of amino acids in the case of deficiencies, poor nutrition, and infections improves the immune status and thus reduces morbidity and mortality.\textsuperscript{[10]}
Impact of nutrient deficiencies

- Reduced defense against infections
- Concentration disorders, impaired memory
- Loss of strength, tiredness
- Depressive disorders, confusion
- Osteoporosis
- Changes in skin and mucous membranes
- Delayed wound healing
- Disturbed blood formation
Overview of the function of individual amino acids in the immune system

 Alanine  
• stimulates leucocyte metabolism

 Arginine  
• deficit in the event of protein nutritional deficiencies, fasts, trauma, burns, inflammation, sepsis and liver transplantations  
• improves the immune function  
• combats pathogenics  
• regulates cytokine production  
• mediator of autoimmune disorders  
• supplementation improves the immune response and increases the weight of the thymus

 Glutamate  
regulation of the immune response

 Glutamine  
• important energy substrate for cells of the immune system  
• necessary for the proliferation of lymphocytes  
• improves the bactericidal characteristics of neutrophils  
• supplementation improves the immune function

 Glycine  
• antioxidants, essential for the proliferation and antioxidative defense of lymphocytes  
• reduces inflammatory reactions  
• deficit leads to a restricted immune response

(Glycine)  
• supplementation acts anti-inflammatory, immune-modulating and cytoprotective

 Histidine  
• necessary for the production of histamine, the principal mediator of inflammatory reactions  
• deficit leads to a restricted immune response  
• supplementation acts as a booster for the immune system, particularly for the skin

 Lysine  
• deficit limits protein synthesis and lymphocyte proliferation, leads to a restricted immune response  
• successful when used to treat infections (e.g. Herpes simplex)

 Methionine  
• important for the synthesis of proteins of the immune system  
• supplementation improves the immune system

 Phenylalanine  
• regulates the NO-synthesis by leucocytes

 Serine  
• stimulates the proliferation of lymphocytes  
• improves antibody production

 Threonine  
• necessary for mucin synthesis, which maintains the intestinal immune function  
• stimulates lymphocyte proliferation  
• improves antibody production  
• supplementation increases the serum antibody titer

 Tryptophane  
• component of serotonin, melatonin and anthranilic acid  
• serotonin and melatonin improve immunity  
• progressive decrease of the tryptophane concentration during an inflammation, having a crucial impact on the function of macrophages and lymphocytes  
• deficit leads to a restricted immune response  
• supplementation improves phagocytosis by macrophages and the congenital immune response  
• supplementation increases the resistance against bacterial and parasitic infections

 Tyrosine  
• deficit leads to a restricted immune response. Regulates the immune response
Amino acids play an important role for the immune system. They influence various processes such as:

- Activation of macrophages
- Activation of natural killer cells
- Activation of T- and B- lymphocytes
- Production of zyototoxic substances
- Production of cytokines
- Production of antibodies
- Lymphocyte proliferation
- Gene expression
- Cellular redox status
- Production of antibodies

These processes are interconnected, highlighting the central role of amino acids in the immune system.
Selenium deficiency impairs the function of the immune system

Selenium is an essential trace element and potent antioxidant. Its manifold biological effects are based on the incorporation in selenium proteins. The large number of selenium proteins in the human body particularly plays a decisive role in the reduction of oxidative stress. Oxidative stress is triggered by reactive oxygen species (ROS). ROS plays an important role in inflammation and the immune response. The selenium supply therefore influences the functional capability of the immune system.

