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Letter to the Editor

Serum Sialic Acid Concentrations in Malignant Melanoma*

ANTOINETTE HOGAN RYAN and J. J. FENNELLY
Department of Medicine and Therapeutics, University College, Woodview, Belfield, Dublin 4, Ireland

AN INCREASED serum bound sialic acid concentration is known to occur in cancer [1, 2] but there have been few detailed studies. Bradley *et al.* [3] studied concentrations of seventeen normally occurring serum glycoproteins and four bound carbohydrate moieties in sera of patients with various solid tumours and found that elevated serum sialic acid values had the highest positive rate in tumour bearers.

Silver *et al.* [4, 5] showed elevated sialic acid levels in the sera of malignant melanoma patients which correlated with tumour burden and were a better monitor of change in tumour burden than serum sialyl transferase or α_1-acid glycoprotein.

We have previously shown correlation of serum sialic acid concentrations with tumour stage in 83 breast cancer patients [6] and wish to report here our findings with malignant melanoma patients.

Sera of 56 healthy control subjects and 45 malignant melanoma patients (aged 24–76 years) at least one month post-surgery were studied. In order to exclude non-specific acute-phase reactant elevations, patients were not studied if they had infection. All patients had measurable disease and could be grouped by estimated tumour burden as follows:

Group I: Post complete resection (18) (any pT, pNo, pMo).

Group II: Restricted to local satellite (pTa) or in-transit (pTb) non-resected recurrence or nodal (regional or juxta-regional) recurrence (any N) not resected (11).

Group III: With distant metastases (16) to either (or combination of) lung, liver, brain and skin (any pT, pTa, pTb, any pNpM$_1$).

Sialic acid was measured in hydrolysed serum samples by the method of Warren [7], with modifications described by O'Kennedy [8].

Sialic acid concentration in the sera of control and malignant melanoma subjects

Sialic acid values are shown graphically in Fig. 1 with means, standard deviations and significance (P) values given in Table 1. In agreement with the report of Silver *et al.* [4], significantly elevated sialic acid levels reflecting tumour burden were found in the sera of malignant melanoma patients. Significantly elevated sialic acid was found in the sera of those patients with minimal tumour burden (Group II) and those with advanced metastatic disease (Group III), but not in those who had a primary melanoma completely resected. However, of the Group II patients, 3/3 with nodal involvement compared with only 1/8 tumour confined to skin had elevated serum sialic acid values >2.23 mM (i.e. $>$ normal mean $+2$ S.D.).

These results confirm for melanoma our earlier results with breast cancer patients, which show that sialic acid is related to clinical stage and to nodal involvement and is a better marker than CEA in breast cancer [6].

The relationship of elevated serum sialic acid levels to recurrence

Group I. Normal sialic acid values were found in 15 out of 16 patients who had no recurrence and in one patient who developed local satellite recurrence. Elevated sialic acid was present in the patient who developed regional recurrence.

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Table 1. *Serum sialic acid concentrations of malignant melanoma patients*

	Controls	Group I	Group II	Group III
Mean ± 1 S.D.	1.69 ± 0.27	1.81 ± 0.31	2.15 ± 0.56	2.76 ± 0.6
	vs Controls	P = n.s.	$P < 0.0005$	$P < 0.0005$
	vs Group I		$P < 0.025$	$P < 0.0005$
	vs Group II			$P < 0.025$

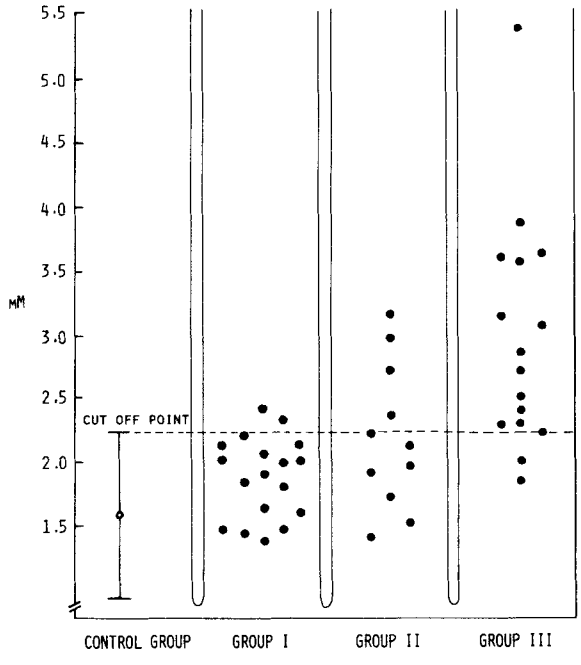

Fig. 1. *Serum sialic acid concentrations of malignant melanoma patients.*

Group II. Of eight patients with local skin recurrence the one who developed distant metastases had elevated baseline sialic acid, but the two who developed only regional recurrence had normal baseline levels. The three with initial nodal involvement had elevated baseline serum sialic acid levels, and one developed distant metastases within a year.

Group III. Only two patients with advanced disease had normal sialic acid values; one patient had brain and the other widespread skin metastases.

Serum sialic acid may aid in predicting recurrence. Of 29 patients with no or minimal tumour burden (Groups I and II), six had recurrence within one year, of whom three had elevated serum sialic acid levels. Elevated serum sialic acid correlated with distant metastatic spread within one year in 2/2 patients and regional recurrence in 1/3.

Because serum sialic acid levels appear to relate to tumour mass and can reflect small tumour burden, e.g. regional disease not resected, this assay could provide a method for monitoring response to therapy in individual patients, and could aid in predicting metastatic dissemination.

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