Serum Protein Bound Hexoses in Patients with Breast Cancer

Francis E. Rosato and Robert G. Ravdin

INTRODUCTION

In a previous report, MacBeth and Bekesi (1) determined the plasma protein bound hexoses (galactose and mannose) in the neutral glycoprotein fraction and found that the levels were elevated above normal in patients with metastatic breast cancer, but within the normal range if the breast cancer were clinically localized. In addition, in a small number of patients with malignant disease other than breast it was possible, by serial determinations of the plasma protein bound galactose-mannose levels, to follow response to treatment. In general the values tended to return to normal when complete excision of the tumor was effected whereas persistent and increasing elevation of serum glycoprotein hexose occurred in the presence of incomplete excision or unsuccessful radiation therapy or chemotherapy.

These interesting observations prompted us to measure these same parameters in a large number of patients previously subjected to radical mastectomy for breast cancer. The results were then correlated with the status of the axillary nodes at the time of surgery and evaluated also in view of the response to treatment.

SUMMARY

The neutral glycoprotein hexoses (galactose and mannose) were measured in the serum of 111 consecutive patients who had undergone radical mastectomy for breast cancer. The patients were categorized into those without recurrence (and further divided as to nodal status at time of surgery) and those with recurrence (further classified in terms of response to therapy). Although the highest levels were found in the group with recurrence and progression of their tumor, the mean values in all groups were not markedly different and the overlap was of such magnitude to render the changes insignificant. There was no appreciable difference in the hexose levels of those without recurrence, regardless of the status of their axillary nodes at surgery. Values in excess of 160 mg % were most often found in the group with recurrence and progression of their disease and is thought to represent a poor prognostic sign.

MATERIALS AND METHODS

Venous blood samples were collected from 111 consecutive patients being followed for known breast cancer who had undergone previous radical mastectomy. These patients were seen regularly in the private offices of the University Hospital, in the Outpatient Clinic, or in the Neoplastic Chemotherapy Clinic. Samples were allowed to clot and the serum separated by centrifugation. All samples were stored at 4°C and assays carried out within 48 hours. The hexoses were determined according to the method of Weimer and Moshin (4).

The patients were classified in four categories as follows:

- Group I: No evidence of tumor recurrence—axillary nodes free of tumor at the time of mastectomy.
- Group II: No evidence of tumor recurrence—axillary nodes involved with tumor at the time of mastectomy.
- Group III: Definite recurrence of tumor—controlled by therapy.
- Group IV: Definite recurrence of tumor—uncontrolled by present therapy and progressing.

The patients ranged from 3 months to 27 years in their postoperative interval and the average time from surgery was 6.5 years. The criteria for recurrence were the presence of adenopathy or skin nodules, findings on chest or bone X-rays, or cytologic examination where pleural effusion was present. In every case of adenopathy or palpable nodules the recurrence was confirmed by histologic examination. In the matter of control or progression of a recurrent tumor, a definite statement was at times more difficult. However, the measurement of palpable lesions or lesions visible by X-ray as well as assessment of the patient's symptoms, were the chief parameters employed in reaching this decision. In 20 patients no definite statement could be made regarding response to treatment and this “indeterminate” category is not included. The treatment employed in the group with recurrence included local excision, radiation therapy, hormonal therapy, or chemotherapy; in many instances combinations of these technics were used.

RESULTS AND CONCLUSIONS

As seen in Chart 1 the mean values for protein bound hexose were lowest in Group I and highest in Group IV. This is generally in agreement with other reports (2, 5) but the differences are small and, in considering the standard error, the overlap is too great to render these of any significance. There are, however, several aspects of this study worth noting.

1 This investigation was supported by USPHS Research Grant No. CA-10287-01 from the National Cancer Institute, AMA Institutional Grant IN-3H-(Sub Project #9) from the American Cancer Society.

2 Advanced Clinical Fellow, American Cancer Society.

Received June 23, 1967; accepted September 25, 1967.
It was originally found that glycoprotein hexose was elevated only in disseminated breast cancer and tended to remain in the normal range in localized breast cancer. The possibility that this level might be of value in indicating axillary metastases was entertained, but in a previous report (3) we could find no relationship between nodal status and protein bound hexose levels in patients with breast cancer. Here again, after mastectomy, there is little difference between those with positive or negative axillary nodes, in the absence of recurrence.

It has also been suggested that the levels of glycoprotein hexose might be of value in assessing response to therapy (1, 4). This is verified to a limited degree in the present study, if one focuses on those patients with values in excess of 160 mg%. As seen from Chart 2 the greatest percentage of such patients are found in Category IV.

ACKNOWLEDGMENTS

The authors express their gratitude to Mrs. Judith Rounick and Miss Lynda Ebling for their technical assistance.
Serum Protein Bound Hexoses in Patients with Breast Cancer

Francis E. Rosato and Robert G. Ravdin