SIGNAL INTENSITY CHANGES OF THE COCHLEA IN PATIENTS WITH CEREBELLOPONTINE MENINGIOMA ON ISOTROPIC 3D FLUID-ATTENUATED INVERSION RECOVERY MR IMAGING AT 3 T; COMPARISON WITH VESTIBULAR SCHWANNOMA

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Purpose
The signal intensity (SI) of the labyrinth in patients with vestibular schwannoma (VS) is known to be increased on FLAIR MR imaging due to increased protein concentration within the perilymph. It has been proposed that mechanical obstruction of the internal auditory canal (IAC) can cause increased perilymph protein concentration by either breakdown of the blood-perilymph barrier due to increased filtration from plasma or blockage of neuroaxonal transport of proteins by compression of the cochlear nerve. To validate this theory, we compared SI changes of the cochlear in patients with cerebellopontine angle (CPA) meningioma with those in patients with VS on isotropic 3D FLAIR imaging.

Materials and Methods
This study included 18 patients with unilateral CPA meningioma extending to the IAC and 77 patients with unilateral VS. In each group, we qualitatively and quantitatively compared the Sis of the cochlear on the affected side with those on the unaffected side on 3D FLAIR imaging. The SI ratios (SIRs) of the cochlear on the affected side in patients with meningioma were compared with those in patients with VS.

Signal intensity ratio (SIR) = SI of the cochlea /SI of the brain stem

Results
Qualitatively, compared with the brain stem, the SI of the cochlear on the affected side was markedly increased in 6% (1/18) and 82% (63/77), mildly increased in 33% (6/18) and 14% (11/77) and not increased in 61% (11/18) and 4% (3/77), in patients with meningioma and VS, retrospectively. Quantitatively study revealed significantly greater SIRs of the cochlear on the affected side in both patients with meningioma (0.57±0.22; p=0.007) and VS (1.03±0.40; P<0.0001), compared with those on the unaffected side (meningioma, 0.45±0.12; VS, 0.60±0.33). The SIRs of the cochlear on the affected side in patients with meningioma were statistically significantly lower than those in patients with VS (p<0.0001).

Conclusion
The SIs of the cochlear in patients with CPA/IAC meningioma are significantly lower than those in patients with VS on 3D FLAIR imaging. There may exist more complex mechanisms other than mechanical obstruction of the IAC to explain the cause of increased protein concentration in the perilymph in patients with VS.

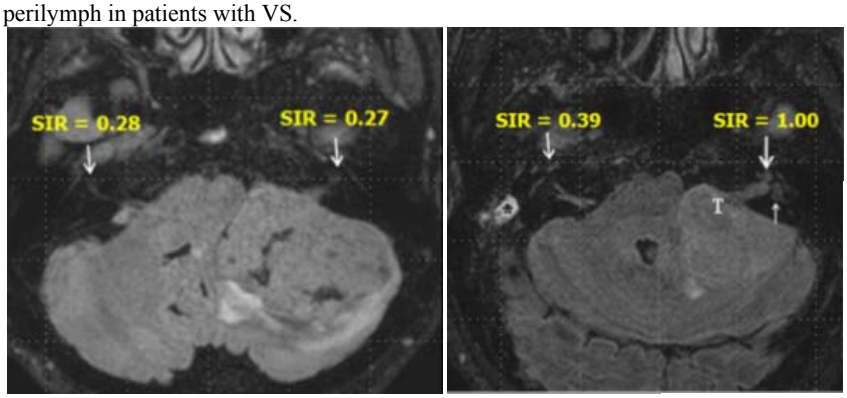

Fig 1. Signal intensity of the cochlea between the affected side and unaffected side shows no significant differences in patient with CPA/IAC meningioma (left). There is significant difference in signal intensity of the cochlea between the affected side and unaffected side in patient with vestibular schwannoma (right).

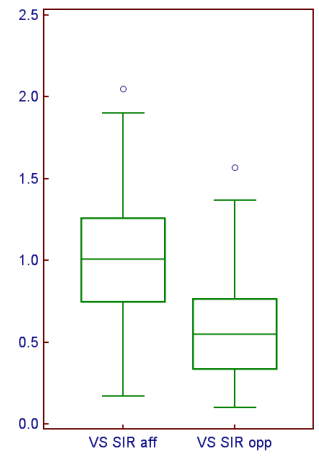

Fig 2. Comparison of signal intensity ratios (SIRs) of the cochlea between the affected ears and unaffected ear in patients with vestibular schwannoma. The SIRs of the cochlea on the affected side are significantly greater than those on the unaffected side (p<0.0001, Paired t test).

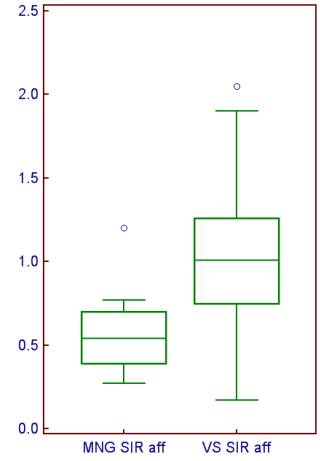

Fig 3. Comparison of signal intensity ratios (SIRs) of the cochlea between the affected ears in patients with meningioma and vestibular schwannoma. The SIRs of the cochlea on the affected side in patients with VS are significantly greater than those in patients with meningioma (p<0.0001, Mann-Whitney U test).