NuVet Labs®

"Your Pet's Best Friend"

NuVet Plus Nutritional Supplement Ingredients & Nutrients + Related Studies

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NUVET PLUS® INGREDIENTS

ALFALFA

(Canine formula only) – A nutritious source of enzymes, proteins, phytochemical substances such as chlorophyll, and minerals such as iron, calcium, and zinc[1]. It is an excellent source of vitamins A, B, C, D, E, K, and U[1]. Functions as a prebiotic, aiding digestion by influencing enzyme activity in the gastrointestinal tract and promoting the growth of beneficial bacteria. Helps maintain a healthy appetite and aids both urinary and bowel functioning. Its mineral rich properties helps strengthen immunity, support blood circulation[1], promote red blood cell production[1,2].

References:

Studies relating to alfalfa's importance to digestion and immunity:

1. *E. Gawel. Chemical composition of lucerne leaf extract (EFL) and its applications as a phytobiotic in human nutrition. Acta Sci Pol Technol Aliment. 2012 Jul-Sep; 11(3): 303-10. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/22744951*

2. *S. Vyas, S. M. Collin, E. Bertin, G. J. Davys, and B. Mathyr. Leaf concentrate as an alternative to iron and folic acid supplements for anaemic adolescent girls: a randomized controlled trial in India. Public Health Nutrition, 2010 March; 13(3): 418-423. Web URL: https://www.cambridge.org/core/journals/public-health-nutrition/article/leaf-concentrate-as-an-alternative-to-iron-and-folic-acid-supplements-for-anaemic-adolescent-girls-a-randomised-controlled-trial-in-india/E34DF9BE67F03F97AB40AC13910F3595/core-reader*

ALPHA AMYLASE

A digestive enzyme that augments the metabolism of carbohydrates supporting digestion and promoting improved energy[2]. Assists in the absorption of nutrients into the cellular network. An antioxidant which protects cells by neutralizing free radicals[1].

References:

Studies relating to alpha amylase's antioxidant properties and ability to support healthy digestion:

1. *S.O. Oyedemi, B.O. Oyedemi, I.I. Ijeh, P.E. Ohanyerem, R.M. Coopoosamy, O.A. Aiyegoro. Alpha-Amylase Inhibition and Antioxidative Capacity of Some Antidiabetic Plants Used by the Traditional Healers in Southeastern Nigeria. Scientific World Journal. 2017 March. Web URL:* https://www.ncbi.nlm.nih.gov/pubmed/28367491

2. *Barrett, Marilyn L, and Jay K Udani. "A Proprietary Alpha-Amylase Inhibitor from White Bean (Phaseolus Vulgaris): A Review of Clinical Studies on Weight Loss and Glycemic Control." Nutrition Journal 10 (2011): 24. PMC. Web. 23 Oct. 2017.Web URL:* *https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3071778/*

AMINO ACIDS

Plays an essential role in overall health. Aids in building new proteins, muscle, bone and tendon cells. Supports a healthy metabolism, brain function and immune system. Assists in the creation of proteins that facilitate growth[2], aid in metabolism and digestion[1], and are used to maintain healthy skin and coat[3]. Supports balanced mood by supporting lipid and tryptophan metabolic pathways[4]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, and Whey Protein (feline formula).

They are used in every part of the body; ranging from the proteins in muscles to the antibodies that support a healthy immune system. They aid a healthy metabolism by assisting in the breakdown of foods into chunks that can be absorbed; supporting healthy digestion and nutrient absorption, improving energy, and promoting a high quality of living.

References:

1. *D.S. Smith. Amino Acids and Probiotics Equals Good Digestion. Healthy Livings Magazine. Web URL: http://hbmag.com/amino-acids-probiotics-good-digestion/*

Studies relating to the importance of amino acids for metabolism and growth:

2. *J.A. Chromiak and J. Antonio. Use of amino acids as growth hormone-releasing agents by athletes. Nutrition. 2002 Jul-Aug; 18(7-8):657-61. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/12093449*

3. *R. W. Young. The Amino Acid Composition of Chinchilla Fur in Relation to the Fur Chewing Syndrome. Thesis: Virginia Polytech Institute 1957. https://vtechworks.lib.vt.edu/bitstream/handle/10919/45584/LD5655.V855_1957.Y686.pdf?sequence=1&isAllowed=y*

4. *J. Puurunen, K. Tiira, M. Lehtonen, K. Hanhineva, and H. Lohi. Non-targeted metabolite profiling reveals changes in oxidative stress, tryptophan and lipid metabolisms in fearful dogs. Behav Brain Funct. 2016: 12;7. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/26867941*

ARGININE

An amino acid that supports the production of collagen and aids the amino acid lysine in promoting healthy bones[1]. Essential for the body's protein manufacturing process. Metabolically versatile amino acid, serves as a precursor for the synthesis of urea, nitric oxide, polyamines, proline, glutamate, creatine and agmatine. Healthy levels of arginine are supported by the enzyme papain, which breaks down complex proteins to produce arginine for use in the body[2]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula.)

References:

1. *University of Maryland Medical Center. Lysine. Web URL: http://www.umm.edu/health/medical/altmed/supplement/lysine*

2. *S. Tokura, N. Nishi, and J. Noguchi. A New Substrate for Papain, Benzoyl-L-arginine-p-nitroanilide (L-BAPA). Journal of Biochemistry. 1971. 69:599-600. Web URL: https://www.jstage.jst.go.jp/article/biochemistry1922/69/3/69_3_599/_article*

Studies relating to the importance of arginine to immune system activity:

3. *Fish Shellfish Immunol. 2012 May;32(5):762-8. Epub 2012 Feb 3. Arginine and glutamine supplementation to culture media improves the performance of various channel catfish immune cells. Pohlenz C, Buentello A, Mwangi W, Gatlin DM 3rd. Department of Wildlife and Fisheries Sciences and Intercollegiate Faculty of Nutrition, Texas A&M University System, College Station, TX 77843, USA; Aquaculture Protein Centre, CoE, Norway.Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22326940*

ASPARTIC ACID

Strengthens the immune system by boosting immunoglobulin$_2$ and antibody production and promoting the chelation of minerals such as calcium, potassium and magnesium aspartate. Supports healthy nervous system function and promotes healthy hormone production and release$_1$. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, and Whey Protein (feline formula).

References:

1. *University of Maryland Medical Center. Asparic acid. Web URL: http://www.umm.edu/health/medical/ency/articles/aspartic-acid*

Studies relating to the importance of asparactic acid to immune system activity:

2. *Pediatric Neurology, P.D. Hinduja Hospital, Mumbai, Maharashtra, India Pediatr Neurol. 2012 Apr;46(4):246-9. Nonparaneoplastic Anti-N-Methyl-d-Aspartate Receptor Encephalitis: A Case Series of Four Children. Raha S, Gadgil P, Sankhla C, Udani V. Department of Pediatric Neurology, P.D. Hinduja Hospital, Mumbai, Maharashtra, India. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22490772*

3. *Biometals. 2012 Feb 19. [Epub ahead of print] Zinc aspartate suppresses T cell activation in vitro and relapsing experimental autoimmune encephalomyelitis in SJL/J mice. Stoye D, Schubert C, Goihl A, Guttek K, Reinhold A, Brocke S, Grüngreiff K, Reinhold D. Institute of Molecular and Clinical Immunology, Otto-von-Guericke-University, Leipziger Str. 44, 39120, Magdeburg, Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22350510*

BETA CAROTENE

Serves as a powerful antioxidant that helps neutralize free radicals and maintain a strong immune system. Crucial for maintaining healthy vision, skin and coat. Helps maintain a healthy heart[1]. It converts into Vitamin A as needed by the body. Vitamin A supports healthy cell division and is essential support for healthy vision[1], skeletal growth, reproductive function, embryonic development, differentiation of tissues and may help with discolored eyes[2].

