Immune-Mediated Disease Burden Affects Audiovestibular Symptoms in Ménière's Disease

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Introduction

- Ménière's disease is a chronic disorder of the inner ear defined by episodic vertigo, fluctuating sensorineural hearing loss, aural fullness, and tinnitus.
- Autoantibodies and circulating immune complexes have been reported in Ménière's disease, which supports an immune-mediated component in some patients.[1,2]
- Whether greater immune-mediated disease burden is associated with specific audiovestibular symptoms remains unclear.
- **Objective:** Determine whether increased immune-mediated disease burden is associated with hearing loss, tinnitus, and vestibular symptoms in Ménière's disease

Methods

- **Design:** Retrospective analysis of the Nationwide Inpatient Sample, 2012 to 2022.[3]
- **Cohort:** Hospitalizations with Ménière's disease as the primary diagnosis; competing otologic and vestibular diagnoses were excluded.
- **Exposure:** Immune-mediated conditions identified by ICD-9/10 code across systemic, endocrine, airway, dermatologic, and gastrointestinal categories, then grouped as 0, 1, or ≥2 conditions.
- **Outcomes:** Hearing loss, tinnitus, and vestibular symptoms, also identified by ICD codes.
- **Analysis:** Multivariable logistic regression adjusted for age, sex, race, hypertension, and fluid/electrolyte disorders.

Results

- **Cohort:** 174,745 Ménière's disease hospitalizations; mean age 69.8 years, 66.5% female, 88.2% White.
- **Immune conditions:** 34,785 (19.9%) had ≥1 (17.5% one; 2.4% ≥2). These patients were younger, more often female, and more often Medicaid-insured (all p<0.001).
- **Outcomes:** Hearing loss 21,075 (12.1%), vestibular symptoms 6,960 (4.0%), tinnitus 2,630 (1.5%).
- **Immune burden:** Odds of hearing loss rose with each added condition (Figure 1); no association with tinnitus or vestibular symptoms.

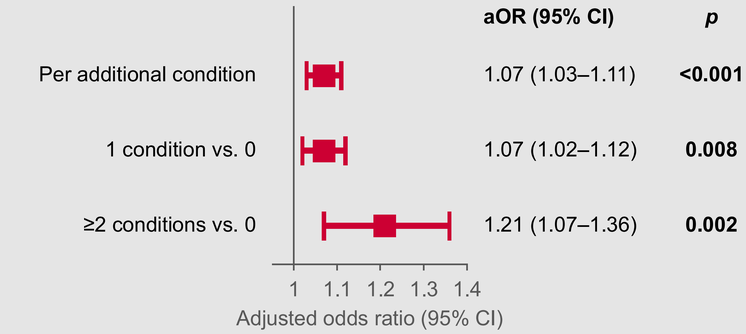
Table 1. Immune conditions and adjusted odds of hearing loss

Condition	n (%)	aOR (95% CI)	*p*
Asthma	19,005 (10.9)	1.06 (1.00–1.13)	**0.037**
Rheumatoid arthritis	5,555 (3.2)	1.03 (0.93–1.14)	0.601
Allergic rhinitis	3,920 (2.2)	1.47 (1.32–1.64)	**<0.001**
Systemic lupus erythematosus	1,725 (1.0)	1.18 (0.98–1.41)	0.081
Psoriasis	1,520 (0.9)	1.53 (1.28–1.83)	**<0.001**
Crohn disease	1,375 (0.8)	0.59 (0.46–0.76)	**<0.001**
Sjögren syndrome	1,260 (0.7)	0.69 (0.54–0.89)	**0.005**
Graves disease	1,165 (0.7)	0.80 (0.63–1.02)	0.073
Ulcerative colitis	990 (0.6)	1.31 (1.05–1.63)	**0.017**
Sarcoidosis	695 (0.4)	1.56 (1.22–2.00)	**<0.001**
Hashimoto thyroiditis	670 (0.4)	0.96 (0.69–1.32)	0.785
Type 1 diabetes mellitus	615 (0.4)	0.89 (0.61–1.29)	0.527
Systemic sclerosis	320 (0.2)	0.18 (0.07–0.43)	**<0.001**
Ankylosing spondylitis	255 (0.1)	0.71 (0.42–1.22)	0.216
Mixed connective tissue disease	190 (0.1)	0.87 (0.46–1.68)	0.686
Antiphospholipid syndrome	155 (0.1)	0.63 (0.26–1.58)	0.327

Sorted by prevalence. Vitiligo (n=85) and atopic dermatitis (n=35) omitted for sparse outcomes. Bold p-values significant at 0.05.

Results (continued)

Figure 1. Adjusted odds of hearing loss by immune burden



Adjusted for age, sex, race, hypertension, and fluid/electrolyte disorders.

Discussion

- Immune-mediated conditions were common, and hearing-loss risk increased with greater immune disease burden. Patients with ≥2 conditions had approximately 20% higher odds of hearing loss than those with none (Figure 1).
- Allergic rhinitis, psoriasis, asthma, and sarcoidosis each carried higher odds of hearing loss, while rheumatoid arthritis and lupus did not (Table 1).
- The pattern favors conditions marked by active tissue inflammation over those defined by circulating autoantibodies.
- **Limitations:** Inpatient data, ICD-based outcomes without audiometric severity, and small numbers for some immune conditions.

Conclusion

- Greater immune-mediated disease burden may help flag Ménière's patients at higher risk for hearing loss.

References

1. Lopez-Escamez JA, Vela J, Frejo L. Immune-related disorders associated with Ménière's disease: a systematic review and meta-analysis. Otolaryngol Head Neck Surg. 2023;169(5):1122-1131.
2. Gazquez I, Soto-Varela A, Aran I, et al. High prevalence of systemic autoimmune diseases in patients with Menière's disease. PLoS One. 2011;6(10):e26759.
3. Healthcare Cost and Utilization Project (HCUP). Nationwide Inpatient Sample, 2012-2022. Agency for Healthcare Research and Quality, Rockville, MD.