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MEDICAL CENTER
PAIN RELIEF UNIT
The Rappaport Faculty of Medicine
Technion - Israel Institute of Technology

P.O.B. 9602 Haifa, 31096 Israel.
Tel: (+) 972-4-8542234
FAX: (+) 972-4-8543505

The effects of Electrotherapy, Heat, and Cold and their combinations on back and neck pain;

Elon Eisenberg MD, Victor Shebshacvich, MD
Pain Relief Unit Rambam Medical Center
Mail: e_eisenberg@rambam.health.gov.il

Background

Physical modalities, such as thermal and electrical stimulation, have been utilized in the treatment of pain for many years. The application of hot and cold packs (Thermo Therapy) and transcutaneous electrical nerve stimulation (TENS) are among the most commonly used modalities for the treatment of pain. TENS has been studied extensively in a considerable number of painful conditions. However, the feasible advantages of simultaneous application of more than one modality (e.g., TENS in combination with Thermo Therapy have not yet been explored within a clinical setting.

Objectives

To compare the effectiveness of using TENS and Thermo Therapy as opposed to use of combinations of TENS and Thermal Therapy in reducing spontaneous pain, hyperalgesia and evoked pain in patients with back and neck pain.

Methods

The study population consisted of 60 patients with either neck or back pain, with at least one identifiable trigger point (a tender point), who were referred for treatment in the Pain Relief Unit at Rambam Medical Center in Haifa, Israel. The study was approved by the Hospital's Helsinki Committee.

Upon signing a written informed consent, subjects were assigned to receive, in a random order, the following treatments: TENS, Thermo Therapy (heat and cold), TENS in combination with Thermo Therapy (heat and cold). Treatments were given one week apart from each other. Stimulations were applied to the most sensitive trigger points using the Elfcare™ (Mediseb Ltd., Hertzelia, Israel), a new device, which allows the use of thermal and electrical modalities alone, or in variable combinations simultaneously, all in a quantifiable fashion.

In the present experiment, the Elfcare™ electrode (ThermoElectrode™), was adjusted to provide 20-minute treatments using the following five different types of stimulations:

- Cold stimulation at 15^0 centigrade (59^0F);
- Heat stimulation at 39^0 centigrade (103^0F);

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- TENS at 100 Hz, 0.1 msec pulse duration, symmetric, biphasic waveform, tolerable intensity;
- TENS in combination with Thermo Therapy administered simultaneously;

(Parameters used in the combinations were identical to those given as separate stimulations).
Three outcome parameters were used in this study, all measured before and immediately after each treatment:

- Spontaneous pain with the use of 0-10 visual analogue scale (VAS).
- Mechanical pain threshold measured by mmHg, with the use of a pressure algometer with a 3 mm diameter paddle (algimeter; Med-Hako, Hamburg, Germany). The algometer was pressed perpendicularly to the skin on the trigger point. Pressure was increased by 20 mm Hg per second by a trained investigator.
- Evoked mechanical pain measured by the intensity of pain (VAS) produced by holding the algometer pressed against the trigger point, at 50 mm Hg above threshold, for 10 seconds.

It is noteworthy that both the patients and the investigator assessing pain levels were blinded to the order of treatments.

Results and conclusions:

The most significant analgesic effect for all three parameters was achieved with the use of simultaneous TENS and Thermal Therapy (as can as can be seen in Figures 1,2,3,4).
These findings are in agreement with our previous findings, showing that the combination of TENS and Thermal Therapy is likely to be the most efficacious modality for clinical pain (and hyperalgesia) in additional to its effect on experimental pain.
These findings also support our hypothesis according to which, an individual patient with back or neck pain is more likely to respond to combination of TENS and Thermal Therapy than to a single predetermined modality (TENS or Thermal Therapy).
Thus, we cautiously raise the possibility that the Elfcare™, which can produce different modalities is likely to produce analgesia in a much larger number of patients (as can be seen in figure 5,6,7) compared to all other single modality producing devices (e.g. TENS, and Thermal Therapy- heat pack or cold pack).

