

SERUM CHOLINESTERASE PROFILE IN PATIENTS WITH CANCER CERVIX

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SUMMARY

Serum cholinesterase levels were estimated in 20 patients with chronic cervicitis, 56 with carcinoma cervix and 18 breast cancer as also 28 age-matched healthy women. The serum values were related to the clinical stage of the cancer. The mean concentration of serum cholinesterase was found to be significantly lower in all the three stages of cancer cervix, when compared to the levels in normal controls of chronic cervicitis patients. The mean serum albumin concentration was not significant in first two stages of cancer cervix and within normal limits in chronic cervicitis. The both serum cholinesterase and albumin levels were also significantly decreased in the patients of breast cancer.

Introduction

Though it has been shown that the level of serum cholinesterase falls in patients with severe malnutrition, starvation, jaundice, cirrhosis of liver, infectious hepatitis and hepatic amoebiasis, it has not received wide acceptance as an index of cancer cervix. The activity of serum cholinesterase in cancer cervix has not been reported systematically so far. Serum cholinesterase and albumin are synthesized by the liver (Sherlock 1968). It has been shown that serum cholinesterase serves as a dependable and sensitive index of liver injury

(Shukla and Sastry 1975) and as a prognosticating index of acute abdominal emergencies (Shukla *et al* 1975). It was therefore considered worthwhile to examine the level of this enzyme stage-wise to consider it as a prognosticative index of cervix cancer.

Material and Methods

Fifty-six patients with cancer cervix, proved by biopsy (aged 40-50 years) were studied, before any treatment was given to them. The patients were classified into stages I (22 patients), II (16 patients) and III (18 patients) by the method of Leissner and Nystron (1968). For counter check this study (patients with cancer at other sites), 18 women with breast cancer were

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selected. The control group comprised 28 age-matched healthy women and 20 cases of chronic cervicitis. It was carefully confirmed before the selection of each and every patient to obtain blood for this study that none of them were not under starvation or severe malnutrition. The venous blood samples were collected and precautions were observed for preventing haemolysis of blood samples. The samples were stored at 4°C until assay. Serum cholinesterase was estimated in the samples by the simple spectrophotometric method of De La Huerga (1965). The serum albumin content was determined by bromocresol green binding method. Bovine serum albumin was used as the reference (Teitz 1976). For statistical analysis Student's 't' test was used.

Results

The results are summarised in Table I.

cervix cancer and also in breast cancer patients. But the decrease of serum albumin levels are not significant in first two stages of the cancer cervix patients.

Discussion

The serum cholinesterase has been found to be lowered in diseases of the liver, it has been found to be lowered in a variety of other conditions, viz severe malnutrition, starvation, acute infections, anaemias and dermatomyositis (Levinson and Mac Fate 1969, Shukla *et al* 1975, Zimmerman and Seef 1970). As serum cholinesterase is synthesized by the liver (Sherlock 1968) it is natural that the values suddenly decrease on account of the toxic action of cancer and enzymes are sensitive indices of altered cell metabolism. As liver also produces serum albumin, decrease in albumin can be anticipated. But, as seen here, decrease of serum cholinesterase is abrupt and that

TABLE I
Serum Cholinesterase and Albumin Levels in Healthy Controls, Chronic Cervicitis, Cervix Cancer and Breast Cancer Patients (Data are Mean \pm SE)

Parameters of study	Healthy patients (control) (28)	Chronic cervicitis (20)	Cervix cancer (56)			Breast cancer (18)
			Stage I (22)	Stage II (16)	Stage III (18)	
Serum Cholinesterase (IU/ml)	4.7 \pm 0.2	3.6 \pm 0.1	2.8 \pm 0.11	1.7 \pm 0.08	2.2 \pm 0.1	2.7 \pm 0.14
Serum albumin (g/100 ml)	5.0 \pm 0.2	4.3 \pm 0.2	4.5 \pm 0.18	4.0 \pm 0.12	3.5 \pm 0.1	3.8 \pm 0.15
Mean age group	44	47	40	45	50	42

Figures in the brackets indicate the number of cases studied.

The mean values of serum cholinesterase and albumin levels did not reveal any significant difference between the chronic cervicitis (untreated) patients and normal healthy women. There was a statistically significant ($P < 0.001$) decrease of serum cholinesterase in all the three stages of

of albumin is gradual. Serum cholinesterase has evidently a very short half life and therefore the levels fall very quickly. The short half life of serum cholinesterase is borne out by the fact that, as it is very quickly destroyed even at 37°C, estimations have to be performed at 25° C. Sustained

fall of serum cholinesterase indicates that cancer has quite severely damaged the delicate enzyme producing mechanism of hepatic cell. The albumin synthesizing mechanism seems to be more ready to recover. In support of this finding, the serum cholinesterase and albumin levels were also significantly decreased in the patients with cancer at other sites, for example patients with breast cancer (Table I).

Serum cholinesterase was shown to be related to serum albumin values (Levinson and Mac Fate 1969), but here minimum values for serum cholinesterase were found right on the stage II, while the minimum values for albumin did not reach before stage III and by then, the values of serum cholinesterase were showing a distinct upward trend in stage III. Therefore, lowered serum albumin did not seem to be responsible for low values of serum cholinesterase.

Present findings of serum cholinesterase seem to agree with the reports that the lowest values are found in active phase of acute liver disease, and rise on recovery (Shukla and Sastry 1975). The values of serum cholinesterase are related to the presence of infection but surprisingly, patients with chronic cervicitis had no significant decrease when compared to the healthy women.

Serum cholinesterase have been among the most studied of enzymes and yet there are many significant areas of controversy regarding this enzyme: its function, molecular weight and even source of enzyme is arguable. Some of the hypothesis on the functional significance of cholinesterase are based on its known or presumed localization. There is no strong evidence as to the physiological function of serum choli-

nesterase. If nothing else serum cholinesterase does tend to maintain the activity of acetyl-cholinesterase by protecting it against inhibitors. It may involve in the homeostatic mechanism maintaining the proper choline|acetyl-choline ratio in the plasma.

Hence, in our view the dissociated alteration of serum cholinesterase values is quite valuable as an index of acute cervix cancer.

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References

1. De La Huerga, J., Yesinick, C. and Popper, H.: In: Practical clinical enzymology. J. King Ed. (Princeton, New Jersey), pp. 180, 1965.
2. Leissner and Nystrom, C.: Cancer of the cervix uterine and aging. In: Cancer and aging (Nordiska, Bekhandels Forlag, Stockholm) pp. 189, 1968.
3. Levinson, S. A. and MacFate, R. P.: Clinical Laboratory Diagnosis (Lea and Febiger, Philadelphia), pp. 224, 1969.
4. Teitz, N. W.: Estimation of serum albumin by bromocresol green binding. In: Fundamentals of clinical chemistry, 2nd Ed., N. W. Teitz, Ed. (W. D. Saunders and Co., Philadelphia), pp. 337, 1976.
5. Sherlock, S.: Disease of the liver and biliary system (Blackwell, Oxford and Edinburgh), 1968.
6. Shukla, P. K., Singh, H. N. and Singh, P. N.: Quart. J. Surg. Sci., 11: 143, 1975.
7. Shukla, P. K. and Sastry, G. H.: Ind. J. Exp. Biol. 13: 398, 1975.
8. Zimmerman, H. J. and Seef, L. B.: In: Enzymes in hepatic diseases-Diagnostic enzymology. Edited by E. L. Coodley (Lea and Febiger, Philadelphia), 1970.