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Zn, Ca and Na Levels in the Prostatic Secretion of Patients with Prostatic Adenoma

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Zinc, calcium and sodium levels of the prostatic secretions in patients with prostatic adenoma were studied. In a control group of 20 patients, two samples of the secretion, taken on the first and the seventh day, were compared and found to show no difference. In the treated group of 20 patients, where a 7-day therapy of ERU (extractum radix urticae) followed upon the first sampling, the 7th-day specimen presented a significant drop in the Zn level. Correlation was found to exist between the Zn and Ca levels. From literary data the inference was drawn that ERU is producing a derangement in the zinc-testosterone metabolism and diminishes the zinc secretion in adenomatous tissue.

Examinations of the prostatic secretion with a view to clarifying immunologic and cytologic questions have long been performed in healthy subjects, and also in patients with prostatic and fertility troubles [1, 3, 7]. Investigations of trace elements carried out by a variety of methods yielded incomparable results [2, 4, 15].

Zinc is an important element in the prostate and an indicator of androgen metabolism [5]. Its storage in the prostate is beginning with puberty [4]. Its secretion and tissue accumulation are specific to the prostate, its androgen dependence is a known quality [15]. Pathologic processes within the prostate self-evidently involve all these functions.

Mackenzie et al. [9] were the first in 1962 to test the normal prostate for its zinc content and found it to be 30.0 to 73.0 mg/100 ml (Table 1). The first figures on calcium are dating back to 1941 when Huggins et al. [8] recorded 28.7–32.7 mval/l. The term valence used by these authors is indistinct and therefore not convertible to currently accepted units.

Marmar et al. [10] investigated the zinc levels in prostatic secretion in five patients and found an average 38.9 mg/100 ml with slight individual fluctuations. Literary data agree in stating that the zinc level drops considerably in patients with prostatitis. We have found it lower in prostatic cancer than in adenoma, admitting though that we tested it in the tissue ash, not in the excrete itself [13]. Hoare et al. [6], too, found diminished zinc level in adenoma.

Our own examinations of prostatic secretion were performed with the aim to

– determine the Zn, Ca and Na volumes at two instances with a 7-day interval;

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Table 1

Expressed prostatic secrete (EPS) values

Author	Zinc (mg/100 ml)	
Huggins et al. [8]	normal*	
Mackenzie et al. [9]	normal	30.0–73.0
Marmar et al. [10]	normal	38.9±8.6
Fair et al. [3]	normal	45.5±2.2
Anderson and Fair [1]	normal	
	BPH	
	prostatitis	1.2±2.5

* Calcium (mval/l): 28.7–32.7

– check the occasional change;
– ascertain the concentrations of several chemical elements in relation to each other.

Material and method

Two groups of 20 patients each were selected at random out of a larger number who had been admitted for surgical management of prostatic adenoma. Sampling in the control group was made on the first day and, after a 6-day interval, was repeated on day 7. In the other group the sampling was followed by 7 days of treatment with 3×2 capsules (6×300 mg) of ERU (extractum radix urticae)* per day. The secretion was collected in vials and frozen. The average value from these measurements, taken with an atomic absorption photometer, served for statistical analysis.

Results

The average Ca and Na values in the control group remained unchanged at t_1 and t_2, with a minimum of individual fluctuation, as confirmed also in the literature [1, 4]. The changes are non-significant of course. Neither are they so for Zn in the 6-day interval (Table 2). Mathematics have shown that there exists a direct correlation, confirmed statistically and observable both at t_1 and t_2, between the Zn and Ca levels ($p = 0.00007$) (Fig. 1). On the other hand, Zn–Na and Na–Ca were found to be uncorrelated.

As concerns the other group of patients, the Zn, Ca and Na levels at t_1 were more or less the same as in the control group at the corresponding points of time. The patients in this group, upon 7 days of ERU capsule treatment after

* Bazoton® (Kanold, FRG).

