**508**

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# THE STABILITY OF LIDOCAINE AND EPINEPHRINE SOLUTIONS EXPOSED TO ELECTRIC CURRENT AND COMPARATIVE ADMINISTRATION RATES OF THE TWO DRUGS INTO PIG BLADDER WALL

**Aims of Study**

Intravesical electromotive administration of local anesthetic agents has proven clinically successful in patients with Interstitial Cystitis for bladder biopsies and cystodistension and in anesthetizing and relaxing neurogenic bladders prior to injections of botulinium toxin. The addition of agents such as dexamethasone also provides a localized anti-inflammatory effect. However, electrochemistry, cost and duration of anesthesia reduce the options to lidocaine HCl 4% diluted with water and mixed with epinephrine prior to procedures. These laboratory studies address 2 major issues: 1) the stability of lidocaine and epinephrine when so mixed (a) over time and (b) when exposed to electric current; 2) comparative transport rates of the 2 drugs with passive diffusion and electromotive.

**Methods**

The drug solution mixed for all experiments was 50 ml lidocaine 4%, 50 ml $H_2O$ and 1 ml epinephrine 1/1000. For stability studies the drug solution was placed (a) in open steel bowls for 7 days and (b) in a 2 chamber cell with the donor compartment (drugs) separated from the receptor compartment (NaCl solution) by a section of viable pig bladder wall and a current generator supplied 30 mA for 45 min. Stability was measured with mass spectrometry analysis.

The same 2 chamber cell set up was used for transport rates with passive diffusion and currents of 20 mA and 30 mA, over 20, 30 and 45 minutes. The quantities of both drugs in the 2 compartments and pig bladder sections were measured using HPLC. Significance was assumed at $p<0.05$.

**Results**

In the steel bowls lidocaine remained stable throughout 7 days. Epinephrine was stable on day 1 but degraded on days 2-7. Both drugs were stable with application of 30 mA x 45 min.

With 20 mA and 30 mA currents 6/6 donor compartment lidocaine levels were lower, 4/6 receptor compartment levels were higher and 6/6 bladder tissue levels were higher compared to corresponding passive diffusion levels. Epinephrine was undetectable in receptor compartments but, with 20 mA and 30 mA, 6/6 donor levels were lower and 6/6 tissue levels were higher than corresponding levels with passive diffusion. All differences were significant. The ratio of lidocaine transport rates was 6:1 (tissues) and 11-13:1 (compartments); that of epinephrine was 9:1 (tissues).

**Conclusions**

The combination lidocaine and epinephrine mixed by users remains stable for one day and when exposed to 30 mA x 45 minutes. Electric current significantly accelerates transport rates of lidocaine and epinephrine into bladder tissues.