

Occupational pigmented contact dermatitis from Naphthol AS

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Hyper-pigmentation as a manifestation of contact sensitivity to optical brighteners has previously been reported.

In 1973 we observed an epidemic of pigmented contact dermatitis occurring in a textile mill in connection with the manufacture of drill fabrics impregnated with a recently introduced azo dye coupling component Naphthol AS.

Of the 53 workers included in the study, 12 presented a spotted pattern of hyper-pigmentation mainly affecting the exposed areas, but without pruritus, 18 were pigmented to a lesser degree, and in 21 it was not possible to discern any well-defined discoloration; some of the patients in the last group, however, complained of slight pruritus. The last two patients who were fair-skinned showed a reddish-brown pigmentation and a well pronounced pruritus. Hyper-pigmentation was most pronounced in individuals with dark complexions, whereas fair-skinned patients also showed "classical" eczematous symptoms including pruritus.

A field study demonstrated direct exposure to the chemical. All 53 patients were patch-tested with Naphthol AS 5 % in water, and 24 were found to be positive.

Histological features were melanocyte proliferation, incontinence of pigment, and various degrees of damage to the basal layer.

Key words: Naphthol AS - occupational - pigmented contact dermatitis.

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Hypermelanosis may occur as a sequel to acute or chronic inflammatory processes in the skin, but lasting pigmentation is not a common feature of contact dermatitis. On the other hand, acquired hypomelanosis is seen after contact with the rubber antioxidant monobenzyl ether of hydroquinone both after occupational exposure to the substance and after use of synthetic rubber sandals (Kalz & Schopflocher 1965, Díaz Mirón 1965). Malten (1971) and Calnan & Cooke (1974) have recently reported occupational leucoderma following contact

with paratertiary butylphenol and its homologues.

Pigmented contact dermatitis caused by optical brighteners in detergents for domestic use has been described by Osmundsen (1970) and Piñol Aguadé et al. (1971).

In 1973 we observed an epidemic of pigmented contact dermatitis occurring in a textile factory in connection with the manufacture of drill fabrics dyed with a recently introduced azo dye coupling component. Cotton and synthetic fabrics are dyed in many different ways, but in one of the most

widely used procedures today, azo dyes react directly on the textile fiber with coupling components previously absorbed to the fabric in a two-stage procedure (Foussereau 1970).

To our knowledge there are no previous reports of pigmentation due to occupational contact with the chemicals used in this dyeing procedure.

Material and Methods

A total of 66 workers from a textile factory were referred to our department because of hyper-pigmentation which in some cases was accompanied by pruritus. The symptoms developed within four to five months after the introduction of a new azo dye coupling component: Naphthol AS, (3-hydroxide-2, naphthanilide = Coupling Component 2, C.I. 37505) (fig. 1).

In the case histories studied, special emphasis was placed on previous eczematous disorders as well as other dermatoses, the involved sites, symptoms, treatment if any, previous occupation, and average exposure time.

A field study was carried out in cooperation with industrial chemists in order to evaluate the information obtained and to exclude other possible sensitizers. Data concerning the technical procedure are not given in detail in this paper.

Biopsies were taken from pigmented lesions and from apparently normal skin in ten cases, as well as from ten positive patch tests.

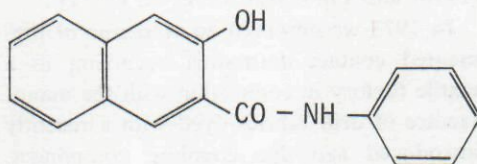


Fig. 1. Naphthol AS (3, hydroxide-2, naphthanilide), Coupling Component 2, C. I. 37505.

Results

After clinical examination, 13 patients were excluded as they showed no evidence of skin involvement, had not been in contact with the chemical or were found to suffer from such non-occupational dermatoses as psoriasis, lichen planus, herpes zoster etc. There was no case of previous eczema, but atopic dermatitis was evident in two cases. Some patients had been given topical treatment with steroids before the examination, but apparently this treatment had not influenced the development of pigmentation.