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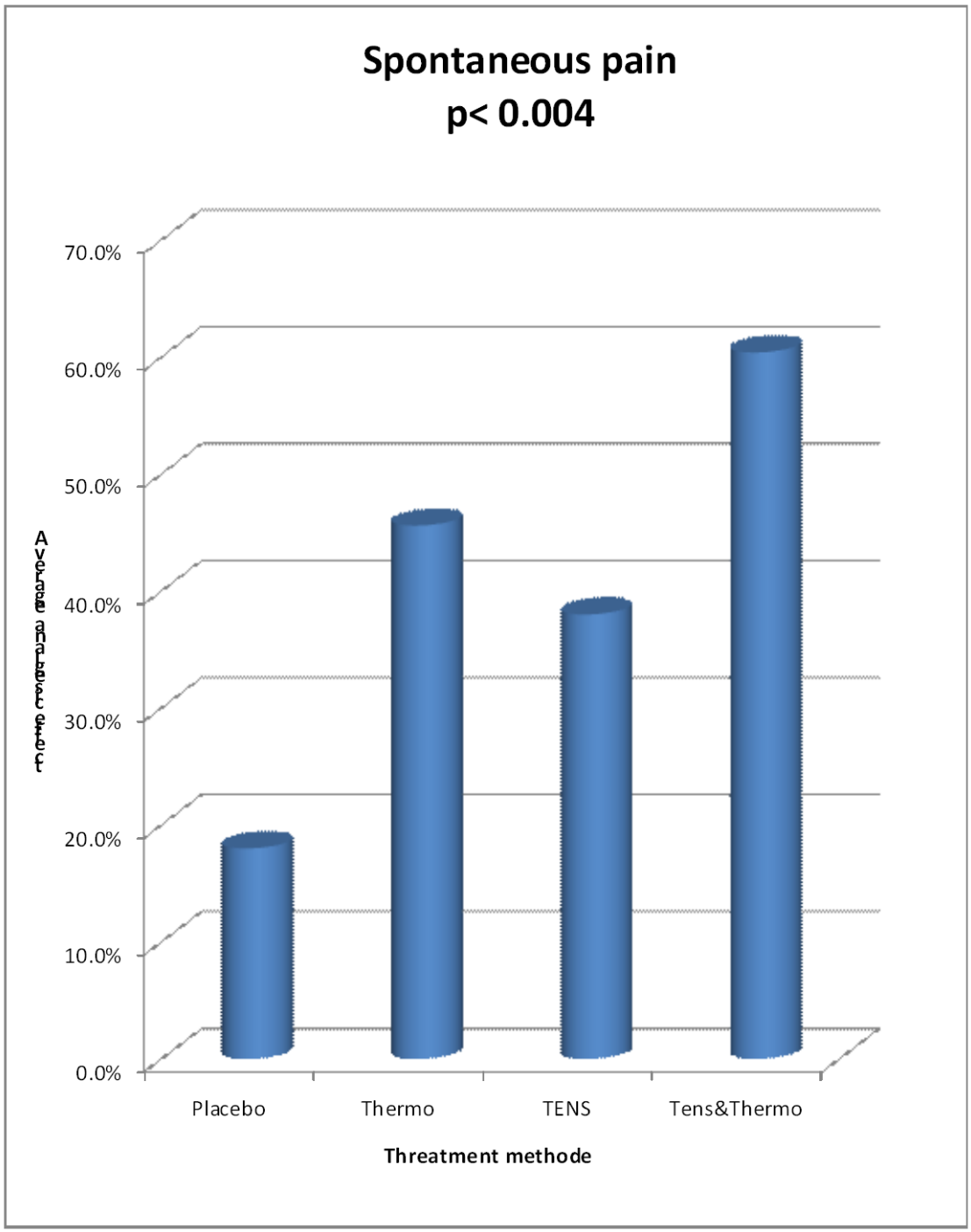