References:

1. *Univerisity of Meryland Medical Center. Beta-carotene. Web URL: http://www.umm.edu/health/medical/altmed/supplement/betacarotene*

Studies relating to the effects of beta carotene on oxidative damage and eye health:

2. *Cumming RG, Mitchell P, Smith W. Diet and cataract: the Blue Mountains Eye Study. Ophthalmology. 2000;107(3):450-56. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/10711880*

3. *Am J Vet Res. 2000 Aug;61(8):886-91. Effects of dietary antioxidant supplementation on oxidative damage and resistance to oxidative damage during prolonged exercise in sled dogs. Baskin CR, Hinchcliff KW, DiSilvestro RA, Reinhart GA, Hayek MG, Chew BP, Burr JR, Swenson RA. Department of Veterinary Clinical Sciences, Veterinary Teaching Hospital, The Ohio State University, Columbus 43210, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/10951977*

BIOFLAVONOIDS

Plant-derived polyphenolic compounds with various health benefits. A class of powerful antioxidants that protect cells from oxidative damage[1]. Supports a healthy vascular system[1]. Found in: Alfalfa, Blue Green Algae, Pine Bark, Evening Primrose Oil.

References:

Studies relating to bioflavonoid's antioxidant properties:

1. *Sebastian, R.S. etal. A New Database Facilitates Characterization of Flavonoid Intake, Sources, and Positive Associations with Diet Quality Among US Adults. Journal of Nutrition. 2015 June. 145(6): 1239-1248. Web URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4442120/*

2. *Food Chem Toxicol. 2010 Nov;48(11):3125-30. Epub 2010 Aug 20. Antioxidant activity of selected plant species; potential new sources of natural antioxidants. Nićiforović N, Mihailović V, Masković P, Solujić S, Stojković A, Pavlović Muratspahić D. Faculty of Science, Department for Chemistry, University of Kragujevac, Kragujevac, Serbia. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/20728497*

BLUE GREEN ALGAE

A rich nutritional food that contains a greater amount of protein than any other whole food. It provides essential amino acids, chlorophyll and trace minerals. Helps support a healthy immune system. Promotes intestinal regularity and helps maintain healthy weight[2,3]. Boost hemoglobin production, purifies the blood and assists in stabilizing proper blood sugar levels. Aids in cholesterol-reduction and mineral-absorption. Helps maintain tissue integrity[1]. Is a powerful antioxidant that can reduce damage to cells by neutralizing free radicals[1].

References:

1. *M. Raposo, R. Costa de Morais, and A. Bernado de Morais. Author Presentation of : Health applications of bioactive compounds from marine microalgae. Life Sciences. 2013 October 93(15): 479-486. Web URL: http://www.sciencedirect.com/science/article/pii/S0024320513004578*

Studies relating to blue green algae's role in digestive health:

2. *C. Wan-Loy and P. Siew-Moi. Marine Algae as a Potential Source for Anti-Obesity Agents. Marine Drugs. 2016 December 14(12): 222; Web URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5192459/*

3. *P. I. Chater, M. D. Wilcox, D. Houghton, and J. P. Pearson. The role of seaweed bioactives in the control of digestion: implications for obesity treatments. Food and Function. 2015 11. Web URL: http://pubs.rsc.org/en/Content/ArticleLanding/2015/FO/C5FO00293A#!divCitation*

BREWER'S YEAST

A balanced, natural source of B-vitamins, including folic acid, which helps maintain healthy skin, coat, nerves and eyes. It is a nutritional supplement that can provide energy, support the nervous system and enhance the immune system. Contains vitamins that help digest carbohydrates, fats, and proteins, supporting a healthy digestive tract[1]. Its antioxidant properties further helps support healthy digestion[2]. Good source of chromium[1] which support healthy weight by supporting healthy metabolism[3].

References:

1. *University of Maryland Medical Center. Brewer's Yeast. Web URL: http://www.umm.edu/health/medical/altmed/supplement/brewers-yeast*

Studies relating to brewer's yeast antioxidant properties and effects on digestion:

2. *M. Fakruddin, N. Hossain, M. M. Ahmed. Antimicrobial and antioxidant activities of Saccharomyces cerevisiae IFST062013, a potential probiotic. BMC Complement Alternative Medicine. 2017 January. 17:64. Web URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5251302/*

3. *R.A. Anderson. Effects of chromium on body composition and weight loss. Nutr Rev. 1998;56(9):266-270. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/9763876*

CALCIUM

An essential mineral that is used to support healthy bones and teeth and cardiovascular system[1]. Promotes healthy muscle function and development. The heart requires calcium to maintain a normal beat. Necessary for muscles to contract and relax[1]. Required for nervous system to function properly and for blood to clot. Essential to all cell functionality. Works synergistically with phosphorus[2]. Found in: Alfalfa, Blue Green Algae, Chicken Liver, Oyster Shell, Shark Cartilage, Whey Protein (feline formula.)

References:

1. *University of Maryland Medical Center. Calcium. Web URL: http://www.umm.edu/health/medical/altmed/supplement/calcium*

2. *University of Maryland Medical Center. Phosphorus. Web URL: http://www.umm.edu/health/medical/altmed/supplement/phosphorus*

CAT'S CLAW (Uña de Gato)

A Peruvian herb that indigenous peoples have used for centuries for its amazing beneficial properties. Its antioxidant properties nourish the immune system, cleanse the intestinal tract, enhance white blood cell formation and promote cardiovascular health. Promotes healthy joints and may aid in mobility and flexibility[1]. Has strong antioxidant properties that support healthy digestion through promoting a healthy microbial community[2].

References:

Studies relating to cat's claw's beneficial properties:

1. *M.J.S. Miller, K. Mehta, S. Kunte, etal. Early Relief of Osteoarthritis Symptoms with a Natural Mineral Supplement and a Herbomineral Combination: A Randomized Controlled Trial [ISRCTN38432711]. J Inflam (London) 2005 October 2:11. Web URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1276811/*

2. *M. Navarro-Hoyos etal. Proanthocyanidin Characterization and Bioactivity of Extracts from Different Parts of Uncaria tomentosa L. (Cat's Claw). Antioxidants (Basel). 2017 February. 4(6):12. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28165396*

CHICKEN LIVER

Whole paddle-dried chicken liver provides valuable nutrients and a delicious flavor for canine and feline companions. It's a rich source of essential amino acids, B-vitamins & folic acid, iron, copper and magnesium. Strengthens the nervous system. Aids in digestion, proper tissue development, increased energy levels and production of red blood cells. Provides the vitamins and minerals in the creation of proteins that facilitate growth[2], aid in metabolism and digestion[4], and are used to maintain healthy skin and coat[3]. Supports balanced mood[4].

References:

1. *D.S. Smith. Amino Acids and Probiotics Equals Good Digestion. Healthy Livings Magazine. Web URL: http://hbmag.com/amino-acids-probiotics-good-digestion/ not scientific source, but has good references.*

Studies relating to the nutrients in chicken liver:

2. *J.A. Chromiak and J. Antonio. Use of amino acids as growth hormone-releasing agents by athletes. Nutrition. 2002 Jul-Aug; 18(7-8):657-61. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/12093449*

3. *R. W. Young. The Amino Acid Composition of Chinchilla Fur in Relation to the Fur Chewing Syndrome. Thesis: Virginia Polytech Institute 1957. https://vtechworks.lib.vt.edu/bitstream/handle/10919/45584/LD5655.V855_1957.Y686.pdf?sequence=1&isAllowed=y*

4. *J. Puurunen, K. Tiira, M. Lehtonen, K. Hanhineva, and H. Lohi. Non-targeted metabolite profiling reveals changes in oxidative stress, tryptophan and lipid metabolisms in fearful dogs. Behav Brain Funct. 2016: 12;7. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/26867941*

CHLOROPHYLL

Chlorophyll is a green pigment found in most plants that allows plants to create energy. Enzymes and copper found in chlorophyll have strong antioxidant properties and protect cells from oxidative damage caused by free radicals$_2$. Found in: Alfalfa, Blue Green Algae, Primrose, Cat's Claw.

