

**SCIENTIFIC
AND
MEDICAL
RESEARCH**

RELATED TO

BOVINE COLOSTRUM

**ITS RELATIONSHIP AND USE
IN THE TREATMENT
OF
DISEASE
IN HUMANS**

**SELECTED
PUBLISHED ABSTRACTS**

Legend:

**Human studies with bovine colostrum.
Studies directly related to bovine colostrum.**

1950-1998

REVISED: March 1, 1999

IMMUNE FACTORS: RESEARCH RELATED TO

Sabin, Albert B. et.al. 1962, *Pediatrics*, 29, pp. 105-115. "Antipoliomyelitic activity of human and bovine Colostrum and milk": **Dr. Sabin isolated antipolio antibodies in bovine colostrum. (Bovine colostrum was used in oral administration successfully. Antibodies were isolated and a successful vaccine prepared.)**

Ebina, et.al. 1983 *The Lancet*, Vol. 29 No 2 pp. 1029-1030: "Prevention of Rotavirus Infection By Cow Colostrum Containing Antibody Against Human Rotavirus": **Japanese researchers exposed cattle to oral doses of rotavirus which causes severe diarrhea and bowel inflammation in humans. Colostrum from these cows contained antibodies which, when fed to humans, prevented them from getting rotavirus.**

Tacket, Binion, Bostwick, et.al., *American Jou of Trop Med Hyg*, Sep 1992 V47(3) p276-83: Efficacy of bovine immunoglobulin concentrate in preventing illness: "Human trial with hyper immune immunoglobulin administered orally with sodium bicarbonate. **Conclusion: Orally administered bovine immunoglobulin protects against shigellosis and may be useful in preventing shigellosis among travelers**".

Hernell, Olle At the University of Ulmea, Sweden 1995, *Science*, Apr. pp231 **reported findings that glycoproteins in bovine colostrum inhibited attachment of the Helicobacter Pylori bacteria believed to cause stomach ulcers, and that colostrum contains significant amounts of interlukin-10, a strong inflammation inhibitory agent significant in reducing inflammation in arthritic joints and injury areas.**

Zhang, Iguchi, Mochizuki, et. al, 1990, *Pro Soc. Exp. Biol. Med.* Jul.; 194(3): 270-3. **Gonadotropin-releasing hormone (GnRH) and it's associated peptide (GAP) found in bovine colostrum Important role in the release of Cytokines (Immune messengers used to elevate immune activity, they also serve both ANTIVIRAL AND ANTITUMOR functions).**

Watson, Fransis, Ballard, 1992, *Journal of Dairy Research* Aug. 59(3): 369-80 "Bovine Colostrum cell-growth factors as well as immunomodulatory factors are able to regulate IgE response in heterologous species. **"Immune regulatory factors are transferable to human and other species.**

Li-Chan, E.: et al. *Food Research International*, vol 28, no 1, 9-16, 1995. Stability of bovine immunoglobulins to thermal treatment and processing. **Normal dairy processing does not harm Active Immune factors.**

Wilson, D.C., N.D., Ph.D., James, 1998, *Journal of Longevity*, Vol. 4, No. 2. Immune System Breakthrough: Colostrum. **"The most effective colostrum is bovine. It's much richer in immune factors than human colostrum, particularly in the body's most important immunoglobulin, IgG (Sandholm, 1979)." "Bovine colostrum can supply an overtaxed body with more immunoglobulins than human colostrum." "...Research at State Univ. of NY, Buffalo has shown that colostrum provides 'specific antibody reactivity' to certain bacteria, viruses and yeast responsible for conditions that affect the lungs, gastrointestinal tract, bones, and blood (Oraga, 1983)." "IGF-1 has...anabolic, and tissue repair characteristics...IGF-1 is the only growth factor that can stimulate muscle growth and repair all by itself. Its role in differentiation, repair, synthesis, and interplay with other necessary growth factors, results in regenerative effects on nearly all structural cells of the body (Tollefsen, 1989)." "COLOSTRUM HAS BEEN SHOWN CONCLUSIVELY TO HAVE A SYSTEMIC EFFECT ON THE IMMUNE SYSTEM."**

Xu, Mardell et. al., *Innumology* 1995 vol 85 p 394-9: Expression of functional IgF-1 receptor on lymphoid cells: **"Our studies suggest that biological activities of IGF-1 include direct stimulation of immune cells and that expression of IGF-1 receptor may have a role in the regulation of T-cell function."**

Watson, Dennis L., et al. 1990, *Journal of Dairy Research*, 59, 369-380, Factors in ruminant colostrum that influence cell growth and murine IgE antibody responses. **“We conclude that bovine colostrum contains cell-growth factors as well as immunodulatory factors that are able to regulate the IgE response in a heterologous species.”**

Sabin, Albert B. 1950, *Journal of Diseases of Children*, 80 p.866 “Antipoliomyelitic Substance in milk from Human Beings and Certain Cows”: As early as 1950 Dr. Albert Sabin, a discoverer of polio vaccine, reported an antipolio substance in the milk of cows, despite the fact that cows do not get poliomyelitis.

Samson, R.R. et. al., *Immunology*, 1975, Vol 38, No 2, 291-296. Dr. Samson and associates found colostrum was 21 times richer in Vitamin B-12 than milk. Research in 1975 confirmed that adequate B-12 in body doubles body’s immune systems ability to fight disease.

Ho, Lawton, 1978 Human Colostral Cells, *Journ. Of Pediatrics* Vol 93, No. 6 pp 910-15 Dr’s in hospital use showed that colostrum Leukocytes are effective against E. Coli and the yeast *Candida Albicans*.

Lawton et. al., 1979, *Archives of Disease in Childhood*, 54, pp. 127-130. “Interferon Synthesis by Human Colostral Leukocytes”: **Exposure of colostrum Leukocytes to certain mitogens stimulated production of interferon, the substance that slows or prevents viral growth.**

Bouda et. al., 1980, *Acta Veterinaria Bmo*. Vol.49 Nos 1-2 pp 53-58. “Vitamins E and C in the blood plasma of Cows”: Vitamin E is 2.5 times greater in bovine colostrum than in milk. It helps protect the vitamin A and other ingredients from oxidation. “Vitamin A and Carotene Metabolism in Cows” pp 45-52; Vitamin A in bovine colostrum is ten times the amount in serum. **Vitamin A shown to restore and revitalize the thymus gland the master gland of the immune system.**

Palmer, E.L. et al. , 1980, *Journal of Medical Virology*. 5pp 123-129. “Antiviral Activity of Colostrum and Serum Immunoglobulins A and G.” Colostrum has an enteric secretory virus antibody that acts against viral invaders. A wide range of antiviral factors were acknowledged to be present in colostrum. This research was done at the US Government’s Center for Disease Control in Atlanta, Georgia.

Dluholucky, S. et. al., 1980 *Archives of Disease in Childhood*, 55, pp 458-460; 1980; Antimicrobial activity of colostrum after the administration of inactive *Escherichia Coli* oral vaccine to expectant mothers: Mothers developed immune factors that develop on mucosal sources that enter blood serum and concentrate in expectant mothers’ mammary glands. Describes how colostrum may develop immunities.

Morris, J.A. et. al., 1980, *Journal of Medical Microbiology* Vol 13 No 2 pp 265-271. “Passive Protection of Lambs Against Enteropathogenic *Escherichia Coli*: Mother sheep and cows given doses of E. Coli orally developed antibodies for E. Coli in their colostrum. When nursing offspring were then dosed with E. Coli, immune factors from the mothers’ colostrum prevented the E. Coli from attaching to the bowel wall and protection resulted.

