

Article

Evaluating the Diagnostic Value of Electrovestibulography (EVestG) in Alzheimer's Patients with Mixed Pathology: A Pilot Study

Zeinab A. Dastgheib, Brian J. Lithgow and Zahra K. Moussavi *

Diagnostic and Neurological Processing Research Laboratory, Biomedical Engineering Program, University of Manitoba, Riverview Health Centre, Winnipeg, MB R3L 2P4, Canada; zeinab.dastgheib@umanitoba.ca (Z.A.D.); brian.lithgow@umanitoba.ca (B.J.L.)

* Correspondence: zahra.moussavi@umanitoba.ca; Tel.: +1-204-474-7023

Section A

The special placement of the IH33 signals of the three populations over the range of frequency or time (i.e., the control population sits in between AD and AD-CVD ones).

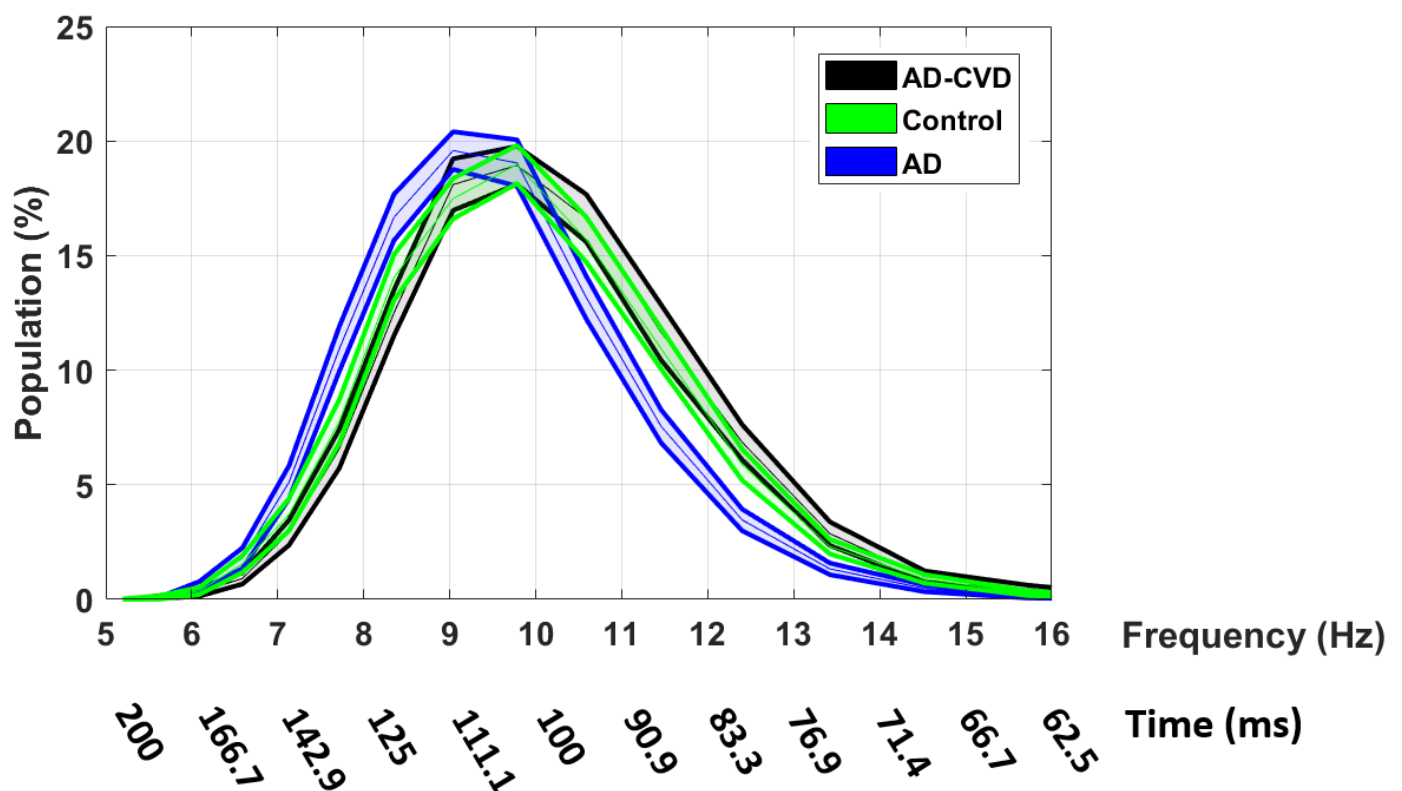


Figure S1. IH33 signals of the average of left and right RTC BGi segments in Supine Up//down tilt (Supine Up/down-RTC-BGi-LR) for the three populations over the range of frequency or time.

