

Anti-Oxidant		
S.no	Study details	Conclusion
1	Scavenging of Peroxynitrite by Phycocyanin and Phycocyanobilin from Spirulina platensis: Protection against Oxidative Damage to DNA Vadiraja B. Bhata and K. M. Madyastha <i>Biochemical and Biophysical Research Communications</i> . Volume 285, Issue 2 , 13 July 2001, Pages 262-266	Phycocyanin efficiently scavenges peroxy nitrite and prevents oxidative damage to DNA
2	Antioxidant activities of phycocyanobilin prepared from Spirulina platensis. Takashi Hirata, Mikiya Tanaka, Masaki Ooike, Teppei Tsunomura, Morihiko Sakaguchi. <i>Journal of Applied Phycology</i> , 12 (3/5):435-439, October 2000.	Both In-tro & In-vivo studies indicate that Phycocyanobilin is responsible for the majority of the antioxidative activity of phycocyanin and may act as an effective antioxidant in a living human body.
3	C-phycocyanin: a potent peroxy radical scavenger in vivo and in vitro. Bhat VB, Madyastha KM. <i>Biochem Biophys Res Commun</i> . 2000 Aug 18;275(1):20-5.	In-vitro & In-vivo Studies indicate that Phycocyanin scavenges both hydroxyl & peroxy free radicals thus act as antioxidant..
4	Antioxidant and anti-inflammatory properties of C-phycocyanin from blue-green algae. Romay C, Armesto J, Ramirez D, González R, Ledon N, García I. <i>Inflamm Res</i> . 1998 Jan; 47(1):36-41.	Inhibition of alkoxy and hydroxyl radicals was observed in both in-vitro & in-vivo studies. Phycocyanin also inhibits liver microsomal lipid peroxidation.
Anti-Inflammatory		
S.no	Study details	Conclusion
1	In-vivo Studies of the Anti-inflammatory Effects of Spirulina platensis; Syeda Hurmatul Quader, Shoaib UI Islam, Arm Saifullah, Md. Fakhar Uddin Majumder, Professor Dr. Jma Hannan; <i>The Pharma Innovation Journal</i> Vol. 2 No. 4 2013 p.70-80	Spirulina platensis possesses significant anti-inflammatory activity.
2	Anti-inflammatory and Antihyperalgesic Activity of C-Phycocyanin; Chao-Ming Shih, MD, Shin-Nan Cheng, MD, PhD†, Chih-Shung Wong, MD, PhD‡, Yu-Ling Kuo, MS§, Tz-Chong Chou, PhD§; <i>Anesth Analg</i> 2009;108:1303–10	Phycocyanin exhibits anti-inflammatory & antihyperalgesic activity by inhibition of NO and PEG ₂ over production through suppressing INOS and COX-2 induction in addition to the inhibition of TNF-alpha formation and neutrophil infiltration in inflammatory sites.
3	Effects of phycocyanin extract on prostaglandin E2 levels in mouse ear inflammation test. Romay C, Ledon N, Gonzalez R. <i>Arzneimittelforschung</i> . 2000 Dec; 50(12):1106-9.	Phycocyanin inhibited in a dose-dependent manner edema as well as PGE ₂ and LTB ₄ levels in animal studies partially from inhibition of PGE ₂ production and a moderate inhibition of PLA ₂ activity.
4	Selective inhibition of cyclooxygenase-2 by C-phycocyanin, a biliprotein from Spirulina platensis. Reddy CM, Bhat VB, Kiranmai G, Reddy MN, Reddanna P, Madyastha KM. <i>Biochem Biophys Res Commun</i> . 2000 Nov 2;277(3):599-603.	Phycocyanin is a selective inhibitor of COX-2 activity with potency comparable to celecoxib and rofecoxib, the known selective COX-2 inhibitors.
5	Anti-Inflammatory Activity Of Phycocyanin Extract In Acetic Acid-Induced Colitis In Rats. Gonzalez R, Rodriguez S, Romay C, Gonzalez A, Armesto J, Ramirez D, Merino N. <i>Pharmacol Res</i> . 1999 Jan;39(1):1055-1059.	Phycocyanin reduced colitis induced by acetic acid in rats which may be because of its free radical scavenging activity
Hepato Protective		
S.no	Study details	Conclusion
1	Protective effect of Spirulina against Paracetamol-induced Hepatic Injury in Rats. Mona N M Sharoud; <i>Journal of Experimental Biology and Agricultural Sciences</i> , February - 2015; Volume – 3(1) 45-5	Phycocyanin significantly reduced the hepatotoxicity caused by paracetamol, especially the damage to DNA molecules possibly due to its radical scavenging activity.
2	Hepatoprotective and Antioxidative Effects of C-Phycocyanin in CCL4 Induced Hepatic Damage Rats; Nagaraj, Arulmurugan, K. Karuppasamy, K.R. Jayappriyan, R. Sundararaj, N. Vijayanand and R. Rengasamy; <i>Academic Journal of Cancer Research</i> 4 (2): 29-34, 2011	Phycocyanin significantly inhibited incidence of cell damage; enhanced enzymic and non-enzymic antioxidant concentrations and decreased circulatory lipid peroxidation.
3	Protective effect of C-phycocyanin against carbon tetrachloride-induced hepatocyte damage in vitro and in vivo; Ou Y, Zheng S, Lin L, Jiang Q, Yang X; <i>Chemico-biological interactions (Impact Factor: 2.58)</i> . 03/2010; 185(2):94-100.	In In-vivo, phycocyanin reduced the CCL ₄ induced liver damage through its anti-inflammatory properties

