Supplementary material for Meyer N, et al. 2014. cVEMPs: A systematic review and meta-analysis. *Int J Audiol*, 54, 143–151.

Supplementary Table I. Stimulus and recording parameters of included 0.1 ms click and 500 Hz tone burst cVEMP reports.

0.1 ms click cVEMP			500 Hz tone burst cVEMP	
Stimulus parameters		Number of reports	Number of reports	
Level	Range of 75 - 110 dB nHL:		Range of 90 - 110 dB nHL	
	75 dB nHL	1	90 dB nHL	2
	90 dB nHL	3	95 dB nHL	31
	95 dB nHL	10	100 dB nHL	3
	97 dB nHL	1	105 dB nHL	2
	100 dB nHL	7	107 dB nHL	1
	103 dB nHL	1	110 dB nHL	3
	105 dB nHL	5		
	110 dB nHL	2		
Rate	Range of 3 - 10 Hz:		Range of 4 - 6 Hz:	
	3 Hz	1	4 Hz	1
	4 Hz	1	4.3 Hz	1
	5 Hz	17	5 Hz	32
	6 Hz	1	5.1 Hz	3
	10 Hz	1	5.26 Hz	1
	NI	3	6 Hz	1
			NI	3
Duration	0.1 ms		Range of different rise/fall (R/F) and plateau times (P):	
			R/F: 1 ms; P: 2 ms	25
			R/F: 1 ms; P: 5 ms	2
			R/F: 1 ms; P: 6 ms	1
			R/F: 2 ms; P: 2 ms	5
			R/F: 2 ms; P: 1 ms	1
			Unclear / not fully described	8
Recording parameters				
Device Positioning	Across different devices		Across different devices	
	a) Seated, turn head contralaterally (STC)	5	a) Seated, turn head contralaterally (STC)	12
	b) Supine, head elevated ('SEH')	16	b) Supine, head elevated ('SEH')	19
	d) Supine, elevate and rotate head contralaterally (SETC)	5	c) Supine, head rotated (SRH)	2
	e) Seated, push head forward (SPF)	2	d) Supine, elevate and rotate head contralaterally (SETC)	5
	f) NI	2	e) Seated, push head forward (SPF)	2
			f) NI	2
Electrode montage Transducer	Across different montages		Across different montages	
	a) Headphone	23	a) Headphone	16
	b) Insert earphone	5	b) Insert earphone	25
	c) NI	2	c) NI	1
Amplifier gain	Range of 1000 - 2500:		Range of 1000 - 10 000:	
	1000	1	1000	2
	2000	1	2500	1
	2500	1	5000	6
	NI	27	10,000	1
			NI	32
Filter settings	Range:		Range:	
	1 - 1000 Hz	1	1.6 - 800 Hz	1
	10 - 1000 Hz	2	8 - 1600 Hz	1
	20 - 2000 Hz	11	5 - 2000 Hz	1
	5 - 1500 Hz	2	10 - 1200 Hz	1
	8 - 1600 Hz	2	10 - 1500 Hz	6
	8 - 4000 Hz	1	10 - 3000 Hz	3

(Continued)

Supplementary Table I. Continued.

0.1 ms click cVEMP			500 Hz tone burst cVEMP	
<i>Stimulus parameters</i>	<i>Number of reports</i>		<i>Number of reports</i>	
	10- 1600 Hz	1	20 - 1500 Hz	2
	10 - 3000 Hz	1	20 - 2000 Hz	16
	5 - 1000 Hz	1	30 - 1500 Hz	1
	5 - 1500 Hz	1	30 - 3000 Hz	9
	30 -1500 Hz	1	NI	1
	30 - 3000 Hz	1		
	20 - 10 000 Hz	3		
	NI	2		
<i>Time window</i>	<i>Range:</i>		Range of 40 -120 ms	
	40 ms	1	40 ms	1
	50 ms	10	50 ms	8
	53 ms	1	53.3 ms	1
	80 ms	1	55.5 ms	2
	100 ms	4	60 ms	8
	120 ms	2	100 ms	9
	200 ms	1	120 ms	2
	220 ms	1	NI	11
	NI	9		
<i>Number of sweeps</i>	100 - 512		100 - 256	
<i>EMG controlling method</i>	Rectified	1	Rectified	8
	Visually monitored	16	Visually monitored	22
	Visually monitored and rectified	2	Visually monitored and rectified	6
	Feedback method alone	0	Feedback method alone	4
	NI	4	NI	2
<i>EMG monitoring levels</i>	50 - 200 mV	9	50 -200 mV	6
	Measuring resistance against examiner's hand	1	Measuring resistance against examiner's hand	1
	Levels not indicated	6	60 -80 mV	1
			100-400 mV	1
			Levels not indicated	15

NI = Not indicated.

