

The Warm-Cool Relationship: A New Way to Differentiate Meniere's Disease from Vestibular Migraine

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Objectives

- How useful is the caloric test in resolving the diagnostic dilemma between MD and VM?
- Is there any correlation between atypical warm and cool responses and our active MD population?

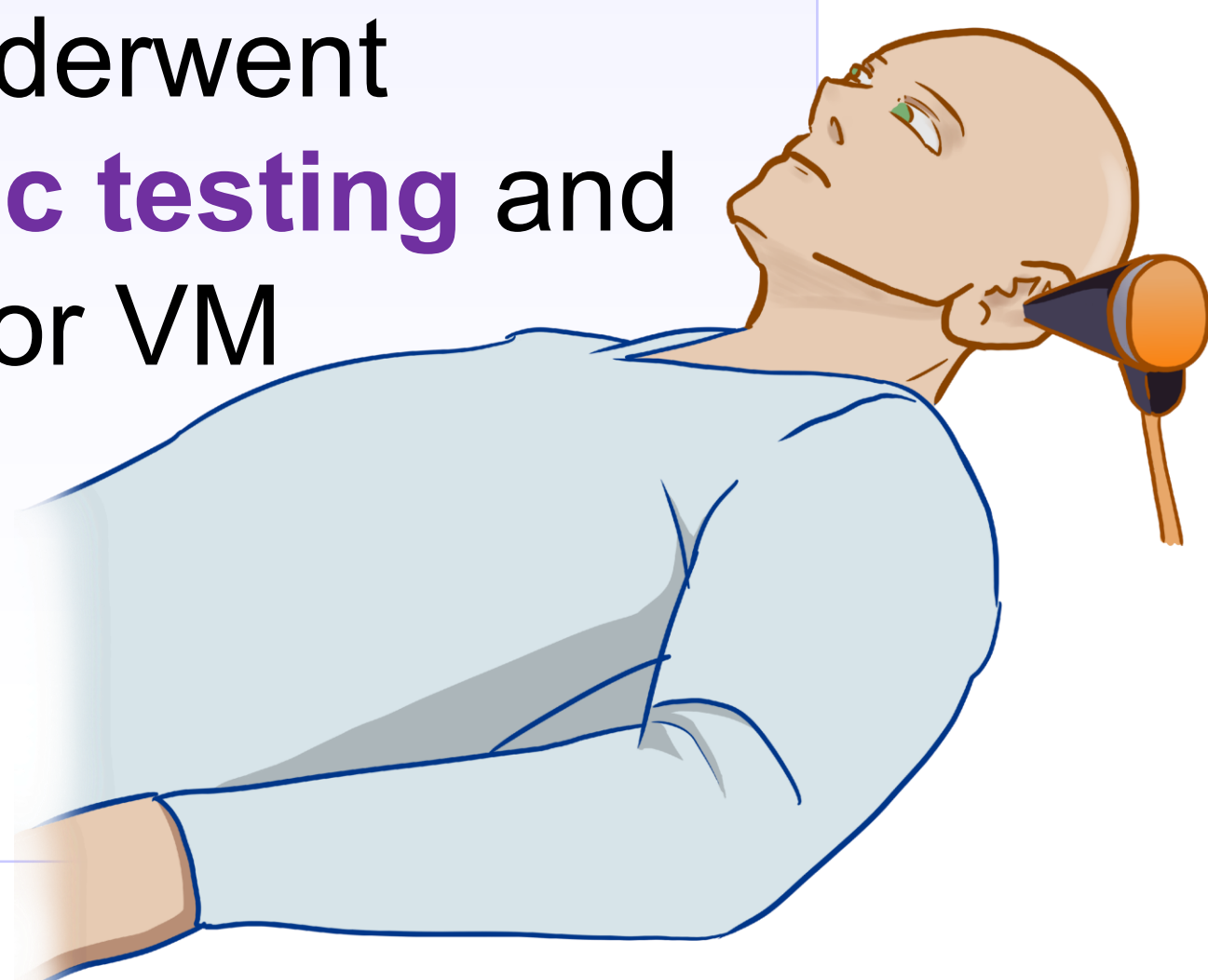
Background

- Meniere's Disease and Vestibular Migraine are two major causes of episodic vertigo
- Caloric testing is often used to determine whether there is a peripheral weakness and therefore Meniere's Disease
- Atypical warm-cool relationships in caloric testing may also be an indicator of active Meniere's disease

The atypical warm-cool relationship: when **cool** responses are stronger than **warm** responses

Methods:

Data was collected from 2022-2026, which included **120 patients** who underwent **bithermal caloric testing** and received an MD or VM diagnosis.