The 53 workers included showed different degrees of involvement, ranging from heavy to almost imperceptible pigmentation. The skin changes found were most frequent in directly exposed areas (face, neck, forearms) but in some cases covered areas were also involved. Involvement of the anterior aspect of the neck was particularly common (fig. 2). Reddish-brown pigmentation was observed in two patients only (fig. 3), and in these patients moderate pruritus was the main symptom. Bizarre dark pigmentation localized to the nape of the neck, forearms and face was observed in 12 workers with dark complexions. None of these 12 patients suffered from pruritus, pigmentation being the primary symptom which, as mentioned above, developed within four months of the introduction of the new dyeing procedure. A total of 18 patients showed streaky pigmentation to a lesser degree, and in 21 no well-defined discoloration was noticeable although some complained of pruritus.

Field study

The field study disclosed that the fabrics were dyed in a two-stage process; in the first stage, the warp was impregnated with a mixture containing Naphthol AS, starch, and sodium hexametaphosphate in an alkaline medium with a pH 7 to 10. After



Fig. 2. Involvement of the anterior aspect of the neck showing spotty hyper-pigmentation.

steaming and drying, the warp was woven without further chemical treatment and then delivered for inspection before final dyeing. The fabric at this time had a yellowish color which constituted the basis for further color development.

The coupling of the dye took place at a further stage in which the azo compound was added to the fabric, thereby developing the desired color.

The occurrence of eczema was limited to the three areas of the textile mill in which Naphthol AS was used: where the fibers were taken through the first stage of the dyeing process, where they were woven, and where the cloth was inspected after weaving, but before the azo compound was added. Most of the affected individuals came from the weaving machine section where the largest part of the local work

force was employed. In all areas of the factory where the fabric was stretched, twisted or woven, yellowish fibers were found to pollute the environment and settle on the skin of the workers. All workers wore loose, short-sleeved uniforms washed weekly by the firm. General ventilation seemed to be inadequate although exhausts were placed in several places where dust collected. Adequate cleaning facilities were not available in the factory and as most of the workers lived in rural areas under rather primitive conditions, it can be assumed that exposure to the chemical continued after work.

Patch testing

All 53 patients were patch-tested as well as a group of ten controls. Patch testing was made with Naphthol AS 5 % in water



Fig. 3. Scattered lightly pigmented macules on the trunk of a fair-skinned individual.

(Bandmann 1967). Readings were performed according to the terminology recommended by the International Contact Dermatitis Research Group (Wilkinson et al. 1970). The patch tests were positive in 24 cases and 29 were negative as were the ten controls (Table 1).

Histology

Histological examination of the two patients with reddish-brown pigmentation showed changes consistent with eczema: spongiosis, irregular acanthosis, oedema of the corium as well as pericapillary lymphocytic infiltration. In heavily pigmented areas, the most striking features were oedema and destruction of the basal layer, melanocyte proliferation and incontinence of pigment in the upper corium with melanin granules found present both free and inside macrophages. Lymphocytic infiltration was also observed

Table 1. Results of patch testing with Naphthol AS 5 % in water

	Positive patch tests	Negative patch tests	Total
Patients	24	29	53
Controls	0	10	10

(fig. 4). Histologic examination of the ten positive patch test reactions showed features of an allergic dermatitis.

Discussion

Residual hypomelanosis seems to be a characteristic feature of eczema in the negro, due to an impaired capacity of the injured epidermal cell to absorb melanin (Ebling & Rook 1972).

In experimental cutaneous inflammation produced on human volunteers by means of primary irritants, Papa & Kligman (1965) found considerable increase in the density of melanocytes per unit surface, hypertrophy, and increased enzymatic activity. However, no clinical hyper-pigmentation was observed and incontinence of pigment is not mentioned.

Until now, hyper-pigmentation as a manifestation of contact allergy appears to be a specific feature in connection with sensitization to certain chemicals (Osmundsen 1970, Piñol Aguadé et al. 1971).

