

Commentary on: Akyildiz E, Uzun I, Inanici MA, Baloglu H. Computerized image analysis in differentiation of skin lesion caused by electrocution, flame burns, and abrasion. *J Forensic Sci* 2009;54(6):1419–22.

Dear Sir,

We compared our experimental results with the one of the articles of Akyildiz et al., on the importance of morphometric analysis of the perimeter and area of the cell nucleus for the differentiation of skin lesions caused by electrocution, flame burns, and abrasion. We focused on the differential diagnosis between hyperthermic lesion and lesion caused by DC electricity. Our data seem to confirm the original proposal of the authors. In fact, the observations of the authors regarding a nuclear swelling occurring after current application, but not with Joule effect, is consistent with our results.

The samples were composed of bioptic material that underwent anatomopathological examination; after cryosection and hydration in saline physiological solution at +4°C to inhibit autolysis, 5-μ-thickness sections were placed on a silanized slide. The slide was then placed on a fiberglass support that housed the connection with a CC/DC feeder (Life, Milan Italy) at an outlet stabilized with a digital control (range, 0–30 V; 0–50 mA). The electrodes were placed in contact with the sections of tissue and covered with a coverslip. After application of a 30 V 4 mA DC current for 20 sec,

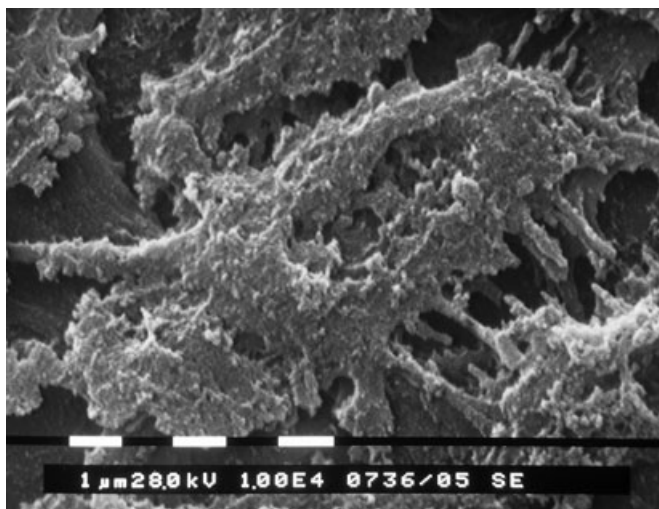


FIG. 1—Colon: after current application the nucleus area appears enlarged in volume with an evident loss of chromatin; the cellular elongation with apical narrowing is also evident (electron microscopy microphotograph 10,000×, one line bar 1 μ).

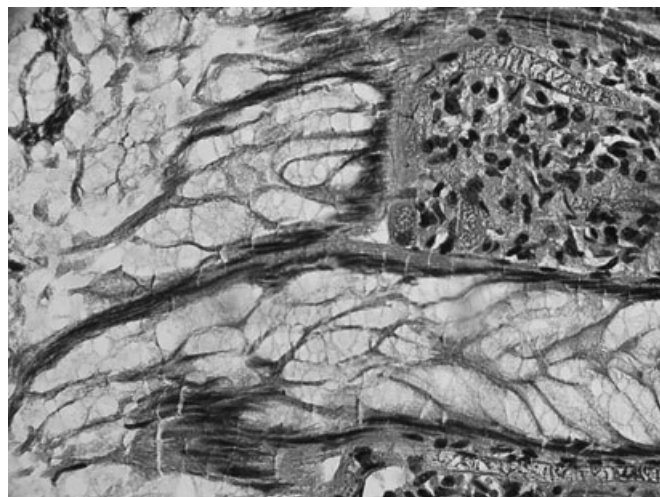


FIG. 2—Colon: after using an electric scalpel the heat induced by Joule effect causes elongation of both the epidermal cells and the respective nuclei which, however, do not assume a globular aspect with increase of volume and loss of nuclear material (EE 600×).

the sections were then dehydrated in a CO₂ critical point dryer and finally gold metalized (Balzers Union, Scottsville, VA) for the scanning electron microscope (Philips 515 model; FEI Europe, Eindhoven, the Netherlands).

In agreement with the data of Akyildiz et al., we present the results of the experimental application of a DC field (30 V 4 mA) on live human bioptic case.

In fact, the first cellular component that “feels” the EM field in the above-mentioned experimental conditions is the nucleus (Fig. 1), thus confirming what has already been thoroughly reported by Akyildiz et al. In the case of the Joule effect, instead, both nuclear and cellular elongation, but not swelling and increased nuclear volume accompanied by karyolysis, is observed (Fig. 2).

For more than a century, the correct etiological classification of the lesions due to electricity as opposed to heat represented (and still represents) a nodal problem in forensic medicine. Our data seem to confirm and support the importance of the morphometric analysis proposed by Akyildiz et al. in solving this problem.

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