Jackson, Baker, Lessof, et al. 1981, *The Lancet*, June 13. Intestinal Permeability in Patients with Eczema and Food Allergy. **“...results suggest that there is an intestinal mucosal defect in eczema which exists whether or not there is coexistent food allergy.”**

McClead, Richard, et. al., 1982, *Pediatric Research*, Vo. 6 No 4 p 227, “Resistance of Bovine Anti-Cholera Toxin IgG-1 (Anti-CT) to In Vitro and In Vivo Proteolysis”: **Colostrum from cows exposed to cholera contained IgG antibodies which protected against that type of cholera.**

Theodore, Christine, et. al., 1982, Raven Press, NY: “Immunologic Aspects of Colostrum and Milk: **Development of Antibody Response to Respiratory Syncytial Virus (RSV) and Bovine Serum Albumin in the Human and Rabbit Mammary Gland**”: **People and animals** exposed to RSV virus, often responsible for bronchitis and pneumonia, **developed IgA and IgG (immunoglobulin) antibodies against this virus in their colostrum.**

Ogra, Lesonsky, Fishout, *Research*, 1983, State University of NY at Buffalo: "Colostrum provided specific antibody reactivity to the bacteria, viruses and yeasts responsible for the following conditions: Appendicitis, Aseptic or Viral Meningitis, Bronchitis, Bronchia or Viral Pneumonia, Candida Albicans, Chicken Pox, Cholera, Diarrhea, Dysentery, Diphtheria, Gastroenteritis, Japanese B Encephalitis, Mucus Membrane Infections, Parathyroidism, Pneumonia, Polio, Septicemia (blood poisoning), Tetanus, Viral Myelitis, and Whooping Cough."

Kim, et. al., 1985, *Journal of Infectious Diseases*, Vol 150, No 1 pp. 57-61: "In Vitro and In Vivo Neutralizing Activity of Human Colostrum and Milk Against Purified Toxins A & B of Clostridium Difficile": **substances from colostrum neutralized the two main toxins of the infectious clostridium bacteria.**

Lie, Syed, *Animal Genetics*, 1986, V. 17 pp 47-59: **Some properties of the lysozymes in colostrum from cows: "High bacteriolytic activity, fully expressed in colostrum. Heat stable in acidic PH."**

Acosta-Altamirano, et. al., 1987, *Advances in Experimental Medicine and Biology*, 216B pp. 1347-52: "Antiamoebic Properties of Human Colostrum" **Colostrum effective against amoebic invaders.**

Buescher, McIlheran, 1988, *Pediatric Research*, Vol. 24 No 1 pp. 14-19: "Antioxidant Properties of Colostrum" **Colostrum found to contain numerous powerful, naturally occurring antioxidants.**

Shortridge, Lawton, Choi, 1990, *Journal of Trop. Pediatric*. APR; 36(2): 94-5 Reported: A. Incidence of infection and gastrointestinal illness markedly reduced in breast fed babies. B. Colostrum contains Non Specific Inhibitors (NSI's): factors that are inhibitory for a wide range of respiratory illness notably influenza viruses. **C. Colostrum specifically cited for its unique effectiveness against potential deadly outbreaks of (new) Asian flu viruses that emerge from animal/human mutations.**

Deitch, MD, FACS, Edwin a., *Arch. Surg.*, 1990, Vol 125, The Role of Intestinal Barrier Failure and Bacterial Translocation in the Development of Systemic Infection and Multiple Organ Failure. "...increasingly clear that the gastrointestinal tract is not a passive organ..." "...the GI tract recognized as having important endocrine, metabolic, immunologic and barrier functions..." "...bacteria/endotoxin escaping from the gut could lead to systemic infection and disease..." "...studies indicate that one or more of three basic pathophysiologic factors appear to be necessary for bacterial translocation to occur." "Three promoting factors are disruption of the ecologic balance of the...microflora, resulting in overgrowth with certain bacteria, impaired host immune defenses, and physical disruption of the gut mucosal barrier."

Science, Vol. 257 Jul. 10, 1992: "Transferred immune cells help fight viral infections": cytomegalovirus (CMV) cause of fatal pneumonia in bone marrow patients reduced with introduction of specific immune cells via administration of bovine colostrum.

Applegate, *Runners World*, June 1992, V27 p22 Protein Power: "Protein depletion weakens the immune system and causes irritability."

Berl, Munch, et. al., 1992 Jul. 1 105(7) pp219-24 Bovine colostrum and protection of young animals: "Calves without colostrum died in 90% of cases. Feeding commercially prepared colostrum can provide immediate compensation. **The application of vaccine(s) directly into the mammary gland at ab lactation provokes specific IgA and IgM antibodies which are normally not channeled from the blood system of the mother into the colostrum. This kind of immunization may become more and more important.**"

Galland, M.D., FACN, Leo, 1995, *Townsend Letter for Doctors*, Aug.-Sept. Leaky Gut Syndromes: Breaking the Vicious Cycle. **"Leaky Gut Syndromes are usually provoked by exposure to substances which damage the integrity of the intestinal mucosa... causes of damage are infectious agents (viral, bacterial and protozoan), 43-46 ethanol, 47,48 and NSAIDs, 20, 49, 50 Hypoxia of the 51, 52 elevated**

levels of reactive oxygen metabolites, 53 and cytotoxic drugs 54-56 also increased para-cellular permeability.” **“Altered intestinal permeability is a key element in the pathogenesis of many different diseases. Hyperpermeability initiates a vicious cycle in which allergic sensitization, endotoxic immune activation, hepatic dysfunction, pancreatic insufficiency and malnutrition occur; each of these increases leakiness of the small bowel. Effective treatment of the Leaky Gut Syndromes requires several components: avoidance of enterotoxic drugs and allergic foods, elimination of infection or bacacterial overgrowth with antimicrobial and probiotics, and dietary supplementation with trophic nutrients.”**

Kamen, PhD, Betty; Kamen, Meng, Paul. 1998 CYTOLOG: INFOPEPTIDES; A POTENT, SAFE BROAD-SPECTRUM THERAPEUTIC TOOL. **Colostrum’s immune components contain the “information “ required by the human immune system to identify and eliminate unfriendly biological pathogens.**

COLOSTRUM SURVIVES ADULT HUMAN DIGESTIVE TRACT AND WORKS ON MUCOSAL SURFACES:

Pineo, A. et. al. 1975 *Biochemical Biophysiology Acta (Amsterdam)* 379:201-206. **Research by Drs. Pineo, Ortego, and Uriel in 1975 discovered a special glycoprotein in cow colostrum. They found it had “Protease Inhibitor Activity” that was extremely effective at protecting the immune and growth factors in colostrum from destruction by digestive acids pancreatic enzymes in the adult human stomach.**

Sandholm, et. al., *Acta Veterinaria Scandinavica*, 1980, Vol 20 No 4 pp 469-476. **“Colostrum Trypsin-Inhibitor Capacity in Different Animal Species”:** **Bovine colostrum was found to contain a powerful trypsin-inhibitor which protects colostrum immunoglobulins from digestion. Demonstrated that colostrum from cows richer in immune factors and inhibitor than colostrum from humans.**

Von Fellenberg, R. and Hoerber, 1980, *Schweiz. Arch. Tierheilkd.* Vol 122 No 3 pp 159-168. **“Multiple Protease Inhibitors in Colostrum and In Bovine Udder Tissue and Their Possible Significance.”:** **Protease inhibitors in colostrum shut down the digestive enzymes that would normally digest proteins such as the immunoglobulins, allowing them to remain active as they pass into the bowel.**

Swarbrick, E.T. et. al., *The Immunology of Infant Feeding*, 1980, Plenum Press, NY, pp 13-20, **“The Handling of Ingested Antigens”:** Dr. Swarbrick discovered that during the first 24-26 hours of a newborn’s life the bowel wall has a number of large open pores through which big immunoreactive molecules from colostrum enter the system. Pages 55-61: Dr. David Tyrell; ‘Breast Feeding and Virus Infections’: **“The major benefit of immune factors from colostrum was shown to be their protective activity in the intestine on the walls of the bowel, and bronchials, (mucosal surfaces), Conclusion: People of all ages may benefit from colostrum”.**

Hanson, et. al., *Annals of NY Academy of Sciences*, 409, 15ff: **“Mucosal Immunity”:** The immune system produces immunoglobulins, antibodies, leukocytes, macrophages, interferon and other factors for defending the body. Immune factors from specialized cell groups in the bronchials and bowel travel away from their sources to coat the passages of the lungs and bowels and destroy antigens, allergens and pathogens. **Immune factors from colostrum other than immunoglobulins blocked attachment of Streptococcus Pneumococci, a major cause of lung inflammations and middle ear infections.**

Klapper, D. G. et.al., 1983, *Endocrinology*; 112 (6) 2215-17. pp 13-18: **Oligo and polysaccharides in colostrum bind many types of bacteria and prevent them from attaching to or entering the body through the mucal membranes.**

Bouda, et. al., 1987, *Veterinari Medicina*, Vol. 32 No 3 pp. 135-44: **“Trypsin Inhibitor Activity in the Colostrum of Cows”:** **Greatest Trypsin Activity was in the colostrum of the first milking after calving.**

(Inhibitor effective in neutralizing digestive acids and enzymes in human digestive system to allow colostrum to reach intestinal area.)