Modelling the warm-cool caloric relationship:

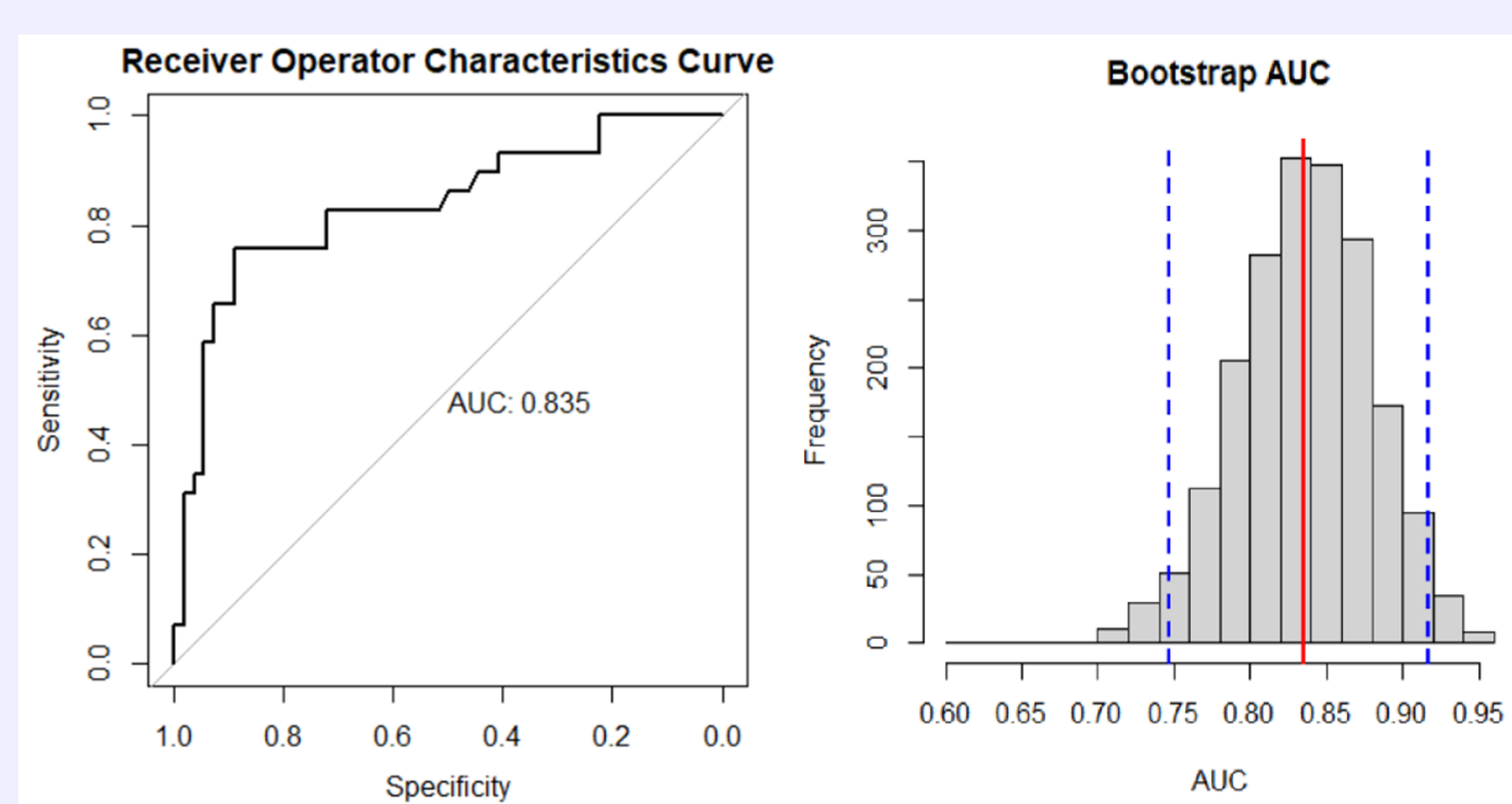
A log transformation was applied to the data so a linear regression could be performed using the 28 vestibular migraine ears with no Meniere's Disease in water calorics.

$$R^2 = 0.67, p = >0.001$$

The below formula represents the typical warm and cool response relationship, allowing us to predict one using the other:

$$WCR = \frac{\text{warm}}{3.058 \times \text{cool}^{0.85}}$$

Internally validating the warm-cool relationship



A sample of **54 new VM ears** and **29 active dMD ears**

AUC = **0.84** (0.75-0.92)
Cut-off of **≤0.523** was positive for active MD (**specificity 94%**; sensitivity 59%).

Results:

*where retrospective data is available

40 MD and 34 VM patients

- Higher canal paresis is significantly associated with an MD diagnosis ($p < 0.001$). AUC: 0.74.
- Directional preponderance shows no significant difference ($p = 0.47$). AUC: 0.66.

35 MD and 32 VM patients

- Normal vHIT and abnormal canal paresis (>20%) was not significantly associated with MD over VM (odds ratio: 2.46 (0.93, $p = 0.07$))

Conclusions:

- Canal paresis is useful for differentiating MD and VM but directional preponderance and caloric-vHIT dissociation is not
- WCR may be useful for ruling-in an MD diagnosis

Proposed mechanism of the WCR