Supplementary Table 2. Digital Content 0.1 ms CV.

Authors	Title	Year	No. of Participants	Latency				Amplitude		Asymmetry Ratio		Threshold
				Mean Latency P	Mean Latency N	Mean Latency P Left	Mean Latency P Right	Mean Latency N Left	Mean Latency N Right	Mean Amplitude L	Mean Amplitude R	
Gazioglu S., Boz C.	Ocular and cervical vestibular evoked myogenic potentials in multiple sclerosis patients	2012	35	12.25	20.8					15.6		
Gode S., Celebisoy N., Akyuz A., Gulec F., Karapolat H., Bilgen C., Kirazli T.	Single-shot, low-dose intratympanic gentamicin in Meniere disease: Role of vestibular-evoked myogenic potentials and caloric test in the prediction of outcome	2011	40	12.7	22				112.7	145.6	129.15	17.5
Boldingh M.I., Ljostad U., Mygland A., Monstad P.	Vestibular sensitivity in vestibular migraine: VEMPs and motion sickness susceptibility	2011	30	11.9	20.9							87
Jin Y., Munetaka U., Hayasi A., Takegoshi H., Nakajima Y., Kaga K.	Vestibular myogenic potentials of athletes for the deaf olympic games with congenital profound hearing loss	2010	10	11.6	19.7							15.5
Nguyen K.D., Weigampola M.S., Carey J.P.	Test-retest reliability and age-related characteristics of the ocular and cervical vestibular evoked myogenic potential tests	2010	12	10.92	19.55					1.72		34.5
Rosengren S.M., Govender S., Colebatch J.G.	The relative effectiveness of different stimulus waveforms in evoking VEMPs: Significance of stimulus energy and frequency	2009	11	12.6	20.5							
Rosengren S.M., Todd N.P.M., Colebatch J.G.	Vestibular evoked myogenic potentials evoked by brief interaural head acceleration: Properties and possible origin	2009	10	13.1	21.6							
Chuang Y.-M., Chen C.-C., Lin C.-P.	Vertebral artery hypoplasia may contribute to abnormal vestibular evoked myogenic potentials	2009	26	12.1	24.8					102.3		

(Continued)

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry Ratio		Threshold
				Mean Latency P Left	Mean Latency P Right	Mean Latency N Left	Mean Latency N Right	Mean Amplitude L	Mean Amplitude R	Mean Amplitude L + R	Mean Asymmetry (%)			
Bektas D., Gazioglu S., Arslan S., Canoglu B., Caylan R.	VEMP responses are not affected in non-insulin-dependent diabetes mellitus patients with or without polyneuropathy	2008	21	12.73	21.06	12.86	12.6	20.99	21.13	218	230	224		
Hong S.M., Park D.C., Yeo S.G., Cha C.I.	Vestibular evoked myogenic potentials in patients with benign paroxysmal positional vertigo involving each semicircular canal	2008	63	13.3	18.9							16.5	3.87	
Seo T., Miyamoto A., Node M., Sakagami M.	Vestibular evoked myogenic potentials of undiagnosed dizziness	2008	10										14.8	
Lee S.K., Cha C.I., Jung T.S., Park D.C., Yeo S.G.	Age-related differences in parameters of vestibular evoked myogenic potentials	2008	63	13.3	18.775							16.4		
Versino M., Ranza L., Colnaghi S., Alloni R., Calicco R., Romani A., Bergamaschi R., Pichiecchio A., Bastianello S., Cosi V.	The N3 potential compared to sound and galvanic vestibular evoked myogenic potential in healthy subjects and in multiple sclerosis patients	2007	31	11.45	19.4	11.7	11.2	19.9	18.9					
Driscoll C., Bekessy A., Bui V., Fox D., Harvey M., Mackenzie D.	Vestibular evoked myogenic potentials: Clinical implications of a normative investigation	2007	30	10.65	18.32									87.09
Wu H.-J., Shiao A.-S., Yang Y.-L., Lee G.-S.	Comparison of short tone burst-evoked and click-evoked vestibular myogenic potentials in healthy individuals	2007	22	12.43	19.85					81.23	20			

(Continued)

Supplementary Table 2. 0.1 ms CV (Continued).

