**Effects of Microperfusion of Lidocaine HCl in Guinea Pig Cochlea**

Kyuongrai Cho, MD, Chan Choi, MD.
Department of Otorhinolaryngology, College of Medicine, Inje University Sanggye Paik Hospital, Seoul, Korea

## Materials
- 250-350gm albino guinea pigs with normal TM
- 18 female guinea pigs
- Composition of artificial perilymph(AP)
  - NaCl(137mM)
  - KCl(5mM)
  - CaCl2(2mM)
  - NaH2PO4(1mM)
  - NaHCO3(1.2mM)
  - Glucose(1mM)
  - pH 7.4
- Lidocaine HCl powder (Sigma-Aldrich, U.S.A.) : pH 7.4

## Methods
**Drug administration**
- **Control group**
  - 1 μl of artificial perilymph was infused into scala vestibuli via cochleostomy site (0.08 μl/min x 4 min) by infusion pump.
- **Study group**
  - Group I: 5 μl of Lidocaine (25μg/ml) diluted with artificial perilymph was infused into scala vestibuli via cochleostomy site (0.08 μl/min x 4 min) by infusion pump.
  - Group II: 5 μl of Lidocaine (12.5μg/ml) diluted with artificial perilymph was infused into scala vestibuli via cochleostomy site (0.08 μl/min x 4 min) by infusion pump.

## Results
**Figure 1.** Before & after lidocaine perfusion CAP threshold change (dB) change.
- AP : 5 μl of artificial perilymph
  - Group I : 5 μl of Lidocaine (25μg/ml) diluted with artificial perilymph
  - Group II : 5 μl of Lidocaine (12.5μg/ml) diluted with artificial perilymph

**Figure 2.** Before & after lidocaine perfusion TEOAE amplitude (dB) change.
- AP : 5 μl of artificial perilymph
  - Group I : 5 μl of Lidocaine (25μg/ml) diluted with artificial perilymph
  - Group II : 5 μl of Lidocaine (12.5μg/ml) diluted with artificial perilymph

**Figure 3.** Before & after lidocaine perfusion TEOAE reproducibility (%)
- AP : 5 μl of artificial perilymph
  - Group I : 5 μl of Lidocaine (25μg/ml) diluted with artificial perilymph
  - Group II : 5 μl of Lidocaine (12.5μg/ml) diluted with artificial perilymph

**Figure 4.** Before & after lidocaine perfusion TEOAE amplitude (dB) change.
- AP : 5 μl of artificial perilymph
  - Group I : 5 μl of Lidocaine (25μg/ml) diluted with artificial perilymph
  - Group II : 5 μl of Lidocaine (12.5μg/ml) diluted with artificial perilymph

## Conclusion
This study revealed that lidocaine perfused into the scala tympani of the guinea pig cochlea affects the CAP threshold, but does not affect the TEOAE amplitude and reproducibility.

It means that the locally perfused lidocaine effect the cochlear nerve greater than the outer hair cells.

---

**Introduction**
Lidocaine is one of the therapeutic trials to treat tinnitus, however, the exact mechanism of the effect of lidocaine remains unclear.

The aim of this study was to elucidate the action site of lidocaine in the cochlear by measuring compound action potential(CAP) and transient evoked otoacoustic emission(TEOAE) amplitude in guinea pig model.

**Methods**
Artifical perilymph was perfused into the scala tympani of the guinea pig cochlea in control group, and lidocaine diluted with artificial perilymph was perfused into the scala tympani of the study groups.

Electrocochleography(ECG) and TEOAE were measured in each groups both before and after lidocaine perfusion.

**Results**
Artificial perilymph perfused to the scala tympani of the guinea pig cochlea did not affect both CAP threshold and TEOAE response.

But, Lidocaine perfused into the scala tympani of the same guinea pig cochlea produced a dose-dependent increase in CAP threshold, but did not affect TEOAE response.