**Undenatured Whey Protein Isolate**

A patented, multi-step ultrafiltration process is used to concentrate the whey protein, glycomacropeptides (GMPs) and bioactive immunoglobulins from pure New Zealand milk. The whey is processed at controlled temperatures and pH, to prevent the protein from denaturing. The immunoglobulin concentration is consistent from batch to batch due to the standardised process by which it is derived. The final product is supplied in powder form, as opposed to a premixed liquid, to stabilise the nutrients and the potency of the protein without using preservatives.

**Nutritional Analysis:**

<table>
<thead>
<tr>
<th>Protein (90%)</th>
<th>Protease peptones (Lactoferrin, Lactoperoxidase)</th>
</tr>
</thead>
<tbody>
<tr>
<td>β-Lactoglobulin</td>
<td>48%</td>
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<tr>
<td>α-Lactalbumin</td>
<td>12%</td>
</tr>
<tr>
<td>Glycomacropeptides (GMPs)</td>
<td>15%</td>
</tr>
<tr>
<td>Immunoglobulins</td>
<td>8%</td>
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</tbody>
</table>

**Directions:** mix 1 scoop (12.4 g) into food or water as prescribed

**Clinical Applications**

As a high quality, high strength protein supplement
- Ketogenic Fat Loss System
- Body builders
- Athletes
- Cachexia: cancer, AIDS, etc.
- Pregnancy, lactation
- Convalescence
- Fasting
- Liver function defects: as indicated by the *Functional Liver Detoxification Profile* pathology test
- Intestinal permeability: as indicated by the *Lactulose/Mannitol* pathology test
- Allergic conditions: Anaesthetics, Asthma, Eczema, Psoriasis, Sinusitis, Rhinitis
- Autoimmune disorders: Rheumatoid arthritis, Ankylosing spondylitis, Multiple sclerosis, Systemic lupus erythematosus, Scleroderma, Graves disease, Hashimoto's thyroiditis, Raynaud's Phenomenon
- Toxicity: Heavy metal exposure, Pesticide/chemical exposure, Prolonged drug use

**Whey Protein**

Passive immunisation through food is unique to mammals, who all receive it through the first mother's milk - the colostrum - immediately after birth. As young mammals are born
without immunity, this is an essential survival adaptation. Colostrum contains immunoglobulins (Igs), otherwise known as antibodies. These are active, large molecular weight proteins that are both immunostimulatory and immunosuppressive\(^1\). They increase host defenses against bacteria, viruses and parasites, and also reduce inflammation and allergic responses.

Like the newborn, certain patients are unable to make sufficient immunoglobulins, and can benefit from a dietary means of enhancing immunity. A bioactive, pure whey protein concentrate with naturally occurring high levels of colostrum antibodies and GMPs is the answer. These constituents promote immunity, and particularly a healthy, efficient intestinal function. This in turn helps the body utilise the whey protein to help maintain overall health, and increase lean body mass (the premier “biomarker of aging”).

A protein’s ‘Biological Value’ (BV) is an index of its capacity to be absorbed, metabolised and retained as useful nitrogen in the body. Whey lactalbumin has the highest biological value of any protein food source (104 out of a theoretical maximum of 100 - see Table 1). It is the ideal protein supplement for protecting against lean muscle loss during the Ketogenic Fat Loss System.

**Table 1: Biological Values of common protein foods**

<table>
<thead>
<tr>
<th>Protein</th>
<th>Biological Value</th>
</tr>
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<tbody>
<tr>
<td>Whey lactalbumin</td>
<td>104</td>
</tr>
<tr>
<td>Egg</td>
<td>100</td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>91</td>
</tr>
<tr>
<td>Beef</td>
<td>80</td>
</tr>
<tr>
<td>Fish</td>
<td>79</td>
</tr>
<tr>
<td>Casein</td>
<td>77</td>
</tr>
<tr>
<td>Soy</td>
<td>74</td>
</tr>
<tr>
<td>Potato</td>
<td>71</td>
</tr>
<tr>
<td>Rice</td>
<td>59</td>
</tr>
<tr>
<td>Wheat</td>
<td>54</td>
</tr>
<tr>
<td>Beans</td>
<td>49</td>
</tr>
</tbody>
</table>

*Undenatured Whey Protein Isolate* contains 8% active **colostrum antibodies** that may aid in the correction of gut dysbiosis due to overgrowth of unfriendly bacteria and yeasts. Cow’s milk antibodies are highly resistant to peptic digestion\(^2\) - a desirable characteristic for a therapeutic food - but the structure of these antibodies is essentially the same as that of other mammalian species, including man.

Whey protein contains immunoglobulins IgG\(_1\), IgG\(_2\), IgM, and IgA. IgM is an early responder to antigenic challenge, specific to bacteria and viruses. In contrast, both IgGs attack viruses and other antigens *after* IgM. IgA blocks bacterial adherence, and is pivotal in viral defense.