Figure 1. Average Spontaneous pain improvement vs. treatment method

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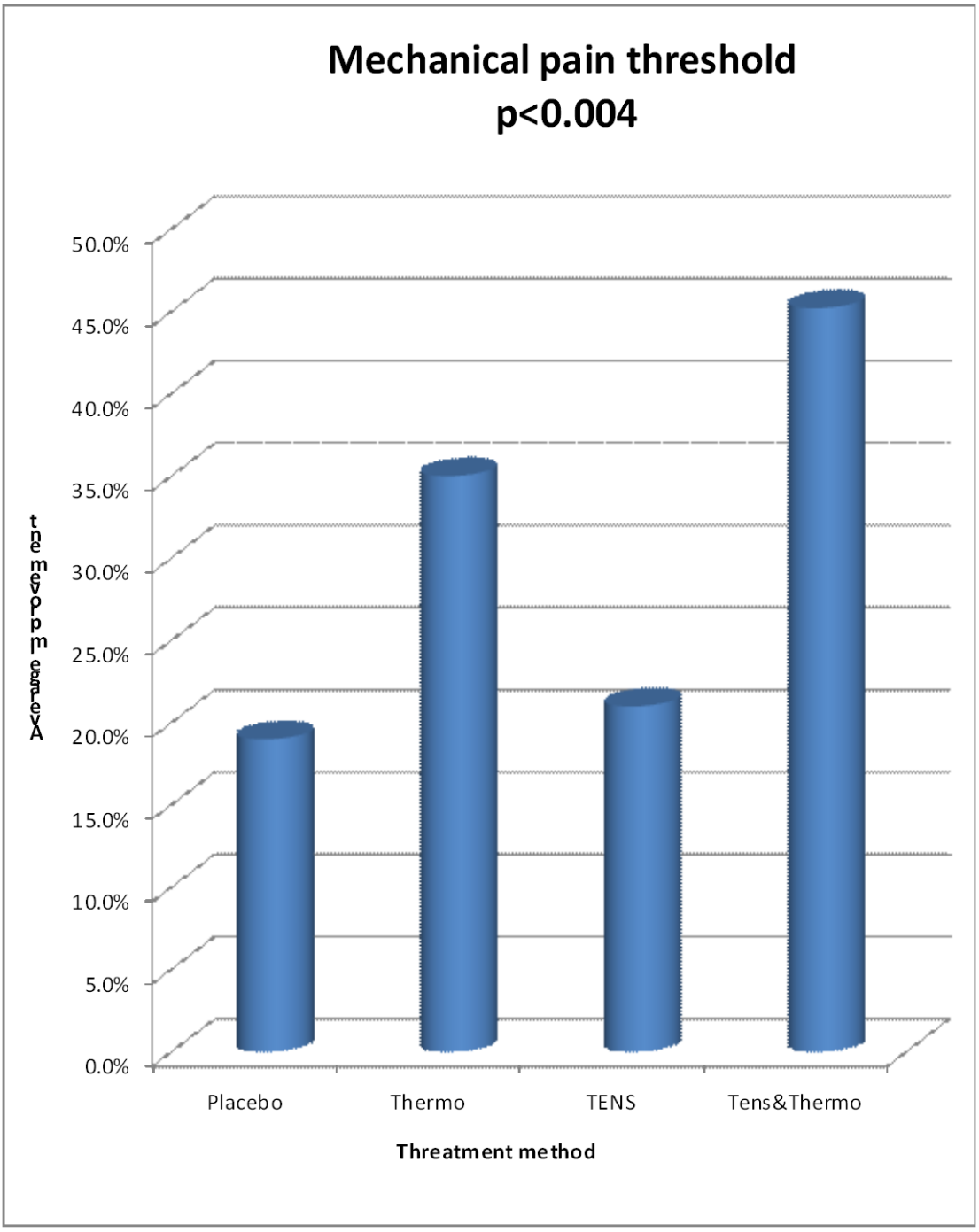