4	Protective Effects of Phycocyanin on Galactosamine-induced Hepatitis in Rats. Ricardo González, Addys González, DiadelisRemirez, CheylaRomay, Sandra Rodriguez, OdelsaAncheta and Nelson Merino. <i>Biotecnología Aplicada</i> 2003;20:107-110	Phycocyanin protects the liver against Gal N-induced hepatitis.
5	Influence of C-phycoyanin on hepatocellular parameters related to liver oxidative stress and Kupffer cell functioning. Ramirez D, Fernandez V, Tapia G, Gonzalez R, Videla LA. <i>Inflamm Res.</i> 2002 Jul;51(7):351-6.	Phycocyanin significantly decreases kupffer cells phagocytosis and the associated respiratory burst activity thereby protecting the liver
6	Hepatoprotective Effect of C-Phycocyanin: Protection for Carbon Tetrachloride and R-(+)-Pulegone-Mediated Hepatotoxicity in Rats. Bhat. B. Vadirajaa, Nilesh. W. Gaikwadb and K. M. Madyastha. <i>Biochemical and Biophysical Research Communications</i> , Volume 249, Issue 2, 1998, Pages 428-431	C-Phycocyanin can significantly reduce R-(+)-pulegone and CCl ₄ induced liver injury in rats possibly due to inhibition of cytochrome P450 in addition to its ability as an effective free radical scavenger.

Anti-Arthritic

S.no	Study details	Conclusion
1	Inhibitory effects of Spirulina in zymosan-induced arthritis in mice. Ramirez D. González R. Merino N. Rodriguez S. Ancheta O. <i>Mediators of Inflammation</i> , 1 April 2002, vol. 11, no. 2, pp. 75-79(5)	Spirulina exerts anti-inflammatory effects in experimental arthritis.
2	Effect of phycocyanin in zymosan-induced arthritis in mice -phycocyanin as an antiarthritic compound. DiadelisRemirez, Addys González, Nelson Merino, Ricardo González, OdelsaAncheta, CheylaRomay, and Sandra Rodriguez. <i>Drug Development Research (Impact Factor: 0.77)</i> . 10/1999; 48(2):70-75.	Phycocyanin significantly reduced the levels of β -glucuronidase that had been increased by zymosan. There was inhibition in cellular infiltration and reduction of synovial hyperplasia and synovitis.

