

## **Builds healthy lactobacillus**

Healthy lactobacillus in the intestines provides humans with three major benefits: better digestion and absorption, protection from infection, and stimulation of the immune system. For these reasons, many people take lactobacillus supplements.

Research in Japan showed spirulina increased lactobacillus in rats 3 times over a control group. A diet with 5% spirulina for 100 days showed 1) caecum weight increased 13%, 2) lactobacillus increased 327%, and 3) Vitamin B1 inside the caecum increased 43%.<sup>41</sup> Since spirulina did not supply this additional B1, it improved B1 absorption. The study suggests spirulina should increase lactobacillus in humans and increase absorption of B1 and other dietary vitamins.

This has implications for AIDS. Some researchers believe the inability to absorb nutrients in the intestines can cause serious immune deficiency. The absence of lactobacillus leads to thriving infections. Nutrient malabsorption with 'opportunistic infections' can initiate full-blown AIDS. One strategy for halting the progression of AIDS is based on supplementation (to correct malabsorption) and lactobacillus (to maintain proper intestinal flora and prevent infection).<sup>42</sup>

41. Tokai, Y., et al. Effects of spirulina on caecum content in rats. Chiba Hygiene College Bulletin (Japan), Feb. 1987, Vol. 5, no. 2.  
42. Archer, D.L. and Glinsmann, W.H. Intestinal infection and malnutrition initiate AIDS. US FDA. Nutrition Research, 1985. 5:19-19.  
Archer, D.L. and Glinsmann, W.H. Enteric infections and other cofactors in AIDS. Immunology Today, 1985, Vol. 6, no.10.

## **Wound healing and antibiotic effects**

People have used spirulina in face creams and body wraps, and there are reports of people taking it in baths to promote skin health. The Kanembu people in Chad use freshly harvested algae as a skin poultice for treating certain diseases

Pharmaceutical compounds in France containing spirulina accelerated wound healing. Patients used whole spirulina, raw juice and extracts in creams, ointments, solutions and suspensions.<sup>43</sup> A study in Japan showed cosmetic packs containing spirulina and its enzymatic hydrolyzates promoted skin metabolism and reduced scars.<sup>44</sup>

Additional research showed extracts of spirulina inhibited the growth of bacteria, yeast and fungi.<sup>45, 46</sup> The antibiotic substances in these extracts may have medical applications.

43. Clement, G. et al. (inventors; Institute Francais de Petrol, assignee.) Wound treating medicaments containing algae. Fr. M. 5279 (Int. Cl. A61k), 11 Sep. 1967.

44. Yoshida, R. Spirulina hydrolyzates for cosmetic packs. Japan. Kokai 7731,838(Int.Cl.A61k7100), 10 Mar. 1977.

45. Martinez-Nadal, N.G. Antimicrobial activity of spirulina. XI Intl Cong. of Microbiology, Mexico City, Aug. 1970.

46. Jorjani, G., Amirani, P. Antibacterial activities of spirulina. Maj. lımy Puz. Danisk. Jundi Shap, 1978, 1:14-18.

## **Benefits for malnourished children**

As little as ten grams a day brings rapid recovery from malnutrition, especially for infants. Spirulina was given to undernourished children in Mexico,<sup>47</sup> and adults<sup>48</sup> with beneficial results. It was more than 10% of their diet and no adverse effects were noted.

