Studies of Sulphate Excretion in the Urine of Healthy Individuals Compared to Recurrent Calcium Oxalate Stone Formers

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Introduction

Sulphur is usually incorporated with the sulphur-containing amino acids cystine, cysteine and methionine, and only a small proportion is taken up as sulphate (Budecke 1974). The oxidation into sulphate is taking place in the liver. It is either used for synthesis as “active sulphate” (sulphatide, chondroitin sulphate, keratin sulphate, heparin) or reaches the circulation as inorganic sulphate. It is then found as amino acid peptide sulphate, as ester sulphate or inorganic sulphate.

The renal excretion is similar to that of phosphate, the reabsorption takes place in the proximal tubule only (Deetjen et al. 1976). The threshold concentration is very low and the excretion which is proportional to the filtration rate only occurs with serum levels above 1.0 mmol/l (Dennis and Brazy 1982). There are hardly any investigations about the role of sulphate in stone disease (Hesse et al. 1985a; 1985b; Schwille et al. 1985).

The supersaturation of the urine is often an additional factor in calcium oxalate stone disease. Until now, the causes for this are unclear and it is unknown which role nutrition and changes in metabolism play (Hesse and Bach 1982).

Material and Methods

We have examined the sulphate excretion in 223 recurrent calcium oxalate stone formers, 152 males and 71 females. 24-h-urine was collected under individual and a standard diet. The control group consisted of 326 healthy individuals - 163 males and 163 females - under individual diet and 30 healthy subjects under individual and a standard diet, 17 males and 13 females. The sulphate excretion was measured nephelometricly.

Results

Under individual diet the average sulphate excretion in males was 21.6 mmol/d, in females 16.9 mmol/d; the difference was statistically significant. In the group of stone formers the average excretion in male individuals was 23.6 mmol/d, in females 18.0 mmol/d. The difference was statistically significant, too. Figure 1 shows the average sulphate excretion under individual diet. Under a standard diet (Fig. 2) the

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Healthy persons

Ca-Oxalate stone formers

Fig. 1. Average sulphate excretion in 24-h-urine under individual diet

Fig. 2. Average sulphate excretion in 24-h-urine under a standard diet

daily sulphate excretion was measured after a steady state had been reached after 7 days. In healthy male it was 23.9 mmol/d, in females 20.4 mmol/d; the difference was not statistically significant though. In male stone patients it was 17.2 mmol/d, in females 15.7 mmol/d (statistically significant difference).

Figures 3 and 4 show a clear change of the sulphate excretion in relation to the age of the patients. Males between 20 and 30 (Fig. 4) years of age show a maximum excretion while there is a marked decrease in patients over 60 years. Females show a