References:

1. *Bioelectrochemistry. 2008 Nov;74(1):58-61. Epub 2008 Apr 27. Phototoxicity and cytotoxicity of chlorophyll a/cyclodextrins complexes on Jurkat cells. Cosma P, Fini P, Rochira S, Catucci L, Castagnolo M, Agostiano A, Gristina R, Nardulli M. Dip. di Chimica, Università di Bari, Via Orabona 4, 70126 Bari, Italy. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/18539097*

Studies relating to chlorophyll's importance to the immune system, particularly as an antioxidant:

2. *J.W. Yu, R. Yang, and Y.S. Kim. Differential cytoprotective effect of copper- and iron containing chlorophyllins against oxidative stress-mediated cell death. Free Radic Res. 2010 Jun;44(6):655-67. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/20370562*

3. *Biochim Biophys Acta. 2000 Sep 27;1487(2-3):113-27. Chlorophyllin as an effective antioxidant against membrane damage in vitro and ex vivo. Kamat JP, Boloor KK, Devasagayam TP. Cell Biology Division,Bhabha Atomic Research Centre, 400 085, Mumbai, India. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/11018464*

COPPER

A needed mineral for healthy nerves, joints and skin. Helps maintain a healthy optic nerve[1]. Supports healthy immune function and the production of white blood cells[2]. Helps maintain bone mineral density supporting growth[2]. Helps with the formation of collagen, increases the absorption of iron and plays a role in energy production[1]. When taken in combination with manganese and zinc helps protect healthy bones[3].

References:

1. *University of Maryland Medical Center. Manganese. Web URL: http://www.umm.edu/health/medical/altmed/supplement/manganese*

Studies relating to the importance of copper to overall immune health:

2. *Oregon State University. Linus Pauling Institute Micronutrient Information Center. Minerals: Copper. Web URL: http://lpi.oregonstate.edu/mic/minerals/copper*

3. *Nutr Res. 2009 Jul;29(7):494-502. Differential impact of copper deficiency in rats on blood cuproproteins. Broderius MA, Prohaska JR. Department of Biochemistry and Molecular Biology,University of Minnesota Medical School, Duluth, MN 55812, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/19700037.*

ESSENTIAL FATTY ACIDS

Unsaturated fatty acids are called essential because animal bodies' require them for supporting healthy cell, gland and organ function. The body cannot synthesize the essential fatty acids on its own[1]. They must come from diet. They support healthy and shiny skin and coat appearance and aid in maintaining bone health, reproductive tissue, and central nervous system[1]. Found in: Chicken Liver, Evening Primrose Oil.

References:

1. *University of Maryland Medical Center. Omega-6 fatty acids. Web URL: http://www.umm.edu/health/medical/altmed/supplement/omega6-fatty-acids*

Studies relating to the health benefits of Omega-3's and Omega-6's for skin health:

2. *Vet Res Commun. 2011 Dec;35(8):501-9. Epub 2011 Jul 23. Analysis of epidermal lipids in normal and atopic dogs, before and after administration of an oral omega-6/omega-3 fatty acid feed supplement. A pilot study. Popa I, Pin D, Remoué N, Osta B, Callejon S, Videmont E, Gatto H, Portoukalian J, Haftek M. Laboratory for Dermatological Research EA4169 "Normal and Pathological Functions of the Skin Barrier", Université Lyon 1, Lyon, France. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21786009*

3. *Vet Dermatol. 2004 Jun;15(3):137-45. A randomized, controlled study to evaluate the steroid sparing effect of essential fatty acid supplementation in the treatment of canine atopic dermatitis. Saevik BK, Bergvall K, Holm BR, Saijonmaa-Koulumies LE, Hedhammar A, Larsen S, Kristensen F. Department of Small Animal Clinical Sciences, The Norwegian School of Veterinary Science, PO Box 8146, Dep., N-0033 Oslo, Norway. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/15214949*

EVENING PRIMROSE OIL

A rich source of gamma linolenic acid, an essential polyunsaturated fatty acid that helps support a healthy cardiovascular system and healthy eyes[1]. Supports healthy joints[2], helps lower cholesterol, and aids in regulating blood pressure. It is rich in omega 3 and 6 fatty acids which help maintain healthy skin, coat, and bone structure. Speeds up and improves energy during recovery promoting higher quality of life[3].

References:

1. *University of Maryland Medical Center. Alpha-linolenic acid. Web URL: http://www.umm.edu/health/medical/altmed/supplement/alphalinolenic-acid*

Studies relating to evening primrose oil's contribution to joint and general health:

2. *M. Veselinovic etal. Clinical Benefits of n-3 PUFA and alpha-Linolenic Acid in Patients with Rheumatoid Arthritis. Nutrients. 2017 9(4). Web URL: http://www.mdpi.com/2072-6643/9/4/325*

3. *Behan PO, Behan WMH, Horrobin D. Effect of high doses of essential fatty acids on the postviral fatigue syndrome. Acta Neurol Scand. 1990;82:209–216. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/2270749*

FOLIC ACID

Form of vitamin B-9 that occurs naturally in a wide range of food. Necessary for healthy growth and division of cells. Helps regulate embryonic and fetal nerve cell formation supporting a healthy nervous system[2]. Needed for the formation of healthy red blood cells and energy production. Strengthens immunity by aiding the formation and functioning of healthy white blood cells. Aids liver and glandular health. Supports healthy ears and hearing[1]. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

Studies relating to folic acid's role in supporting healthy ears and cell formation:

1. *R. Martinez-Vega etal. Folic acid deficiency induces premature hearing loss through mechanisms involving cochlear oxidatice stress and impairment of homocysteine metabolism. FASEB Journal. 2015 Feb. 29(2):418-432. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/25384423*

2. *M. Viswanathan etal. Folic Acid Supplementation for the Prevention of Neural Tube Defects: An Updated Evidence Report and Systematic Review for the US Preventive Service Task Force. JAMA. 2017 January. 317(2):190-203. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28097361*

HISTIDINE

One of ten essential amino acids for pets. A precursor to histamine. Essential amino acids are required by an animals' body to support healthy cell, gland and organ function. Necessary for tissue growth and repair. Promotes red and white blood cell production, cleansing the body of toxins and maintaining antibodies to help resist harmful pathogens. Cannot be produced by the animal's body[1]. They must come from diet. Important for mood balance[2]. Flushes out heavy metals from the body. Supports healthy muscle function[2]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

1. *University of Maryland Medical Center. Amino Acids. Web URL: http://www.umm.edu/health/medical/ency/articles/amino-acids*

2. *PubChem. L-histidine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/L-histidine#section=Top*

3. *Biochemistry. 1997 Jun 3;36(22):6653-62. Histidine-rich glycoprotein binds to human IgG and C1q and inhibits the formation of insoluble immune complexes. Gorgani NN, Parish CR, Easterbrook Smith SB, Altin JG. Division of Immunology and Cell Biology, The John Curtin School of Medical Research, Australian National University, Canberra, ACT. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/9184145*

IRON

Helps with protein metabolism and promotes proper tissue growth. An essential mineral necessary for energy production. Important component of hemoglobin, needed in the formation of red blood cells which carry oxygen throughout the body, improving energy and promoting mood balance$_2$. Aids in maintaining healthy cells, skin, hair, and nails. Alongside of vitamin c helps support a healthy immune system$_1$. Found in: Alfalfa, Chicken Liver, Shark Cartilage, Whey Protein (feline formula.)

References:

1. *M. Ware. Reviewed by H. Webberley. What are the Health Benefits of Iron? MedicalNewsToday. Web URL: http://www.medicalnewstoday.com/articles/287228.php*

Studies relating to the importance of iron to a healthy immune system:

2. *Agarwal R, Nonhematological Benefits of Iron. Am J Nephrol 2007;27:565-571. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/17804903*

L-CYSTEINE

An amino acid found in many of the body's proteins. Supports healthy and shiny skin and coat[1]. Used in the production of L-Cystine[1]. Eliminates certain harmful chemicals from the body and contains a form of sulfur that helps neutralize free radicals. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

1. *PubChem. L-cysteine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/5862#section=Top*

Studies relating to L-cysteine's effects on the immune system:

2. *J Immunol. 2012 Apr 20. [Epub ahead of print] The Human Lactoferrin-Derived Peptide hLF1-11 Exerts Immunomodulatory Effects by Specific Inhibition of Myeloperoxidase Activity. van der Does AM, Hensbergen PJ, Bogaards SJ, Cansoy M, Deelder AM, van Leeuwen HC, Drijfhout JW, van Dissel JT, Nibbering PH. Department of Infectious Diseases, Leiden University Medical Center, Leiden, 2333 ZA, The Netherlands; Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22523385*