In Togo, rapid recovery of malnourished infants was reported in a village clinic. Children given 10 to 15 grams per day mixed with millet, water and spices, recovered in several weeks.<sup>49</sup> In India, large

scale studies with preschool children showed carotenes in spirulina helped children recover from symptoms of Vitamin A deficiency.<sup>50, 51</sup>

In Romania, tablets were given to patients with nutritional deficiencies in a Bucharest municipal clinic. Patients had suffered weight loss in conjunction with chronic pancreatitis, rheumatoid arthritis, anemia, diabetes and other symptoms. The patients gained weight and their health improved.<sup>52</sup>

In China, spirulina was prescribed at Nanjing Children's Hospital as a 'baby nourishing formula' with baked barley sprouts. 27 of 30 children aged two to six recovered in a short period from bad appetite, night sweat, diarrhea and constipation. The researchers concluded this is a genuine health food for children.<sup>53</sup> In another study, children deficient in the essential mineral zinc, made more rapid recovery with high zinc spirulina than a standard zinc supplement.<sup>54</sup>

47. Ramos Galvan, R. Clinical experimentation with spirulina. Colloque sur la valeur nutritionnelle des algues spirulines, Rueill, May 1973. Nat. Inst. of Nutrition, Mexico City.

48. Sautier, C. and Tremolieres, J. Food value of spirulina in humans. Ann. Nutrition Alim, 1976, 30:517-534. (French).

49. Fox, Ripley D. Integrated village health and energy system, Farende, Togo. April 4, 1986 letter.

Fox, R. D. Algoculture: Spirulina, hope for a hungry world. Pub. by Edisud, Aix-en Provence, France, 1986.

50. Seshadri, C.V. Large Scale Nutritional Supplementation with spirulina alga. All India Project. Shri Amm Murugappa Chettiar Research Center (MCRC) Madras. 1993.

51. Annapurna, V. et al. Bioavailability of spirulina carotenes in preschool children. National Institute of Nutrition. Hyderabad, India. J. Clin. Biochem Nutrition. 10 p. 145-151. 1991.

52. Fica, V. et al. Observations on the utilization of spirulina as a nutritive factor in treating diseases accompanied by a nutritional deficiency. Clinica II Medicală, Spitalul Clinic Municipiului, Bucuresti. Med Interna 36 (3), 1984.

53. Miao Jian Ren. Spirulina in Jiangxi China. Academy of Agricultural Science, Jiangxi province, China. Paper presented at Soc. Appl. Algology, Lille, France, Sep. 1987.

54. Yonghuang, W. et al. The study on curative effect of zinc containing spirulina for zinc deficient children. Shenzhen Blue-Green Algal Biotech. Corp, Capital Medical College, Beijing, 5th Int'l Phyco Cong, Qingdao, China. June 1994.

## Iron bioavailability and correction of anemia

Iron is the most common mineral deficiency worldwide. Iron anemia is prevalent in women, children, older people, and especially women on weight loss diets. Iron is essential for healthy red blood cells and a strong immune system, but typical iron supplements are not well absorbed by the human body. Because spirulina is known to have a very high iron content, it was tested against a typical iron supplement. Spirulina fed rats absorbed 60% more iron than rats fed the iron supplement, suggesting there is a highly available form of iron in spirulina.<sup>55</sup> An earlier study showed it corrected anemia in rats.<sup>56</sup>

In Japan, eight young women had been limiting their meals to stay thin, and showed hypochromic anemia ? lower than normal blood hemoglobin content. After four grams of spirulina after each meal, in 30 days, blood hemoglobin content increased 21% from 10.9 to 13.2, a satisfactory level, no longer considered anemic.<sup>57</sup>

Athletes in intensive training can suffer from non-anemic iron deficit, with clinical symptoms such as exhaustion and muscle fatigue. A 1998 study with Macedonian male and female athletes taking spirulina for two months showed a distinct rise in iron reserves. This simple dietary modification can eliminate iron deficit symptoms and optimize athletic health and physical capacity.<sup>57A</sup>

55. Johnson, P., Shubert, E. Availability of iron to rats from spirulina, a blue-green alga. Nutrition Research, 1986, Vol. 6, 85-94.

56. Takemoto, K. Iron transfer from spirulina to blood in rats. Saitama Medical College, Japan, 1982.

57. Takeuchi, T. Clinical experiences of administration of spirulina to patients with hypochromic anemia. Tokyo Medical and Dental Univ., Japan, 1978.

