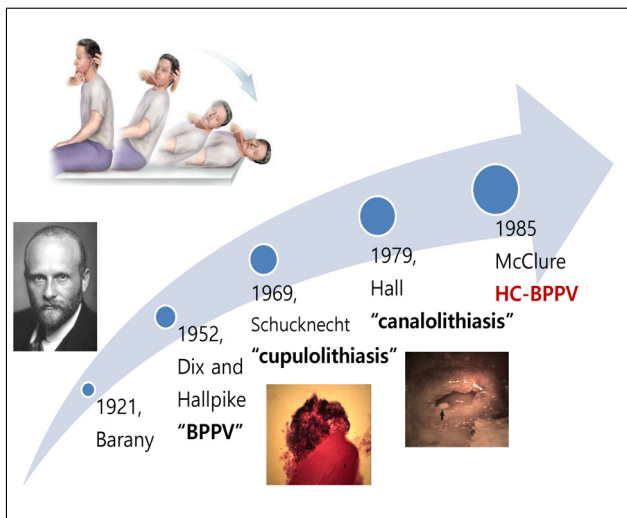


Horizontal canal BPPV



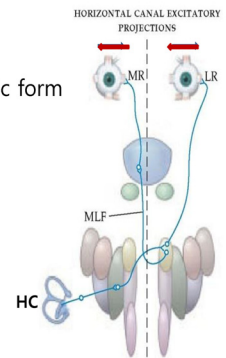
Sun-Young Oh, MD

Department of Neurology, Chonbuk National University School of Medicine

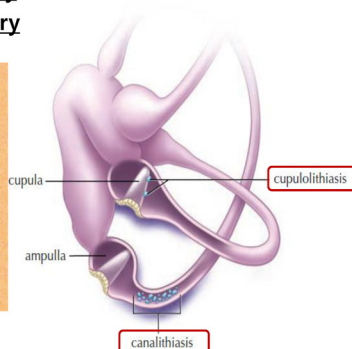
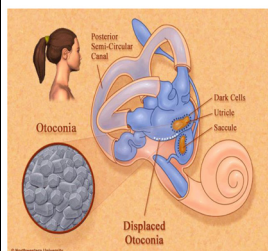


HC-BPPV

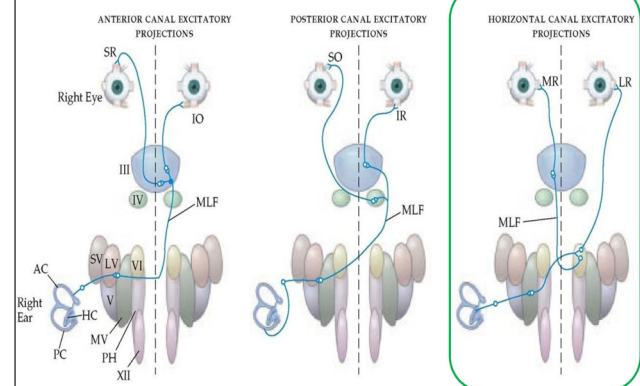
- Horizontal canal variant of BPPV ; McClure (1985)
- Pagnini et al. reported apogeotropic form in 1994.
- **10-42.7%** of BPPV.
- Evoked maneuver; supine roll test
- Two types of HC-BPPV ; **Geotropic >> Apogeotropic**

