**Background**
Ventilation tubes (VT) in the tympanic membrane expose the middle ear (ME) to the external auditory canal and its content. It carries the risk of penetration of contaminated material and could provide a pathway for the delivery of drugs into the ME.

**Objective**
To use a printed 3D-model of the external auditory canal (EAC) and ME to assess the permeability of various VTs to different fluids.

**Methods**
CT scan of the external and ME was 3D-reconstructed and printed. Five different types of VT were inserted in the model's tympanic membrane and the minimal pressure for penetration to the ME was measured. Liquids with different viscosities, including commonly used ear drops, were tested.

**Results**
Water passed through the standard 1.14mm diameter VTs after filling the EAC with a volume of 2ml and through a narrower grommet or a T-tube after filling the canal with 2.5ml.
Soapy-water had the highest penetration in all VTs (1-2ml).
The initial volume of dexamethasone needed for penetration was 2.5ml in the standard tubes. It did not pass at any volume through the narrow grommet or the T-tube.

**Conclusion**
In the printed 3D-model, the volume of most solutions, including water, required to provide enough pressure in order to pass through the VTs was as high as the EAC volume or exceeded it. Soapy water had the highest penetration while Dexamethasone needed volume of 2.5ml to pass through the VT, questioning its reliability as a passive drug delivery channel to the ME.