

The Potential Benefits on Human Health from Colostrum Enhanced with Proline-Rich Polypeptides (PRP)

BioPharma Scientific



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Colostrum: Nature's Super Zoonutrient!

- Just as certain fruits and vegetables are naturally rich in special health promoting chemicals called *phyto-nutrients*, certain animal sourced foods are rich in special health promoting chemicals called *zoo-nutrients* (pronounced zoo' -o-nutrients). The richest of all zoonutrients is the first food of all mammals, called *colostrum*.

Colostrum: Nature's Super Zoonutrient! (cont.)

- This “first meal” for all mammals is
 1. rich in cell signaling messengers that both support the immune system and rapid growth,
 2. while supplying a super-rich source of nutrition.

Colostrum: Nature's Super Zoonutrient! (cont.)

- Nature's "first food" for mammalian neonates
- Nature's original "functional food", a *zoonutrient* rich "pre-milk" providing nutrients, growth factors, immune factors, which are cell signaling and information carrying-peptides
- Therefore colostrum provides a nutrient dense super food while also passively transferring growth and immune factors and immune system modulating peptides.

What are the main components in Colostrum ?

- Nutritional Components
- Growth Factors
- Immune Factors
- Other Health Related Components
- Proline-Rich Polypeptides (PRPs)

Nutritional – Vitamins

- Thiamin (Vitamin B1)
- Riboflavin (Vitamin B2)
- Pantothenic Acid (B5)
- Pyroxidine (Vitamin B6)
- Folic Acid (B9)
- Vitamin B12
- Vitamin E
- Vitamin A (from beta-carotene)
- Retinoic Acid
- Vitamin C

Nutritional – Minerals

- Calcium
- Chromium
- Iron
- Magnesium
- Phosphorus
- Potassium
- Sodium
- Zinc

Nutritional - Fats

- Milk Fat
 - Provides essential fatty acids for cell development and acts as an energy source. Colostrum's milk fat profile is similar to that of "spring milk" in that it contains a higher percentage of unsaturated fatty acids.
- Milk Fat Globule Membrane (liposomes)
 - Contains compounds, such as sphingomyelin, cephalin, phos. choline and phos. serine that assist in development of the mucosal barrier, liver function, brain function, and immune function

Nutritional - Carbohydrates

- Lacto-oligosaccharides
 - promote the growth of good bacteria in the intestine.
- Sialyl-oligosaccharides and sialyl-glycoconjugates
 - have an immune function in the intestine,
 - are involved in brain and nerve development,
 - and in cell to cell recognition

Growth Factors

- Growth factors help signal *growth, repair and regeneration* of tissue.
- For example, colostrum is known in the cosmetic industry as a natural source of Epithelial Growth Factor, which is thought to enhance the regeneration of skin and maintenance of skin elasticity.
- Similarly, colostrum is believed to enhance the regeneration of stomach and gut cells, and reduce the intestinal permeability to bacteria and viruses associated with *leaky gut syndrome*.

Growth Factor Peptides

- Growth hormone (GH)
- Insulin type growth factor (IGF-1)
- Insulin type growth factor (IGF-2)
- Transforming growth factor (TGF-alpha)
- Transforming growth factor (TGF-beta)
- Epidermal-GF
- Fibroblast-GF
- Platelet-derived-GF

Passive Immunity Factors – Ig Antibodies

- Immunoglobulin type G (IgG1)
- Immunoglobulin type G (IgG2)
- Immunoglobulin type A (IgA)
- Immunoglobulin type M (IgM)
- Immunoglobulin type D (IgD)
- Immunoglobulin type E (IgE)
- secretory IgA
- IgA specific helper

Bio-Active Immune Modulators: Proline-Rich Polypeptides

- PRPs are short chains of amino acids, called polypeptides, with a molecular weight of 500-5000 Da, with a high concentration of the amino acid proline.
- PRPs are also known as info-peptides, info-proteins, cytokine precursors, or immune-modulators.
- They support the regulation of the thymus, the gland responsible for the normal development of immunologic function in the body.
- They are generally characterized by PRP1 thru PRP5, with PRP2 and PRP3 most active.

PRP % Concentration in colostrum

- The concentration of PRPs in whole colostrum powder is between 1-3% of the total powder weight.
- BioPharma's whole colostrum contains 5-6 % PRPs!
- Most manufacturers of colostrum powders remove the PRP fraction, lactose, minerals and water, using ultrafiltration technology, to elevate the protein content of the powder.
- This then reduced the immune balancing effectiveness of the colostrum powder.

What are PRPs functions?

- To provide anti-viral, anti-allergy, and anti-inflammatory functions, especially by:
- stimulating T helper lymphocytes type 1 (TH1) responses and lowering T helper lymphocytes type 2 in TH2 dominated conditions.
- promoting proper response to microbial invaders, toxins, or allergens through immune and cytokine modulation, and Natural Killer Cell (NK) Activity.

TH1 helper/TH2 helper paradigm

- T helper lymphocytes develop along two lines of cell populations, TH1 and TH2.
- TH1 cells, which modulate cell-mediated immunity, produce the cytokines: IL-2, IFN-gamma, and TNF-alpha.
- TH2 cells, which modulate humoral immunity, or antibody production, produce IL-4, IL-5, IL-6, IL-10, and IL-13
- PRPs tend to stimulate TH1 and lower TH2 if these are in imbalance; i.e., PRP modulate TH1/TH2.
- This is known as the “TH2 to TH1 shift”.

