

DOPA AND 5-S-CYSTEINYLDOPA IN MALIGNANT MELANOMA IN UGANDAN AFRICANS

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Abstract. Melanoma tissue from four out of seven studied Ugandan African patients contained 5-S-cysteinyldopa. The tumours with 5-S-cysteinyldopa also contained free dopa but in smaller amounts. Dopa was in one case present in the absence of 5-S-cysteinyldopa.

Two different catechols, dopa and 5-S-cysteinyldopa have been demonstrated in Caucasian patients with malignant melanomas (1, 3, 4, 5). Dopa is considered to be an intermediate substance in the formation of melanin and the presence of this aminoacid in melanomas could therefore be expected.

The detection of 5-S-cysteinyldopa in a melanoma from a patient with red hair (3) has provided further support for the well-founded opinion, based on extensive chemical studies, that this sulphur-containing catechol is an intermediary substance in the formation of phaeomelanin (6).

The occurrence of 5-S-cysteinyldopa in a melanoma might constitute a sign of abnormal pigment metabolism in malignant tissue but may also reflect the rôle of this thioether in the formation of normal pigment of the melanoma-sufferers. To resolve this question, melanoma tissue from patients without evident phaeomelanin formation were analysed for the presence of 5-S-cysteinyldopa.

MATERIAL AND METHODS

Tumour tissues were obtained at surgery from 7 Ugandan African patients treated at the Uganda Cancer Institute for biopsy-proved primary malignant melanoma of the sole of the foot. The tumour specimens were from the primary lesion except in patients NAK and KAT, from whom cutaneous metastases were examined. All tumours

except that of KAT were melanotic. Specimens were taken in 0.4 N perchloric acid and sent by air to Lund, Sweden. Transport time was generally 3 days. The specimens were examined soon after arrival. Dopa was determined according to Anton & Sayre (2). This method was also used for determination of 5-S-cysteinyldopa, which catechol gives a fluorophore with excitation and emission maxima other than that of dopa (7). In addition, a new fluorimetric method for determination of 5-S-cysteinyldopa was used in 5 of the cases (8). Eluate from one melanoma (NAK) was boiled in 0.1 N HCl for 5 minutes and the colour obtained was read in 2 N HCl in a spectrophotometer (3).

RESULT

The concentrations of dopa and 5-S-cysteinyldopa found in the various melanomas are given in Table I. Dopa was detected in five tumours and 5-S-cysteinyldopa was found in four of these. In one case the quantity of 5-S-cysteinyldopa was of same order as that of dopa but in 3 cases the concentrations of 5-S-cysteinyldopa were considerably higher than those of dopa. In the tumour which contained the largest amount of dopa there was no 5-S-cysteinyldopa. When the eluate from the melanoma of patient NAK was heated in 0.1 N HCl, a violet colour appeared. In 2 N HCl this compound had an absorption maximum at 587 with a slope at 550 nm.

DISCUSSION

With the fluorimetric methods 5-S-cysteinyldopa was found in substantial amounts in four out of seven malignant melanoma tissue specimens from African patients. Dopa was present in the absence of 5-S-cysteinyldopa in only one case. In 3

Table I. *Dopa and 5-S-cysteinyl-dopa in malignant melanomas of Ugandan Africans*

Patient	Tribe	Dopa ($\mu\text{g/g}$)	5-S- cysteinyl-dopa ($\mu\text{g/g}$)
MUG ♂ 55 y	Mutoro	0.5	1.9
NAK ♀ 40 y	Muganda	2.0	8.9
HAM ♀ 60 y	Mugisu	6.1	0.0
KAL ♂ 60 y	Muganda	5.7	4.0
MUT ♂ 70 y	Muganda	0.0	0.0
AND ♂ 45 y	Lugbara	1.8	4.6
KAT ♂ 40 y	Mutoro	0.0	0.0

cases the quantities of 5-S-cysteinyl-dopa demonstrated were definitely higher than those of dopa. The presence of cysteinyl-dopa in one patient was confirmed by the typical colour obtained after heating in acid (3). The specimens that did not contain dopa or 5-S-cysteinyl-dopa were weakly pigmented and absence of dopa in amelanotic melanomas has previously been described (5). The results show that 5-S-cysteinyl-dopa plays a role in the pigment metabolism of malignant melanoma in African patients. The presence of this substance in melanoma tissue may be an indication of an aberrant metabolic pathway in tumour tissue related to the malignancy of the pigment tumour, or it could be that 5-S-cysteinyl-dopa is also produced during normal melanin formation in Africans. If this were the case, the occurrence of phaeomelanin should be more widespread than is generally thought.

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