Hearing Loss and Cochlear Pathology in a Type 2 Diabetic Mouse Model

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ABSTRACT

• Population based studies have shown that sensorineural hearing loss is more common in diabetics than in age matched controls.
• Diabetes have a statistically significant increased risk of hearing impairment in a variety of species at all frequencies.
• Type 2 diabetics demonstrate a significant difference between their age matched counterparts in multiple audiologic domains.
• Light microscopy analysis of cochlear pathology in human diabetics shows capillary thickening and loss of outer hair cell density.
• Human temporal bones make poor specimens for study given an inability to control for co-morbidities.
• Murine models are a superior experimental model for diabetic otopathology.

INTRODUCTION

The Lepr-db/db (Db/Db) mouse has a spontaneous mutation which results in a nonfunctioning leptin receptor. Without leptin feedback inhibition to mediate satiety, these mice eat relentlessly. They manifest a phenotype which is obese by 3 weeks of age, hyperinsulinemic and hyperglycemic. Previous studies have confirmed that these mice experience sequelae of uncontrolled diabetes, including: peripheral neuropathy, retinopathy, nephropathy, and dyslipidemia. To our knowledge this is the first study of otopathology in this genetically derived type 2 diabetes mellitus mouse model.

MATERIALS AND METHODS

• 15 male mice (Jackson Labs, Bar Harbor, ME) were divided into 3 experimental groups: 5 weeks (n=5), 8 weeks (n=10) and 10 weeks (n=5).• Six 10 week old mice of the background strain (C57Bl6) served as age-matched controls.

RESULTS

• ABR thresholds plotted by age (left) show significantly (p<0.001) higher thresholds in the 10 wk Db/Db compared to their 10 wk C57 controls. • Free from confounding ototoxic and ototraumatic exposure and inconsistent availability of audiometric data found in human studies, murine models are a superior experimental model for diabetic otopathology.

CONCLUSIONS

• The Db/Db mouse demonstrates hearing loss which is significantly worse than age matched controls.

REFERENCES


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