

Autoimmune Inner Ear Disease

Clinical Background

Autoimmune inner ear disease (AIED), also called autoimmune sensorineural hearing loss (ASNHL), is characterized by bilateral, rapidly progressive sensorineural hearing loss over a period of weeks to months. Ménière disease (MD), which is a recurrent and spontaneous episodic vertigo associated with hearing loss, fullness in the ear and tinnitus, may sometimes be confused as AIED. Individuals with MD or variants of MD may have symptoms due to immune dysfunction.

Epidemiology

- Prevalence – rare disease, accounting for <1% of all cases of hearing impairment; true prevalence unknown
- Age – peak onset in 20s-40s
- Sex – M:F ratio is unknown due to low prevalence of disease

Pathophysiology

- Inner ear cells are delicate and have limited abilities for regeneration and repair
- Disruption of regulating mechanisms may cause substantial damage to inner ear structures resulting in loss of hearing function
- Both cell-mediated and antibody responses have been associated with AIED; immune response may cause substantial damage to inner ear structures
- Possible antibodies involved in AIED:
 - Heat shock protein 70 (HSP70) – also known as anti-68kDa antigen
 - Cochlin protein
 - Choline transporter-like protein 2
 - Myelin protein P0
 - *Beta*-tectorin

Clinical Presentation

- Autoimmune sensorineural hearing loss
 - Rapidly progressive sensorineural hearing loss
 - Most often bilateral loss; usually asymmetrical
 - Fluctuating hearing loss
 - May be accompanied by ataxia, dizziness
- Other autoimmune disorders present in 15-30% of cases – disease severity usually unrelated to degree of hearing loss
 - Systemic lupus erythematosus (SLE)
 - Antiphospholipid syndrome (APS)
 - Behçet disease (BD)
 - Rheumatoid arthritis (RA)
 - Cogan syndrome
 - Sjögren syndrome
 - Wegener granulomatosis
 - Hashimoto thyroiditis
- Presentation is similar in Ménière disease and cochlear vasculitis

Treatment

- Corticosteroid therapy does not reverse hearing loss in all patients
- If not steroid responsive, cytotoxic drugs may be considered

Diagnosis

- Indications for testing
 - Appropriate clinical presentation and exclusion of other causes of hearing loss, including Ménière disease, other autoimmune diseases (with associated hearing loss), otosclerosis, retrocochlear disorders and infectious diseases such as syphilis and Lyme disease
 - Audiology – initial testing for pure tones, speech discrimination, tympanometry, acoustic reflex testing
 - If vestibular symptoms present
 - Vestibular function testing for pursuit, saecade optokinetic nystagmus, positional and spontaneous nystagmus, caloric stimulation and rotation chair stimulation
- Laboratory testing
 - No single laboratory test recommended for evaluation of disorder; non-specific antibody screening testing to rule out autoimmune or infectious disease associated with hearing loss
 - Antinuclear antibodies (ANA), rheumatoid factor, antineutrophil cytoplasmic antibodies (ANCA)
 - Consider thyroid stimulating hormone (TSH)
 - Syphilis – fluorescent treponemal antibody (FTA)
 - Lyme disease – Lyme serology
 - Diabetes mellitus – hemoglobin A1c
 - HIV – Western blot
 - Erythrocyte sedimentation rate (ESR) or C-reactive protein (CRP) helpful if elevated
 - Specific hearing loss autoimmune testing
 - HSP70 testing helpful if positive; however, a negative result does not rule out hearing loss due to an autoimmune disease process
 - HSP70 positivity is an indicator of steroid responsiveness of the disease; however, a subset of patients with AIED who are HSP70 antibody negative may respond to steroid treatment.
 - Cochlin antibody testing helpful if HSP70 is negative

Differential Diagnosis

- Vasculitis
 - Cochlear vasculitis
 - Cogan syndrome
- Infectious disease
 - Lyme disease hearing loss
 - Syphilitic hearing loss
 - Viral – HIV
- Ménière disease
- Nonsyndromic hearing loss
- Idiopathic sensorineural hearing loss
- Systemic disease
 - Diabetes mellitus
 - Systemic lupus erythematosus

Lab Tests

Indications for Laboratory Testing

Tests generally appear in the order most useful for common clinical situations. For test-specific information, refer to the test number in the ARUP Laboratory Test Directory on the ARUP Web site at www.aruplab.com.

Test Name and Number	Recommended Use	Limitations	Follow Up
Sedimentation Rate, Westergren (ESR) 0040325 Method: Westergren	Assess degree of inflammation		
C-Reactive Protein 0050180 Method: Immunoturbidimetric	Assess degree of inflammation		
Anti-Neutrophil Cytoplasmic Antibody with Reflex to Titer & MPO/PR-3 Antibodies 2002068 Method: Indirect Fluorescent Antibody/Multi-Analyte Fluorescent Detection	Rule out systemic vasculitis Panel contains ANCA IgG; myeloperoxidase antibody and serine protease 3 antibody		
Anti-Nuclear Antibody (ANA), IgG Screen with Reflex to ANA IFA Titer, dsDNA, RNP, Smith, SSA, & SSB Antibodies 0050317 Method: Enzyme-Linked Immunosorbent Assay/Indirect Fluorescent Antibody/Multi-Analyte Fluorescent Detection	Rule out autoimmune connective tissue disease		
Rheumatoid Factor, IgM, IgG, & IgA by EIA 0051298 Method: Enzyme Immunoassay	Rule out rheumatoid arthritis		

Heat Shock Protein 70 (68 kDa), IgG by Western blot 0097338 Method: Western Blot	Predict corticosteroid responsiveness in patients with idiopathic rapidly progressive sensorineural hearing loss	False positives from other systemic autoimmune disease	
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Additional Tests Available

Test Name and Number	Comments
Thyroid Stimulating Hormone 0070145 Method: Electrochemiluminescent Immunoassay	

General References

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Comprehensive Review: November 2009

Last Update: November 2009