

Vestibular schwannoma research

□ Current Research Topics in Vestibular Schwannoma 1. Genetics and Molecular Biology NF2 gene mutations: Key role in both sporadic and neurofibromatosis type 2 (NF2)-associated VS.

Merlin pathway: Understanding how merlin protein dysfunction contributes to tumor growth.

Studies focus on identifying biomarkers for growth prediction and treatment response.

2. Tumor Growth Predictors Longitudinal studies on radiologic growth rates.

Research into radiomic signatures (machine learning + MRI) to non-invasively predict tumor behavior.

Investigation of peritumoral edema, contrast enhancement, and vascularity as prognostic factors.

3. Hearing Preservation and Auditory Outcomes Optimizing microsurgical approaches (e.g. retrosigmoid, middle fossa) for hearing preservation.

Advancements in cochlear implantation in single-sided deafness due to VS.

Use of intraoperative neuromonitoring and advanced imaging to preserve the cochlear nerve.

4. Radiosurgery and Radiotherapy Long-term outcomes of Gamma Knife and CyberKnife.

Studies comparing fractionated stereotactic radiotherapy (FSRT) vs. single-fraction radiosurgery.

Research into delayed hearing loss and radiation-induced neuropathies.

5. Surgical Techniques and Outcomes Endoscopic-assisted microsurgery.

Integration of intraoperative imaging and augmented reality.

Comparative studies of surgical approaches based on tumor size and location.

6. Quality of Life & Patient-Centered Outcomes Use of patient-reported outcome measures (PROMs) like PANQOL (Penn Acoustic Neuroma Quality of Life).

Focus on facial nerve outcomes, balance dysfunction, and anxiety/depression post-treatment.

7. Artificial Intelligence and Imaging AI in segmentation, tumor growth prediction, and outcome modeling.

Deep learning models analyzing MRI data for tumor classification and treatment planning.

8. Drug Development and Medical Therapy Ongoing trials testing mTOR inhibitors, bevacizumab, and other targeted therapies (especially for NF2-related VS).

Hope for future non-surgical treatment options in growing or symptomatic tumors.

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