Protexil is a form of concentrated protease. The protease enzyme in Protexil is derived as an exogenous production from controlled fermentation of maltodextrins through the Aspergillus oryzae, which is then eliminated through a special purification process. Like all other enzymes derived from the fermented maltodextrins, this protease, as opposed to proteases derived from animal (pancreatin, trypsin, pepsin) or other vegetable sources (papain, bromelain) is active throughout the gastrointestinal tract, and reaches its peak activity at the typical human temperature (between 30° and 40° Celsius).

Undigested or only partially digested proteins enter the bloodstream and can cause inflammatory reactions, potentially leading to allergic and autoimmune diseases.

Solid evidence exists showing that the protease, if taken on an empty stomach, can reach the gut and can then be absorbed through the mucous intestinal membrane at a rate of about 40%1. Once absorbed into the bloodstream, they effectively perform various functions, anti-inflammatory, anti-edema, circulatory,2 analgesic, immuno-modulating and anti-tumor.3

### Composition

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protease</td>
<td>375,000 HUT / gram</td>
</tr>
<tr>
<td>Calcium citrate</td>
<td>57.5 mg / gram</td>
</tr>
</tbody>
</table>

### Indications:

Useful in the treatment of acute and chronic inflammatory states, osteo-arthritis, allergic syndromes, autoimmune diseases, post-surgery recovery, sport traumas. Helps to resolve edemas. Helpful in the treatment of degenerative pathologies and immune deficiency. It is also useful against cellulitis.

### Recommended dosage:

50 - 200 mg per dose (on an empty stomach).

### Toxicity:

All data report no risks of toxicity. As to interaction with drugs, the only one known is with anticoagulants, whose action it may increase, thus requiring medical supervision.

**Scientific evidences in the use of protease**

Once absorbed in the bloodstream, the proteases from Protexil® are bound to specific molecules, alpha 2-macroglobulines, which are thus modified into an activated form. Once activated, the alpha-2-M bind the main circulating immune complexes, that are responsible both for the activation of the immune response and for inflammatory and allergic reactions. In particular, the alpha-2-M bind the cytokines TNF-alpha (tumor necrosis factor alpha) and TGF-beta (transformative growth factor beta), modulating their activity in a selective way. Thus, while on the one hand the activated alpha-2-M stimulate the production of TNF-alpha when there is a need for it (for instance, in the presence of tumors), on the other hand they contribute to a more rapid elimination of TNF-alpha on the part of macrophages, hepatocytes and fibroblasts when the excess of TNF-alpha circulating in the body generates inflammatory reactions. This action of the alpha-2-M, initiated by the proteases, is particularly relevant in relation to allergic and autoimmune pathologies, such as lupus, multiple sclerosis, rheumatoid arthritis, ulcerative colitis, and Crohn disease.6
The TGF-beta, which act instead by promoting the vascularization and regeneration of tissues, are conducted more quickly by the protease-activated alpha-2-M to the inflamed area or where there is a need for an immune response. Various studies, as well as a long clinical practice, have shown the powerful anti-inflammatory, anti-edema and analgesic action of proteolytic enzymes, which have proven to be more effective in the middle-long period than non-steroidal anti-inflammatory drugs, and without any of the serious side effects of the latter.\textsuperscript{10}

Thanks to its anti-inflammatory, immune-modulating and analgesic properties, as well as to its activity of vascularization and oxygenation of tissues, the use of vegetable protease for the reduction of recovery time from sport and osteo-muscular traumas, as well as from surgical operations, has a consolidated history.\textsuperscript{11}

Proteolytic enzymes perform further important anti-viral and anti-tumor functions. Both viruses and cancer cells are covered by a protein coating that protects them from the attacks of our immune system. Once absorbed and circulating, the protease decomposes such protein coating and this, besides making viruses and cancer cells more vulnerable, generates on the side some antigens that stimulate the activity of the immune system.\textsuperscript{12} The protease has proven to be active in that way towards many types of viruses, including the herpes zoster.\textsuperscript{13}

Finally, the protease, being a fibrinolytic enzyme, prevents the formation of blood clots, that it also helps dissolve.\textsuperscript{14}

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\textsuperscript{3} Desser L., Rehberger A., Oncology, 1990; 47: 474. Larryck J.W., Therapeutic Enzymes for Cancer, Biological Response Modifiers Symposium, Tulsa, Oklahoma, October 1992;
\textsuperscript{4} Chichoke A., Enzymes and Enzyme Therapy, New Canaan, 1994, p.191.
\textsuperscript{5} Steffen C., Menzel J., Weiner klinischen Wochenschrift, 1985; 97:8, 474.
\textsuperscript{10} Glenk W., Neu S., Enzyme Baustine des Leben Wie Sir Wirken Helfen und Heilen, 1990; Munchen, Wilhelm Verlag.
\textsuperscript{12} Wolf M., Ransberger K., Enzyme Therapy, Los Angeles, 1972, 156-166.
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