Anti-Cancer

S.no	Study details	Conclusion
1	Phycocyanin induces apoptosis and enhances the effect of topotecan on prostate cell line LNCaP; Gantar M1, Dhandayuthapani S, Rathinavelu A; J Med Food. 2012 Dec;15(12):1091-5.	Phycocyanin induces apoptosis through generation of ROS and activation of caspase-9 and caspase-8. While phycocyanin increases the efficacy of drug it also diminishes the side effects in the patients.
2	Apoptotic mechanism of MCF-7 breast cells in vivo and in vitro induced by photodynamic therapy with C-phycoyanin; Li B, Chu X, Gao M, Li W; ActaBiochimBiophys Sin (Shanghai). 2010 Jan;42(1):80-9	Phycocyanin showed anti-tumor activity, enhanced immune activity. The effects were enhanced when in combination with laser radiation.
3	Molecular mechanisms in C-Phycocyanin induced apoptosis in human chronic myeloid leukemia cell line-K562. Subhashini J, Mahipal SV, Reddy MC, Mallikarjuna Reddy M, Rachamalla A, Reddanna P. <i>BiochemPharmacol.</i> 2004 Aug 1;68(3):453-62.	Phycocyanin induces apoptosis in human chronic myeloid leukemia cells and decrease in K562 cell proliferation. - mediated by cytochrome c release, PARP cleavage, Bcl-2 down regulation
4	Phycocyanin-mediated apoptosis in AK-5 tumor cells involves down-regulation of Bcl-2 and generation of ROS. Bobbili V.V. Pardhasaradhi1, A. Mubarak Ali, A. Leela Kumari1, PalluReddanna and Ashok Khar. <i>Mol Cancer Ther.</i> 2003;2:1165-1170	Phycocyanin induced apoptosis in BC-8 cells (tumor cells), which is mediated through the activation of caspase-3 and possibly other caspases.
5	Inhibitory effect of phycocyanin from Spirulina platensis on the growth of human leukemia K562 cells. Yufeng Liu, LizhiXu, Ni Cheng, Lijun Lin, ChengwuZhang . <i>Journal of Applied Phycology</i> , 12 (2):125-130, 2000.	Phycocyanin significantly inhibited the growth of tumor cells - K562Leukemia cells. The Inhibitory effect is by different pathways other than apoptosis

Nephro-Protective

S.no	Study details	Conclusion
1	Salubrious effect of C-phycoyanin against oxalate-mediated renal cell injury; Farooq SM, Asokan D, Sakthivel R, Kalaiselvi P, Varalakshmi P; ClinChimActa. 2004 Oct;348(1-2):199-205.	MDA and the other Anti-Oxidant markers were controlled; Phycocyanin due to its Antioxidant effect; protects the renal cells against oxalated induced injury
2	Prophylactic role of phycocyanin: a study of oxalate mediated renal cell injury. Farooq SM, Asokan D, Kalaiselvi P, Sakthivel R, Varalakshmi P. <i>Chem Biol Interact.</i> 2004 Aug 10;149(1):1-7.	Phycocyanin prevents Ca Ox stone formation possibly by controlling oxalate levels & lipid peroxidation.