Preston, R., 1987, *International Institute of Nutritional Research*: **“Bovine Colostrum: Human consumption: Efficacy and Effects: Found to be safe, effective via oral administration, no known contradictions or overdoses”**.

Ulcova-Gallove, Fialova, Krauz, 1994, *Clinical Study: Cas Lek. Cesk.* May 2, Vol. 133(9) pp. 275-6. Reported that: **A. Immunofactors present in bovine colostrum are: IgG, IgM, IgA, SIgA, SCIgA, C3, C4, Orosormucoid, Prealbumin, Alpha 1- Antitrypsin, Alpha-1 Fetoprotein, Alpha-2-Macroglobulin, Alpha 2-AP Glycoprotein, and, IgE. B. An important immunoligical liquid with proven bacteriostatic and viral inhibitory activity preventing penetration of pathogenic microorganisms and absorption of potential allergens into the digestive tract.**

Eldrige, et. al. 1983, *Annals of NY of Sciences*, 409 pp. 819-821. “Peyer’s Patches Accessory Cells Bear I-1”: Groups of cells in the mucosa of the intestinal tract, known as Peyer’s patches produce and absorb immune factors.

Ogram Pearay, et. al., 1983, *Annals of NY Academy of Sciences*, 409, pp 82-92: “Colostrum Derived Immunity and Maternal Neonatal Interaction”: Peyer’s patches are found throughout the intestinal tract and groups of immunoactive cells like them are found in the bronchial mucosa. Both the intestinal and bronchial immunoactive cell groups respond to allergens, antigens and pathogens by neutralizing or destroying them. In newborns, these special cell groups are not immediately operative but protection is provided by a variety of immune factors from the mother’s colostrum. Antibodies found in colostrum protect against E. Coli, Salmonella, Shigella, V. Cholera, Bacteriodes Fragilis, Streptococcus Pneumoniae, Bordtella Pertussis, Clostridium Diphtheria, Clostridium Tetani, Steptococcus Mutans and Candida Albicans.

Waldman, et. al., 1983, *Annals of NY Academic Science*, Vol. 409, 510-515: Reported the intestinal tract is lined with mucous membranes. Researchers at West Virginia University School of Medicine and Pharmacy stated: “Most infectious diseases enter the body through or remain localized on mucosal surfaces.” Walman stated: “that this means in order to be healthy, we must be able to combat disease causing organisms where most of them attack us; which is on the mucous membranes of the intestinal tract.” (this is where colostrum does most of its work).

Dial, Elizabeth J.; et. al., *Gastroenterology*, 87; 379-85, 1984 A Role For Milk Phospholipids in Protection Against Gastric Acid (Studies in Adult and Suckling Rats) **Findings suggest that milk contains potent anti-ulcer activity.**

Kivinen, Anneli; S. Salminen; et al. *Milchwissenschaft*, 47(9), 1992. Gastroprotective effect of milk phospholipids, butter serum lipids and butter serum on ethanol and scetylsalicylic acid induced ulcers in rats. **Phospholipids in cow milk protect the GI tract from ulcers.**

Service, *Science*, Sept. 9, 1994 v 265 p 1522-4: Research News: Triggering the First line of Defense: “Vaccines that activate the mucosal immunity, the bodies first chance to ward off infection, are hard to come by. Situation changing, new vaccines are needle free. **Mucosal surfaces turn out 70% of our body’s antibodies. Has been virtually ignored. Mucosal system most important area to concentrate attention in prevention of disease. New vaccines developed to be delivered orally. IgA very effective in picking up invaders before they gain entry. Studies prove that vaccines made with pathogens that infect animals can confer protection to humans.**”

Science News: Vol. 133 pp. 196, 1994: **Colostrum and breast milk (from cows, sheep and humans) stimulates babies own immune systems: as yet unidentified proteins speed the maturation of cultured B lymphocytes (a type of white blood cell) and prime them for production of antibodies says: Michael Julius of McGill University, Montreal.**

Pakula, Ronit; et. al. *Lipids*, Vol. 31, No 3, 1996. The Effects of Dietary Phospholipids Enriched with Phosphatidylethanolamine on Bile and Red Cell Membrane Lipids in Humans. **Diets enriched in phospholipids resulted in reduced cholesterol saturation in the bile with no side effects.**

Litman, Burton J.; et. al. *Lipids*, Vol 31, Supplement, 1996. A Role for Phospholipid Polyunsaturation in Modulating Membrane Protein Function.

IMMUNOGLOBULINS: ANTI-VIRAL, ANTI-BACTERIAL, ANTI-YEAST, ANTI-TOXIN

McClead, R. et. al, 1979, *Pediatrics Research*, Vol, 13 No 4 2 of 2, 464. **Human clinical study completed using immunoglobulins and antibodies from cow colostrum proving its effectiveness against disease-causing bacteria. Presented in 1979 by Dr. R. McClead and associates at the 88th annual meeting of the American Pediatric Society. It was demonstrated that immune factors were effective in providing protection. They concluded: “The preservation of the biological activity of IgG (immunoglobulin) in the digestive secretions of adults receiving bovine immune colostrum orally indicates – passive enteral (intestinal) immunization for the prevention and treatment of acute intestinal diseases.”**

Khazenson, L.B., 1980, *Microbial & Epidemial Immunobiology* No 9 101-106. In 1980 Dr. L.B. Activity of bovine colostrum IgG in the human digestive tract. **Khazenson and assoc.’s completed a study on human volunteers in which cow colostrum was taken orally. Samples of their digestive tract demonstrated that the immune factors were effective in providing protection. They concluded: “The preservation of the biological activity of IgG (immunoglobulin) in the digestive secretions of adults receiving bovine immune colostrum orally indicates – passive enteral (intestinal) immunization for the prevention and treatment of acute intestinal diseases.”**

Davidson, GP; et.al. *The Lancet*, Sept. 23, 1989. 709-712. Passive Immunization of Children with Bovine Colostrum Containing Antibodies to Human Rotavirus. **In a 10-day controlled study: Children fed bovine colostrum did not get rotavirus while 13.8% of those who were fed an artificial infant formula acquired the virus.**

Ushijima et. al., Dept. of Enteroviruses, *Japanese National Health Institute*, Mar, 1990 V64(3)p 274-9: Immunoglobulin components and anti-viral activities in bovine colostrum: “IgG, IgM, IgA, were found in bovine colostrum, anti-human adenovirus antibody was not found. **Oral treatment rotavirus gastroenteritis found to be effective.” (Rotavirus is the leading cause of diarrhea in world)**

Heaton, *Arch of Disease in Childhood*, 1990; 65:813, Cryptosporidiosis and acute leukemia: “Paper at 6th annual Asian Pediatric Conference: “Treatment of 3 year old with acute cryptosporidia caused diarrhea. Bovine colostrum 100 ml 3x daily in form of milkshake. Within two weeks symptoms alleviated. Cryptosporidia tests negative. Bovine colostrum very rich source of immunoglobulins. Pooled colostrum from nonimmunized cows provides an effective method of controlling symptoms in immunodeficient patients. **Immunoglobulin concentrated may provide an effective, convenient method by which immunology can be administered”.**

Jage, Kampmann, Kolb, et. al., 1992, *Clin. Investigation* Jul.; 70(7): 588-94 Reported: **A. Immunoglobulins from bovine colostrum (lactobin, biotest, Dreieich, FRG) contain high titres of antibodies against a wide range of bacterial, viral and protozoa pathogens, as well as against various bacterial toxins. B. Colostrum quite resistant to gastric acids. C. Effective in the treatment of intestinal opportunistic infections associated with HIV and other immunosuppressed disease.**

