Excerpt
Stress
Animal and human evidence suggests that pantothenic acid is needed for adrenal function and might be involved in the adrenal response to stress. As mentioned in the section on deficiency, a progressive morphological and functional change occurs to the adrenal glands when there is a pantothenic acid deficiency. The eventual result of deficiency is adrenal hypofunction, with an inability to respond appropriately to stress. If pantothenic acid is supplied early enough after deficiency has been induced (i.e., before adrenal exhaustion occurs), the response to stress can be improved. Supplementation of pantothenic acid when the diet is adequate in pantothenic acid also appears to impact adrenal function. In male rats, adding pantothenic acid (0.03%) to drinking water for nine weeks increased adrenal gland weight, basal plasma levels of corticosterone, and the release of corticosterone in response to ACTH. Supplementation also increases urinary excretion of 17,21-dihydroxy-20-ketosteroids – a sign of functional activation of the adrenal gland.

Results of several animal studies suggest that providing supplemental pantothenic acid might improve the response to certain types of stress. Supplementing the diet of rats with 43.6 mg of calcium pantothenate per 100 g of chow increased adrenal weight significantly in response to surgical stress. In unstressed animals supplementation of pantothenic acid had no effect on adrenal weight. Since adrenal hypertrophy in response to stress is believed to be an adaptive response, this suggests that pantothenic acid supplementation improved the stress response. Exposure to gamma radiation reduces blood levels of pantothenic acid and its derivatives by about 80 percent. It also produces a significant increase in oxidative stress – lipid peroxidation increases and liver levels of CoA and reduced glutathione decrease. Administration of dexpantenol, in amounts sufficient to increase blood pantothenic acid levels significantly above control (non-irradiated) levels, normalized these markers of oxidative stress.

Pantothenic acid appears to be involved in optimizing the response to cold stress. A deficiency of pantothenic acid increases the sensitivity of undernourished rats to cold. Deficiency also significantly decreases average survival time of rats exposed to cold stress. Supplementing the combination of calcium pantothenate and a small amount of hydrocortisone prolonged survival of cold-stressed, adrenalectomized rats. Supplementation of pantothenic acid allowed rats that had undergone removal of the adrenals to swim in cold water for as long as rats with intact adrenals. In rats with intact adrenals, supplementation with large amounts of pantothenic acid doubled the length of time they were able to swim in, and survive in, cold water. Men receiving pantothenic acid (10 g/d for six weeks) had a less pronounced drop in white blood cell counts and vitamin C levels subsequent to cold-water immersion stress, compared to presupplementation values. A report indicated that a high proportion of schizophrenic patients had impaired adrenal function. When pantothenic acid was given to these patients, adrenal function improved.