Figure 2. Average Mechanical pain threshold improvement vs. treatment method

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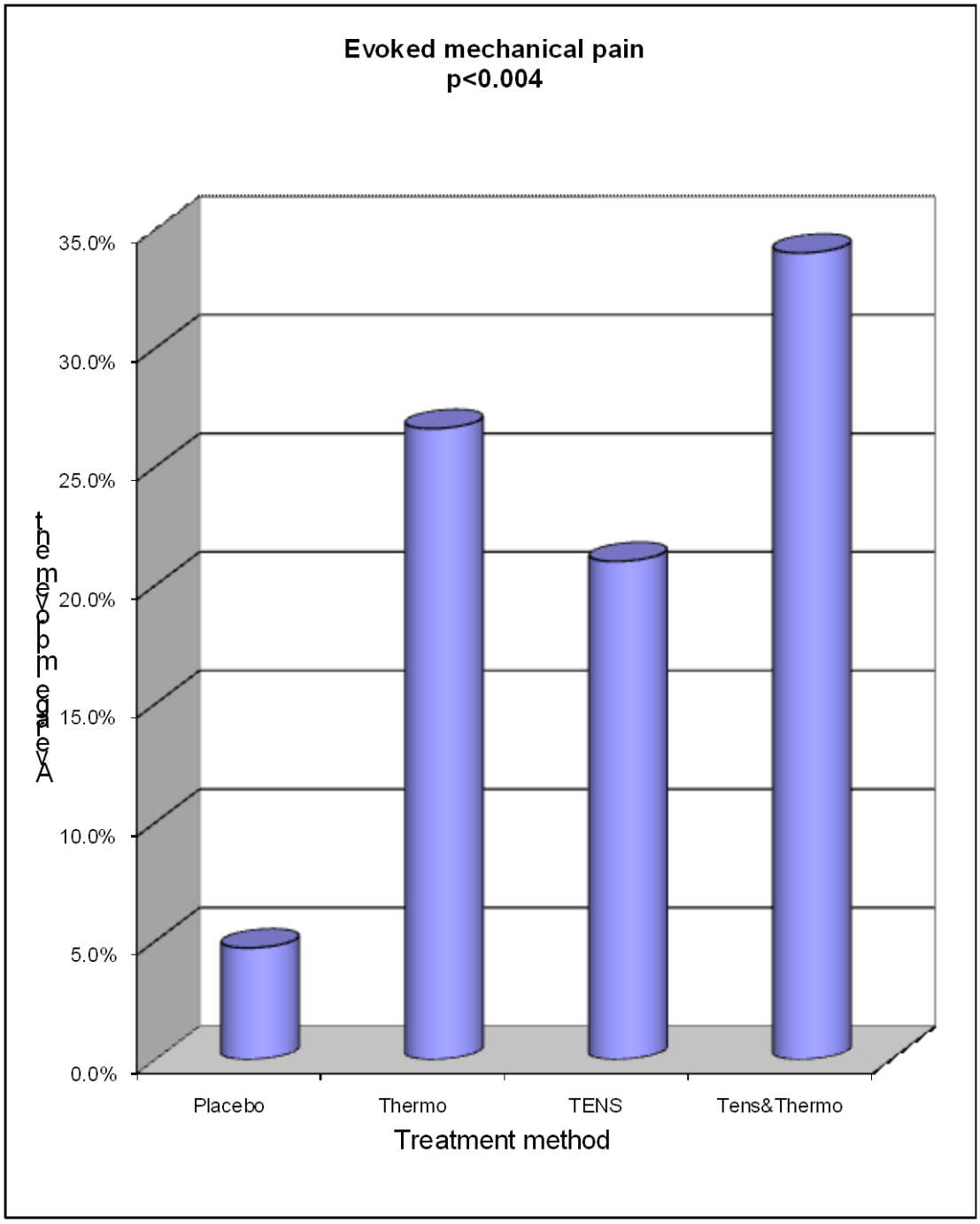