3. *Exp Parasitol. 2012 Apr 13. [Epub ahead of print] Evaluation of the efficacy of a recombinant Entamoeba histolytica cysteine proteinase (EhCP112) antigen in minipig. He GZ, Deng SX, An CW. Guiyang College of Traditional Chinese Medicine, Guiyang 550002, Guizhou Province, China. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22521909*

L-CYSTINE

The oxidized form of L-cysteine that protects bone and skin tissue[1]. Supports a healthy immune system and digestive tract[1]. Precursor of the antioxidant and detoxifying agent glutathione. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to L-cystine's importance to the immune system:

1. *PubChem. L-cystine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/67678#section=Top*

2. *J Vet Med Sci. 2010 Feb;72(2):157-65. Epub 2009 Nov 25. Combined administration of (L)-cystine and (L)-theanine enhances immune functions and protects against influenza virus infection in aged mice. Takagi Y, Kurihara S, Higashi N, Morikawa S, Kase T, Maeda A, Arisaka H, Shibahara S, Akiyama Y. Division of Virology, Department of Infectious Diseases, Osaka Prefectural Institute of Public Health, Osaka 537-0025, Japan. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/19940390*

3. *Amino Acids. 2010;2010:307475. Epub 2010 May 12. Effects of (L)-cystine and (L)-theanine supplementation on the common cold: a randomized, double-blind, and placebo-controlled trial. Kurihara S, Hiraoka T, Akutsu M, Sukegawa E, Bannai M, Shibahara S. Research Institute for Health Fundamentals, Ajinomoto Co., Inc., Kanagawa 210-8681, Japan. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22331996*

L-GLUTAMIC ACID

An amino acid that supports nerve function and improves energy by supporting healthy cellular metabolism (how cells make energy) [1]. L-glutamic acid occurs in proteins and appears widely throughout plant and animal tissue. It functions as an inhibitory neurotransmitter in the central nervous system[3]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to L-glutamic acid's importance to cellular metabolism, nerve and immune function:

1. *PubChem. L-glutamic acid. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/33032#section=Top*

2. *Arch Neurol. 2012 Mar 26. [Epub ahead of print] Autoimmune Epilepsy: Clinical Characteristics and Response to Immunotherapy. Quek AM, Britton JW, McKeon A, So E, Lennon VA, Shin C, Klein CJ, Watson RE Jr, Kotsenas AL, Lagerlund TD, Cascino GD, Worrell GA, Wirrell EC, Nickels KC, Aksamit AJ, Noe KH, Pittock SJ. McKeon, Lennon, Klein, and Pittock), Neurology (Drs Britton, McKeon, So, Lennon, Shin, Klein, Lagerlund, Cascino, Worrell, Wirrell, Nickels, Aksamit, and Pittock), Immunology (Dr Lennon), and Radiology (Drs Watson and Kotsenas), Mayo Clinic, College of Medicine, Rochester, Minnesota; and Department of Neurology, Mayo Clinic, College of Medicine, Scottsdale, Arizona (Dr Noe). Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22451162*

3. *Brain Pathol. 2012 May;22(3):412-21. doi: 10.1111/j.1750-3639.2012.00580.x. Epileptic encephalitis: the role of the innate and adaptive immune system. Bauer J, Vezzani A, Bien CG. Department of Neuroimmunology, Center for Brain Research, Vienna, Austria Department of Neuroscience, Mario Negri Institute for Pharmacological Research, Milan, Italy Hospital Mara, Epilepsy Center Bethel, Bielefeld, Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22497613*

L-LYSINE

An essential amino acid that supports healthy growth and tissue function[2]. Essential amino acids are required by an animal's body to support healthy cell, gland and organ function, but can't produce them in their own body[1]. They must come from diet. Necessary to the makeup of the body's proteins and contributes to healthy immune system activity by helping the body absorb calcium and produce antibodies[3]. Main sources – Brewer's Yeast, Chicken Liver, Whey Protein. Other sources - Alfalfa, Blue Green Algae.

References:

1. *University of Maryland Medical Center. Amino Acids. Web URL: http://www.umm.edu/health/medical/ency/articles/amino-acids*

Studies relating to lysine's importance to health body functions:

2. *PubChem. L-lysine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/5962#section=Top*

3. *Biochem Biophys Res Commun. 2012 Apr 17. [Epub ahead of print] Lysine-specific demethylase 1(LSD1) and histone deacetylase 1 (HDAC1) synergistically repress proinflammatory cytokines and classical complement pathway components. Janzer A, Lim S, Fronhoffs F, Niazy N, Buettner R, Kirfel J. Institute of Pathology, University of Bonn, Sigmund-Freud-Str. 25, 53127 Bonn, Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22542627*

L-METHIONINE

An essential amino acid that is not synthesized by the body and must be obtained from food or supplements. Helps to buffer and eliminate heavy metals in the body and maintain low histamine levels. It is also a powerful antioxidant and a good source of sulfur, which neutralizes free radicals and helps promote healthy skin, coat and nails. Essential for the absorption, transportation, and bioavailability of selenium and zinc in the body. Promotes mood balance and improves overall quality of life[1]. Supports healthy liver and protects healthy joints[1]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to the importance of L-methionine for immune system activity :

1. *S. Gregoire, etal. Therapeutic benefits of the methyl donor S-adenosylmethionine on nerve injury-induced mechanical hypersensitibity and cognitive impairment in mice. Pain. 2016 December. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28030474*

2. *Fish Shellfish Immunol. 2012 May;32(5):629-36. Epub 2012 Jan 10. Effects of graded levels of dietary methionine hydroxy analogue on immune response and antioxidant status of immune organs in juvenile Jian carp (Cyprinus carpio var. Jian). Kuang SY, Xiao WW, Feng L, Liu Y, Jiang J, Jiang WD, Hu K, Li SH, Tang L, Zhou XQ. Animal Nutrition Institute, Sichuan Agricultural University, Ya'an 625014, China;Animal Nutrition Institute, Sichuan Academy of Animal Science, Chengdu 610066, China.http://www.ncbi.nlm.nih.gov/pubmed/22245840.*

L-ORNITHINE

An amino acid that supports liver and kidney function[1]. Supports immune system health by strengthening the thymus gland. A strong thymus gland produces T cells to protect the body against harmful microorganisms[3]. Helps maintain healthy nitrogen levels in the body[1]. Precursor of L-glutamic acid. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to L-ornithine's importance to healthy immune function:

1. *PubChem. L-ornithine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/6262#section=Top*

2. *Scand J Gastroenterol. 2012 May;47(5):565-71. Alpha-ketoglutarate (AKG) inhibits proliferation of colon adenocarcinoma cells in normoxic conditions. Rzeski W, Walczak K, Juszczak M, Langner E, Pożarowski P, Kandefer-Szerszeń M, Pierzynowski SG. Department of Virology and Immunology, Institute of Microbiology and Biotechnology, Maria Curie-Skłodowska University , Akademicka, Lublin, Poland. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22486188*

3. *J Immunol. 2011 Apr 1;186(7):4396-404. Epub 2011 Feb 23. N-α-benzoyl-N5-(2-chloro-1-iminoethyl)-Lornithine amide, a protein arginine deiminase inhibitor, reduces the severity of murine collagen-induced arthritis. Willis VC, Gizinski AM, Banda NK, Causey CP, Knuckley B, Cordova KN, Luo Y, Levitt B, Glogowska M, Chandra P, Kulik L, Robinson WH, Arend WP, Thompson PR, Holers VM. Division of Rheumatology, Department of Medicine, University of Colorado School of Medicine, Aurora, CO 80045, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21346230*

MAGNESIUM

All-purpose mineral that plays an important role in the body's assimilation and utilization of nutrients. Helps the body convert carbohydrates, fats, protein, calcium, phosphorus, and potassium into energy. Supports the production of red blood cells which also allows for improved energy[1]. Provides support for strong, healthy bones, teeth, arteries, cardiovascular health, and the nervous system. When combined with vitamin B12 helps promote mood balance and improves overall quality of life[2]. Found in: Alfalfa, Blue Green Algae, Chicken Liver, Shark Cartilage, Whey Protein (feline formula.)