Jochims, Kaup and Drommer, 1994, *Res. Vet. Science* Sept. Vol. 57(2) pp. 146-151 **Reports the absorption of colostrum IgG (immunoglobulin) by small intestine enterocytes in adult human subjects.**

Bitzan MM; et al, *J Infect Dis.* April 1998. Inhibition of Helicobacter Pylori and Helicobacter Mustelae binding to lipid receptors by bovine colostrum. **Results indicate confirmation that colostrum can prevent infection of Helicobacter species bacteria.**

Bocci, Bremen, Corradeschi, Luzzi and Paulesu, 1991, *Journal Biology Regul. Homeost. Agents* Oct-Dec 5(4): 121-4. **REPORTED: A. Immunoglobulins cannot be received through the placenta. B. Colostrum has a well acknowledged crucial value for the survival of animal species. C. Presence of 4 Cytokines verified in bovine colostrum: Interlukin 1 & 6, tumor necrosis factor, and interferon gamma. D. Exert an important immunostimulatory role particularly on the oropharyngeal-associated lymphoid tissue. E. Administration can provide benefits in aged or immunodeficient people. F. Nature has used the oral route for the development of the immune system since the origin of mammals (safe and effective). G. Oral administration of immunofacators is very simple, inexpensive, free of side effects and may be vastly beneficial in veterinary and HUMAN medicine to correct immunodeficiency.**

“Immunoglobulin to Prevent Nosocomial Infections” *New England Journal of Medicine*, July 23, 1992, Vol 327 No 4 p 269. **Immunoglobulin from bovine colostrum effective in reducing and preventing infections in immune deficient subject: bone marrow recipients, premature babies, AIDS, etc.** Problem: obtaining high and consistent levels of functional antibodies through donor selection. Could improve through pooled selection, selective donor immunization, and addition of monoclonal antibodies.

Dwyer, *New England Journal of Medicine*, Jan 9, 1992, V326 p107(10) Manipulating the Immune System with Immunoglobulin: “Reports that: **Immunoglobulin has been used to successfully treat: Thrombocytopenia, Anemia, Neutropenia, Myasthenia Gravis, Guillain Barre Syndrome, Multiple Sclerosis, Systemic Lupus Erythematosus, Rheumatoid Arthritis, Bullous Pemphigoid, Kawasaki’s Syndrome, Chronic Fatigue Syndrome, and Crohn’s disease, among others**”.

Quigley, Martin, et. al., *J Dairy Sci.*, Jan 1994; Vol 77(1):264-9. Immunoglobulin concentration in cows colostrum: IgG 65.8 IgM 2.4 and IgA 1.7 g/l.

Petschow and Talbott, 1994, *Journal of Pediatric Gastroenterologic Nutrition.* Aug.; 19(2) pp. 228-235. **Bovine colostrum immunoglobulin concentrates proposed for incurring passive immunity against various enteric pathogens.** Reports on specific bovine colostrum viral immunofactors for rotavirus partially reduced by gastric acid. Suggest reduction of gastric acid and pancreatic trypsin would enhance immunoprophylaxis (effectiveness).

Bruce, C.E. 1969 *Natural History*, Feb. **Dr. C.E. Bruce demonstrates that human colostrum contains only 2% IgG (the body’s most important immunoglobulin) while cow colostrum contained a phenomenal up to 20 times that amount.**

Harper, H.A. et. al., 1977, *Review of Physiology Chemistry* (Lang Medical Pub. Los Gatos, Ca.). **Analysis of immunoglobulins and how they work in the defense of disease:** Showed the bodies key immunoglobulins: IgG, IgM, IgA, and Secretory IgA contain “Y” shaped proteins with special adaptive sites on the ends of their arms. These sites are very effective at neutralizing different types of bacteria, viruses, and yeast. When the arms, or the FAB portion, are released by pepsin or trypsin, they are freely assimilated by the tissues and become an important part of the body’s immune system. **Sic: (In 1983 it was discovered that (bovine) colostrum contained all four key immunoglobulins and that they were not species specific).**

Brandtzaeg, Per, 1983, *Annals of New York Academy of Sciences*, Vol. 409 pp. 353-378. “The Secretory Immune System of Lactating Human Mammary Glands Compared with other Exocrine Organs”: Immune factors present in the mother are transmitted to the infant in colostrum and breast milk until its immune system is operative. **Immunoglobulins are able to neutralize the most harmful bacteria, viruses, and yeasts.**

Science News 1994, Vol 133 p 196; Breast Milk Stimulates Immunity: “Researchers reporting evidence that **colostrum stimulates babies own immune systems. Speeds maturation of B Lymphocytes (a type of white blood cell) and primes them for production of antibodies, according to M. Julius of McGill University, Montreal. March 1 Journal of Immunology reported sheep’s colostrum enhances growth and differentiation of cultured white blood cells. Similar activity in cow and human colostrum...substance can also activate macrophages.**”

LACTOFERRINS: ANTIBACTERIAL, IRON BINDING, IRON TRANSPORTER

Spik, G. et. al. , *Immunology*, Vol 35 No 4, 663-671. **(Bovine) Colostrum contains a special iron binding protein called Lactoferrin which was demonstrated at the Clinical Research Center, Harrow, England, to be highly antibacterial.**

Hamilton, Whitney and Sizer, 1985, *Nutrition: Concepts and Controversies*, West Pub. (nutritional textbook): **(Bovine) Colostrum contains a bifidus factor that favors the growth of friendly intestinal bacteria. Also contains huge counts of active Lactobacillus Bifidus. Also reported that Lactoferrin in colostrum keeps invading bacteria from getting iron needed to reproduce.**

Sanchez, et. al., 1988, *Biological Chemistry Hoppe-Seyler*, Vol. 369(9) pp. 1005-1008: “Concentration of **Lactoferrin and Transferrin (necessary to transport iron into blood)** throughout Lactation in Cow’s Colostrum and Milk”: **Highest Concentrations of both substances was found in the first milking**, decreasing sharply throughout the colostrum period (48hrs), then decreasing more slowly.

Ushijima et. al., Dept. of Enteroviruses, *Japanese National Health Institute*, Jan. 1991 V65(1) p54-60: Bacteriostatic activity of bovine colostrum: “Immunoglobulin, Lactoferrin and Lactoferrin Fe tested using the automated antimicrobial susceptibility testing system. Lactoferrin was found to be an even more effective antibacterial than immunoglobulin. (Immunoglobulin is more effective against viruses). The results indicated that all three had significant bacteriostatic action.”

Walker, *Townsend Letter for Doctors*, Aug 1995, p 42-45: Infectious bugs are back but there’s a remedy: “The very technology that saves people’s lives sets them up for infection”, says Rober Haley, MD Head of the epidemiology and Preventative Medicine unit at University of Texas in Dallas. Antibiotic resistant organisms are an integral risk of any infection. After forty years of aggressive antibiotic abuse physicians are now confronting antibiotics the drug companies claim to be working on there are no more potent antibiotics left to treat these drug resistant bacteria. The only viable answers are natural remedies comprised of antimicrobial cationic proteins that stimulate the immune system, to be capable to defend against the super mutants and others. Lactoferrin is one of the strongest and most active. (Lactoferrin is an abundant protein in colostrum) that works at the mucosal surface. Lactoferrin is: 1) iron binding that deprives bacteria of this essential growth mineral (nearly all bacteria cannot grow without iron); 2) it is also directly antibacterial through systemic immune responses, 3) has a high affinity N-terminus for binding directly and inactivating bacteria by increasing bacterial membrane permeability so that it can be neutralized by the body’s natural immune functions. High affinity Lactoferrin receptors have been identified on most immune cells: lymphocytes, monocytes, macrophages, and platelets. It is thought to regulate cytokine release. Lactoferrin is highly resistant to digestion and passes intact to intestine where it does its work”.