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry Ratio		Threshold	
				Mean Latency P		Mean Latency N		Mean Latency P		Mean Latency N		Mean Amplitude			Mean Asymmetry (%)
				Left	Right	Left	Right	Left	Right	L	R				
Sazgar A.A., Akrami K., Akrami S., Karimi Yazdi A.R.	Recording of vestibular evoked myogenic potentials	2006	18	12.45	20.8										
Sazgar A.A., Dortaj V., Akrami K., Akrami S., Karimi Yazdi A.R.	Sacular damage in patients with high-frequency sensorineural hearing loss	2006	18	12.45	20.8										
Huang T.-W., Su H.-C., Cheng P.-W.	Effect of click duration on vestibular-evoked myogenic potentials	2005	17	11.31	18.44							111.38			
Huang T.-W., Young Y.-H., Cheng P.-W.	Eliciting constant and prominent waves n34-p44 of vestibular-evoked myogenic potentials	2004	27	11.905	19.105							108.2			
Su H.-C., Huang T.-W., Young Y.-H., Cheng P.-W.	Aging effect on vestibular evoked myogenic potential	2004	40	11.53	19.015							117.6	16		
Cheng P.-W., Huang T.-W., Young Y.-H.	The influence of clicks versus short tone bursts on the vestibular evoked myogenic potentials	2003	29	11.45	19.17							119.55			
Nong D.X., Ura M., Kyuna A., Owa T., Noda Y.	Saccular origin of acoustically evoked short latency negative response	2002	12										94.2		
Versino M., Colnaghi S., Callieco R., Cosi V.	Vestibular evoked myogenic potentials: Test-retest reliability	2001	13	11.515	19.14	11.51	11.52	18.93	19.35	216.65	199.15	207.9			
Brantberg K., Fransson P.-A.	Symmetry measures of vestibular evoked myogenic potentials using objective detection criteria	2001	23	11.4	18.18							66.6			
Ochi K., T., Nishino H.	Variance of vestibular-evoked myogenic potentials	2001	18	11.26	20.23							264.1	13.5		

(Continued)

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry Ratio	Threshold
				Mean Latency P Left	Mean Latency P Right	Mean Latency N Left	Mean Latency N Right	Mean Amplitude R	Mean Amplitude L	Mean Amplitude L + R	Mean Asymmetry (%)		
Streubel S.-O., Cremer P.D., Carey J.P., Weg N., Minor L.B.	Vestibular-evoked myogenic potentials in the diagnosis of superior canal dehiscence syndrome	2001	11										96
Sasaki O., Asawa S., Katsuno S., Usami S., Taguchi K.	The effects of intense click sounds on velocity storage in optokinetic after-nystagmus	2000	12	14.05	15	13.1	21.2	3.1	3.5				
De Waele C., Tran Ba Huy P., Diard J.-P., Freyss G., Vidal P.-P.	Saccular dysfunction in Meniere's disease	1999	34	11.5	19.3			80.5					
Murofushi T., Matsuzaki M., Mizuno M.	Vestibular evoked myogenic potentials in patients with acoustic neuromas	1998	8								12.3		
Robertson D.D., Ireland D.J.	Vestibular evoked myogenic potentials	1995	7	14.6	21.3			10.2					

Supplementary Table 2. Digital Content 500 Hz tone burst.

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry Ratio	Threshold
				Mean Latency p	Mean Latency n	Mean Latency p Left	Mean Latency p Right	Mean Latency n Left	Mean Latency n Right	Mean Amplitude R	Mean Amplitude L		
McNerney K.M., Burkard R.F.	The vestibular evoked myogenic potential (VEMP): Air-versus bone-conducted stimuli	2011	22	13.48	21.8						81.96		
Murofushi T., Nakahara H., Yoshimura E., Tsuda Y.	Association of air-conducted sound oVEMP findings with cVEMP and caloric test findings in patients with unilateral peripheral vestibular disorders	2011	7	15.1	23.7							16.4	
De Oliveira Barreto A.C., Colafemina J.F., De Lemos Menezes P.	Sacculus sensitivity function measured by vestibular evoked myogenic potential	2011	78	14.15	24.17								
Tourillott B.M., Ferraro J.A., Bani-Ahmed A., Almqvist E., Deshpande N.	Age-related changes in vestibular evoked myogenic potentials using a modified blood pressure manometer feedback method	2010	11	16.1	24.5						168.5	10.1	76.8
Sazgar A.A., Yazdani N., Rezazadeh N., Yazdi A.K.	Vestibular evoked myogenic potential (VEMP) in patients with auditory neuropathy: Auditory neuropathy or audiovestibular neuropathy?	2010	30	14.47	23.79						114.09		
Jin X., Munetaka U., Hayasi A., Takegoshi H., Nakajima Y., Kaga K.	Vestibular myogenic potentials of athletes for the deaf olympic games with congenital profound hearing loss	2010	10	13.6	23.9							12.9	
Nguyen K.D., Weigampola M.S., Carey J.P.	Test-retest reliability and age-related characteristics of the ocular and cervical vestibular evoked myogenic potential tests	2010	12	12.96	20.79						2.76	31.6	
Maes L., Dhooge L., D'Haenens W., Bockstaël A., Keppler H., Philips B., Swinnen F., Vinck B.M.	The effect of age on the sinusoidal harmonic acceleration test, pseudorandom rotation test, velocity step test, caloric test, and vestibular-evoked myogenic potential test	2010	51	14.5025	23.515						147.0525	2.1675	71.875