References:

Studies relating to magnesium's contribution to energy levels and overall health:

1. *I.M. Cox, M.J. Campbell, and D. Dowson. Red blood cell magnesium and chronic fatigue syndrome. Lancet. 1991;337:757–760. https://www.ncbi.nlm.nih.gov/pubmed/1672392*

2. *D. McCabe, K. Lisy, C. Lockwood, and M. Colbeck. The impact of essential fatty acid, B vitamins, vitamin C, magnesium and zinc supplementation on stress levels in women: a systematic review. JBI Database System Rev Implement Rep. 2017 February. 15(2):402-453. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28178022*

MANGANESE

Essential trace mineral needed for normal skeletal, brain and nerve development. Helps the body form connective tissue and blood clotting factors. When taken in combination with copper and zinc helps protect healthy bones[1]. Needed for the proper lubrication of the joints and helps support healthy joints[1]. Required for protein, fat and carbohydrate metabolism. Needed for calcium absorption and blood sugar regulation. Helps promote mood balance[1] and improve energy[2]. A key component in the antioxidant enzyme superoxide dismutase (SOD), which helps combat free radicals. Found in: Chicken Liver, Shark Cartilage, Whey Protein (feline formula.)

References:

1. *University of Maryland Medical Center. Manganese. Web URL: http://www.umm.edu/health/medical/altmed/supplement/manganese*

Studies relating to manganese's contributions to immune system health:

2. *J. Cappelli etal. Manganese Supplementation in Deer under Balanced Diet Increases Impact Energy and Contents in Minerals of Antler Bone Tissue. PLoS One. 2015 July. 10(7). Web URL: https://www.ncbi.nlm.nih.gov/pubmed/26177083*

3. *Poult Sci. 2004 Mar;83(3):344-51. Immune system and cardiac functions of progeny chicks from dams fed diets differing in zinc and manganese level and source. Virden WS, Yeatman JB, Barber SJ, Willeford KO, Ward TL, Fakler TM, Wideman RF Jr, Kidd MT. Department of Poultry Science, Mississippi State University, Mississippi State, Mississippi 39762, USA. http://www.ncbi.nlm.nih.gov/pubmed/15049485*

OYSTER SHELL

Provides calcium and phosphorus in the proper ratio for structural integrity of bones and teeth. Calcium supports the function of virtually every cell in the body[2]. It is vital to maintain a normal heart beat and functioning of the heart. Aids in the contraction and relaxation of muscles, expanding mobility. Promotes healthy nerves and cardiovascular health. Calcium and Phosphorus are essential for blood clotting, proper cell growth, nervous system function and kidney function. Phosphorus acts a pH buffer in the body enhancing protein and enzyme function[1].

References:

Studies relating to the importance of calcium for proper cell function:

1. *R. Casiday and R. Frey. Blood, Sweet, and Buffers: pH Regulation During Exercise. Department of Chemistry Washington University. Web URL: http://www.chemistry.wustl.edu/~edudev/LabTutorials/Buffer/Buffer.html*

2. *Curr Opin Immunol. 2008 Jun;20(3):250-8. Calcium signaling in lymphocytes. Oh-hora M, Rao A. Department of Pathology, Harvard Medical School, Immune Disease Institute, Boston, MA 02115, USA.Web URL: http://www.ncbi.nlm.nih.gov/pubmed/18515054.*

PAPAIN

Natural enzyme found in the papaya. Aids in protein digestion and metabolism. Aids in the digestion of gluten, a protein found in pet foods that use grains, by neutralizing ammonia supporting healthy digestion[1]. The unique ability of Papain to break down protein and convert a portion of it into arginine is extremely important because arginine, in its natural form, has been found to influence the production of HGH. HGH, produced in the pituitary gland, is directly responsible for DNA and RNA replication as well as synthesis in liver, muscle, cartilage, and adipose tissues. HGH helps to increase muscle tone and decrease body fat. Helps to cleanse the tissues and walls along the gastrointestinal tract. A powerful antioxidant known support cell, gland, and organ function by neutralizing free radicals[2].

References:

Studies relating to the benefits of papain's antioxidant properties:

1. *M. Messer, C. M. Anderson, and L. Hubbard. Studies on the mechanism of destruction of the toxic action of wheat gluten in celiac disease by crude papain. Gut. 1964. 5: 295. Web URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1413471/pdf/gut00667-0019.pdf*

2. *A. Manosroi, C. Chankhampan, K. Pattamapun, and J. Manosroi. Antioxidant and Gelantinolytic Activities of Papain from Papaya Latex and Bromelain from Pineapple Fruits. Chaing Mai Journal of Science. 2014 July 41(3): 635-648. Web URL: https://www.researchgate.net/publication/286496026_Antioxidant_and_Gelatinolytic_Activities_of_Papain_from_Papaya_Latex_and_Bromelain_from_Pineapple_Fruits*

PHOSPHORUS

An essential mineral that works synergistically with calcium to promote healthy bones and teeth[1]. Supports healthy kidney function by aiding in waste filtration[1]. Protects healthy joints[1]. Needed for the growth and repair of all tissues and cells. Aids in the production of DNA and RNA. Plays a key role in how the body utilizes energy. Found in: Alfalfa, Blue Green Algae, Chicken Liver, Oyster Shell, Shark Cartilage, Whey Protein (feline formula.)

References:

1. *University of Maryland Medical Center. Phosphorus. Web URL: http://www.umm.edu/health/medical/altmed/supplement/phosphorus*

PINE BARK (Pycnogenol®)

Extracted from the bark of French maritime pine trees, Pycnogenol® contains a natural blend of bioflavonoids. An effective antioxidant known to reduce oxidative damage to cells and vital tissues caused by free radicals; as well as, improve energy[3] and promote joint health. Studies have shown that the naturally-occurring proanthocyanidins that are contained in pine bark have 20 times more antioxidant power than Vitamin C and 50 times more antioxidant power than Vitamin E. Can readily cross the blood-brain barrier to protect vital brain and nerve tissue from oxidation. It has been shown to reduce histamine production, thereby helping the lining of arteries resist mutagen attacks, supporting cardiovascular health. May help with mood balance[1,2]. Promotes skin and coat health by protecting from photoaging[4].

References:

Studies relating to pine bark's importance to immune system health:

1. *M. Dvorakova etal. The Effect of Polyphenolic Extract from Pine Bark, Pycnogenol on the level of glutathione in children suffering from attention deficit hyperactivity disorder (ADHD). Redox Rep. 2006 11(4): 163-172. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/16984739*

2. *J. Trebaticka etal. Treatment of ADHD with French Maritime Pine Bark Extract, Pycnogenol. Eur Child Adolesc Psychiatry. 2006 September 15(6):329-335. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/16699814*

3. *J. Mach, A.W. Midgley, S. Dank, R.S. Grant, and D.J. Bentley. The Effect of Antioxident Supplementation of Fatigue During Exercise: Potential Role for NAD+(H). Nutrients. 2010 March 2(3):319-329. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/22254024?dopt=Abstract*

4. *J. Reuter, U. Wolfle, H.C. Korting, and C. Schempp. Which plant for which skin disease? Part 2: Dermatophytes, chronic venous insufficiency, photoprotection, actinic keratoses, vitiligo, hair loss, cosmetic indications. J Dtsch Dermaltol Ges. 2010 November. 8(11):866-873. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/20707877?dopt=Abstract*

POTASSIUM

Important for maintaining regular heart rhythm, healthy nervous system and correct muscle function. Works with sodium to regulate the amount of water in the cells. Protects healthy bones by aiding in the absorption of Calcium[2]. Supports a healthy urinary tract by keeping pH balanced and waste materials dissolved[1]. Found in: Alfalfa, Shark Cartilage, Whey Protein (feline formula.)

References:

Studies relating to potassium's role in urinary health and calcium absorption:

1. *M. Barbera, A. Tsirgiotis, M. Barbera, and Q. Paola. The Importance of Citrate and Potassium Bicarbonate in the Treatment of Uric Acid in Renal Stones. Arch Ital Urol Androl. 2016 December. 88(4):341-342. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28073209*

2. *F.A. Tylavsky, L.A. Spence, and L. Harkness. The Importance of Calcium, Potassium, and Acid-Base Homeostasis in Bone Health and Osteoporosis Prevention. Journal of Nutrition. 2008 January. 138(1):1645-1655. Web URL: http://jn.nutrition.org/content/138/1/164S.full*

SELENIUM

Essential trace mineral whose principle function is to inhibit the oxidation of lipids (fats). A mineral needed for pancreatic function and tissue elasticity. Plays a vital role in regulating thyroid hormone and fat metabolism. When combined with Vitamin E, it works synergistically to aid in the production of antibodies and helps to maintain a healthy heart and liver. Helps maintains a healthy immune system. It plays an important role in the formation of antioxidant enzymes which protect against cell damage[1]. Found in: Chicken Liver.