Figure 3. Average Evoked mechanical pain improvement vs. treatment method

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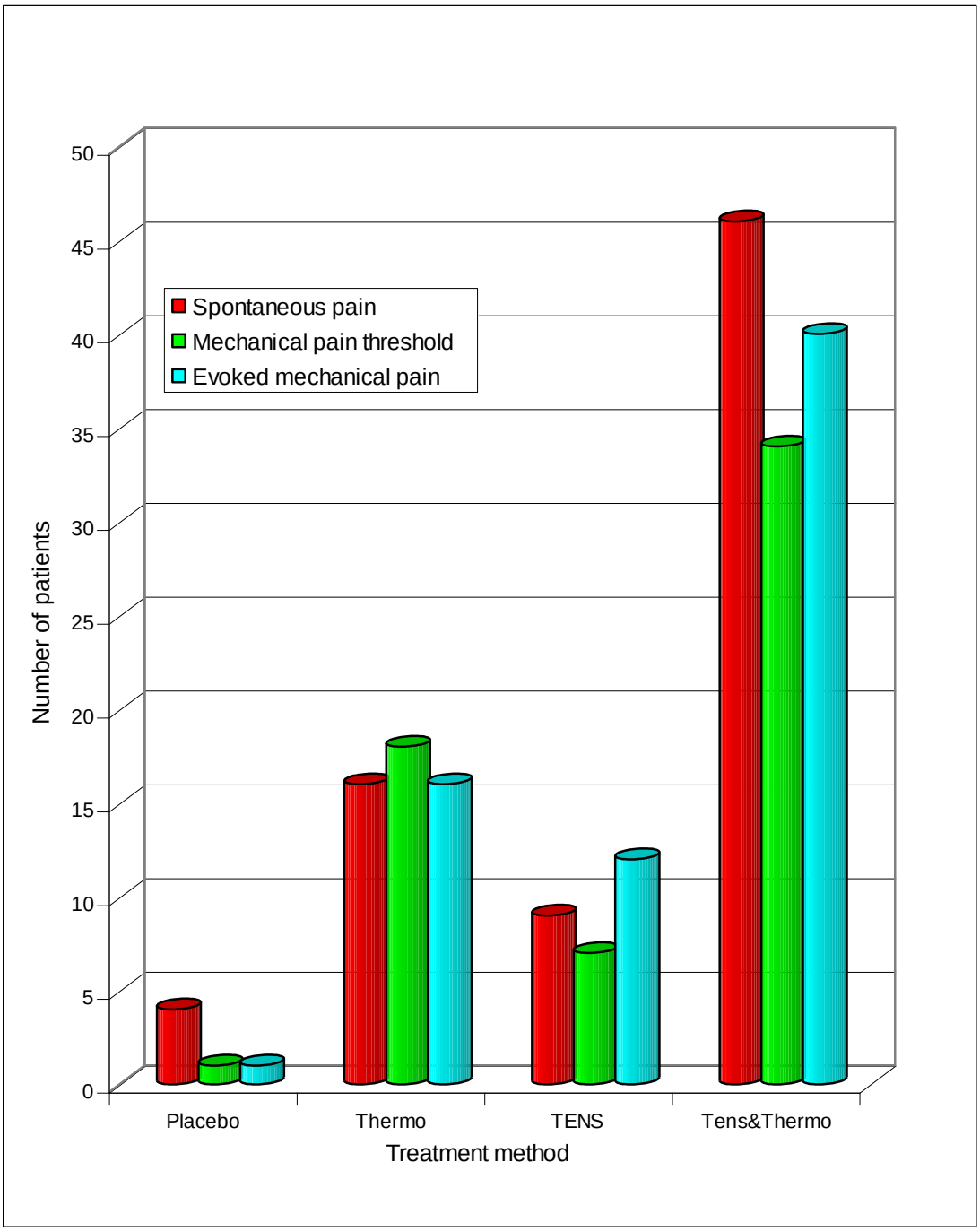