(Continued)

Supplementary Table 2. 500 Hz tone burst (Continued).

Authors	Title	Year	No. of Participants	Latency						Amplitude				Asymmetry Ratio	Threshold	
				Mean Latency p			Mean Latency n			Mean Amplitude		Mean Amplitude				
				Left	Right	Mean	Left	Right	Mean	L	R	L + R	Mean			
Park H.J., Lee I.-S., Shin J.E., Lee Y.J., Park M.S.	Frequency-tuning characteristics of cervical and ocular vestibular evoked myogenic potentials induced by air-conducted tone bursts	2010	20	14.2		21.6								87.7	24	74
Rosengren S.M., Govender S., Colebatch J.G.	The relative effectiveness of different stimulus waveforms in evoking VEMPs: Significance of stimulus energy and frequency	2009	11	14.3		21.1										
Murofushi T., Ozeki H., Inoue A., Sakata A.	Does migraine-associated vertigo share a common pathophysiology with Meniere's disease? Study with vestibular-evoked myogenic potential	2009	8	13.7		22								1.76		
Vanspauwen R., Wuyts F.L., Van De Heyning P.H.	Vestibular evoked myogenic potentials: Test-retest reliability and normative values obtained with a feedback method for the sternocleidomastoid muscle contraction	2009	30	15.4		24.1								1.84		
Buyuklu F., Tarhan E., Ozluoglu L.	Vestibular functions in motion sickness susceptible individuals	2009	20	15.98		25.25	15.94	16.02		25.13	25.37	78.97	62.19		70.58	
Kawashima Y., Noguchi Y., Ito T., Kitamura K.	Vestibular evoked myogenic potentials in patients with the mitochondrial A1555G mutation	2009	20											132.2		
Chou C.-H., Wang S.-J., Young Y.-H.	Feasibility of the simultaneous ocular and cervical vestibular-evoked myogenic potentials in unilateral vestibular hypofunction	2009	20	14.5		22								84.6		
Fujimoto C., Karino S., Ito K., Murofushi T.	Existence of possible functional interaction between the saccule and the posterior semicircular canal in humans	2009	14	13		18.5								1.63		

(Continued)

Supplementary Table 2. 500 Hz tone burst (Continued).

Authors	Title	Year	No. of Participants	Latency						Amplitude		Asymmetry Ratio	Threshold
				Mean Latency p		Mean Latency n		Mean Latency n		Mean L	Mean R		
				Left	Right	Left	Right	Left	Right				
Maes L., Vinck B.M., De Vel E., D'haenens W., Bockstaef A., Keppler H., Philips B. Swinnen F., Dhooge I.	The vestibular evoked myogenic potential: A test-retest reliability study	2009	61	14.97	23.41					147.34	0.12	77	
Wang S.-J., Yeh T.-H., Chang C.-H., Young Y.-H.	Consistent latencies of vestibular evoked myogenic potentials	2008	14	13.9	20.9					1.9			
Erbek S., Erbek S.S., Yilmaz S., Yucel E., Ozluoglu L.N.	Vestibular evoked myogenic potentials in Behcet's disease	2008	25	15.4	22.4					46.1			
Isaradisakul S., Strong D.A., Moushey J.M., Gabbard S.A., Ackley S.R., Jenkins H.A.	Reliability of vestibular evoked myogenic potentials in healthy subjects	2008	20	14.4075	21.1975					163.2825	20.175	104.35	
Welgampola M.S., Myrie O.A., Minor L.B., Carey J.P.	Vestibular-evoked myogenic potential thresholds normalize on plugging superior canal dehiscence	2008	20							1.29			
Basta D., Todd I., Ernst A.	Characterization of age- related changes in vestibular evoked myogenic potentials	2007	44							59.4			
Driscoll C., Bekessy A., Bui V., Fox D., Harvey M., Mackenzie D.	Vestibular evoked myogenic potentials: Clinical implications of a normative investigation	2007	30	14.8	24.22							97.12	
Murofushi T., Iwasaki S., Ozeki H., Ushio M., Chihara Y.	Tone burst-galvanic ratio of vestibular evoked myogenic potential amplitudes: A new parameter of vestibular evoked myogenic potential?	2007	12	13.9	23.5					1.6	14.6		
Chang C.-H., Tsung-Lin Yang, Wang C.-T., Young Y.-H.	Measuring neck structures in relation to vestibular evoked myogenic potentials	2007	20	13.8	20.85	14.1	13.5	20.9	20.8				