References:

Studies relating to selenium's importance to the immune system:

1. *X. Wu, J. Cheng, and X. Wang. Dietary Antioxidants: Potential Anticancer Agents. Nutr Cancer. 2017 March. 31:1-13. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28362118*

2. *Arch Immunol Ther Exp (Warsz). 2007 Sep-Oct;55(5):289-97. Mechanisms by which selenium influences immune responses. Hoffmann PR. Department of Cell and Molecular Biology, John A. Burns School of Medicine, University of Hawai'i, Honolulu, HI 96813, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed?term=Arch%20Immunol%20Ther%20Exp%20(Warsz).%202007%20Sep-Oct%3B55(5)%3A289-97*

3. *J Egypt Soc Parasitol. 2005 Aug;35(2):537-50. Effect of parenteral vitamin E and selenium supplementation on immune status of dogs vaccinated with subunit and somatic antigens against Taenia hydatigena. Kandil OM, Abou-Zeina HA. Department of Parasitology and Animal Diseases, National Research Center, Giza. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/16083066*

SERINE

An amino acid that supports healthy muscle growth and a healthy immune system[1]. It is a protein building block and precursor to other amino acids like l-cysteine, glycine, and tryptophan. Serine proteases (enzymes) are the central components of the body's complement system, which coordinates the immune response by recognizing and eliminating invading pathogens and altered host cells[2]. Promotes the metabolism of fats and fatty acids[1]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to serine's contributions to a healthy immune system:

1. *PubChem. L-serine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/5951#section=Top*

2. *Int J Physiol Pathophysiol Pharmacol. 2012;4(1):10-27. Epub 2012 Feb 28. Gastrointestinal absorption and biological activities of serine and cysteine proteases of animal and plant origin: review on absorption of serine and cysteine proteases. Lorkowski G. GL Pharma Consulting Research & Development (GL Pharma CR&D), D-82131 Gauting/Munich Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22461953*

3. *Trends Mol Med. 2012 May 1. [Epub ahead of print] Virus-derived anti-inflammatory proteins: potential therapeutics for cancer. Zheng D, Chen H, Bartee MY, Williams J, Davids JA, Huang E, Moreb J, Lucas A. Department of Medicine, Divisions of Cardiology and Rheumatology and Department of Molecular Genetics and Microbiology, University of Florida, 1600 SW Archer Rd, PO BOX 100277, Gainesville, FL 32610-0277, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22554906*

SHARK CARTILAGE

(Sourced from non-endangered species.) – An effective source of vitamins that supports healthy bones and muscles. Clinically, it has been shown to help maintain a strong and healthy immune system. Rich in naturally-occurring collagens and glycoproteins, which play essential roles in cell adhesion and tissue formation, supporting healthy muscle and organ function[1]. Its rich nutrients also help fortify the body against harmful bacteria, viruses and fungi. Collagen, alongside of vitamin C, supports healthy skin[3].

References:

Studies relating to shark cartilage's contributions to skin and muscle health:

1. *H. Munakata, K. Takagaki, M. Majima, and M. Endo. Interaction between collagens and glycosaminoglycans investigated using surface Plasmon resonance biosensor. Glycobiology. 1999. 9(10):1023-1027. Web URL: https://academic.oup.com/glycob/article/9/10/1023/567789/Interaction-between-collagens-and*

2. *Biol Pharm Bull. 2010;33(3):410-4. Anti-arthritic action mechanisms of natural chondroitin sulfate in human articular chondrocytes and synovial fibroblasts. Imada K, Oka H, Kawasaki D, Miura N, Sato T, Ito A. Department of Biochemistry and Molecular Biology, Tokyo University of Pharmacy and Life Sciences,School of Pharmacy, Hachioji, Tokyo 192-0392, Japan. Web URL: http://www.ncbi.nlm.nih.gov/pubmed?term=Biol%20Pharm%20Bull.%202010%3B33(3)%3A410-4*

3. *State University. Linus Pauling Institute Micronutrient Information Center. Vitamin C and Skin Health. Web URL: http://lpi.oregonstate.edu/mic/health-disease/skin-health/vitamin-C*

TAURINE

(Feline formula only) – An essential amino acid that cats require as part of their diet[1] that has a wide range of uses in the body. Taurine occurs naturally in dogs; however, cats must obtain all their taurine from their diet as their bodies cannot synthesize the taurine compound. Taurine's many functions include bile production, modulation of calcium signaling, and support of the cardiovascular, central nervous, and skeletal systems. Helps maintain healthy blood pressure levels and promotes a healthy immune system[1]. Aids in the digestion of fats in the small intestine. It helps maintain the health of the heart muscle and healthy cholesterol levels by supporting the liver. It balances the levels of sodium, potassium and magnesium in the cells. Supports the integrity of the retina of the eye. Found in: Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to the importance of taurine to the immune system:

1. *J. Leukoc etal. Immunologic consequences of taurine deficiency in cats. NY State Institute for Basic Research in Developmental Disabilities. Biol. 1990 Apr;47(4):321-31. http://www.ncbi.nlm.nih.gov/pubmed/2319206*

2. *Poult Sci. 2009 Jul;88(7):1394-8. Effects of dietary taurine supplementation on growth performance and immune status in growing Japanese quail (Coturnix coturnix japonica). Wang FR, Dong XF, Tong JM, Zhang XM, Zhang Q, Wu YY. State Key Laboratory of Food Science and Technology, and School of Food Science and Technology, Jiangnan University, Jiangsu Wuxi 214122, China. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/19531709*

3. *Amino Acids. 2002;22(1):39-53. Effects of arginine, L-alanyl-L-glutamine or taurine on neutrophil (PMN) free amino acid profiles and immune functions in vitro. Mühling J, Fuchs M, Fleck C, Sablotzki A,Krüll M, Dehne MG, Gonter J, Weiss S, Engel J, Hempelmann G. Department of Anaesthesiology and Intensive Care Medicine, Justus Liebig University, Giessen, Federal Republic of Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/12025873*

THREONINE

An essential amino acid that supports a healthy liver and promotes fat metabolism[2]. Essential amino acids are required by an animals' body to support healthy cell, gland and organ function, but can't produce them in their own body[1]. They must come from diet. Helps keep the body's proteins in balance. Like L-ornithine, threonine stimulates the thymus gland to produce more T cells, which fight invading microorganisms and aid in immune system function[3]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

1. *University of Maryland Medical Center. Amino Acids. Web URL: http://www.umm.edu/health/medical/ency/articles/amino-acids*

Studies relating to threonine's importance to healthy immune system activity:

2. *PubChem. L-threonine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/6288#section=Top*

3. *Mol Cell Proteomics. 2012 May;11(5):171-86. Epub 2012 Apr 12. Quantitative phosphoproteomic analysis reveals a role for serine and threonine kinases in the cytoskeletal reorganization in early T cell receptor activation in human primary T cells. Ruperez P, Gago-Martinez A, Burlingame AL, Oses-Prieto JA. ‡Department of Pharmaceutical Chemistry, Mass Spectrometry Facility, School of Pharmacy, University of California San Francisco, San Francisco, California 94158. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22499768*

TYROSINE

An amino acid that supports a healthy nervous system and thyroid function[1]. Used by the body's cells to synthesize protein. When combined with L-lysine, L-alanine, and L-glutamic acid, L-tyrosine assists with immune system regulation and boosts antibody production. Supports healthy hormone production and mood balance[1]. Main sources – Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver, Whey Protein (feline formula).

