

Letter

Electrode Material in Iontophoresis

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We would like to comment on one detail in the recent review article, "Iontophoretic Devices for Drug Delivery" (P. Tyle, *Pharm. Res.* 3:318–326, 1986), which we have read with the greatest interest. The author states that the "electrode material should be harmless to the body." Based on the work of Rahm *et al.* (3), he claims as a fact that "tin or steel plates are known to be the best." We would have liked to see a discussion on the possible hazard of introducing metallic ions from the electrodes into the skin. This aspect is hardly discussed at all in the literature.

During work to develop an iontophoretic device for research purposes (2), we administered norepinephrine dissolved in deionized water. The anode was made of brass or

steel (medical grade). Analysis with an atomic absorption spectrophotometer (Pye Unicam SP 9) of the fluid surrounding the anode revealed small amounts of copper, nickel, and chromium. This was found with current densities as low as 400 $\mu\text{A}/\text{cm}^2$ during 2–4 min. As chromium and nickel are well-known dermal allergens, we are now using an anode made of platinum for iontophoresis. We suggest that the possibility of introducing metallic ions into the skin even from medical-grade steel during iontophoresis should be further studied before recommendation of anode material.

REFERENCES

1. P. Tyle. *Pharm. Res.* 3:318–326 (1986).
2. L. E. Lindblad, L. Ekenvall, K. Ancker, H. Rohman, and P. Å. Öberg. *J Invest. Dermatol.* 87:634–636 (1986).
3. W. E. Rahm, W. F. Strother, J. F. Crump, and D. E. Parker. *Ann. Otol. Rhinol. Laryngol.* 71:116–123 (1962).

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