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BRIEF COMMUNICATION

LEVELS OF SELENIUM IN THE SKIN OF PATIENTS WITH CHRONIC LYMPHEDEMA

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The finding that lipid peroxides are transported in thoracic duct lymph (1) suggests that impaired lymph flow may predispose to deposition of lipoperoxides in the skin and contribute to tissue changes associated with chronic lymphedema (2). Indeed, in a preliminary study, the content of malondialdehyde, a marker for lipid peroxidation, was increased in skin biopsies of patients with longstanding lymphedema (2). Other workers have reported that the erythrocyte concentrations of glutathione, another marker of free radicals was decreased in patients with lymphedema in conjunction with a marked increase in the plasma concentration of malondialdehyde (3). Because metabolism of glutathione is closely linked to selenium (Se), it has been postulated that patients with lymphedema have a deficiency of this trace mineral (4). Siems et al have reported decreased plasma levels of selenium in patients with lymphedema (5) but Földi was unable to substantiate this finding (6). It has further been reported that in patients treated with both physical therapy and Se, there has been a marked decrease in lymphedema, and, accordingly, supplemental Se in the diet has been suggested as useful for this condition (4,5).

Because it is generally recognized that there is no deficiency of Se in middle Europeans (7), doubt remains about recommending Se supplement to patients with lymphedema. To elucidate whether there is in fact a Se deficiency in patients with lymphedema, we measured the Se content in skin biopsies of patients with lymphedema and compared the findings with Se levels in skin biopsies taken from randomized recently deceased individuals without peripheral edema.

MATERIALS AND METHODS

In 15 patients with longstanding lymphedema (age 25-81 years; median 61 years), a skin biopsy was taken under local anesthesia after voluntary patient consent was obtained. The skin specimen was chosen from an edematous region of the extremity, preferably where there was palpable sclerosis of the skin and underlying soft tissue. In 15 patients who were recently deceased but without peripheral edema (controls), median age 63 years) skin biopsies were similarly taken.

The skin biopsies were incubated with concentrated salpetric acid. 100 µl of each specimen was mixed with 50 µl dilution (0.2% Triton X). The concentration of Se was determined using electrothermal atomic absorption spectrometry (ETAAS), Zeeman 3030 (Perkin-Elmer, Überlingen). Maximum sensitivity of the analysis was achieved, and interference was avoided by Zeeman

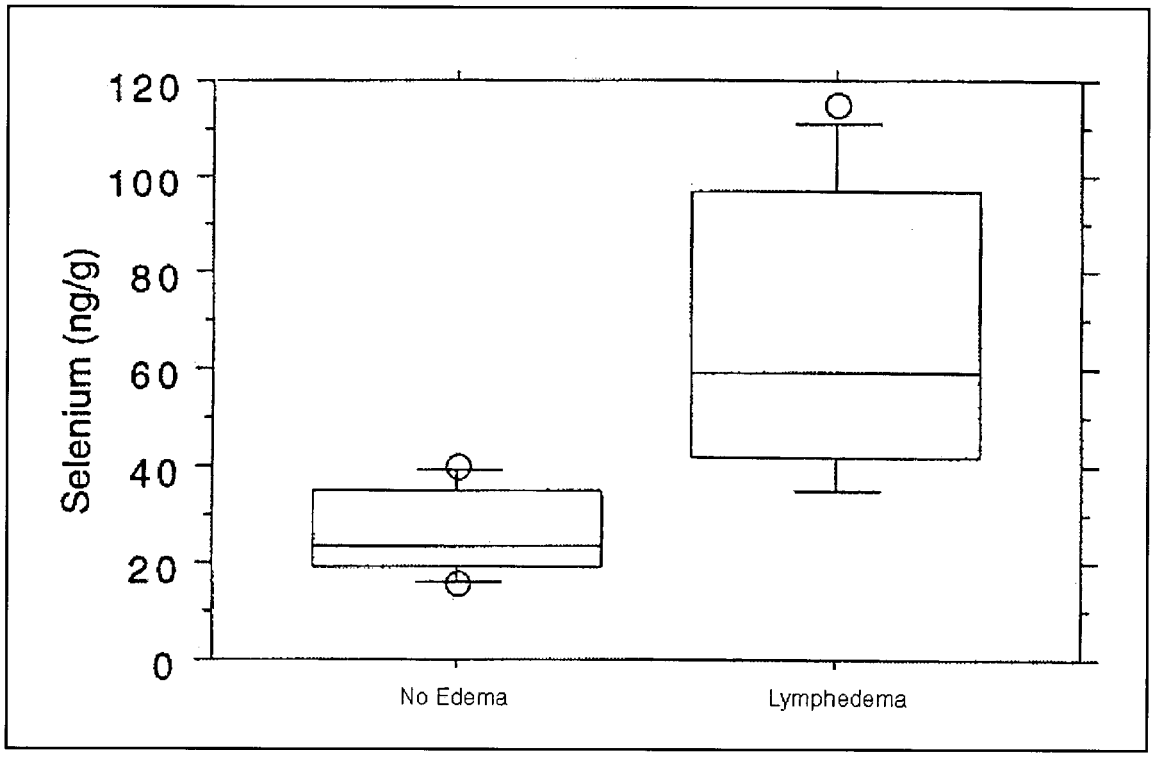

Fig. 1. Selenium concentrations in skin of subjects with and without chronic lymphedema.

background compensation. The method has high reliability with a detection of 0.053 µmol/l) (8). Statistical analysis was done using the Mann-Whitney-U test.

RESULTS

In patients with lymphedema, the concentration of Se in biopsies of the skin was elevated compared with controls; the median values were also significantly higher ($p<0.001$) *(Fig. 1)*. There were no differences in the concentration of Se in regard to gender or age. Except for transient leakage of lymph fluid in two patients, there were no sequelae of the skin biopsies.

DISCUSSION

The findings do not support a deficiency of Se in patients with chronic lymphedema. It should be recognized, however, that there may be a correlation between the composition of the specimen and the concentration of Se (i.e., chemical interference), and we were unable to confirm a calibration of the measuring method within a standardized tissue specimen (8). Moreover, it would be desirable in addition to measuring Se in skin biopsies to determine the level of Se in the blood.

It is still speculative if the higher concentration of Se in patients with lymphedema is linked to tissue protein metabolism. Thus, there is a relatively high protein content in lymphedema fluid which may account for accumulation of Se which binds to proteins (7,9). Whereas biochemically this assumption is unlikely, this issue could be clarified by taking skin biopsies (under strict ethical guidelines) from non-edematous areas of the body in patients with lymphedema for Se content.

These preliminary data do not indicate a deficiency of Se in patients with longstanding lymphedema (4,5,10). Moreover, supplemental Se administration is not without risk (6,9).

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