In conditions of gastrointestinal dysfunction, the benefit of the passive provision of these antibodies becomes apparent. The intestinal epithelium, the interface between the internal body and the outside world, is an excellent barrier to most chemicals, but a poor physical barrier to penetration by foreign organisms. The body has both non-immunologic defenses, such as gastric acid and digestive enzymes, and immune defenses, known as the gut-associated lymphoid tissue (GALT). The GALT has both cell-mediated and humoral defenses. It produces antibodies that bind with antigens and prevent their adherence to the gut wall and subsequent penetration.
The amino acid profile of whey is ideal for the promotion of tissue repair in general, and mucosal repair in particular. Table 2 shows the amino acid profile compared to other high-quality proteins. Two sets of three amino acids are of particular interest nutritionally. Cysteine, glutamate and glycine combine to make glutathione (chemically $\gamma$-glutamyl-cysteinyl-glycine; while leucine, isoleucine and valine constitute the branched chain amino acids (BCAAs).

**Glutathione** is found in all mammalian cells, and provides the principal intracellular defense against oxidation stresses such as superoxide anions, lipid peroxidases, and iron-generated hydroxyl radicals. It is abundant in the cytoplasm, nuclei, and mitochondria, and is the major soluble antioxidant in these fractions. It can thus detoxify both soluble and lipid peroxidases. *Undenatured* whey protein has been shown to be superior to denatured lactalbumin (e.g. exposed to heat, acid/alkali washes during processing) in the production of glutathione for intracellular antioxidant protection and detoxification.

Levels of glutathione decrease with suboptimal nutrition, particularly of protein, and with exercise. It is also depleted by oxidative stress, for instance from infection, trauma, or major surgery. Giving cysteine alone does not increase glutathione, because it is rapidly metabolised (and toxic)\(^3\). However, dietary administration of $\gamma$-glutamyl-cysteine will increase glutathione. Whey contains substantial amounts of this dipeptide. The glutamyl-cysteine groups are located primarily in bovine serum albumin, $\beta$-lactoglobulin, and immunoglobulin G\(_1\). It is rarely found in other protein sources or plants, except raw egg whites, which are not commonly consumed.

**BCAAs** are primarily an excellent source of energy for skeletal muscle. As such, they improve athletic performance\(^4\), stamina and endurance\(^5\). When used in conjunction with isoton exercise (e.g. weight lifting) supplementation with BCAAs can prevent muscle catabolism, facilitate muscle growth, and increase muscle strength\(^6,7\), and are thus an excellent supplement for body builders. In combination with a low-calorie diet, they can facilitate weight loss in obese people\(^8\). BCAAs have been speculated to help prevent hypertension, through beneficial effects on cardiac muscle, and may help to prevent and reverse cachexia\(^9\).

*Undenatured Whey Protein Isolate* contains 15% **Glycomacropeptides** (GMPs), which stimulate cholecystokinin (CCK) and improve protein absorption and satiety. By promoting satiety, these proteins confer a feeling of fullness and reduce appetite, which is very beneficial during weight loss programs. The oligosaccharide moiety of these peptides confer an action similar to glyconutrients in the inhibition of pathogen adherence to the gut wall. GMPs are thought to reduce the risk of infection from viruses and bacteria, including influenza, Salmonella, cholera and E. coli.

This specially processed whey also contains other proteins that enhance immune function, including lactoferrin, alpha-lactalbumin and bovine serum albumin. **Lactoferrin** binds to iron, both enhancing its absorption, and denying it to pathogenic intestinal bacteria like...
E. coli\textsuperscript{10}. It may also modulate immune function\textsuperscript{11}. **Alpha-lactalbumin** is a subunit of the enzyme lactose synthetase, which catalyses the addition of galactose to glucose to produce lactose. Its capacity to bind calcium may aid milk digestion and calcium absorption in infants. **Beta-lactoglobulin** is involved with phosphorus metabolism in the mammary gland, transfer of passive immunity, and binding of retinol and fatty acids, allowing the efficient uptake of fats by cells\textsuperscript{12}. **Bovine serum albumin** also binds fatty acids, while stimulating pregastric lipases, which aids digestion in newborns.

**REFERENCES**

\textsuperscript{1} Xanthou M. Immune protection of human milk. Biol neonate 1998;74:121-133.
\textsuperscript{6} Brainum J. Branched chain amino acids: New study shows BCAAs taken before and after training increase strength and lean mass. All Natural Muscular Development. 35(8):149, 1998.
\textsuperscript{7} Millward DJ, et al. The need for indispensable amino acids: The concept of the anabolic drive. Diabetes Metab Rev. 5:191-211, 1989.