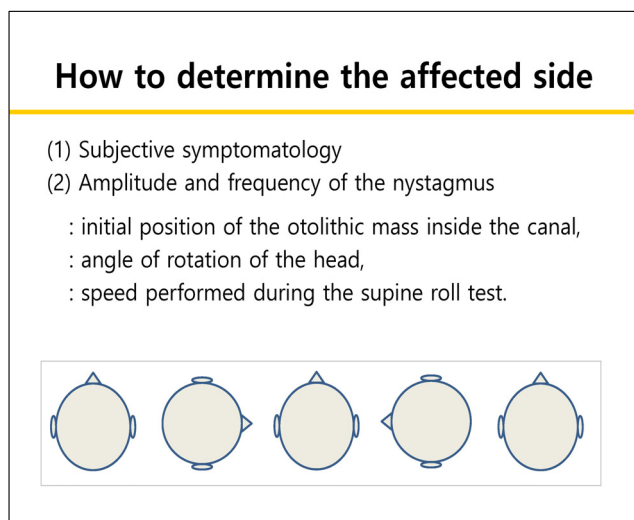
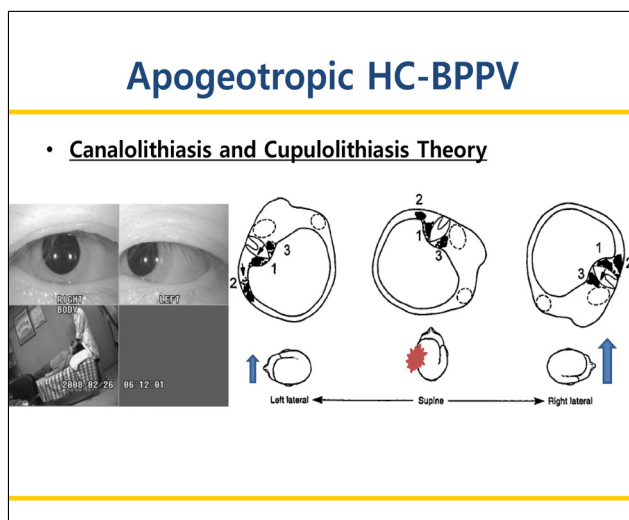
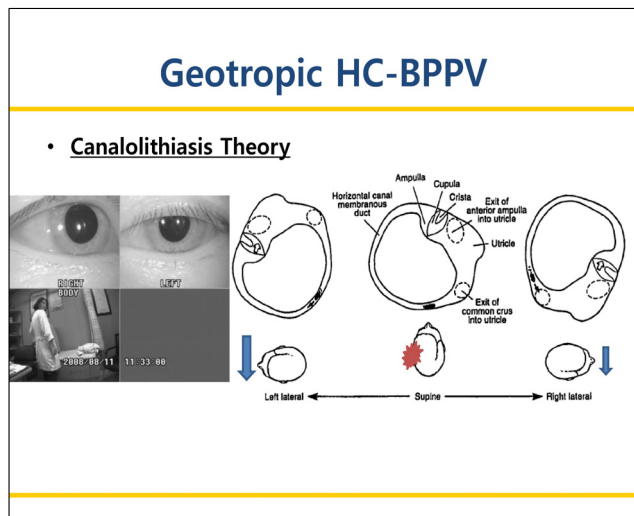
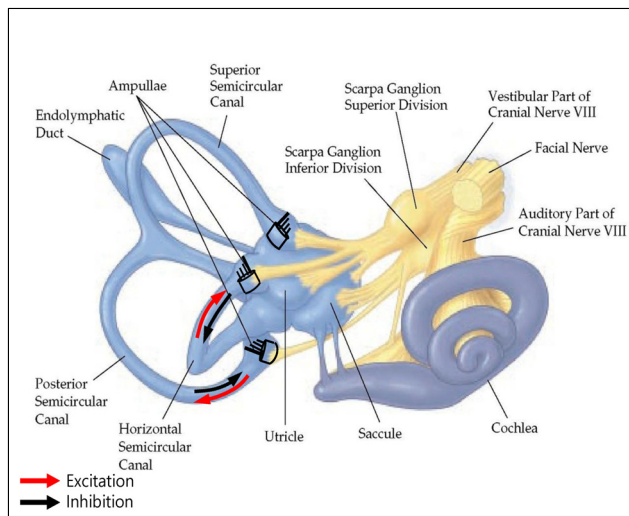
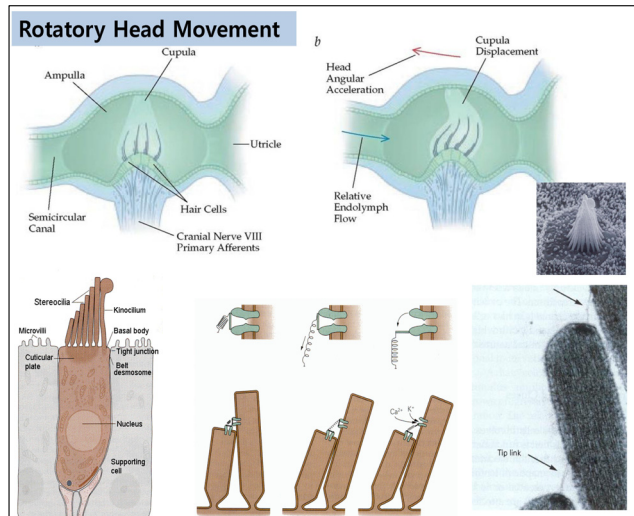
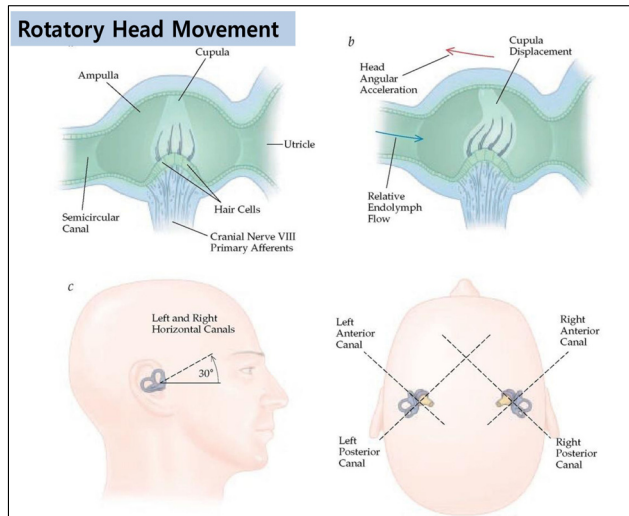