T helper lymphocytes Type 1 (TH1)

- TH1 helper responses are important in defense against viruses, fungi, parasites, cancer, and intracellular organisms.
- Cell-mediated immunity can be tested by delayed hypersensitivity skin testing, response to non-specific or specific mitogens, and alloantigens.

T helper lymphocytes Type 2 (TH2)

- If one has a TH2-dominated condition, with decreased *cellular* immunity and heightened *humoral* immunity, the conditions that tend to prevail are:
- allergies, chronic sinusitis, atopic eczema, asthma;
- systemic autoimmune conditions such as SLE and mercury-induced autoimmunity, vaccination-induced reactions
- malaria, parasite infestations, chronic giardiasis and candidiasis, viral infections, hepatitis C, AIDS
- Certain cases of autism, hyper-insulinism, hyper-cortisolism, cancer, ulcerative colitis

PRPs Stimulate Natural Killer T-Cell Activity

- NK cells, large lymphocytes that circulate in plasma, comprise of 10-15% of the lymphocytes in human blood.
- Of all the immune system's soldiers, NK cells are the most aggressive.
- NK Cells provide the front line of defense and as such are specially equipped to locate and kill diseased cells.
- NK cells attach to the surfaces of foreign substances, and inject a chemical “grenade” (granule) into the interior.
- They are your first line of defense against mutant and virus infected cells like Severe Acute Respiratory Syndrome (SARS) or Bird Flu Virus.

How do NK cell destroy infected cells?

- NK cells do not kill indiscriminately. They look for a banner flown by normal cells. If the NK cell sees this banner, it receives a signal to spare that cell. This signal overrides the NK cell's urge to kill. If this banner is absent on the target cell the NK cell proceeds with its attack. It attaches to the target and releases a lethal burst of chemicals that penetrate the cell wall. Fluids begin to leak in and out and eventually the cell explodes.

Some Common Cytokines Influenced by PRPs

- Cytokines are any of several regulatory proteins, such as the *interleukins* and *interferon*, that are released by cells of the immune system and act as intercellular mediators in the generation of an immune response.
- Some common cytokines influenced by PRPs are:
- Interleukins type-1, 4, 5, 6, 10, 13,14
- Beta-interferon (IFN-beta)
- Interferon-gamma
- Interferon-alpha (TFN-alpha)

PRP Biochemical Mechanisms

- PRP2 stimulates the production of **antiviral cytokines** like beta and gamma interferon*, interleukins-1,6,and lymphokines.
- PRP3:
- stimulate the production of interferon alpha, a cytokine that **modulates immunity**,
- promote interleukin-10 which is strongly **anti-inflammatory**, especially in arthritic joints,
- and other interleukins that:
 - regulate the duration and intensity of the immune response
 - are responsible for cell to cell communication,
 - boost T-cell activity and the production of immunoglobulins

*(-Inglot, A.D. et at., Arch Immunol Ther Exp (Wasz), 1996, 44(4):215-224)

Other Health Related Components

- **Lactoperoxidase-thiocyanate**
 - has anti-microbial properties.
- **Lactoferrin**
 - regulates iron adsorption, which is 20 times more concentrated in colostrum than milk, 4g/l, equal to 1.0% in whole colostrum powder.
- **Transferrin**
 - binds and transports iron.
- **Lysozome**
 - is a hydrolyzing agent and immune system booster capable of destroying bacteria and viruses on contact.

Other Health Related Components, cont.

- **Leukocytes**
 - stimulate the production of interferon, which slows viral reproduction, and penetration of cell walls.
- **Lymphokines**
 - along with Interleukin-1,6, Gamma, Beta, are thought to be highly effective antiviral immune substances.
- **Interleukins**
 - regulate the duration and intensity of the immune response, boosting T Cell activity and the production of immunoglobins, and are responsible for immune system cell to cell communication.

Other Health Related Components, cont.

- **Xanthine Oxidase**
 - oxidizes bacteria through their ability to release hydrogen peroxide
- **Glycoproteins**
 - trypsin and protease enzyme inhibitors that prevent the destruction of immune and growth factors from digestion and may have use in the protecting gastric erosions.
- **Lactalbumin**
 - raises brain serotonin levels, which may improve mood under stress.

Fortifying Colostrum with Nano-Encapsulated PRPs

- PRP' s can be extracted from colostrum using ion exchange and nano-membranes.
- However, normally these can only be taken sublingually, because they are no longer protected by glycoprotein enzyme inhibitors.
- BioPharma nano-encapsulates these extracted PRPs in its patented **NanoSorb™** liposomal technology, thus protecting them from gastric PH and enzymes.
- These are added back to the already highest quantity / quality PRP colostrum to create the very highest PRP colostrum available.

BioPharma's Unique PRP Enriched Colostrum

- BioPharma PRP enriched colostrum is unique in that we only use:
- whole colostrum, extra rich in PRPs, from pasture feed cows that are antibiotic, growth hormone, steroid and pesticide free;
- taken from the first two milkings,
- in the first 24 hours.
- But we do not prevent the newborn calf from getting its colostrum!

References for the Health Benefits of Colostrum*

- AIDS, Allergies, Alzheimer's, anti-aging, asthma, anti-inflammatory, antioxidant, athletic performance, autoimmune disease, bacterial infections, cancer defense, diabetes, heart disease, leaky gut syndrome, Lupus, MS, RA, Sjogren's Syndrome, skin health, viral conditions, wound healing.
- Go to:
 - <http://www.biopharmasci.com/hp/snp/science.asp>
 - *These statements have not been evaluated by the U.S. Food and Drug Administration.
 - *This product is not intended to diagnose, treat, or prevent disease.