Table 2

Ca, Zn and Na levels of the prostatic secretion in prostatic adenoma patients (control group)

	Mean value
Calcium (mg/100 ml)	
t_1	32.15
t_2	31.45
Sodium (mg/100 ml)	
t_1	387.55
t_2	387.45
Zinc (mg/100 ml)	
t_1	48.00
t_2	45.85

the secretion sampling, presented no change in the Na level, an insignificant drop in the Ca level (Table 3) and a very significant change in the Zn level (Table 4). The difference in Zn between t_1 and t_2 within this group was conspicuous ($p = 0.0013$) and so was the difference between the treated and the control group at t_2 ($p = 0.009$). The zinc-calcium correlation at t_2 is as pronounced as it was at t_1, and the degree of significance is also alike ($p = 0.0001$).

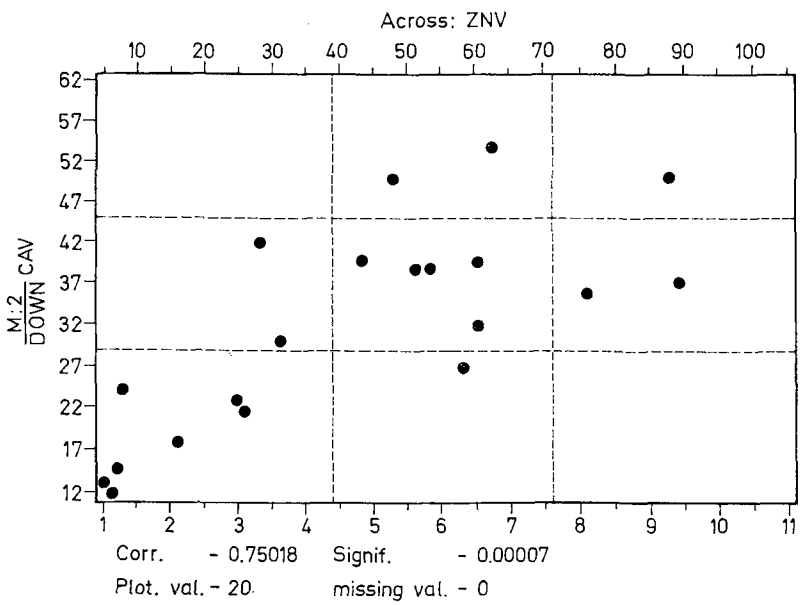

Fig. 1. Correlation between Ca and Zn levels in the prostatic secretion at t_1 (control group)

Table 3

Variation of the Ca value in prostatic secretion in the course of treatment

Untreated	Treated
Mean value	
(mg/100 ml)	(mg/100 ml)
t_1 32.15	28.47
t_2 31.45	24.29
Δ 0.7	4.18*

* p = 0.03

Table 4

Variation of the Zn value in the prostatic secretion after 7 days of ERU therapy

Untreated	Treated
Mean value	
(mg/100 ml)	(mg/100 ml)
t_1 48.60	39.88
t_2 45.85	26.75
Δ 2.15	13.12*

* p = 0.009

Discussion

Owing to the rapidity with which androgen is synthesized in the organism, the serum hormone determination furnishes very little information regarding the processes inside the normal or the adenomatous prostatic tissue. One single hepatic perfusion absorbs 40–60% of the circulating testosterone, wherefore it is difficult to gain any insight into the intraprostatic testosterone kinetics. Zinc, however, may serve as a stable hormone kinetic indicator, as our results in both groups have shown. Worth to note is the interdependence of the Zn and Ca levels, and their connection with the secretory processes is obvious.

After 7 days of ERU therapy the zinc level has significantly dropped. On evidence of the results we assume that

– ERU is producing derangement in the zinc–testosterone relationship;
– zinc secretion diminishes in adenomatous tissue.

However, further studies are required for drawing final conclusions.

At any rate it should be pointed out that up to recently several weeks if not months had passed in the testing of adenoma of the prostate before bio-

chemical and pathological changes were recorded. By contrast, we saw measurable changes after a few days of treatment.

Future examinations should be aimed at finding out how the zinc levels alter in the course of long-term treatment: do they continue to drop or would they resume the control values after a while.

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