# Around The World

## International Vitamin Convention in Switzerland

**Dr. G. E. Schuitemaker**[1]

An international symposium entitled, *Elevated Doses of Vitamins: Benefits and Hazards,* was held in September, 1987 at Interlaken, Switzerland. The convention was organized by the Swiss Society for Nutrition Research. This organization is closely involved in legislative procedures in Switzerland regarding the admission of food supplements and addition of vitamins to nutritional products. These items are at the moment of current interest in many countries in Europe. Actually many government authorities would like to close the market for food supplements in higher dosages. To get an update of the current scientific situation, the Swiss Society for Nutrition Research invited many scientists from all over the world. The convention has been sponsored by the big Swiss companies Hoffmann-la Roche, Sandoz and Nestle and also the Swiss Academy of Sciences.

Literature on most of the vitamins has been reviewed by the lecturers. Particular interest was in the effects of the antioxidants and the free radical pathology. My main impression was that:

1. More and more therapeutic applications of higher dosages of vitamins are becoming known, based on regular scientific research.
2. At the moment very much research is going on, the results of which are not yet known.
3. We are standing at the beginning of a development of the application of vitamins regarding prevention and therapy.
4. Up to now hardly any toxic effects of vitamins are known. The fat soluble vitamins A and D are frequently mentioned, but toxic phenomena are seen only with very high dosages, during a long time, and even then the effects are reversible.

The following is a summary of the highlights of the symposium.

1. European Institute for Orthomolecular Science. Postbus 420, 3740 AL Baarn. The Netherlands.

**Vitamin A**

Twenty-five to fifty million children in the third world suffer from serious symptoms of vitamin A deficiency. Five million develop a xerophthalmia and each year 250,000 to 500,000 children suffer from intestinal and bronchial diseases, associated with some kind of vitamin deficiency. Even a small vitamin A deficiency seems to be correlated with a four-to tenfold increase of mortality. Prof. A. Sommer from Baltimore, USA, reported that four controlled studies indicated that this mortality is reduced to 30-70% by supplementation with vitamin A. Projects have been started in which children were given 200,000 IU vitamin A by injection each half year (100,000 IU to children younger than one year old). Since vitamin A is a fat soluble vitamin, it can be stored in the liver which functions then as a depot. Because of the possible teratogenicity pregnant women are only given 10,000 IU the first trimester of the pregnancy. The next lecturer was Dr. Barbara Underwood from the National Eye Institute in Bethesda, USA. She dealt with this teratogenicity. It is very well known that vitamin A derivatives like vitamin A-acid (tretinoin) is teratogenic to humans. Only in animal experiments vitamin A itself showed teratogenicity, because animals produce metabolites out of vitamin A which are teratogenic. Humans are not able to synthesize these metabolites. Dr. Underwood advised, if there exists a vitamin A deficiency, to limit the dose for pregnant women to not exceed the 10,000 IU limit. Of course betacarotene remains a safe alternative.

**Vitamin E**

Dr. L. Machlin from Hoffmann-la Roche USA discussed vitamin E. People with a decreased fat absorption, hemolytic anemia and hepatitis in general have a deficiency. Also patients on Total Parenteral Nutrition develop a vitamin E deficiency rather

quickly. From double blind studies it is known that vitamin E is effective in Peyronie's disease, arthritis, PMS, claudicatio intermittens and tardive dyskinesia. At the moment a study is going on in Finland in which the influence of smoking on the vitamin E status is examined. Also there is a very big study going on on the relation between Parkinson's disease and vitamin E. Dr. Mino from Japan stated that vitamin E is preventive in infections, cancer and ischemic heart diseases. He stated that this prevention is based on the protective role of vitamin E against free radicals. He mentioned dosages of 800 IU to maximum 2,000 IU of vitamin E. Also the development of cataracts seem to be inhibited by vitamin E. Dr. Gey from Switzerland reported on the influence of vitamin E on ischemic heart disease (IHD). From animal experiments it is known that a vitamin E deficiency is correlated to arterial lesions. He described an epidemiological study he had performed among eleven European populations, in which the mortality caused by ischemic heart disease varied. Mortality in the northern part of Europe is much higher than in the southern. The plasma levels of the anti-oxidative vitamins and selenium were measured. It was seen that the alpha-tocopherol/cholesterol ratio had the best correlation factor with IHD. Remarkable is that the correlation values according to the current scientific knowledge are considered normal instead of too low.

The high significant correlation between alpha-tocopherol/cholesterol and IHD seemed to be independent of the mortality risk from hypercholesterolemia. Dr. Gey concluded that these new data show that the vitamin E/cholesterol ratio is an underestimated risk factor for IHD annex to hypercholesterolemia, smoking, etc. He suggested a study with higher dosages of vitamin E and the possible protective action of this vitamin against IHD.

**Vitamin D**

Rachitis is the typical deficiency disease of vitamin D. With relative low amounts of this vitamin symptoms can be treated. Higher dosages of vitamin D are effective in more rare diseases, the so called vitamin D resistant diseases. Examples are hypoparathyroidism, genetic and acquired osteomalacics and renal osteodystrophia. There are also new developments in the treatment of leukemia and other blood and skin diseases with the vitamin D metabolite, 1,25-dihy-droxy vitamin D.