Figure 4. Number of patients with best analgesic effect vs treatment method

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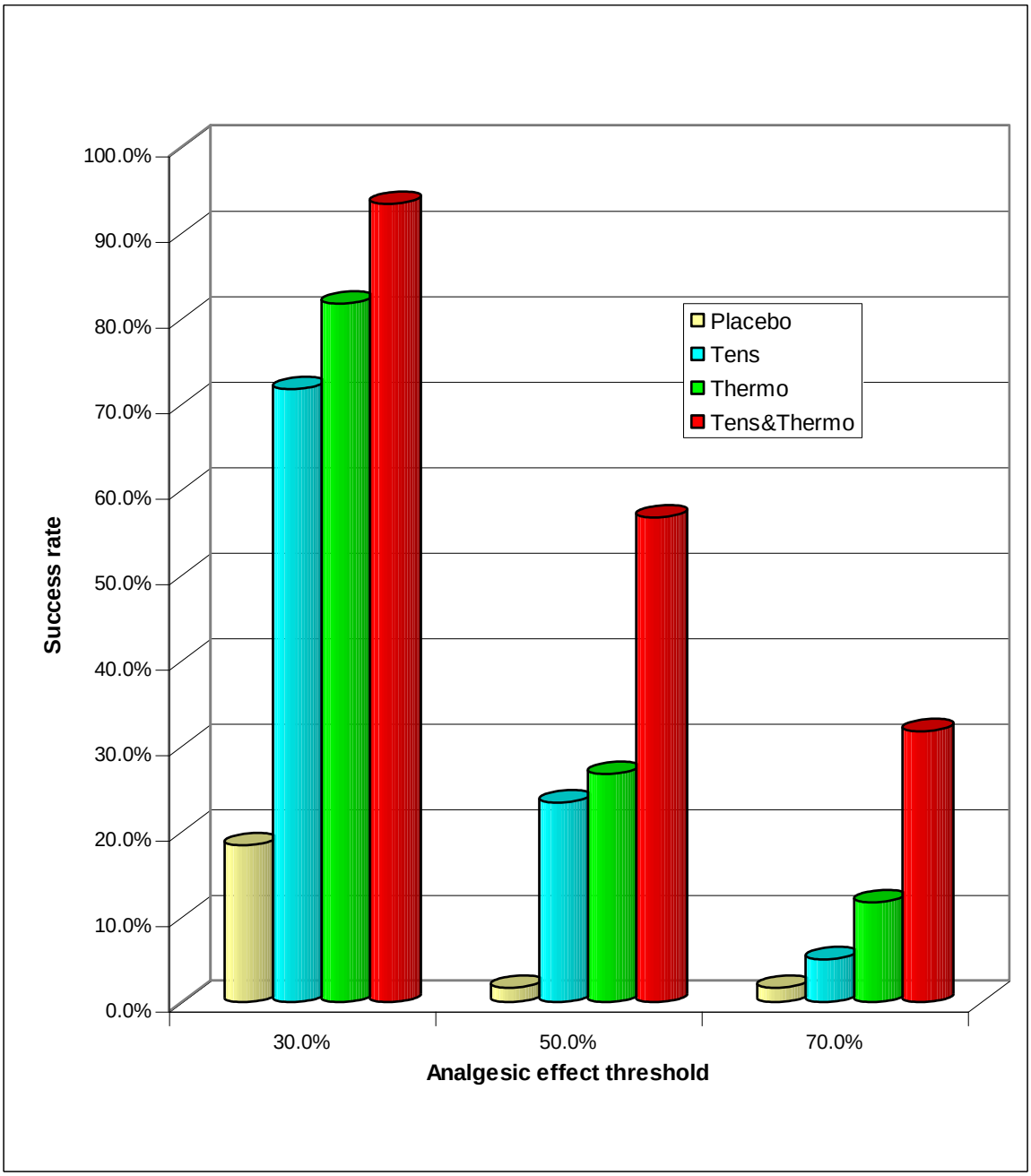

Figure 5. Succsess rate for Spontaneous pain improvement (p<0.004)