There are some features in common between our cases and those reported by the above-mentioned authors. In our series only two cases developed typical eczematous changes with erythematous, pruriginous lesions which microscopically showed spongiosis, oedema and lymphocytic infiltration in the corium. As in Piñol Aguadé's (1971) experience, these two patients were fair-skinned individuals. Heavy hyper-pigmentation, which in most cases developed without any noticeable, eczematous change or pruri-

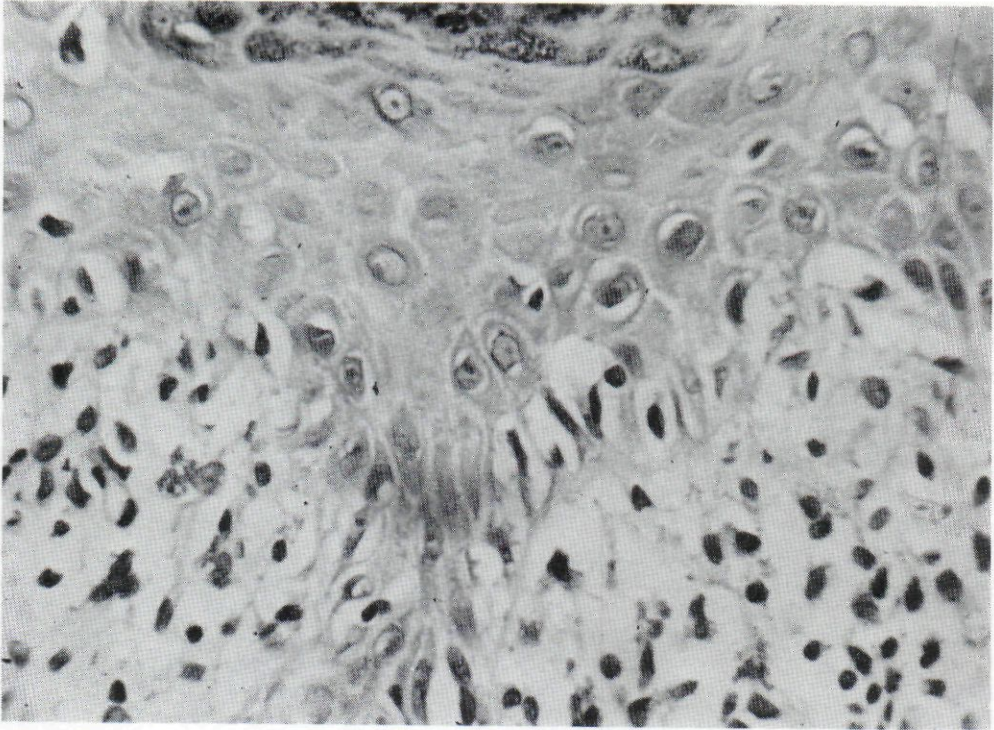


Fig. 4. Histological features of heavily pigmented areas showing oedema and destruction of the basal layer, incontinence of pigment with melanin granules found present both free and inside macrophages. H & E, $\times 640$.

tus, appeared to be the main feature in individuals with a dark complexion.

Osmundsen (1970) mentions that all his patients who developed pigmentation were Caucasians with a dark complexion, and Piñol Aguadé (1971) stresses that in lightly pigmented individuals, discoloration was less intense while the heaviest pigmentation occurred in patients with dark skin. The correlation between strong pigmentation and virtual absence of pruritus is also clear in our cases.

The striking histological features were proliferation of melanocytes and incontinence of pigment, associated with various degrees of damage to the basal layer.

In pigmented contact dermatitis due to optical brighteners, the clinical pattern observed was that of a textile dermatitis due

to impregnation of garments with detergents.

In our patients, the sites of pigmentation corresponded with the nature and degrees of contact with the chemical. The fibers which contaminated the environment not only settle on the skin, but also adhere to the clothing. The absence of adequate cleaning facilities within the factory and in the homes of the workers accounts for a close and prolonged contact.

As a result of our study, the dyeing process in the textile mill was changed and no more cases of pigmentation have subsequently occurred.

When hyper-pigmentation reaches epidemic proportions in a limited area, as in our study, suspicion is easily aroused. However, under different circumstances this

unusual manifestation of contact dermatitis might easily be misdiagnosed and attributed to other diseases.

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