

Research Paper  
Oral Surgery

# Electrical nerve stimulation method for intraoperative localization of the inferior alveolar nerve within the mandible: a pilot study in rabbits

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**Abstract.** The efficacy of the electrical nerve stimulation method for localizing the inferior alveolar nerve (IAN) within the mandibular bone was evaluated. Six New Zealand rabbits were used (both sides of the mandible). The IAN was stimulated through the mandibular bone and compound action potentials (CAPs) were recorded proximally from the main trunk of the nerve. Stimulation current pulse widths were set at 0.05, 0.1, 0.3, 0.5, and 1 ms. The minimum current magnitude that generated a CAP with a criterion level (300 mV peak-to-peak amplitude) was measured in the range of 0.05–5 mA. Correlations between the distance of the IAN from the active electrode site and the minimum current magnitudes were studied for each pulse width. The correlation coefficients were 0.678, 0.807, 0.893, 0.851, and 0.890 for the pulse widths of 0.05, 0.1, 0.3, 0.5, and 1 ms, respectively. The minimum current producing the criterion CAP response in the IAN was significantly ( $P < 0.0001$  for all pulse widths) and highly correlated with the distance between the stimulation site and the nerve. The results suggest that electrical nerve stimulation is a promising method that can be used for the localization of the IAN, especially during mandibular implant surgery.

**Keywords:** nerve location; intraoperative neurophysiological monitoring; bone; trigeminal nerve; *in vivo* study.

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Inferior alveolar nerve (IAN) injury associated with mandibular surgery is a complication contributing to altered sensation of the lower lip, chin, and buccal gingiva. The outcomes of such an iatrogenic nerve

injury are usually devastating for the patient and this remains a complex clinical problem with major medico-legal implications.<sup>1</sup> The risk of iatrogenic IAN injury depends on the procedure performed, the

technique used, and the surgeon's experience. Careful preoperative examination of the location and the course of the IAN is essential for mandibular surgeries associated with the risk of nerve injury, e.g.