

The Potential Role of Spirulina in Protection against Radiation and its Effects

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Introduction

During the Chernobyl nuclear accident, and now due to the recent Japanese earthquake-related nuclear accident, many people have asked us about some reports that they have read about the effect of Spirulina in protection against radiation related health problems. These studies refer to those made in Belarus using Spirulina donated by Earthrise. This introductory article is to present what is known about the effect of Spirulina on radiation related effects as presented in the scientific literature. This article should not be used to diagnose, treat, cure or prevent any radiation related condition. Consumers should evaluate its use with their physician. In as much as Spirulina is a food, consumers may want to take it in addition to any other protection method advised by their physicians.

Radiation Protection Effects of Spirulina

1. *Studies on people affected by the Chernobyl accident*

In 1993, doctors from Belarus reported the results of their finding on the effect of Spirulina in reducing radiation load in Children subjected to low level of radiation over a long period of time.¹ This paper presented at the 6th International Congress of Applied Algology held in the Czech Republic showed that feeding children with 5 grams of Spirulina a day resulted in the reduction of Cesium-137 in urine by 50%. According to the authors this study confirmed an earlier study that they conducted in 1990-1991 (unpublished) where they concluded that “use of Spirulina decreases radioaction dose load received from food contamination with radionuclides, Cesium-137 and Strontium-90. Spirulina is favorable for normalizing adaptive potential of children’s bodies in conditions of long-lived low dose radiation.” The same group has also found a similar detoxifying effect in another study reported in 1999 at the 8th International Congress of Applied Algology held in Italy.²

Researchers from Ukraine reported in 2000, in the journal, Lik Sprava, their study on the “adaptive potentials of those who worked in the cleanup of the aftermath of the accident at Chernobyl atomic electric power station under the influence of different methods”. They found that several drugs, phytochemicals and Spirulina lead to the reconditioning of several adaptive mechanisms, resulted in long lasting remissions and provided prophylactic activity and promoted work activity.³

2. *Radiation Protection in Bone Marrow and Blood Cells*

In a paper presented at the Second Asia-Pacific Conference on Algal Biotechnology in Malaysia in 1994, Chinese scientists reported a study on the effect of c-phycoyanin and polysaccharide extracts of Spirulina on peripheral blood and bone marrow progenitor cells in normal, gamma- irradiated and anemic mice. C-phycoyanin and polysaccharide of Spirulina were found to stimulate recovery of white blood cells and bone marrow cell counts. The anemic condition induced by irradiation was also reduced.⁴

In a paper published in Radiat Biol Radioecol, researchers from Ukraine reported in 2001 the result of a study to investigate the effect of a polysaccharide extract of Spirulina (PSP) on the hematopoietic (bone marrow stem cells) system of mice and dogs injected with cyclophosphamide (CTX) or irradiated with Co₆₀-gamma irradiation respectively. At a dose of 30 and 60 mg/Kg, the extract increased the level of white blood cells and DNA in bone marrow in mice. At a level of 12 mg/Kg, the extract increased the level of red blood cells, white cells and hemoglobin in blood and nucleated cells in bone marrow in dogs. The authors concluded that “PSP has chemo-

protective and radio-protective capability, and may be a potential adjunct to cancer therapy".⁵ A similar protective effect against gamma irradiation was observed in an earlier study reported by Quishen et al. in 1988.⁶

Mazo et al. subjected rats to gamma irradiation and followed intestinal barrier permeability to polyethylene glycol 4000. Addition of Spirulina to the diet led to near-complete normalization of permeability.⁷

3. Other Potential Beneficial Properties of Spirulina against Radiation Effects

The three most important and long-term effects of irradiation are: a) compromised immune system, b) oxidative stress and c) cancer. Numerous animal studies and some human clinical studies have shown that Spirulina modulates the immune system favorably and it has strong anti-oxidant and anti-inflammatory effects. Some studies have also shown its anti-cancer effects. These studies have been compiled in a recent book: *Spirulina in Human Health and Nutrition*⁸ and in an extensive review article published in the Journal of the American Nutraceutical Association.⁹

In addition to the potential health benefits described above it is also a good source of protein, Vitamin A (as beta-carotene), iron, Vitamin B-12 and the rare essential fatty acid, gamma linolenic acid (GLA). It also contains a rich source of phycocyanin, a blue pigment with several potential health benefits.

4. Suggested Mechanism of Action

Some of the beneficial aspects of Spirulina in radiation effects may be due to its ability to bind to heavy metals and radioisotopes. In many studies the bulk of heavy metals are found in the protein fraction. This has led to the hypothesis that the high content of metallothioneins in Spirulina may be responsible for the accelerated excretion of radioisotopes and heavy metals. This heavy metal binding property has been shown to result in the reduction of heavy metal toxicities from mercury, lead and cadmium in animal studies and arsenic in a human clinical study.^{8,9}

5. Conclusion

The available evidence seems to indicate that Spirulina has a potential to be used as an adjunct to other means of radiation protection. Spirulina has been used for centuries as food. Spirulina produced by Earthrise has a GRAS (Generally Recognized as Safe) status by scientific procedures and FDA review.¹⁰ Spirulina is available in many health food stores and other outlets world-wide.

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