A selenium deficit leads to a weaker immune response to viruses, tumors and allergens

The expression “selenium is a booster of the immune system” is based on studies that have examined the effect of selenium on immunosenescence as well as its protection against various pathogens.[11]

These studies have shown that both the cell-mediated as well as the humoral immune response are improved by increasing selenium levels. A selenium deficit leads to a weaker immune response to viruses, tumors and allergens.[11]
Fig. 6  Impairment of the immune system in old age due to oxidative stress

Oxidative stress

Immune system

Selenium

Oxidative stress

Immune system
Selenium and immunosenescence

Already in 2000, a Spanish study revealed that almost all elderly people who were both healthy as well as well-fed showed a selenium deficit.[12] Since the selenium supply in Spain and Germany is comparable, it is assumed that selenium deficiency also concerns the majority of elderly people in Germany.

An additional study from 2006 demonstrated a significant connection between the selenium status and the mortality of elderly people.[13] Serum selenium values less than 110 µg/L increased the risk of death by 54% compared to a serum selenium concentration of 123 µg/L (Hazard Ratio 1.54, 95% CI 1.03–2.32; p < 0.05). The lower the selenium level in the blood, the greater the mortality risk for elderly people. This connection exists not only for selenium deficiency, hence a serum selenium value less than 80 µg/L, but already for selenium concentrations in the reference range, because the reference range for selenium in the serum is determined at 80–120 µg/L for Germany.

An intervention study from France with elderly people over 65 years (n = 725) investigated the effect of a daily intake of 100 µg selenium and 20 MG zinc on the immune system over two years.[14] In France as well, almost all participants showed a significant selenium deficit. After an influenza vaccination, the selenium/zinc supplemented group showed significantly higher antibody titer compared to the placebo group (p < 0.05). Also the number of participants without an infection of the respiratory tract was lower in the supplemented group during the study (p = 0.06).

A selenium protein protects against cellular senescence

Selenium is incorporated in a variety of selenoproteins. Apart from its function as an antioxidant, a study from 2014 showed that selenoprotein H protects against cellular senescence, above all against senescence triggered by enduring oxidative stress.[16] Selenoprotein H also degrades hydrogen peroxide, increases the quantity of glutathione in the cell and indirectly up-regulates other antioxidative proteins.

Interaction of various factors on the age-dependent reduction of immunological competence

Aside from immunosenescence, additional factors reduce immunological competence in old age. A worsened nutrient uptake in old age means fewer amino acids and micronutrients are taken up, which are important for the functioning of the immune system. The trace element selenium in the micronutrients must be especially emphasized. Germany as well as all of Europe are undersupplied with selenium. Selenium is essential for the immune system and protects against senescence. An additional reduction of the selenium intake in old age therefore has an especially negative impact on health.
The effect of selenium on the immune system [11, 15]

- Increases the number of T-cells
- Increases the migration ability of immune cells
- Increases the activity of the T-cell growth factor Interleukin-2
- Increases leukocyte function
- Increases anti-viral immunity
- Improves cytotoxicity provided by natural killer cells
- Reduces the concentration of pro-inflammatory cytokine Interleukin-6
- Reduces inflammation
- Increases anti-viral immunity
- Increases the number of T-cells


KIMUN® equalizes immunosenescence

KIMUN® is a nutritional food supplement consisting of a balanced composition containing amino acids harmonized with the immune system in combination with the trace element selenium. KIMUN® thus contributes to the compensation of progressive immunosenescence in old age and helps to support the natural resistance capability of the body.

The daily intake of KIMUN® is therefore recommended in old age, especially in stress situations such as:

- in convalescence
- in influenza periods
- at vaccinations
- with chronically recurring infections
- for immune regeneration after administration of antibiotics
- in the scope of complementary tumor therapy
Fig. 8
Impact of the age-dependent reduction of immunological competence

- Immunosenescence
- Selenium uptake
- Amino acid uptake
- Kidney failure
- Cancer
- Infections
- Arthritis
- Cardiovascular diseases

Age
KIMUN® – Nutritional food supplements with Selenium

KIMUN® is a nutritional food supplement with harmonized amino acids in combination with the trace element selenium in a balanced composition. The selenium contributes to the normal functioning of the immune system and supports the body’s natural defensive forces. The regular daily intake of KIMUN®, especially in stress situations, can therefore be highly recommended as a supporting nutritional measure.