- Degenerative debris from utricle (otoconia)
- Canalolithiasis Theory
- Cupulolithiasis Theory



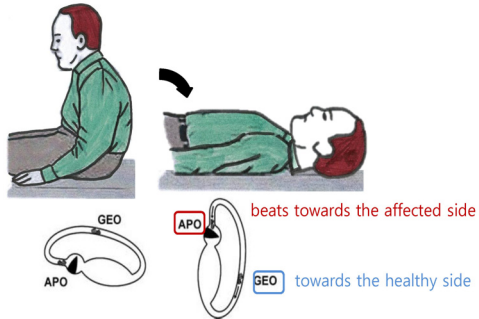
Semicircular canals & extraocular muscles





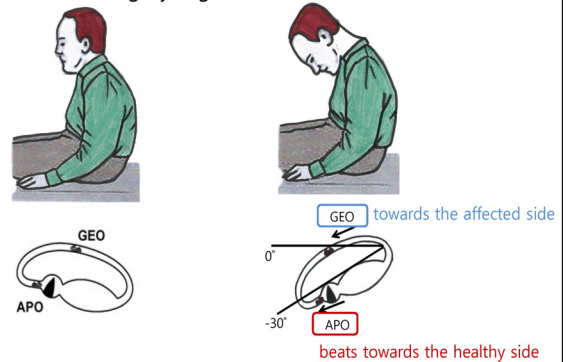
How to determine the affected side

(3) Lying down nystagmus



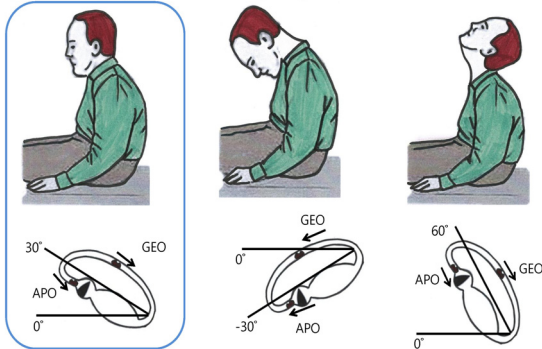
How to determine the affected side

(4) Head-bending nystagmus



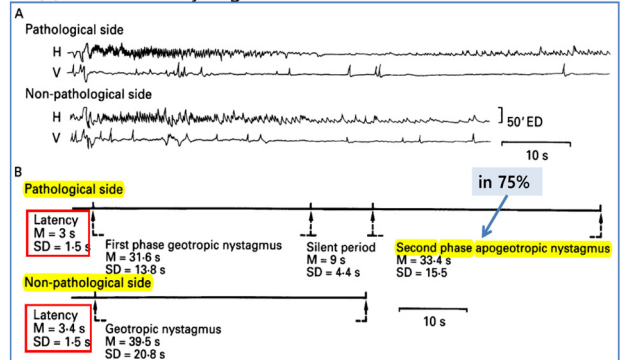
How to determine the affected side

(5) Pseudo-spontaneous nystagmus



How to determine the affected side

(6) Reversal of nystagmus



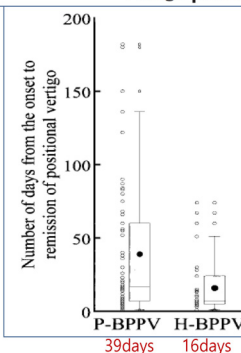
How to determine the affected side

	Lateralization	
	Geotropic	Apogeotropic
Intensity of nystagmus	Stronger side	Weaker side
Lying down nystagmus	Usually contralateral	Usually ipsilateral
Head bending nystagmus	Usually ipsilateral	Usually contralateral
Pseudo-spontaneous nystagmus	Usually contralateral	Usually ipsilateral
Null point	-	Present in lesion side
Reversal of nystagmus	Ipsilateral side	

Natural course of the remission of vertigo in patients with benign paroxysmal positional vertigo

Abstract—The authors assessed the natural course of benign paroxysmal positional vertigo (BPPV) in 108 patients who were not treated with canalith repositioning procedure. The average number of days from onset to remission of positional vertigo in patients with posterior canal BPPV (P-BPPV) (39 days) was longer than in those with horizontal canal BPPV (H-BPPV) (16 days). The ratio of patients with H-BPPV to those with BPPV was 33%.

