

## QUANTITATIVE COMPARISONS OF SPINAL CORD STIMULATION ELECTRODE DESIGNS

Richard North, MD

Spinal cord stimulation for chronic, intractable pain has been increasingly successful in clinical practice because of recent technical improvements in particular the development of electrode arrays with multiple contacts, supported by programmable implanted pulse generators. Contemporary electrode have up to sixteen contacts; some are insulated plates requiring laminotomy, while others may be placed percutaneously. Percutaneous electrode may be placed in combination, to form two-dimensional arrays.

The standard clinical practice of screening patient» with temporary electrode» before implanting a permanent system makes possible comparative studies of different electrode designs, using each patient an his or her own control. We have compared the performance of these designs in A quantitative fashion, using A computerized system which allows direct patient interaction As instructed by the system patients adjust certain stimulation parameters to specific psychophysical thresholds, while other stimulation parameters and contact combinations are presented by the system in a randomized, blinded fashion. Quantitative comparisons have been made between each patient's temporary and permanent electrode configuration. we collect not only patient ratings (A subjective standard) but also patient drawings (entered with graphic tablet input devices). Calculated overlap of pain by paresthesias (A major determinant of pain relief) is calculated from graphic data, and amplitude thresholds are scaled psychophysically.

To date, we have undertaken studies of percutaneously placed arrays of 4 electrodes single (1x4) and in tandem (2x4), with 7-10 mm intercontact distances, and arrays of from 4 to 16 contacts (1x4, 2x8) placed by laminectomy. All study protocols have been prospective-, one has been randomized. Significant performance advantages and disadvantages have been observed for several electrode designs - as will be presented in detail. The technical advantages and disadvantages demonstrated in these studies MAY be expected to correlate with treatment outcome, extended clinical followup Will be required to demonstrate this.