**Vitamin C**

One of the best and most clear lectures was given by Dr. Rivers from the University of Texas at Austin. The title was *Safety of High Level Vitamin C Ingestion.* She reviewed all the literature reporting toxic effects of vitamin C:

— formation of urate stones
— formation of oxalate stones
— decreased absorption of vitamin B12 from the gut
— increased absorption of iron and additionally an iron intoxication
— mutagenicity (in vitro studies)
— conditioning/dependency

At the end of her speech she concluded that *none* of the mentioned damaging effects were confirmed by later, more expanded studies. Even the vitamin B12 status in rats seems to be ameliorated when given vitamin C. The most commonly heard effect, the formation of oxalate stones after ingestion of high dosages of vitamin C, has never been observed and this formation is also unlikely to occur, because the formation of oxalate out of vitamin C is a saturation process. So at a certain point there is no more oxalate formed when more vitamin C is given.

An excess of iron in the body because of high dosages of vitamin C is also not based on facts. The next speaker, Dr. Leif Hallberg from Sweden discussed this matter in depth. He said that vitamin C is the best promoter of the absorption of iron. Phytates and tannines inhibit the absorption, but vitamin C is undoing this action. Dr. Hallberg stated: "The need for ascorbic acid in iron absorption is much greater than the need to prevent scurvy. This fact should be considered in setting the recommendations of the dietary intake of vitamin C.

The last lecturer on vitamin C was Dr. S. Tannenbaum of the Massachusetts Institute of Technology. He did research on the relation between the formation of the carcinogenic nitroso-compounds and stomach cancer. He confirmed this relation and the synthesis of nitroso-compounds out of nitrates and nitrites from food and the

inhibiting effect of vitamin C on this formation. Vitamin E seems to have much less effect. The reason for this is now well understood.

**Vitamin B6**

Dr. Bassler from Mainz, West Germany, discussed vitamin B6. The indications which he mentioned for vitamin B6 were alcoholism, homocystinuria, medication with iso-niazideand D-penicillamin, arthritis, PMS, carpal tunnel syndrome and the Chinese Restaurant Syndrome. According to Dr. Bassler, these two last illnesses are often seen together. Because of the fact that the toxic effects of vitamin B6 are frequently described in the international literature, this part of the lecture was the most interesting. Dr. Bassler stated that the mentioned intoxications are limited to case histories. No systematic intoxications have been described. On the other hand, many studies with high dosages of pyridoxin have been performed (i.e. in the treatment of PMS) and no side effects have been reported from these studies.

**Anti-oxidants**

Dr. Sies is a researcher in Dusseldorf, West Germany, on the free radical pathology. He described research on glutathione (GSH) activity during exercise. It was shown that on a molecular level a change in the redox potential occurred. During exercise the total glutathione concentration remained unchanged in the blood, but the oxidized form (GSSG) was increased and the reduced form (GSH) reduced. Furthermore, another experiment showed that during shock the GSH-concentrations in many organs are lowered, but this concentration is increased in the adrenals.

Since 1971 the so called Basel study has been conducted: 3,756 healthy adolescents were clinically examined and at the same time the plasma levels of the vitamins A, C, E and beta-carotene were determined. In the following years mortality was recorded and it was seen that there existed an inverse relation between the beta-carotene level and lung cancer, stomach cancer and all cancer forms together. A low vitamin A level was significantly correlated with stomach cancer. In this respect a study has been published in *The Lancet* (16 October 1982), in which stomach ulcers were successfully treated with 3 x 50,000 IU vitamin A.

Low vitamin C and E levels were correlated with stomach cancer and all forms of cancer together. The levels of the mentioned anti-oxidants together showed an inverse correlation with all types of cancer together.

The Swiss scientists attribute the effects of the anti-oxidants to their ability to scavenge free radicals. They concluded that the anti-oxidants play a role as natural inhibitors which may act on cancer initiation or promotion.

**Sports**

An excellent review of the effects of vitamins on sport performance has been given by Prof. M. H. Williams from the United States. He stated that up to now little research has been done on this relationship. He also considered more research of the effects of megadoses of vitamins necessary. In general it has not been shown that extra vitamins next to a proper diet influence the sport performance. Exceptions can be made for the B-vitamins, which improve the fine motor control and for vitamin E, which improves endurance at high altitudes. Other effects are mainly based on physiological theories: thiamin, riboflavin, niacin and pantothenic acid in energy metabolism in the muscle cells, vitamins C and E as antioxidants and as protective substances of the membranes of erythrocytes, folic acid and vitamin B12 in the production of the ery-throcytes and vitamin B6 in the synthesis of hemoglobin. Research indicates that most top athletes use vitamin supplementation which exceeds 50 to 100 times the USRDA.

A good example of the effects of vitamins on sport performance was given by Dr. Boncke, Merck, Darmstadt, West Germany. In a good study with marksmen, a combination of vitamin Bl, B6 and vitamin B12 improved the records. In a double blind controlled study, a group of target shooters were compared with a placebo-group. The group given 300 mg vitamin Bl, 600 mg vitamin B6 and 600 microgram vitamin B12 for eight weeks had significantly better results than the placebo-group. These marksmen had a better control over their fine muscles (less tremor) and an improved firing accuracy. The improvement was related linearly to the time of treatment.

## Conclusion

Nutritional science is on the move. At this international symposium it became clear once more that nutritional science has much to offer to medicine. The integration of nutrition in the medical treatment of patients is dependent on the number of (clinical) studies which are performed. Because of broad public awareness, science has begun many studies, most of which are still in process. Results will become available in a few years, and those already shown are very encouraging.