Spik, Genevieve, et. al. 1983, *Immunology*, Vol 35 No 4 pp. 663-670: “Bacteriostasis of a milk-sensitive strain of E. Coli by Immunoglobulins and Iron-binding Proteins in Association”: **French doctors showed that a combination of IgG and Lactoferrin in colostrum was bacteriostatic for E. Coli.**

Moldoveanu, Zina, et. al., 1983, *Annals of NY Academy of Sciences*, 409, pp. 848-850: “Antibacterial Properties of Milk: IgA-Peroxidase Lactoferrin Interactions”: **Combination of peroxidase, lactoferrin and IgA in (bovine) colostrum produces strong combined antibacterial effect. Peroxidase enzymes oxidize bacteria by generating the release of Hydrogen peroxide which burns up (hydrolyses) harmful bacteria.**

Applemelk, Ben J.; et. al. *Infection and Immunity*, Vol. 62, No. 6 June 1994, 2628-2632. Lactorferrin Is a Lipid A-Binding Protein. **This research shows that lactoferrin acts as a preventative against ingested bacteria.**

Brodie, Ainscough, et. al., *Adv. Exp. Med. Biol.*, 1994 V 357 pp 33-44: Synergism and substitution in the lactoferrins: "The anion binding properties of human Lactoferrin; Oxalate and hybrid complexes exist in the human body. Oxalate can displace carbonate from either on or both anion sites depending on the oxalate concentration, but no such displacement occurs for Fe² although it does for bovine Lacatoferrin.

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Walker, W. A., 1975, *Pediatr Clin. North Am.*, Vol 22(4) p 731-46; 'Antigen absorption from the small intestine and gastrointestinal disease'.

Doe, W. F., 1979, *Am. J Med*, Vol 67(6) p 1077-84; 'An overview of intestinal immunity and malabsorption'.

Jackson, P.G., et. al., 1981, *Lancet*, Vol 1(8233) p 1285-6; 'Intestinal permeability in patients with eczema and food allergy.'

Bjarnason, I. et. al., 1984, *Lancet*, Vol p 79-82. 'The leaky gut of alcoholism: the route of entry for toxic compounds'.

Dohan, F.C., et. al. 1984, *Biol Psychiatry*, Vol 19(3) p 385-99; 'Schizophrenia is rare if grain is rare; a study on gluten and gut permeability'.

Hamilton, I. et. al., 1985, *Q J Med*, Vol 55(221) p 559-67 'Small intestinal permeability in dermatological disease'.

Jenkins, R.T., et. al., 1987, *Br J Rheumatol*, Vol 26(2) p 10-3-7; 'Increased intestinal permeability in patients with rheumatoid arthritis: a side effect of oral nonsteroidal anti-inflammatory drug therapy'.

Wood, N. C., et. al., 1987, *Br J Psychiatry*, Vol 150 p 853-6; 'Abnormal intestinal permeability. An etiological factor in chronic psychiatric disorders'.

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Crinsinger, K.D., et. al., 1990, *J Intern Med Sppl*, Vol 732: p145-54; 'Pathophysiology of gastrointestinal mucosal permeability'.

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Rooney, P.J., et. al., 1990, *Clin Exp Rheumatol*, Vol 8(1) p 75-83; 'A short review of the relationship between intestinal permeability and inflammatory activity in asymptomatic patients with Crohn's disease.'

Bloembergen, P. et. al., 1990, *Arch Allergy Appl Immol.*, Vol 92(2) p 124-30; "Endotoxin induced autoimmunity in mice'.

Pironi, L., et. al., 1990, *Dig Dis Sci*, Vol 35(50) p 582-8; 'Relationship between intestinal permeability and inflammatory activity in asymptomatic patients with Crohn's disease.'

Mielants, H., 1990, *Clin Exp Rheumatol*, Vol 8(5) p 523-4; 'Reflections on the link between intestinal permeability and inflammatory joint disease'.

Hazenburg, M.P. et. al., 1992, *Review Article Apmis*, Vol 100(1) p 1-9; 'Are intestinal bacteria involved in the etiology of rheumatoid arthritis?'

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Ohri, S.K., et. al., 1993, *Ann Thorac Surg*, Vol 55(5) p 1080-6; 'Cardiopulmonary bypass impairs small intestine transport and increases gut permeability.'

Galland, L. et. al., 1993, *J Adv Med*, Vol 6 p 67-82; 'Intestinal dysbiosis and the causes of disease.'

IMMUNE RELATIONSHIPS: AUTO-IMMUNE, ALLERGIC, DIABETIC

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Crago, Mestecky, 1983, *Survey of Immunology. Res.*, Vol. 2 No 2 pp. 164-169: "Immunoinhibitory Elements in Human Colostrum": **(A protein substance was found in colostrum which inhibits the overproduction of lymphocytes stimulated by antigens and mitogens and may reduce symptoms associated with allergic reactions.)**

Julius, Janusz, Lisowski, *Journal of Immunology*, 1988 Vol. 140, p 1366-77. Dept of Microbiology and Immunology, McGill University, Montreal, Quebec, Canada. A colostrum protein (PRP) that induces the growth and differentiation of resting B lymphocytes. "PRP (Proline-rich Polypeptide) is the first protein of mammalian origin that induces the growth and differentiation of reacting B lymphocytes. PRP has been isolated from sheep and (cows) colostrum. PRP is not species specific. Spleenocytes from neonatal mice responded robustly to PRP with the growth and differentiation of contained B cells to plaque formation. PRP did not induce detectable Ig isotype switching".

Janusz, Lisowski, 1993, *Arch. Immunol. Ther. Exp. Warz.* Vol. 41(5-6): 275-9. Report on clinical study: A. New immunodulatory peptide found in bovine colostrum: Proline-rich Polypeptide (PRP). B. Not Species specific (transferable to human use). C. PRP increases permeability of skin vessels. D. Causes differentiation of murine thymocytes into functionally active T-cells. E. Simultaneously changes surface markers and function of cells. F. Results shown in treatment of auto-immune disorders and sarcoma S-180 (cancer). G. Important Immune modulator: stimulates underactive immune system, tones down an overactive one.

Dohm Elton, et. al., *Diabetes*, Sept. 30, 1990 pp 1028-32: IgF-1 stimulates glucose utilization. **Igf-1 found in bovine colostrum (identical to human) can provide an effective acture treatment for Hyperglycemia.** Igf-1 can be an effective alternative to insulin in stimulating transport in diabetic muscle. Plasma levels of IgF-1 in diabetic patients is lower than in nondiabetic groups. IgF-1 receptors present in human muscles. IgF binding is 24% that of insulin IgF-1 stimulated glucose transport twofold. Did not stimulate transport in obese subjects."

Newsweek, Nov. 15, 1993, p 73; A new way to fight Diabetes: Researchers at UCLA and Stanford have diabetes cause by allergic reaction to a protein called GAD, immune systems in diabetics turn against other antigens as well. A single injection produced tolerance to GAD in mice eliminating the diseases process."

Pennisi, Jan 15, 1995, *Science News*, Vol 145, p37(1) Immune therapy stems diabetes progress: 'Researchers report that mice are treated with the anti-CD3 monoclonal antibody have been able to resume normal regulation of their blood sugar. **The results of treatment are the first known to induce remission of the development of diabetes and have kept the mice free of the disease.**'

CANCER: RESEARCH RELATED TO

Wada et. al., 1980, *Infection and Immunity*, 29, pp 545-550. "Neutralizing Activity Against Clostridium Difficile Toxins in the Supernatants of Cultured Colostral Cells": **Colostrum immune factors neutralize crude toxins.**

Paulik, et. al., 1985, *Veterinari Medicina*, Poland, Vol. 30 No 1 pp. 21-28: "Lysozyme in the Colostrum and Blood of Calves of Dairy Cows": **Lysozyme in bovine (and human) colostrum is the enzyme present in egg white, tears, saliva and other body fluids that kills bacteria by dissolving their cell walls.**

Tokuyama and Tokuyama, 1989, Dept. of Molecular Immunology, Cancer Research Institute and Dept. of Nuclear Medicine, Kanazawa University, Kanazawa, Japan. Harwood Academic Publishers, UK. *Cellular Biology Report* 13, 251-258; "Bovine Colostric Transforming Growth Factor-B-Like peptide induces growth inhibition and changes morphology of human osteogenic sarcoma (cancer) cells": **TgF B produced cell destruction in certain human cancer (sarcoma) cells in cell culture growth experiments in Japan.**

Tokuyama, et. al., 1990, Dept. of Molecular Immunology, Cancer Research Institute and Dept. of Nuclear Medicine, Kanazawa University, Kanazawa, Japan. Harwood Academic Publishers, UK: **Reported two new Proteins discovered in Bovine Colostrum: BC-1 and BC-2. Belong to a new class of mitogen inhibitors. Reported that through biological activities resemble TGF-B.** Showed inhibitory effect on some sarcoma (cancer) tumor cell lines in vitro.