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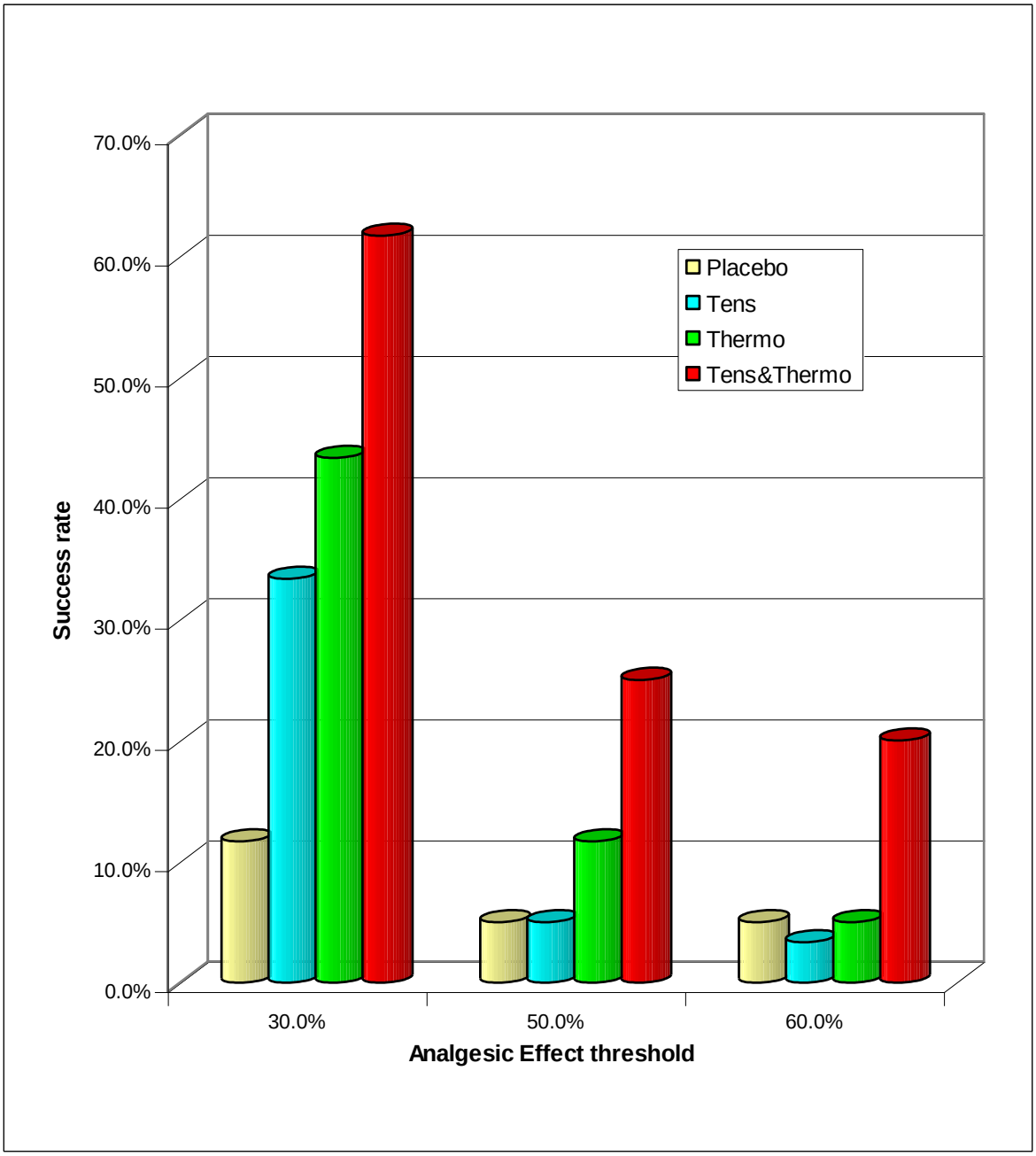

Figure 6. Success Rate for Mechanical pain threshold improvement (different threholds, p<0.004)