57A. Trojancanec, Z. et al. Influence of extensive training on the number of erythrocytes and hemoglobin level and its correction. Inst. for Physiology, Skopje, Macedonia. XXIV FIMS World Congress of Sports Medicine, June 1998.

## GLA and prostaglandin stimulation

Foods high in saturated fats, typical of the American diet, may block the beneficial work of essential fatty acids in the human body, leading to many disease conditions.

Gamma linolenic acid (GLA), an essential fatty acid, is a precursor for the body's prostaglandins, master hormones that control many body functions. The prostaglandin PGE1 is involved in many tasks including regulation of blood pressure, cholesterol synthesis, inflammation and cell proliferation. PGE1 is usually formed from dietary linolenic acid, and the GLA progresses to PGE1.<sup>58</sup> Dietary saturated fats and alcohol and other factors may inhibit this process, resulting in GLA deficiency and suppressed PGE1 formation.<sup>59</sup>

Numerous studies have shown GLA deficiency may figure in degenerative diseases and other health problems. Clinical studies show dietary intake of GLA can help arthritis,<sup>60</sup> heart disease,<sup>61</sup> obesity<sup>62</sup> and zinc deficiency.<sup>63</sup> Alcoholism, manic-depression, aging symptoms and schizophrenia also have been ascribed partially to GLA deficiency.<sup>64</sup> A source of dietary GLA may help conditions of heart disease, premenstrual stress, obesity, arthritis and alcoholism.<sup>65</sup> In Spain, the GLA in spirulina and evening primrose oil is prescribed for treatment of various chronic health problems.<sup>66</sup>

The few known sources of GLA include two foods, human milk and spirulina, and oil of the evening primrose plant, black currant and borage seeds. Ten grams of spirulina has over 100 mg of GLA. This high amount of GLA is well documented.<sup>67, 68, 69</sup> It is about 5% essential fatty acids and 20% of this is GLA.

58. Jassby, Alan. Nutritional and Therapeutic Properties of Spirulina. Proteus Corp. 1983.

59. Tudge, C. Why we could all need the evening primrose. *New Scientist*, Nov. 1981, 506:23.

60. Kunkel, S.L. et al. Suppression of chronic inflammation by evening primrose oil. *Progress in Lipids*, 1982, Vol. 20, p. 885-888.

61. Kernoff, P.B.A., et al. Antithrombotic potential of DGLA in man. *British Med. Journal*, 1977, 2:1441-1444.

62. Vadaddi, K.S., Horrobin, D.F. Weight loss produced by evening primrose oil. *IRSC Med. Sci.*, 1979, 7:52.

63. Huang, Y.S. et al. Biological effects of zinc deficiency corrected by GLA. *Atherosclerosis*, 1982, 41:193-208.

64. Horrobin, D.F. The possible roles of prostaglandin E1 and of essential fatty acids in mania, depression and alcoholism. *Progress in Lipids*, 1981. Vol 20, 539-541. Horrobin, D.F. Loss of delta-6-desaturase activity as a key factor in aging. *Med Hypotheses*, 1981, 7:1211-1220.

65. Passwater, R.A. *Evening Primrose Oil*. Keats Publishing Co. New Canaan, CT, 1981.

66. Lopez-Romero, D. Gamma linolenic acid as a base of treatment for infirmities with evening primrose oil and spirulina. *Med. Holistica*, Madrid, Spain, 12 Oct. 1987.

67. Hudson and Karlis. The lipids of the alga spirulina. *J. Sci Food Agric.*, 1974, 25: 759.

68. Nichols, B., Wood, B. The occurrence and biosynthesis of gamma linolenic acid in spirulina platensis. *Lipids*, 1986, Vol 3, No. 1, 46-50.

69. Roughan, P. Grattan. Spirulina: Source of dietary gamma-linolenic acid? *J.Sci.Food Agric.*, 1989,47, 85-93.