Dillehay, Dirck L. American Institute of Nutrition. 1994. Biochemical and Molecular Roles of Nutrients. Dietary Sphingomyelin (Found in bovine colostrum and milk) Inhibits 1, 2-Dimethylhydrazine-Induced Colon Cancer in CF1 Mice 1-4. **Sphingomyelin significantly reduced evidence of colon cancer.**

Parodi, PW. *The Australian Journal of Dairy Technology*, Vol. 51, April 1996. Bovine milk fat components: possible chemopreventive agents for cancer and other diseases. **Evidence suggests that bovine milk fat contains cancer fighting components.**

Neely, EK, et. al., Dept. of Ped., Stanford Univ. Sch. Of Med., Calif., *J Invest. Dermatol.*, 1991. **"Insulin-like growth factors are mitogenic for human keratinocytes and a squamous cell carcinoma."**

Moro, et. al., 1985, *Cellular Immunology*, 93(2) pp. 467-74: "Natural Killer Cells in Human Colostrum": Approximately 0.5% of colostrum cells were identified as natural killer cells of two morphological types.

Tokuyama and Tokuyama, 1993, *Jour.Dairy Res.* Vol. 60: 99-109 (Printed in Great Britain) Bovine colostrum contains high levels of transforming growth factor (TGF) – beta-like activity during the first 12-30 hours after parturition. Results of study indicate that **TGF-beta-like growth factor found in bovine colostrum is chemically and antigenically related to TGF-beta2.**

Hakansson, et. al., *Proceedings, The Nation of Academy of Sciences*, Vol. 92, pp. 8064-8068 Aug. 1995, Research Study: Lund University, Stockholm, Sweden. Study showed in vitro effect of ingredient in human milk and colostrum: Multimeric a-lactalbumin caused lung cancer (transformed epithelial cells) to create selective suicide (apoptosis). Normal surrounding cells unaffected. **Conclusion: multimeric a-lactalbumin – is a potent Ca²⁺ elevating and apoptosis-inducing agent with broad, yet selective, cytotoxic activity.**

Business Week, Feb. 6, 1995: "Quiet Strides in the War on Cancer": National Cancer Institute researcher Steven A. Rosenberg became a media sensation when he achieved success with cancer patients in 1985 using an experimental technique called immunotherapy. Since cancers can invade the immune system, why not load the body with killer immune cells, along with special chemical messengers called Cytokines that give the body an extra kick." Treatments partially successful. More trials ongoing. Cytokine for cancer vaccines is the largest single protocol under study today.

HEART DISEASE

Lange, Schreiner, Apr. 21, 1994, *New England Journal Of Medicine*, Vol. 330 p 1129(7). Immune Mechanisms of Cardiac Disease: "Many cardiac diseases are the result of immune sensitization to cardiac antigens. Such immune mediated injury results in the presence of inflammatory cells within the myocardium, leading to myocarditis. Cellular, rather than humoral (antibody based), immunity has been the target of most of the research conducted on immune-related heart disease, with lymphocytes and macrophages being the predominant infiltrating cells. Cardiac disease associated with immune mechanisms include giant-cell-associated cardiomyopathy and primary idiopathic myocarditis. Research aimed at discovering the mechanisms by which myocardium, affect muscle cell functions and rearrange myocardial cell architecture has greatly increased the medical community's knowledge of the immune mechanisms of heart disease. The development of successful drug therapy for such conditions is now considered possible."

Wagner, Norma, *The Salt Lake Tribune*, 1996, June 1. Utah Study: Bacteria May Cause Heart Disease. "Utah scientists found evidence another possible cause [of heart disease]." "...the finding may play a large roll in the treatment and prevention of heart disease." "What they found surprised them. [A type of chlamidia bacteria." "...79 percent of the patients had the bacteria in their coronary arteries." "We thought we'd find evidence of chlamydia in [only] 20 to 30 percent," said Jeffrey L. Anderson, director of cardiology at LDS Hospital." "...the team said it was too early to tell whether the bacteria actually cause atherosclerosis..."

Herzberg, Mark of Univ. of Minnesota, as reported by Tim Friend, *USA Today*, 1998, February, 17. Gum disease linked to heart illness. "The most common strain of bacteria in dental plaque can cause blood clots to form within minutes." "Chronic inflammation of the gums due to plaque also could be involved in the inflammation of the lining of the blood vessels that is known to lead to the build-up of plaque in the arteries..." "Additional studies...show that bacteria in plaque also are linked to: ...infective endocarditis, lung infections..., A weakened immune system that can slow wound healing and diminish a person's response to vaccines against hepatitis B and influenza, [And] A higher risk of giving birth to premature, low-birth weight infants."

HERPES and HIV (AIDS) RELATED RESEARCH

Ebina, et. al., 1983, *The Lancet*, Vol. 29 No 2 pp. 1029-1030: "Prevention of Rotavirus Infection By Cow Colostrum Containing Antibody Against Human Rotavirus": **Japanese researchers exposed cattle to oral doses of rotavirus which causes severe diarrhea and bowel inflammation in humans. Colostrum from these cows contained antibodies which, when fed to humans, prevented them from getting rotavirus.**

Stephan, Dichtelmuller and Lissner, 1989, *Journal of Clinical Chem. And Clinical Biochem.*, Vol. 28, 1990, no 1: "Antibodies from Colostrum in Oral Immunotherapy": **Spray dried concentration of immunoglobulin preparation for oral use from pooled source of 100 cows was found to be highly effective in treatment of severe diarrhea e.g. in AIDS patients. After treatment no cryptosporidia were found in stools where it had been previously detected.**

Foothill, Oak and Mott, 1990, *Archives of Disease in Childhood*, Vol. 65 pp 813-14: "Case Report": **Favorable treatment of Ctryptosporidiosis with pooled bovine colostrum via oral administration was reported.**

Nord, DiJohn, Tripori, Tacket, 1990, *AIDS*, Vol. 4(6) pp. 581-4: "Treatment with bovine hyperimmune colostrum of cryptosporidial diarrhea in AIDS patients": **Double Blind, controlled pilot study of hyperimmune colostrum in five AIDS patients by nasitic infusion. Conclusion that treatment was effective. More studies suggested.**

Ungar, Ward, Fayer and Quinn, 1990, *Gastroenterology*, Vol. 98 pp. 486-89: "**Cessation of Cyprtosporidium-Associated Diarrhea in an AIDS Patient after oral treatment with Hyperimmune Bovine Colostrum**": **Cryptosporidium absent after treatment.**

Desert News, Salt Lake City, Utah June 19, 1991 Mentioned Study by protozoologist Ron Fayer US Dept. of Agric.: **Two AIDS patients with cryptosporidium caused diarrhea were relieved of symptoms in treatment with hyperimmune colostrum. A larger study to continue at Johns Hopkins Hospital. Dr. Bruce Anderson a veterinary pathologist at the University of Idaho stated: "There have been over 50 drugs tried to relieve AIDS patients diarrhea, they didn't work. But this hyper immune colostrum does."** Anderson is credited with suggesting this form of therapy because he noticed that a number of veterinary students would come down with cryptosporidiosis after contact with cattle who had disease. He theorized that immune capability could be transferred to humans.

Flanigan, Marshall, Redman, Kaetzel, Ungar, 1991 *Journal. Prtozool Nov-Dec*, Vol. 38(6): 225s-227s A. **Diarrhea producing Cryptosporidium parvum infection treated effectively with oral ingestion of bovine colostrum. B. Also effective in treatment of prophylaxis and rotavirus gastroenteritis C. Hyper immune cows colostrum and regular cows colostrum compared: Parasite infections reduces 82% in presence of hyperimmune and 67% in regular colostrum.**

Immunoglobulin to Prevent Nosocomial Infections, *New England Journal of Medicine*, July 23, 1992, Vol. 327 No 4 p 269. **Immunoglobulin from bovine colostrum effective in reducing and preventing infections in immune deficient subject: bone marrow recipients, premature babies, AIDS, etc.** Problem: obtaining high and consistent levels of functional antibodies though donor selection. Could improve through pooled selection, selective donor immunization.

