Introduction
It is well documented that children with Trisomy 21 often have external auditory canal (EAC) stenosis with incidence ranging from 50% to 77% [1-4]. Anecdotal reports suggest that stenosis is more common when they are infants, with increased area occurring by 2 to 3 years of age[2,4]. This is thought to be due to thickened canal wall tissue that recedes as the child grows however there are no published studies looking at the difference in stenosis in patients with Down’s syndrome in respect to their age.

Objectives
• To establish whether EAC stenosis improves in relation to age in children with Trisomy 21 through the use of tympanometric measurement of ear canal volume (ECV).
• If there is an improvement, at what age does this occur

Method
Children born in the last 10 years at a regional women’s hospital, who had been categorised as having a syndrome, were identified through the Newborn Hearing Screening Programme database.
Available tympanometry reports were then identified for these children, and ECV at different ages were noted and compared.
A comparison set of non-syndromic children’s tympanometry reports were also identified.

Results
All data was analysed using SPSS software (version 24, IBM, Armonk, NY, USA). Data from 311 tympanometry reports was identified, with n=157 in the group with Trisomy 21(T21), and n=154 in the control group.

Linear regression analysis was used to examine the relationship between ECV and age. This showed age as a predictor of ECV in both children with T21 (p=0.008) and the control group (p=0.000), though the proportion of variation explained by each model was low (R^2 0.022 T21; R^2 0.044 control).

A significant regression equation was found in both groups, predicting a yearly increase in ECV of 0.008ml/year in T21 children versus 0.016ml/year in the control group.

Polynomial cubic modelling mapped a non-linear relationship between ECV and age and suggests that differences in ECV increase with age between the T21 and control groups are more marked from the age of 6 years onwards.

Conclusion
The data presented here suggests that, compared to their age-matched control, a child with Down’s syndrome will have a significantly lower ear canal volume. This difference appears to increase from the age of 6 years onwards. Further studies need to be done to ascertain whether ear canal volume can be used as an indirect measure of ear canal stenosis.

References

Alder Hey Children’s Hospital
Department of Otolaryngology
Eaton Road, Liverpool, L12 2AP
United Kingdom
Email: sarah.dawes1@nhs.net