Section B

A one-way MANCOVA was applied using the final selected most informative features of Control-vs-AD, AD-CVD-vs-Control, and AD-vs-AD-CVD classifiers with controlling for age, and sex covariates [1, 2]. The first feature in Control-vs-AD and the second and third features in AD-CVD-vs-Control classifier were transformed to have a normal distribution using the method described in [3]. Table S1 summarizes that analysis.

Table S1. One-way MANCOVA on the selected features of C-vs-AD, AD-CVD-vs-C, and AD-vs AD-CVD classifiers controlling for age and sex. Each feature is named based on the IH33 that is extracted from in terms of the IH33's tilt name, segment (seg), and the ear side, left (L) or right (R).

Main One-way MANCOVA

Selected feature	Covariates	Covariate p value	Wilkes Lambda	F	MANOVA Partial p value	MANOVA Partial η^2	Power	Box's M p value	Lavene's p value
Multivariate main effect-pathology									
C-vs-AD	- Supine average BGi_L								
	- Supine up/down								0.951
	RTC_BGi_L	age	0.693	0.764	F(3,53) =5.457	0.002	0.236	0.921	0.131
		sex	0.698						
	- Supine up/down								
	RTC_BGi_LR								

Univariate main effects

- Supine average BGi_L									
- Supine up/down	F(1,55)=15.916		<0.001		0.224		0.975		
RTC_BGi_L	F(1,55)=10.183		0.002		0.156		0.880		
- Supine up/down	F(1,55)=5.244		0.026		0.087		0.614		
RTC_BGi_LR									

Multivariate main effect

AD-CVD-vs-C	- Supine up/down_								
	OnAA_L								
	- Supine up/down_	age	0.889	0.717	F(3,45) =5.935	0.002	0.283	0.939	0.081
		sex	0.835						
	OnAA_R								
	- Supine up/down_								
	OnBB_R								

Univariate main effects

- Supine up/down_									
OnAA_L	F(1,47)=6.453		0.014		0.121		0.701		
- Supine up/down_	F(1,47)=12.147		0.001		0.205		0.927		
OnAA_R	F(1,47)= 6.451		0.014		0.121		0.701		
- Supine up/down_									
OnBB_R									

Multivariate main effect-pathology

			- Upright											
			average_B											
			Gi_LR											
AD-vs-	-										0.297			
AD-CVD	Up/down	age	0.594	0.719	F(3,43) = 5.59	0.003	0.281	0.922	0.302	0.687	0.596			
	_OnBB_R	sex	0.344											
	- Supine													
	up/down_													
	OnBB_R													

Univariate main effects

- Upright									
average_B	Gi_LR	F(1,45)= 7.215	0.01		0.138		0.748		
- Up/down	_OnBB_R	F(1,45)= 8.939	0.005		0.166		0.833		
- Supine		F(1,45)= 9.978	0.003		0.181		0.871		
up/down	_OnBB_R								

References

1. Landau S, Everitt B; A handbook of statistical analyses using SPSS. Chapman & Hall/CRC, Boca Raton, **2004**
2. Pituch KA, Stevens J, Applied multivariate statistics for the social sciences: analyses with SAS and IBM's SPSS, 6th edition. Routledge/Taylor & Francis Group, New York, **2016**
3. Templeton, G.F. A Two-Step Approach for Transforming Continuous Variables to Normal: Implications and Recommendations for IS Research. *Commun. Assoc. Inf. Syst.* **2011**, *28*, 41–58, <https://doi.org/10.17705/1cais.02804>.