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SHORT REPORTS

Trichochromes in Red Human Hair

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Abstract. The presence of trichochromes B and C in red human hair was confirmed with an analytical procedure which does not give rise to the formation of these compounds as artifacts. The trichochrome precursor 5-S-cysteinyldopa previously demonstrated in red guinea-pig hair was not detected in red human hair.

A century ago Sorby reported that "when certain specimens of very red human hair are heated with sulphuric acid diluted with twenty times its volume of water, a very well-marked pink solution is obtained" (7). He also observed that the colour became very faint and not decidedly red at neutral pH. Rothman & Flesch who rediscovered the pigment, named it trichosiderin because it was thought to contain iron (6). Because no iron could be detected in the isolated pigments (1) they were subsequently renamed trichochromes.

A precursor of trichochrome, 5-S-cysteinyldopa, has been detected in pigmented tissues (5). Since recent studies have shown that trichchromes can be formed as artifacts from cysteinyldopas during certain analytical procedures for the demonstration of trichochromes (2), we decided to analyse red human hair for its content of 5-S-cysteinyldopa and to re-investigate the occurrence of trichochromes with an analytical method that is not associated with the formation of trichochromes as artifacts.

MATERIAL AND METHODS

Scalp hair was obtained from a 14-year-old girl at her regular haircut. The red colour of her hair is shown in a photograph on a book cover (3). 5-S-cysteinyldopa was determined fluorimetrically (4) after extraction of 1.0 g of hair with 0.1 M HCl.

Trichochromes were extracted from 33.5 g of hair and analysed according to a recently described method (2).

RESULTS AND COMMENTS

No 5-S-cysteinyldopa was detected in the hair. The absence of 5-S-cysteinyldopa in human hair is in contrast to the finding of this amino acid in red guinea-pig hair (5).

Thin-layer chromatography demonstrated decarboxytrichochromes B and C, indicating the presence of trichochromes B and C in the red human hair. Trichochromes E and F were not detected.

The trichochrome content was calculated to be 4 μg/g, on the basis of the molecular absorption of decarboxytrichochrome C. The previously reported presence of trichochromes B and C in red human hair was confirmed (1).

Sorby emphasized in his paper on the "possible pink constituent" of red hair, that he had "no positive proof that it occurs in the hair in the same state as when dissolved and is not due to the alteration of some other substance".

The acid extraction used by Sorby decarboxylates trichochromes B and C already present and thereby gives them their pink colour. In human hair, however, formation of trichochromes as artifacts seems unlikely with any analytical procedure in the absence of the trichochrome precursor 5-S-cysteinyldopa. If 5-S-cysteinyldopa were present in a tissue analysed for trichochromes, hot acid extraction might result in artificial formation of trichochrome F, and alkaline extraction might give trichochrome C as an artifact. However, even if cysteinyldopas had been present, prolonged oxidation in alkaline medium before extraction, as used in this study, would exclude artificial formation of trichochromes

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Trichochromes in Human Malignant Melanoma

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Abstract. Decarboxytrichochromes B and C were isolated from a melanoma metastasis in a red-haired man, indicating the presence of trichochromes B and C in the tissue. Trichochromes E and F were not detected.

Trichochromes are pigments of low molecular weight present in certain red hair and feathers (3, 4). Two of them, trichochromes B and C, have been detected in the urine of some patients with widespread melanoma metastases (1, 6).

Trichochromes E and F, however, reported to be present in red feathers (3), have not been detected in red human hair (2) or in melanoma urines (1, 6).

Trichochromes are insoluble at neutral pH. It seems likely that, if formed in human melanoma, trichochromes E and F would be excreted in the urine in the same way as trichochromes B and C. No study on trichochromes in melanoma tissue has been performed previously, and we now report an investigation on trichochromes in a human melanoma metastasis.

MATERIAL AND METHODS

Melanoma tissue was obtained at necropsy of a 41-year-old man with red hair. A few weeks before death he had shown excretion of large amounts of 5-S-cysteinyldopa (123 mg/24 h) and of trichochromes B and C (29 mg/24 h).

1.94 g of a liver metastasis was homogenized in 10 ml 0.1 M NaOH, oxidized for 15 hours in oxygen current to destroy any 5-S-cysteinyldopa and then analysed for trichochromes as previously described (6).

RESULTS AND COMMENTS

Thin-layer chromatography showed decarboxytrichochromes B and C, indicating the presence of trichochromes B and C in the melanoma metastasis. No trichochrome E or F could be detected. The quantity of trichochromes was calculated, on the basis of the molecular absorption of decarboxy trichochrome C, to be 4.8 μg/g melanoma tissue.

Although the total tumour mass was not calculated in our patient the content of trichochromes in the tumour and in the urine shortly before death indicates rapid excretion of trichochromes from the tumour tissue. The absence of detectable amounts of trichochromes E and F indicates that these compounds are formed in melanoma either in very small amounts or not at all.

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