References:

Studies relating to L-tyrosine's role in supporting a healthy nervous system and immune function:

1. *PubChem. L-tyrosine. Web URL: https://pubchem.ncbi.nlm.nih.gov/compound/6057#section=Top*

2. *Immunol Lett. 2012 May 3. [Epub ahead of print] A novel BTK-like protein involved in immune response in Lethenteron japonicum. Wu F, Zhao J, Chen L, Liu X, Su P, Han Y, Feng B, Li Q. College of Life Science, Liaoning Normal University, Dalian 116029, China; Institute of Marine Genomics & Proteomics, Liaoning Normal University, Dalian 116029, China. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22580165*

3. *Dev Immunol. 2001;8(3-4):171-81. Role of Bruton's tyrosine kinase in B cell development. Maas A, Hendriks RW. Department of Cell Biology and Genetics, Erasmus University Rotterdam, The Netherlands. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/11785667*

VITAMIN B COMPLEX

B vitamins are crucial for overall animal health. Helps the functioning of the brain and the nervous system by supporting the development of neural tubes[3] and promoting healthy nerve cells[1]. Promotes muscle tone in the gastrointestinal tract. Helps to maintain healthy skin, coat, eyes, mouth and liver. Helps metabolize fats, proteins, and carbohydrates to glucose which can improve energy[2]. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

1. *University of Maryland Medical Center. Vitamin B12. Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-b12-cobalamin*

2. *University of Maryland Medical Center. Vitamin B2. Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-b2-riboflavin*

Studies relating to the importance of the Vitamin B complex for proper neural tube development:

3. *M. Viswanathan etal. Folic Acid Supplementation for the Prevention of Neural Tube Defects: An Updated Evidence Report and Systematic Review for the US Preventive Service Task Force. JAMA. 2017 January. 317(2):190-203. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28097361*

VITAMIN B1 (THIAMINE)

Essential vitamin that supports healthy functioning of the heart, nerves, muscles, skin and digestive system. Contains strong antioxidant properties. Helps strengthen and protect the body against free radical damage. Helps maintain healthy nerve and brain function[1]. Supports immune system and healthy metabolic activity[2]. May support healthy eye function[3] and help with discolored eyes[5]. May improve energy[4]. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

Studies relating to thiamine's importance to immune response and overall health:

1. *J.C. Kattah. The Spectrum of Vestibular and Ocular Motor Abnormalities in Thiamine Deficiency. Current Neurol Neurosci Rep. 2017 April. 17(5):40. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28365885*

2. *C.S. Tejpal etal. Dietary supplementation of thiamine and pyridoxine-loaded vanillic acid-grafted chitosan microspheres enhances growth performance, metabolic and immune responses in experimental rats. Int J Biol Macromol. 2017 March. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28342754*

3. *A.W. Lawton and N.E. Frisard. Visual Loss, Retinal Hemorrhages, and Optic Disc Edema Resulting from Thiamine Deficiency Following Bariatric Surgery Complicated by Prolonged Vomiting. Ochsner J. 2107 Spring. 17(1):112-114. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28331457*

4. *A. Costantini and M.I. Pala. Thiamine and fatigue in inflammatory bowel diseases: an open-label pilot study. J Altern Complement Med. 2013 August. 19(8):704-708. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/23379830*

5. *Cumming RG, Mitchell P, Smith W. Diet and cataract: the Blue Mountains Eye Study. Ophthalmology. 2000;107(3):450-56. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/10711880*

VITAMIN B2 (RIBOFLAVIN)

Necessary for carbohydrate-fat-protein metabolism, and red blood cell and antibody formation. Important for energy production. Acts as an antioxidant. Essential for maintaining healthy eyes, skin, and coat. A strong skin and coat help to protect the body from harmful pathogens. May help with discolored eyes[3]. Promotes longevity of life by protecting against oxidative damage to cells and tissues[1]. May help with mood balance[2]. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

Studies relating to riboflavin's effects on oxidative damage and eye health:

1. *Y.X. Zou, M.H. Ruan, J. Luan, X. Feng, S. Chen, and Z.Y.Chu. Anti-Aging Effect of Riboflavin Via Endogenous Antioxidant in Fruit Fly Drosophila Melanogaster. J Nutr Health Aging. 2017. 21(3):314-319. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28244572*

2. *B. Colombo, L. Saraceno, and G. Comi. Riboflavin and migraine: the bridge over troubled mitochondria. 2014 May. Neurol Sci. 1:141-144. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/24867851*

3. *Cumming RG, Mitchell P, Smith W. Diet and cataract: the Blue Mountains Eye Study. Ophthalmology. 2000;107(3):450-56. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/10711880*

VITAMIN B3 (NIACIN)

Promotes proper growth and function of the nervous system. Shown to lower elevated cholesterol and improve circulation. Also helps maintenance of healthy skin, tongue and digestive system. Promotes healthy eyes and may help with discolored eyes$_2$. Helps the body convert carbohydrates into glucose, producing energy. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

1. *Vitamin B3 (Niacin). University of Maryland Medical Center. Web URL: www.umm.edu/health/medical/altmed/supplement/vitamin-b3-niacin*

Studies relating to niacin's importance to eye health:

2. *Cumming RG, Mitchell P, Smith W. Diet and cataract: the Blue Mountains Eye Study. Ophthalmology. 2000;107(3):450-56. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/10711880*

VITAMIN B5 (PANTOTHENIC ACID)

Plays an important role in the production of the adrenal hormones and helps with mood balance. Needed for normal functioning of the gastrointestinal tract by aiding in the breakdown of fats and carbohydrates[1]. Plays an essential role in the production red blood cells[1] and the formation of antibodies. Aids the body in using other members of the vitamin B complex[1]. Enhances overall immune function and has been proved effective in maintaining good skin health. Found in: Alfalfa, Brewer's Yeast, Chicken Liver.

References:

1. *University of Maryland Medical Center. Vitamin B5 (Pantothenic acid). Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-b5-pantothenic-acid*

Studies relating to pantothenic acid's value to immune system health:

2. *FEBS Lett. 2000 Oct 20;483(2-3):149-54. Pantetheinase activity of membrane-bound Vanin-1: lack of free cysteamine in tissues of Vanin-1 deficient mice. Pitari G, Malergue F, Martin F, Philippe JM,Massucci MT, Chabret C, Maras B, Duprè S, Naquet P, Galland F. Dipartmento di Biologia di Base ed Applicata Università di L'Aquila, Italy.Web URL: http://www.ncbi.nlm.nih.gov/pubmed/11042271*

3. *Altern Med Rev. 1999 Aug;4(4):249-65. Nutritional and botanical interventions to assist with the adaptation to stress. Kelly GS. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/10468649*

VITAMIN B6 (PYRIDOXINE)

Necessary for carbohydrate-fat-protein metabolism and antibody formation. Plays an important role in immune system function by supporting red blood cell and immune system cell production and neutralizing free radicals. Aids digestion. Promotes healthy organ and system function by helping in the formation of neurotransmitters, which foster cell to cell communication[1]. Needed for normal brain function and helps regulate mood. Supports healthy cognitive function[2]. Found in: Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver.

References:

1. *University of Maryland Medical Center. Vitamin B6 (Pyridoxine). Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-b6-pyridoxine*

Studies relating to pyridoxine's importance to immune system function:

2. *T. Barichello, J.S. Generoso, L.R. Simoes LR, et al. Vitamin B6 prevents cognitive impairment in experimental neumococcal meningitis. Exp Biol Med (Maywood). 2014;239(10):1360-5. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/24903161*

3. *Environ Toxicol Pharmacol. 2010 Sep;30(2):169-74. Epub 2010 May 20. Pyridoxine mitigates cadmium induced hepatic cytotoxicity and oxidative stress. Wen YF, Zhao JQ, Bhadauria M, Nirala SK. College of Animal Science and Technology, Yunnan Agricultural University, Kunming 650 201, PR China. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21787648*

VITAMIN B12 (COBALAMIN)

Helps maintain the fatty sheaths that cover and protect nerve endings and maintain neurological function. Aids in cell formation and cellular longevity. Helps in the utilization of iron. Important for maintaining healthy red blood cells and may improve energy[1]. Vitamin B12 works with vitamins B6 and B9 to help control blood levels of the amino acid homocysteine. When combined with magnesium helps promote mood balance and improves overall quality of life[2]. Found in: Alfalfa, Blue Green Algae, Brewer's Yeast, Chicken Liver.