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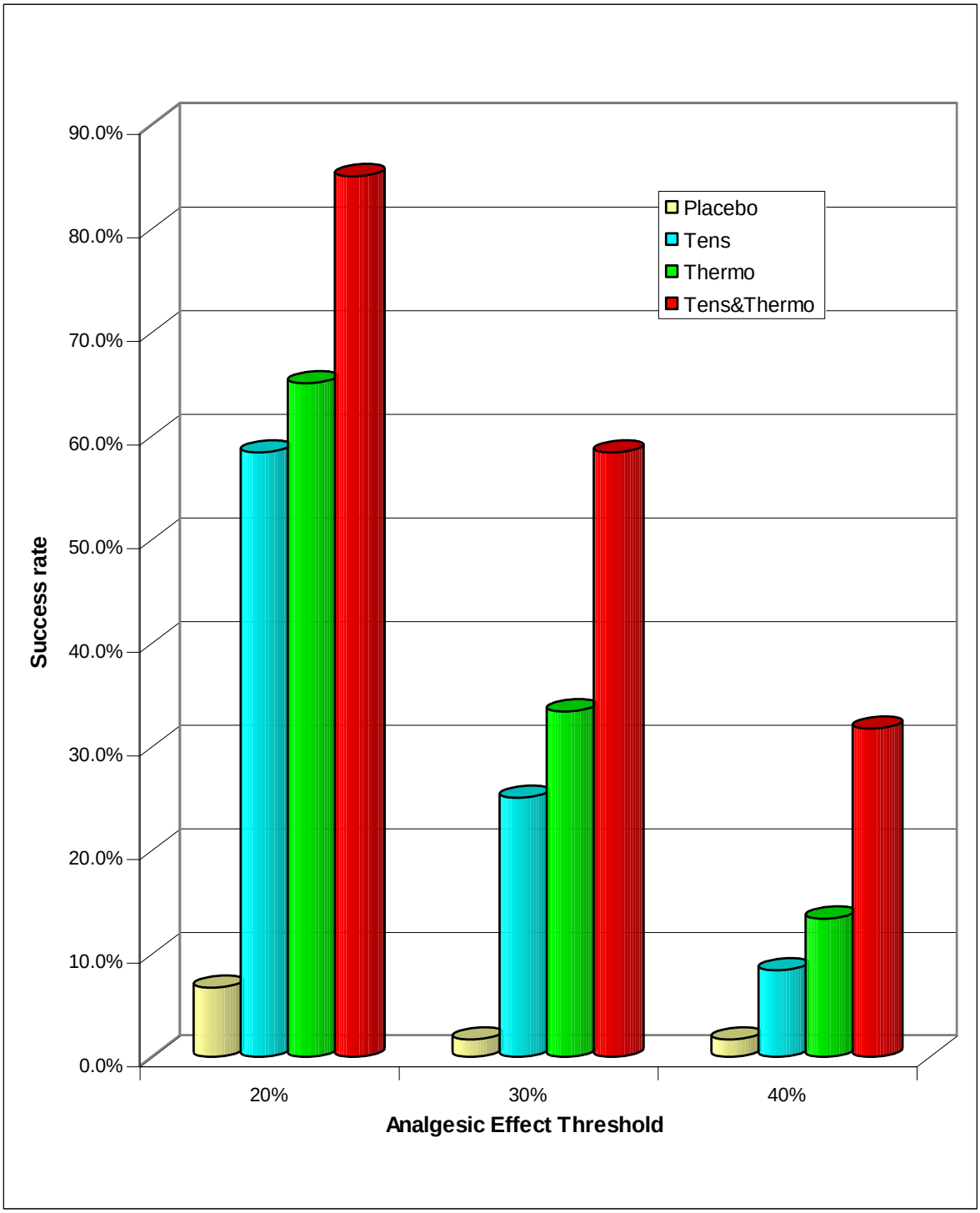

Figure 7. Success Rate for Evoked mechanical pain improvement (different thresholds, $p<0.004$)

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