



Interference with Transtelephonic Electrocardiographic Transmissions by Occult Metallic Dust Particles

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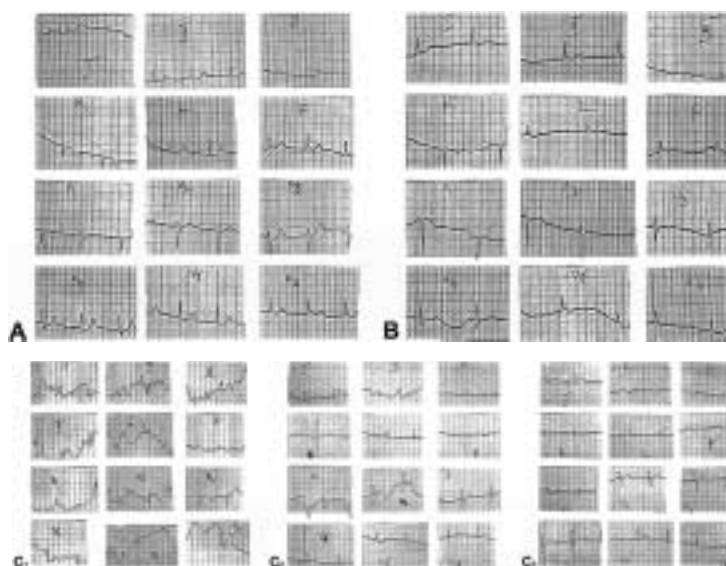
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Recent years have witnessed heightened interest in telemedicine, especially in telecardiology. SHAHAL Medical Services [1] telephonically receive over 150,000 electrocardiograms for analysis and storage from a wide variety of venues every year. Following our incidental discovery that the ECG transmissions from foundries often produced technically poor recordings, we began to explore the possible culpability of occult metallic (ferrum, titanium, magnesium, etc.) dust particles on the quality of both routinely recorded and telephonically transmitted ECGs.

All the laborers and management staff of two foundries volunteered to undergo a 12-lead ECG that was recorded by standard ECG equipment as well as a 12-lead ECG that was transtelephonically transmitted by means of the CB-12 cardiobeeper – a device utilizing dry electrodes that is routinely used by SHAHAL [2]. These procedures were carried out in the foundry's office with the assistance of an experienced paramedic and, as is common practice, the skin was not previously submitted to any special cleansing treatment. The participants included 17 male workers and one female secretary (mean age 47 ± 11 years, range 27–69). The study was conducted in the winter, and the workers were fully clothed as they worked, some even wearing protective shields.

The initial standard ECG recordings and the teletransmitted ECGs of the secretary [Figure A], the foundry's two drivers, and its two managers [Figure B] were of good quality. The initial recordings of all the others (n = 13) exhibited heavy electric



A) Representative transmitted ECG tracing of the female secretary whose work site was limited entirely to the foundry's office. **B)** Representative transmitted ECG tracing of a manager whose work site was mostly in the office and seldom in the foundry.

[C] 1. Representative transmitted ECG tracing of a full-time foundry worker. **2.** The transmitted ECG tracing of this foundry worker taken post-shower. **3.** The transmitted ECG tracing of this foundry worker taken after a thorough alcohol rub of the electrode placement site.

disturbances that were manifested by drifts of the isoelectric line and difficulties in its stabilization [Figure C1], whereupon at least three attempts per subject were needed to obtain adequate tracings by each of the two procedures. The disturbances continued even after the electrodes were moistened by plain water (a maneuver often used successfully in such situations). Taking an on-site shower before the second set of recordings improved the capability of resetting the isoelectric line [Figure C2], while a thorough alcohol rub of the electrode placement sites remarkably improved the quality of both the recording of the standard 12-lead ECG and of its transmission transtelephonically by the cardiobeeper [Figure C3]. We concluded that occult

metallic dust particles that adhere to the skin could be responsible for disrupting the routine recording and the transtelephonic transmission of ECG tracings.

References

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ECG = electrocardiogram