References:

1. *University of Maryland Medical Center. Vitamin B12 (Cobalamin). Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-b12-cobalamin*

Studies relating to methylcobalamin's importance to immune and stress response:

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3. *Int J Vitam Nutr Res. 2000 Jul;70(4):167-71. Changes in CD4+CD8-/CD4-CD8+ ratio and humoral immune functions in vitamin B12-deficient rats. Funada U, Wada M, Kawata T, Mori K, Tamai H, Kawanishi T, Kunou A, Tanaka N, Tadokoro T, Maekawa A. Faculty of Applied Bioscience, Tokyo University of Agriculture, Japan. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/10989765*

VITAMIN C (ESTER C®)

A powerful antioxidant that is vital for the immune system and a myriad of metabolic processes in the body. Promotes the formation of collagen which supports healthy skin[2]. Also supports healthy tissue and cell growth. Aids in proper adrenal gland function. Helps to eliminate toxic substances such as heavy metals from the body. Supports healthy eyesight. Alongside of iron helps support a healthy immune system[1]. May promote healthy mood balance[3]. Found in: Alfalfa, Blue Green Algae, Chicken Liver.

References:

1. *M. Ware. Reviewed by H. Webberley. What are the Health Benefits of Iron? MedicalNewsToday. Web URL: http://www.medicalnewstoday.com/articles/287228.php*

Studies relating to Ester C's® role in stress reduction and healthy skin:

2. *State University. Linus Pauling Institute Micronutrient Information Center. Vitamin C and Skin Health. Web URL: http://lpi.oregonstate.edu/mic/health-disease/skin-health/vitamin-C*

3. *D. McCabe, K. Lisy, C. Lockwood, and M. Colbeck. The impact of essential fatty acid, B vitamins, vitamin C, magnesium and zinc supplementation on stress levels in women: a systematic review. JBI Database System Rev Implement Rep. 2017 February. 15(2):402-453. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/28178022*

VITAMIN D

Promotes healthy immune and cardiovascular system by supporting healthy veins and arteries[1]. Benefits the immune system by modulating the body's response to sensitivities[2]. Aids in the absorption of calcium to support strong bones[1]. Found in: Alfalfa.

References:

1. *University of Maryland Medical Center. Vitamin D. Web URL: http://www.umm.edu/health/medical/altmed/supplement/vitamin-d*

Studies relating to Vitamin D's importance to immune system function:

2. *Curr Opin Allergy Clin Immunol. 2012 Feb;12(1):13-7. Vitamin D and chronic rhinitis. Abuzeid WM, Akbar NA, Zacharek MA. Department of Otolaryngology/Head and Neck Surgery, University of Michigan, Ann Arbor, Michigan 48109, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22193052*

3. *Curr Opin Otolaryngol Head Neck Surg. 2011 Jun;19(3):224-8. Vitamin D: immunomodulation of asthma, allergic rhinitis, and chronic rhinosinusitis. Akbar NA, Zacharek MA. Department of Otolaryngology/Head and Neck Surgery, University of Michigan, Ann Arbor, Michigan 48109, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21499100*

VITAMIN E

A very effective antioxidant that protects the cell structure against free radicals. Aids in the utilization of Vitamin A. Important for maintaining a healthy immune system, blood circulation and proper formation of tissue and cell growth. Supports cardiovascular health, red blood cells and neurological function. Supports healthy eyes and sight[1]. Found in: Alfalfa, Blue Green Algae.

References:

Studies relating to the effects of Vitamin E against oxidative damage and for cardiovascular health:

1. *J. Cai, K.C. Nelson, M. Wu, P. Sternberg Jr, Jones DP. Oxidative damage and protection of the RPE. Prog Retin Eye Res. 2000;19(2):205-21. Web URL: https://www.ncbi.nlm.nih.gov/pubmed/10674708*

2. *Vet Med Int. 2011 Apr 6;2011:180206. Oxidative stress in dog with heart failure: the role of dietary Fatty acids and antioxidants. Sagols E, Priymenko N. ENVT, 2 allée des Cèdres 66330 Cabestany,France.Web URL: http://www.ncbi.nlm.nih.gov/pubmed?term=Vet%20Med%20Int.%202011%20Apr%206%3B2011%3A180206*

3. *Br J Nutr. 2011 Oct;106 Suppl 1:S116-9. Increased antioxidant capacity in the plasma of dogs after a single oral dosage of tocotrienols. Raila J, Rohn S, Schweigert FJ, Abraham G. Institute of Nutritional Science, University of Potsdam, Arthur-Scheunert-Allee 114-116, D-14558 Nuthetal, Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/22005405*

VITAMIN K

Supports healthy immune and cardiovascular system[1]. Used by the body's immune system to form blood clots[1]. Possesses strong antioxidant properties and provides protection against the effects of free radical damage[3]. Found in: Alfalfa, Chicken Liver.

References:

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2. *Int Immunopharmacol. 2011 Feb;11(2):233-43. Epub 2010 Dec 4. Immune responses to novel allergens and modulation of inflammation by vitamin K3 analogue: a ROS dependent mechanism. Kohli V, Sharma D, Sandur SK, Suryavanshi S, Sainis KB. Medical Division, Bio-Medical Group, Bhabha Atomic Research Centre, Trombay, Mumbai-400085, India. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21134493*

Studies relating to the benefits of Vitmain K's antioxidant properties:

3. *Biol Chem. 2011 Apr 29;286(17):15085-94. Epub 2011 Mar 2. Human vitamin K 2,3-epoxide reductase complex subunit 1-like 1 (VKORC1L1) mediates vitamin K-dependent intracellular antioxidant function. Westhofen P, Watzka M, Marinova M, Hass M, Kirfel G, Müller J, Bevans CG, Müller CR,Oldenburg J. Institute of Experimental Hematology and Transfusion Medicine, Sigmund-Freud-Strasse 25, University Clinic Bonn, 53127 Bonn, Germany. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/21367861*

WHEY PROTEIN

(Feline formula only) - A highly-digestible and complete protein containing 20 amino acids including methionine, lysine, and taurine. Cats are unable to produce the amino acid taurine, which is important in promoting a healthy immune system [2] along with other body functions (see Taurine). Lysine supports healthy eyes and may help with discolored eyes[2]. High protein levels help strengthen the immune system[3]. Contains peptides that help boost the immune system.

References:

1. *University of Maryland Medical Center. Lysine. Web URL: http://www.umm.edu/health/medical/altmed/supplement/lysine*

Studies relating to whey protein's ability to strengthen the immune system:

2. *J.* Leukoc *etal. Immunologic consequences of taurine deficiency in cats. NY State Institute for Basic Research in Developmental Disabilities. Biol. 1990 Apr;47(4):321-31. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/2319206*

3. *Mol Cancer. 2005 Jan 11;4(1):1. Dietary exposure to soy or whey proteins alters colonic global gene expression profiles during rat colon tumorigenesis. Xiao R, Badger TM, Simmen FA. Arkansas Children's Nutrition Center, 1120 Marshall Street, Little Rock, AR 72202, USA. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/15644144*

ZINC

Required for protein synthesis and collagen formation. Promotes normal growth and development. Enhances cell division and repair. Helps to maintain normal levels of Vitamin A in the body. Works with red blood cells to move carbon dioxide from the tissues to the lungs. Helps synthesize DNA and RNA. Functions as an important antioxidant[3]. Promotes a healthy immune system. When taken in combination with manganese and copper helps protect healthy bones[1]. Found in: Alfalfa, Chicken Liver, Shark Cartilage, Whey Protein (feline formula).

References:

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2. *Ann N Y Acad Sci. 2007 Apr;1100:111-22. Zinc and inflammatory/immune response in aging. Vasto S, Mocchegiani E, Malavolta M, Cuppari I, Listì F, Nuzzo D, Ditta V, Candore G, Caruso C. Immunosenescence Unit, Department of Pathobiology and Biomedical Methodologies, Palermo University, Corso Tukory 211, 90134 Palermo, Italy.Web URL: http://www.ncbi.nlm.nih.gov/pubmed/17460169*

3. *Mol Med. 2008 May-Jun;14(5-6):353-7. Zinc in human health: effect of zinc on immune cells. Prasad AS. Wayne State University School of Medicine, Detroit, Michigan 48201, United States of America. Web URL: http://www.ncbi.nlm.nih.gov/pubmed/18385818*