

ECG Ink as a Cause of Asthma

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Since the 1960's, spray writers have been used extensively in medical apparatus such as electrocardiographs and electroencephalographs. Moreover, new applications for spray writers have been introduced and, to the best of our knowledge, their use is likely to increase substantially over the next few years. We would like to report one case of asthma and rhinitis caused by a dye component of commercial ink used in an ECG spray writer. More recently a similar case has been diagnosed at Tiuru Hospital in Finland (Tari Haahtela, personal communication) and one case of rhinitis was revealed in our Department of Clinical Physiology.

CASE REPORT

History

A female laboratory nurse without any previous symptoms of atopy had been working in a small clinical laboratory for about 12 years. In 1974 she had suffered dermatitis of the hands due to potassium ferricyanide, which at the time was used in the determination of hemoglobin. After this, her principal task became the recording of ECGs. In 1976, she developed symptoms of rhinitis later followed by asthmatic symptoms which she herself associated with the ECG recording. Still later she noted similar symptoms following exposure to two common laboratory dyes, methyl violet and methylene blue.

Although the electrocardiograph had received regular and adequate servicing, some of the ink used in the spray writer was dispersed near the apparatus as an aerosol. The blue ink, in use for about 30 years, consisted of water, formaldehyde, glycerine, sulphuric acid and an organic dye. The dye turned out to be methyl blue, a triarylmethane dye. These are frequently used in dyeing cotton and silk, but also as a food additive and as an antiseptic.

RESULTS

During testing at our Institute in 1978, the patient was symptomless. Prick tests performed with 17 common allergens were negative. Her spirometric values were normal. The inhalation of histamine revealed moderate bronchial hyperreactivity. Peak flow values (PEF) upon admission showed a diurnal variation of only 7%. A placebo inhalation provocation test using lactose powder did not elicit any bronchial reaction, nor did an inhalation test with formaldehyde. However, 10 normal breaths drawn above a vessel containing blue ECG ink resulted in an immediate mild reaction (PEF decrease of 17%) as well as a late reaction (PEF decrease 20%). When the inhalation test was repeated with 10 g of methyl blue powder mixed with 300 g of lactose powder, an immediate reaction (PEF decrease of 31%) followed. This reaction was reversed by the inhalation of isoprenaline. In an attempt to find a substitute for the blue ink, an inhalation test with a commercially available green ink was performed. The green ink,

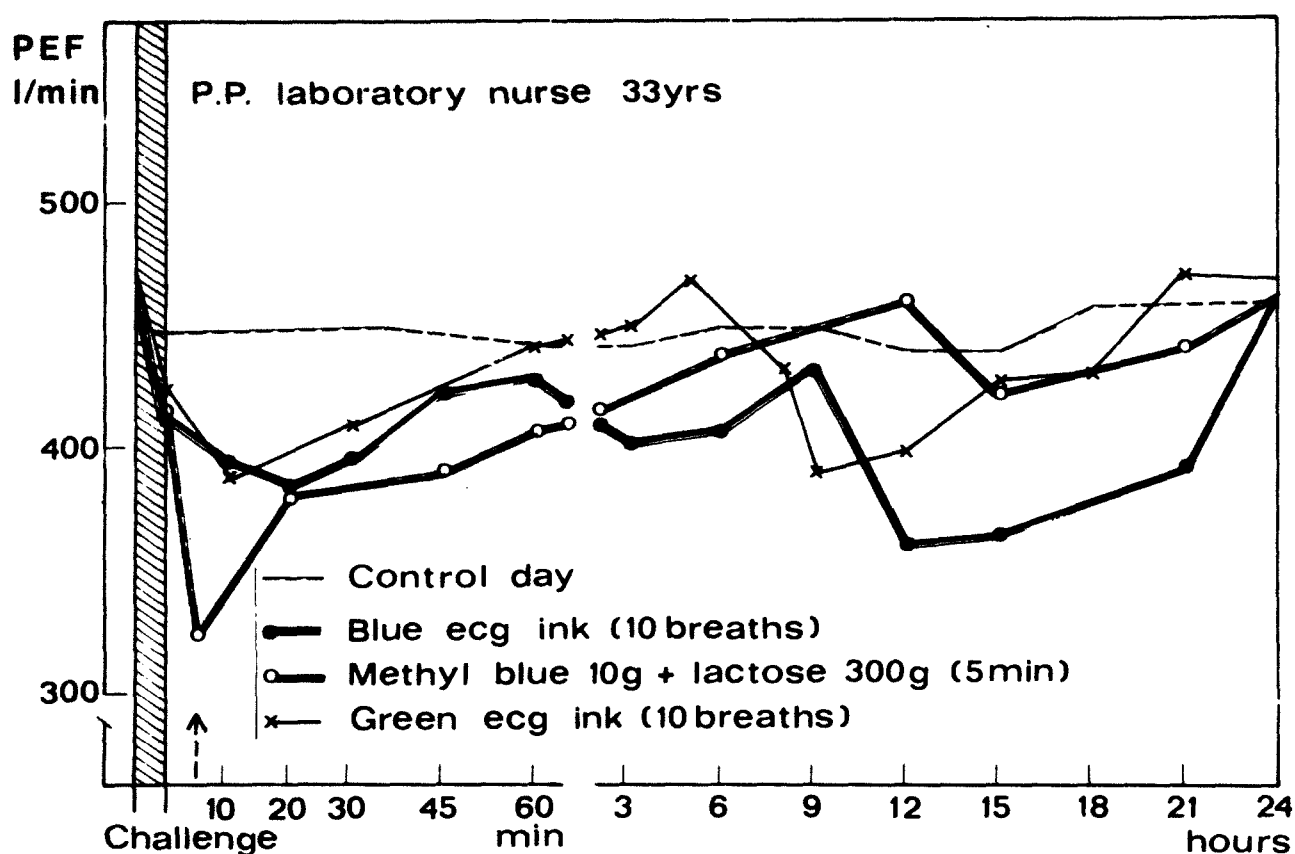


Fig. 1. Results of the bronchial provocation tests. Arrow indicates the inhalation of isoprenaline (0.1 mg) following testing with methyl blue. Two placebo tests, one with lactose and one with usual ink (10 breaths) did not differ from the control day.

which contained another triarylmethane dye (Patent Blau V®), caused a bronchial reaction very similar to that caused by the blue ink (Fig. 1).

Skin prick tests with methyl blue, Patent Blau V, and methylene blue were positive, whereas methyl violet was negative. Nasal challenge tests were positive for all dyes except for the methylene blue, which gave a borderline result. Six control patients were skin tested with the dyes; with the exception of one positive reaction to methylene blue, all tests were negative.

CONCLUSIONS

According to the case history, skin tests as well as nasal and bronchial challenge tests, our patient had become sensitized to the dye of the ECG ink, methyl blue. She also reacted in a similar way to methyl violet used in the laboratory and to Patent Blau V, a dye component of the green ink which she had never used. The cross-reactivity can be explained by the fact that

all these dyes are triarylmethane dyes which are chemically very similar. The positive skin tests of the control patient indicate that the reaction to methylene blue, which is a tiazid dye, would be a toxic one. When carrying out laboratory tasks without any exposure to the dyes, our patient has only had occasional symptoms of asthma.

It appears as though the small amounts of ECG ink dispersed as an aerosol around apparatus equipped with spray writers may constitute a sensitivity risk. The exposure can probably be decreased using simple technical solutions. However, an inert alternative to the sensitizing inks seems desirable.

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