Jage, Kampmann, Kolb, et. al., 1992, *Clin. Investigation* Jul.; 70(7): 588-94 Reported: A. Immunoglobulins from bovine colostrum (lactobin, biotest, Dreieich, FRG) contain high titres of antibodies against a wide range of bacterial, viral and protozoa pathogens, as well as against various bacterial toxins. B. Lactobin quite resistant to gastric acids. C. Effective in the treatment of opportunistic infections that cause diarrhea. **Treatment and effectiveness in AIDS patients verified, where no other treatment was effective.**

Rump, et. al., 1992, *Clinical Investigator*, Vol. 70 pp. 588-94: Treatment of Diarrhea in AIDS and bone marrow transplant patients with bovine colostrum: **Reported colostrum quite resistant to gastric juice. Oral treatments very effective. No side effects.**

Plettenberg, et. al., 1993, *Clinical Investigator*, Vol. 71 pp 42-45: **Open study of 25 AIDS patients with cryptospoidiosis were treated with a daily oral dose of 10g of bovine colostrum for 10 day period. Complete remission reported in 40% and partial remission in 24% of patients described. Treatment is judged overall: effective.**

New Scientist, Jan. 8, 1994: **Reported an Australian Co. has been involved in successful human trials with an oral administration of over 500 patients in hospitals in India, Hong Kong and Australia with hyperimmune colostrum specific for rotavirus a diarrhea causing virus rampant in third world countries but common in developed countries also.**

Rouse, B.T. et. al., 1976, *Infection and Immunity*, 13, pp. 1433. Antibody-dependent Cell-Mediated Cytoxicity in Cows: Comparison of Effector Cell Activity Against Heterologous Erthrocyte and Herpes-Virus-Infected Bovine Target Cells: "Bovine leukocytes have antibody dependent cell-mediated cytotoxicity against bovine herpesvirus." **Bovine colostrum cells with antibody were able to kill cells infected with herpes simplex in vivo.**

Kohl, S. et. al., 1978, *Journal of Clinical Laboratory Immunology*, 1, pp. 221-224. "Human Colostral Cytotoxicity: Antibody-Dependent Cellular Cytotoxicity Against Herpes Simplex-Infected Cells Mediated by Colostral Cells": **Colostral cells along with antibody were found to destroy herpes simplex-infected cells.**

Raloff, *Science News*, Apr. 15, 1995 Vol. 147 p 231(1) More Ways Mother's Milk Fights Disease: Contains Retinoic Acid which helps baby fight herpesvirus. The **glycoprotein kappa casein protects against H. Pylori bacteria that causes stomach ulcers**, (Retinoic acid and kappa casein found in bovine colostrum also).

Isaacs, et. al., 1995, *Science*, April pp 231: **"Reporting in Experimental Biology '95: teams confirmed colostrum delivers not just antibodies but a battery of infection fighting agents. Among them, retinoic acids a Vitamin A derivative. Dr. Charles E. Isaacs et. al. at New York State Institute for Basic Research on Staten Island, NY, infected culture cells with herpesvirus, his findings were that only retinoic acids conferred protection and reduced colonization. He concluded that while retinoic acids were not a cure, it effectively reduced the herpes virus to levels (1/100 to 1/10,000 viruses remained active after treatment) where the bodies immune system could fight off an outbreak.**

Harmsen, et. al., *Jour. Infectious Disease* 1995 Vol. 172 p 380-8 Antiviral effects of plasma and milk proteins: lactoferrin shows potent activity against both human immunodeficiency virus HIV and human cytomegalovirus HCMV in vitro: **"Only native and conformationally intact Lactoferrin from bovine colostrum or human milk could completely block Cytomegalovirus infection. Moreover, native Lactoferrin also inhibited the HIV-1 induced cytopathic effect. When negatively charged groups were added to Lactoferrin by succinylations there was 4-fold increased anti-viral effect on HIV. Lactoferrin likely exerts its effect at the level of virus absorption or penetration (or both), because after cytomegalovirus penetrated cellular tissue the ongoing infection could not be further inhibited.**

Fisher, Jeffery, 1994, *Futuristic Nov-Dec*: "Book Review; "The Plague Makers" Simon and Schuster, NY. "Antibiotics taken in successive and prolonged doses may suppress the immune system enough to allow unusual forms of mycoplasma bacteria to develop. These bacteria interact with HIV to form AIDS. Antibiotics act as catalyst for the process. **Warns against the reliance on antibiotics. Suggests alternative means to stimulate immune response.**

Deseret News, SLC, Utah, Apr. 6, 1995: **Component of Human Milk Blocks HIV Infection:** "Research reported in the March issue of the Journal Of Nutrition by David Newburg of the Harvard Medical School, reported a component called chondroitin sulfate blocks the binding of HIV to its host cell receptor. This could limit the postnatal transmission of HIV in breast fed infants of HIV infected mothers.

Nowa, McMichael, *Scientific American* Aug. 1995 p 58-65. How HIV defeats the immune system: "Continuous and dangerous evolution of HIV virus underlies body and medical sciences inability to find means to defeat. Vaccines not effective, virus mutates too quickly and there are too many mutant variations. **Reducing viral levels in the body and stimulating natural immune capabilities have the most promise to help natural immune system contain the virus.**

GROWTH FACTORS: IMPLICATIONS IN HEALING AND PHYSIOLOGY

Dohm, G. Lynis, et al, Sept. 1990, *Diabetes* Vol, 39. "IGF-1 Stimulated Glucose Transport in Human Skeletal Obesity and NIDDM." "Based on the observation that insulin-like growth factor 1 (IGF-1) can stimulate glucose utilization in non-diabetic subjects...IGF-1 might provide an effective acute treatment for the hyperglycemia of NIDDM." "Presence of IGF-1 receptors in human muscle, with IGF-1 binding being 24% that of insulin. There was no change in IGF-1 bind in muscle from obese or diabetic subjects..." **"IGF-1 stimulated glucose transport approximately twofold..."**

Mero, Antti; et al. The Dept. of Biology of Physical Activity, Univ. Of Jyväskylä, **Finland.** *The American Physiological Society.* 1997. Effects of bovine colostrum supplementation on serum IGF-1, IgG, hormone,

and saliva IgA during training. **Bovine colostrum supplement increased serum IgF-1 concentration in athletes during strength and speed training.**

Antonio, PhD. CSCS, Jose. *Muscle and Fitness*. May 1998. BODY BUILDING SCIENCE- From the Weider Research Group. Can Bovine Colostrum Enhance Levels of IGF-1? **Studies indicate that bovine colostrum supplementation can increase levels of IGF-1.**

Gil, Angel, Sanchez-Medina, 1981, *Journal of Dairy Research*, Vol. 48 pp. 35-44. "Acid Soluble Nucleotides of Cow's, etc.": **Bovine colostrum was found to contain seven different nucleotides which are important for normal cell function and repair.**

Ballard, Neild, Francis et. al., 1982, *Journal of Cellular Physiology*, 110 pp 249-254. "The Relationship Between the Insulin Content and Inhibitory Effects of Bovine Colostrum on Protean Breakdown": **Insulin-like ingredient in bovine colostrum (igF-1) slows protein breakdown. Protein breakdown was also slowed by addition of colostrum to a cell line known to be unresponsive to insulin, indicating the presence of non-insulin growth factors in bovine colostrum.**

Sporn, et. al., 1983, *Science*, 219 pp. 1329-31: "Polypeptide Transforming Growth Factors (TGF A & B) and Epithelial Growth Factor Isolated from Bovine Colostrum Used for Wound Healing in Vivo": **Growth factors in bovine colostrum were found to be very effective in promoting wound healing. Implications for trauma, and surgical healing. External and internal applications implied.**

Ballard et. al., *Biochem J*. 1983 Vol 210, 243-249: Effects of anabolic agents on protein breakdown: **"Protein degradation is inhibited by bovine colostrum.** Anabolic agents such as trenbolone, diethylstilboestrol, and testosterone do not alter rates of intercellular protein breakdown."

