Title: **The CPREzy™ and caregiver safety under stringent defibrillation conditions**

Author(s) **GJ Noordergraaf MD**,[1] **GCP Janssen BSc**[2] (g.noordergraaf@elisabeth.nl)

Hospital/Institute: [1]Dept of Anesthesiology & Resuscitation, and [2] Dept of Medical Instrumentation. St Elisabeth Hospital, Hilvarenbeekseweg 60, 5022 GC Tilburg (NL)

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Objective: We investigate conductance characteristics of the CPREzy™, evaluating whether it electrically isolates a caregiver during accidental or untimely defibrillation.

Introduction: Manual chest compressions require sternal compressions. This compression site lies in a direct line between the optimal areas for defibrillation. Despite the universal precaution of wearing gloves, increased safety in the face of untimely defibrillation might be possible if the CPREzy™ (Health Affairs LTD, London UK) electrically isolates the caregiver from the patient. It would also allowing chest compressions between shocks in a 3-shock block. This issue is stimulated by two documented incidents in our hospital where the three step "hands off" procedure was called but shocks were given while another caregiver was involved in an invasive technique.

Chest compressions during shock blocks are designed to increase flow without causing delays. The CPREzy™ is a small feedback device designed to improve the quality of compressions by giving real time feedback (Noordergraaf et al. 2006). Untimely defibrillation may be seen more frequently when using defib-electrodes instead of the paddles.

The CPREzy: a 240gr, device, using a 9 volt battery with metronome at 1.4 Hz

1 light = a child (40kg); 2 lights = adult (±55kg); 3 lights = adult (±75kg), 4 lights = adult (±90kg)

Methods: Working in a bench model, the QED-6 (defib analyzer, Adquipment Medical, Hellevoetssluis NL) simulated the electrodes at apex and right subclavian locations. The defibrillator (SMART biphasic, Agilent, Grafimedics Almere, NL) was attached to the analyzer, and a series of shocks ranging from 5 – 200 J was generated, while the amperage was monitored using the Fluke 190 scope (Fluke Medical, Eindhoven, NL).

Results: The CPREzy is made of lexane, a polycarbonate. The unit consists of a top and bottom half, each of 1 mm thickness, connected by the spring. At a maximum voltage of 1700 V and using the Paschen Curve, with the air pressure as if at 10km height, the distance the current would have travel is 1.7 mm. This makes conduction impossible due to the lexane thickness of 2 mm.

When the defibrillator was discharged at 200 J, only inductive energy could be seen, at low amperages. The device, itself, was unaffected by the discharges.

Discussion and recommendations: Having a caregiver's hands between the two defibrillation points may be compared to diathermy and the use of gloves. Due to the high frequency and the low amperage, thin gloves electrically isolate the user. Gloves will not protect during defibrillation as this operates at low frequency and higher energy. If conduction occurs, the complete charge is transmitted, but only if the caregiver is connected to ground. With the CPREzy, a caregiver is electrically isolated from the patient even if he is compressing the chest during the defibrillation. This is only true as far as the hands have no other contact with the chest wall, even outside the direct current line.

We suggest that the use of the CPREzy™ makes a contribution to the safety of the caregiver, when using a biphasic defibrillator. This may be particularly important in ad hoc teams or when compressions are performed close to defibrillation.

References: Noordergraaf et al. Resuscitation 2006 (In press). Shepherd et al. IEEE Eng Med Biol 2004; 23(3): 66-72.