<table>
<thead>
<tr>
<th>Composition of KIMUN®</th>
<th></th>
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<tbody>
<tr>
<td>Average content</td>
<td>Per capsule</td>
<td>Per 5 capsules</td>
</tr>
<tr>
<td>L-glutamic acid</td>
<td>65.0 MG</td>
<td>325.0 MG</td>
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<tr>
<td>L-aspartic acid</td>
<td>39.0 MG</td>
<td>195.0 MG</td>
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<tr>
<td>L-leucine</td>
<td>39.0 MG</td>
<td>195.0 MG</td>
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<tr>
<td>L-Valine</td>
<td>33.0 MG</td>
<td>165.0 MG</td>
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<tr>
<td>L-Lysine mono-HCl</td>
<td>31.2 MG</td>
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<tr>
<td>L-Arginine</td>
<td>30.0 MG</td>
<td>150.0 MG</td>
</tr>
<tr>
<td>L-Isoleucine</td>
<td>25.0 MG</td>
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<tr>
<td>Glycine</td>
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<tr>
<td>L-alanine</td>
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<tr>
<td>L-Threonine</td>
<td>19.5 MG</td>
<td>97.5 MG</td>
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<td>L-Serine</td>
<td>19.5 MG</td>
<td>97.5 MG</td>
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<tr>
<td>L-Proline</td>
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<td>97.5 MG</td>
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<tr>
<td>L-Phenylalanine</td>
<td>19.5 MG</td>
<td>97.5 MG</td>
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<tr>
<td>L-Methionine</td>
<td>7.8 MG</td>
<td>39.0 MG</td>
</tr>
<tr>
<td>L-Histidine mono-HCl</td>
<td>7.8 MG</td>
<td>39.0 MG</td>
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<tr>
<td>L-Cystine</td>
<td>3.9 MG</td>
<td>19.5 MG</td>
</tr>
<tr>
<td>L-Tyrosine</td>
<td>0.8 MG</td>
<td>4.0 MG</td>
</tr>
<tr>
<td>Selenium</td>
<td>30 µg (55%)*</td>
<td>150 µg (273%)*</td>
</tr>
</tbody>
</table>

* Reference quantities for the daily intake of vitamins and minerals – nutrient reference values (NRV)
Recommended intake of KIMUN®

Take one capsule with some liquid a day, about one hour before a meal. In high-stress situations, take up to five capsules a day at intervals of every one to two hours. If you experience difficulty in swallowing, open up the capsule and swallow the contents with some liquid.

KIMUN® contains no lactose or yeast and is very well tolerated.

The micropellets ensure an unvarying optimal quality and bioavailability of the individual constituents and provide protection from the decomposing environment of gastric juices.

**Ingredients:** 63.2% amino acid mixture (L-glutamic acid, L-aspartic acid, L-leucine, L-valine, L-lysine mono hydrochloride, L-arginine, L-isoleucine, Glycine, L-alanine, L-threonine, L-serine, L-proline, L-phenylalanine, L-methionine, L-histidine mono hydrochloride, L-cystine, L-tyrosine); glazing agent: hydroxypropyl methylcellulose, shellac; filling material: microcrystalline cellulose; sodium selenite-pentahydrate; colorants: E 101, E 131; separating agent: magnesium salts of the fatty acids.
Sources


Contact and information

Further information is available at:
www.kimun.de

Consumer information:
www.biosyn.de/produkte/nahrungsergaenzungsmittel/kimun

Please do not hesitate to get in touch with us for more information or feedback. We would also gladly send you information by post, upon request!
information@biosyn.de

Product samples

You can request a product sample from KIMUN®.
Please send your request per fax:
+49 (0) 711-575 32-99.

Newsletter

You can request our Online Newsletter by sending an email to:
information@biosyn.de

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