

Training with the BrainPort™ Balance Device has the Potential to Decrease the Risk of Falls in Elderly Patients with Vestibular Disorders

Purpose

To demonstrate balance improvement in elderly subjects with vestibular disorders after training with the BrainPort™ balance device.

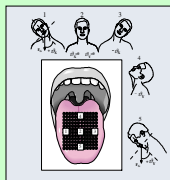
Methods

5 men & 6 women, ages 65-88, with chronic balance dysfunction due to a vestibular disorder were trained with the BrainPort™ balance device. 10 were trained for 5 days and 1 was trained for 3 months. Subjects were tested before and after training using the NeuroCom® SOT, DGI, DHI and ABC.

BrainPort™ Balance Device



Stimulus & Response



1. Patient feels electro tactile stimulation on tongue relative to head position (e.g. head left = signal on left side of array)
2. Accelerometer sends head position information to the electrode array on tongue
3. Patient maintains a centered body position by keeping the signal at center of tongue
4. Patient continues this task for 20 minutes, standing with eyes closed

Results

Gender	Age ¹	Etiology	SOT Score Pre/Post	SOT Total Falls Pre/Post	DHI Pre/Post	ABC Pre/Post	DGI Pre/Post
F	65	Ototoxicity--Gentamicin	25/38	10/8	60/22	63/85	18/23
M	65	Idiopathic	17/22	10/10	92/74	9/23	4/15
M	65	Unilateral Ménières	80/83	0/0	40/14	57/91	23/24
F	69	Ototoxicity--Gentamicin	31/47	7/6	74/0	64/85	21/24
M	69	Ototoxicity-Gentamicin with Bilateral Below Knee Amputations ²	23/47	12/6	80/64	49/62	11/22
F	69	Bilateral Vestibulitis-Idiopathic	40/28	6/7	38/36	43/41	13/11
M	73	Cerebellar Lesion	32/40	9/7	48/10	52/70	11/14
F	79	Cavernous Angiomas	42/54	6/3	74/58	25/53	11/14
M	81	Acoustic Neuroma s/p radiation	55/73	3/1	16/12	81/89	21/21
F	80	Bilateral Vestibular Hypofunction following acute neuritis	41/49	6/6	42/40	81/88	10/18
F	88	Age-related vestib. loss with bilateral BPPV	48/71	5/1	24/2	51/94	18/21

1-Average age = 73

2-Scores after 3 months training

Average Change

Test	Before	After	Average Change	P-value	
SOT¹ Score	39.5	50.2	33%	0.006	t-test
SOT Total Falls	6.7	5.0	-26%	0.021	Wilcoxon Matched Pairs Test
DHI²	54	30	-45%	0.003	Wilcoxon Matched Pairs Test
ABC³	52	71	51%	0.004	Wilcoxon Matched Pairs Test
DGI⁴	14.6	18.8	51%	0.009	Wilcoxon Matched Pairs Test

1-SOT = Sensory Organization Test

2-DHI = Dizziness Handicap Inventory--higher score indicates greater handicap

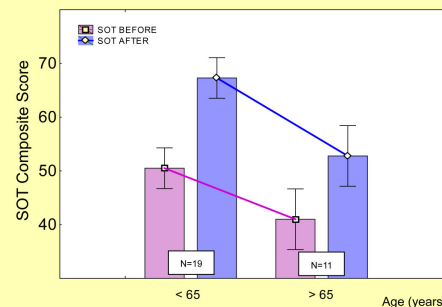
3-ABC = Activities-specific Balance Confidence scale

4-DGI = Dynamic Gait Index

Number (%) of subjects who improved by a clinically significant amount on each assessment measure

DHI > 18	6/11 (54%)
ABC > 10	8/11 (72%)
DGI > 4	4/11 (36%)

Comparison of 19 previously tested subjects ages 31-65 to 11 subjects ages 65-88



Discussion

- 10 of 11 subjects demonstrated clinically significant improvement in at least one assessment measure.
- 9 of 11 subjects improved after only 5 days of training with the BrainPort balance device.
- All subjects had a chronic balance dysfunction for at least one year.
- 10 of 11 subjects had completed vestibular rehabilitation therapy prior to participating in the study.

Conclusions

- Elderly subjects with vestibular disorders who trained with the BrainPort balance device improved their balance as demonstrated by one or more of the following tests: SOT, DHI, ABC, and DGI.
- These clinically significant improvements demonstrate the potential to improve balance and decrease falls in the elderly.
- Magnitude of improvement is similar across all ages.
- Further studies are needed.

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