Ballard, Francis, Geoffrey, 1983, *Journal of Biochemistry*, Vol. 210 pp. 243-249: "Effects of Anabolic Agents on Protein Breakdown in L6 Myoblasts": **Describes how protein breakdown in tissue due to injury is inhibited by several anabolic agents especially an insulin-like substance (IgF-1) found in bovine colostrum.**

Noda, et.al., 1984, *Gann*, Vol. 75, 109-112. **Japanese researchers discovered that Transforming Growth Factors A and B (TGF A & B) in bovine colostrum were involved in normal cellular activities such as embryonic development, cell proliferation, and tissue repair. They also reported it promoted the synthesis and repair of DNA – the master code of the cell.**

Francis, 1986, *Biochemical Journal*, 233(1) pp. 207-213; "Purification and Partial Sequence Analysis of Insulin-like Growth Factor 1 from Bovine Colostrum" **showed bovine IgF-1 to be identical to human IgF-1.** Described purification process for extraction of IgF-1 from colostrum.

Roberts, Sporn, Assoian, et. al., 1986, *Procedures of the National Academy of Sciences*, Vol. 83, pp. 4167-71: "Transforming Growth Factor Type B: Rapid Induction of Fibrosis and Angiogenesis in Vivo and Stimulation of Collagen Formation in Vitro: Ristow, et. al., pp. 5531-5533. Reports BSC-1 growth inhibitor type B transforming factor is a strong inhibitor of thymocyte (T-lymphocyte precursor) proliferation (presence in bovine colostrum confirmed: Noda, 1984)

Seyedin, Thompson, Bentz, et. al., 1986, *Journal of Biol. Chemistry*, Vol. 261, pp. 5693-95: **Reported Cartilage Inducing Factor-A in colostrum and its apparent affinity to Transforming Growth Factor B (in human and bovine colostrum), and its relationship to cartilage repair.**

Francis, G.L., et. al. 1988, *Biochem. J.*, 251:95-103. Insulin-like growth factors 1 and 2 in bovine and colostrum. **"...The sequence of bovine IGF-1 was found to be identical with that of human IGF-1,..."**

Francis, Upton, Ballard, McNeil, 1988, *Journal of Biochemistry*, Vol. 251: 95-103 (printed in Great Britain): "Insulin-Like Growth Factors 1 & 2 in Bovine Colostrum": Two growth factors similar to insulin were purified from bovine colostrum. **IGF-1 found to be identical to the corresponding human growth**

factor. In this experiment protein synthesis was increased and protein breakdown was reduced by administration of bovine colostrum extracts.

Oda, Shinnichi, et. al., 1989, *Comparative Biochemical Physiology, A: Comparative Physiology*, Vol. 94A No 4 pp. 805-808: "Insulin-Like Growth Factor 1, GH, Insulin and Glycogen Concentration in Bovine Colostrum and in Plasma of Dairy Cows": **Bovine colostrum contains high levels of growth factors that promote normal cell growth and DNA synthesis.**

Tollefsen, Lajara, McCusker, Clemmons, 1989, *Journal of Biological Chemistry*, Vol. 264 No 23. Aug. 15: "Insulin-Like Growth Factors (IgF) in Muscle Development": IgF's role in differentiation, repair, synthesis, and their interplay with other necessary growth factors. **IgF-1 only factor that can stimulate muscle growth and repair by itself. Eliminates catabolism and stimulates anabolism at the cellular level.**

Tollefsen, Sherida E., et. al., 1989, *The Journal of Biological Chemistry*, Vol. 264, No 23, August 15, Insulin-Like Growth Factors (IGF) in Muscle Development. "...**Studies demonstrate that several components critical to IGF action are produced in a fusing skeletal muscle cell line in a differentiation-dependent manner and suggest that both IGF-1 and IGF-2 may be autocrine factors for muscle.**"

Watson, Dennis L., et. al. 1990, *Journal of Dairy Research*, 59, 369-380, Factors in ruminant colostrum that influence cell growth and murine IgE antibody responses. **"We conclude that bovine colostrum contains cell-growth factors that are able to regulate the IgE response in a heterologous species."**

Allen and Rankin, 1990, *PSEBM* Vol. 194, Muscle Biology Group, Dept. of Animal Sciences and Physiology, Univ. of Arizona, Tucson, AZ. **Reported: A. Fibroblast growth factor (FGF) stimulates proliferation but depresses differentiation of muscle cell growth. B. Insulin Like Growth Factor (IGF-1) stimulates both. C. Transforming Growth Factor (TGF-b) slightly depresses proliferation and inhibits differentiation. Conclusion: When administered in combination these factors induce satellite cells to grow, regenerate and proliferate. Following, these cells will fuse with one another or the adjacent muscle fiber thereby increasing myonucleus numbers for growth and repair. All three Factors found in bovine colostrum.**

Ullman, et. al., *Acta Physiol. Scand.* 1990 Vol 140 p 521-5: Effects of Growth Hormone on muscle regeneration and Igf-1 concentration in old rats: **"High age is associated with reduced levels of GH and IgF-1. Administration of growth hormone raises level of IgF-1 to that of young rats. With increased IgF-1 the reduced protein synthesis of old rats is restored, caused increased muscle tissue in normal and regenerating muscle tissue, and increased maximum contraction force."**

Patureau-Mirand, Posone, Levieux, Attaix, et. al., 1990, *Biol. Neonate* Vol. 57(1): 30-6 **Reported that Colostrum stimulated intestinal protein synthesis.**

Skottner, Arrhenius-Nyberg, Kanje and Fryklund, 1990, *Acta Paediatric Scand.* (suppl) 367: 63-66. **A. IGF-1 resulted in significant body weight gain and significant bone growth. B. Topical administration to wounds resulted in more effective healing. C. Stimulated nerve regeneration.**

Dohm, Elton, Raju, Mooney, Pories, Flicklinger, Atkinson, 1990, *Diabetes* 39: 1028-32, Reported that: **A. IGF-1 stimulates glucose utilization. B. IGF-1 receptors in muscle tissue is normally occurring in humans. C. IGF-1 effective treatment for Hyperglycemia.**

Tokuyama H, et. al., *Growth Factors*, 1990, Vol. 3 pp. 105-114, "Isolation of Two New Proteins from Bovine Colostrum Which Stimulate Epidermal Growth Factor-Dependent Colony Formation of NRK-49F Cells". "...results suggest that BC-1 and BC-2 belong to a new class of mitogen/inhibitors."

Thissen, et. al., *Endocrinology*, 1991 Vol. 129 p 429-35: Evidence that pretranslational and translational defects decrease serum IGF-1 concentrations during dietary protein restriction: **"Dietary protein**

restriction causes GH (growth hormone) resistance and decreases IGF-1 serum levels.” (Implications in loss of muscle mass related to protein deprivation).

Marcotty et. al., *Growth Regulation* 1991 Longman Group UK: IgF-1 from cow colostrum: Characterization: “IgF-1 potent stimulator of growth and differentiation of numerous cell types. **Bovine sequence identical to Human IgF-1.**

Lundeberg, et.al., *W.B. Saunders Co.* 1991: Growth Hormone Improves Muscle Protein Metabolism: “Human Study indicated: **GH prevented catabolism in muscle and improved whole body nitrogen economy. Investigations of the possible beneficial effects of GH to prevent skeletal muscle deterioration after surgical trauma are advocated.”**

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factor IGF-1 and epithelial growth factor are important for wound healing.” Treatment implications for trauma and surgical wounds, accelerated healing possible.

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ANTI-AGING ASPECTS

Nunzi, Maria Grazia; et. al. *Phospholipids*, 1990. Therapeutic Properties of Phosphatidylserine in the Aging Brain. **Research results may justify the use of natural phospholipids (a component found in bovine colostrum) as a therapy for treating brain aging.**

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Cenacchi, T.; et. al. *Aging Clin. Exp. Res.* 5: 123-133, 1993. Cognitive decline in the elderly: A double-blind, placebo-controlled multicenter study on efficacy of phosphatidylserine administration. **Behavioral and cognitive abilities improved significantly after administration of phosphatidylserine, a component found in milk & bovine colostrum.**