3	Effect of spirulina on the renal toxicity induced by inorganic mercury and cisplatin. H. Fukino, et al. <i>Pub. inEisei Kagaku</i> , 36:5, 1990. Japan.	Renal toxicity induced in rats by para-Aminophenol & Cisplatin (anti-cancer) was significantly reduced by the phycocyanin extract of Spirulina.
4	The effect of spirulina on nephrotoxicity in rats. Y. Yamane, et al. <i>Chiba Univ. Presented at Annual Symposium of the Pharmaceutical Society of Japan</i> , April 15, 1988.	Spirulina supplementation has resulted in a significant decrease in Blood Urea Nitrogen and serum creatinine levels, the indicators of acute nephritis
Neuro-Protective		
S.no	Study details	Conclusion
1	C-Phycocyanin is neuroprotective against global cerebral ischemia/reperfusion injury in gerbils; Pentón-Rol G, Marín-Prida J, Pardo-Andreu G, Martínez-Sánchez G, Acosta-Medina EF, Valdivia-Acosta A, Lagumersindez-Denis N, Rodríguez-Jiménez E, Llópiz-Arzuaga A, López-Saura PA, Guillén-Nieto G, Pentón-Arias E. <i>Brain Res Bull.</i> 2011 Aug 10;86(1-2):42-52.	Phycocyanin significantly reduces the infarct volume and also protect hippocampal neurons from death, induced by global cerebral ischemia / reperfusion injury in gerbils.
2	C-phycocyanin protects cerebellar granule cells from low potassium/serum deprivation-induced apoptosis. Rimbau V, Camins A, Pubill D, Sureda FX, Romay C, Gonzalez R, Jimenez A, Escubedo E, Camarasa J, Pallas M. <i>NaunynSchmiedebergsArch Pharmacol.</i> 2001 Aug;364(2):96-104.	In-vitro studies indicate that Phycocyanin prevents cell death caused by 24 h potassium and serum (K/S) withdrawal in rat cerebellar granule cell (CGC) cultures due to its antioxidant activity.
3	Protective effects of C-phycocyanin against kainic acid-induced neuronal damage in rat hippocampus. Rimbau V, Camins A, Romay C, Gonzalez R, Pallas M. <i>NeurosciLett.</i> 1999 Dec 3;276(2):75-8.	The incidence of neurobehavioral changes was significantly lower in rats receiving Phycocyanin.
Immune-Enhancer		
S.no	Study details	Conclusion
1	Phycocyanin enhances secretory IgA antibody response and suppresses allergic IgE antibody response in mice immunized with antigen-entrapped biodegradable microparticles. Nemoto-Kawamura C, Hirahashi T, Nagai T, Yamada H, Katoh T, Hayashi O. <i>J NutrSciVitaminol (Tokyo).</i> 2004 Apr;50(2):129-36.	Phycocyanin increases the mucosal immune response, particularly the mucosal IgA antibody response, inhibits the production of antigen-specific IgE antibodies, and reduces allergic inflammation.
2	Role of histamine in the inhibitory effects of phycocyanin in experimental models of allergic inflammatory response. Ramirez D, Ledon N, Gonzalez R. <i>Mediators Inflamm.</i> 2002 Apr; 11(2):81-5	Phycocyanin protects against allergy by inhibition of histamine release from mast cells
Cardio-Protective		
S.no	Study details	Conclusion
1	Phycobiliprotein C-Phycocyanin from Spirulina platensis Is Powerfully Responsible for Reducing Oxidative Stress and NADPH Oxidase Expression Induced by an Atherogenic Diet in Hamsters; Riss J, Décordé K, Sutra T, Delage M, Baccou JC, Jouy N, Brune JP, Oréal H, Cristol JP, Rouanet JM. <i>J. Agric. Food Chem.</i> 2007, 55, 7962–7967	Prolonged consumption of Se-rich spirulina phycocyanin powerfully prevents the development of atherosclerosis due to antioxidant activity
2	C-phycocyanin protects against ischemia-reperfusion injury of heart through involvement of p38 MAPK and ERK signaling; Mahmood Khan, SaradhadeviVaradharaj, Latha P. Ganesan, Jagdish C. Shobha, Madireddi U. Naidu, Narasimham L. Parinandi, SusheelaTridandapani, Vijay Kumar Kutala, and PeriannanKuppusamy; <i>Am J Physiol Heart CircPhysiol</i> 290: H2136 –H2145, 2006.	Phycocyanin improved the recovery of cardiac function during I/R-induced myocardial injury
3	C-phycocyanin, a very potent and novel platelet aggregation inhibitor from Spirulina platensis. Hsiao G, Chou PH, Shen MY, Chou DS, Lin CH, Sheu JR. <i>J Agric Food Chem.</i> 2005 Oct 5;53(20):7734-40.	Phycocyanin increases Cyclic GMP activity, prevents phosphorylation, formation of Thromboxane A2 formation and also inhibits free radical production – which ultimately inhibits patelet aggregation.
Wound Healing		

S.no	Study details	Conclusion
1	In vitro and in vivo investigations of the wound healing effect of crude Spirulina extract and C-phycoerythrin; CananSevimliGur , DenizKirazErdogan , IlyasOnbasilar , PerginAtilla , Nur Cakar4 and IsmetDelilogluGurhan ;Journal of Medicinal Plants Research Vol. 7(8), pp. 425-433, 25 February, 2013	Phycocyanin directly enhances wound repair by its anti-oxidant and scavenging destructive free radical mechanism. .
Skin Protective		
S.no	Study details	Conclusion
1	Antimelanogenic effect of c-phycoerythrin through modulation of tyrosinase expression by upregulation of ERK and downregulation of p38 MAPK signaling pathways;Li-Chen Wu*, Yu-Yun Lin , Szu-Yen Yang , Yu-Ting Weng and Yi-Ting Tsai; Journal of Biomedical Science 2011, 18:74	Phycocyanin is a potential melanogenesis inhibitor as it effectively restrained the expression of tyrosinase
Radio-Protective		
S.no	Study details	Conclusion
1	The biliprotein C-phycoerythrin modulates the early radiation response: A pilot study;Ivanova KG, Stankova KG, Nikolov VN, Georgieva RT, Minkova KM, Gigova LG, Rupova IT, Boteva RN.Mutation Research 695 (2010) 40–45	The results showed that C-PC selectively stimulated the lymphocyte antioxidant defence system of occupationally exposed subjects..
2	The postradiation use of vitamin-containing complexes and a phycoerythrin extract in a radiation lesion in rats [Article in Russian]. Karpov LM, Brown , Poltavtseva NV, Ershova ON, Karakis SG, Vasil'eva TV, ChabanluL. RadiatsBiolRadioecol. 2000 May-Jun;40(3):310-4.	Feeding of exposed rats with phycoerythrin extract from blue-green algae Spirulina platensis lead to correcting effect on the rats that have been exposed to X-rays.