(Continued)

Supplementary Table 2: 500 Hz tone burst (Continued).

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry		Threshold
				Mean		Mean		Mean		Mean		Ratio		
				Latency p	Latency n	Latency p	Latency n	Latency p	Latency n	Latency p	Latency n			
Wu H.-J., Shiao A.-S., Yang Y.-L., Lee G.-S.	Comparison of short tone burst-evoked and click-evoked vestibular myogenic potentials in healthy individuals	2007	22	14.83	22.54							198.53	13	
Ito K., Karino S., Murofushi T.	Effect of head position on vestibular evoked myogenic potentials with toneburst stimuli	2007	14	16.3	26.6							1.78		
Yang T.-L., Young Y.-H.	Vestibular-evoked myogenic potentials in patients with otosclerosis using air- and bone-conducted tone-burst stimulation	2007	10	14	22.8							87.7		
Tal D., Hershkovitz D., Kaminski G., Bar R.	Vestibular evoked myogenic potential threshold and seasickness susceptibility	2006	15	14.45	23.24							365.7	12.4	77.33
Bhagat S.P.	Properties of binaural vestibular evoked myogenic potentials elicited with air-conducted and bone-conducted tone bursts	2006	18									90.7		
Wang C.-T., Young Y.-H.	Comparison of the head elevation versus rotation methods in eliciting vestibular evoked myogenic potentials	2006	20	13.625	21.175							104.725		81.25
Karino S., Ito K., Ochiai A., Murofushi T.	Independent effects of simultaneous inputs from the saccule and lateral semicircular canal. Evaluation using VEMPs	2005	11	13.9	21.2							1.5		
Young Y.-H., Kuo S.-W.	Side-difference of vestibular evoked myogenic potentials in healthy subjects	2004	14	13.3875	20.3875	13.48	13.295	20.46	20.315					
Brantberg K., Lofqvist L., Fransson P.-A.	Large vestibular evoked myogenic potentials in response to bone-conducted sounds in patients with superior canal dehiscence syndrome	2004	5	14.35	23.8	14.5	14.2	24.1	23.5	1.9	1.77	1.835		

(Continued)

Supplementary Table 2: 500 Hz tone burst (Continued).

Authors	Title	Year	No. of Participants	Latency				Amplitude				Asymmetry Ratio	Threshold
				Mean Latency p	Mean Latency n	Mean Latency p Left	Mean Latency p Right	Mean Latency n Left	Mean Latency n Right	Mean Amplitude L	Mean Amplitude R		
Wang S.-I., Young Y.-H.	Vestibular evoked myogenic potentials using simultaneous binaural acoustic stimulation	2003	14	14.46	21.825								
Cheng P.-W., Huang T.-W., Young Y.-H.	The influence of clicks versus short tone bursts on the vestibular evoked myogenic potentials	2003	29	12.49	19.97								102.84
Takegoshi H., Murofushi T.	Effect of white noise on vestibular evoked myogenic potentials	2003	20	15.1	24.2								115
Cheng P.-W., Murofushi T.	The effects of plateau time on vestibular-evoked myogenic potentials triggered by tone bursts	2001	13	14.4	24.27								
Akin F.W., Murnane O.D.	Vestibular evoked myogenic potentials: Preliminary report	2001	2	14.3	20.3								150.2
Cheng P.-W., Murofushi T.	The effect of rise/fall time on vestibular-evoked myogenic potential triggered by short tone bursts	2001	13	13.7	23								
Sheykholeslami K., Murofushi T., Kaga K.	The effect of sternocleidomastoid electrode location on vestibular evoked myogenic potential	2001	15										227.46
Wu C.-H., Young Y.-H., Murofushi T.	Tone burst-evoked myogenic potentials in human neck flexor and extensor	1999	16	16.6	25.2								54.6