NEUROLOGY 2005;64:920-921



HC-BPPV resolves significantly faster than PC-BPPV.

In 30% of patients with P-BPPV and 53% with H-BPPV, the vertigo disappeared within 7 days.

In 36% of patients with P-BPPV and 11% with H-BPPV, the vertigo lasted more than 1 month.

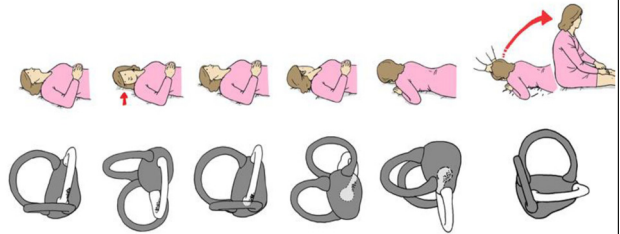
Treatment maneuvers in HC-BPPV

- 1993, 180° rotation toward the unaffected ear
Baloh RW, Jacobson K, Honrubia V.
- 1994, Barbecue rotation (Lempert maneuver)
Lempert T.
- 1997, Forced prolonged position
Vannucchi P, Giannoni B, Pagnini P.
- 1998, Gufoni maneuver
Gufoni M, Mastrosimone I.
- 2002, Modified Semont maneuver.
AP Casani, G Vannucci, B Fattori.
- 2005, Vanucchi-Asprella liberatory maneuver
Vannucchi P, Asprella G, Gufoni M.

Geotropic

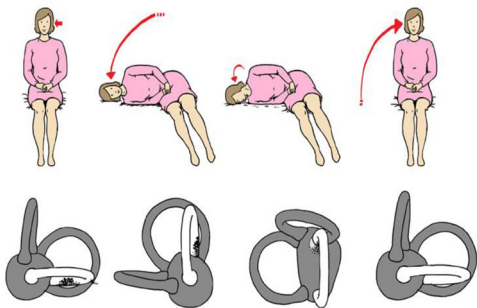
Lempert roll (Barbecue) maneuver

- The most widely published treatments
- Success in treatment, based on all Class IV studies (<75%, 50% to nearly 100%).



Geotropic

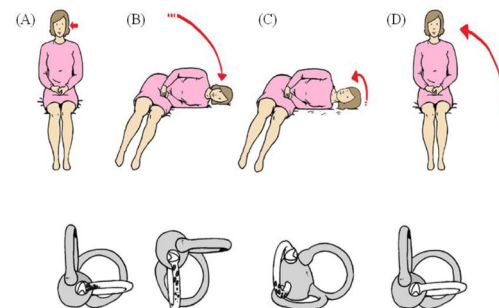
Gufoni maneuver for Geotropic HC-BPPV



20

Apogeotropic

Gufoni maneuver for Apogeotropic HC-BPPV



21

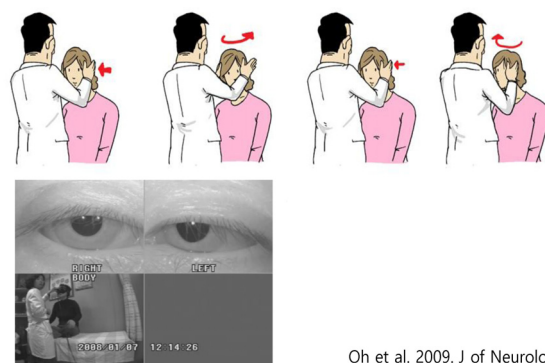
Geotropic and Apogeotropic

Forced prolonged positioning

- In 1994, Vannucchi et al.
- Slow gravitational sedimentation of otoliths outside non-ampullary HC segment.
- Remain immobile on healthy side for at least 12 hrs.
- One Class IV data, 75%~90%
- Geotropic type : to the contralesional side
- Apogeotropic type : to the ipsilesional side

Apogeotropic

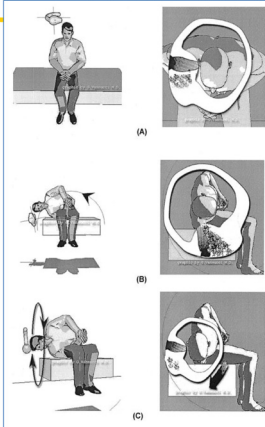
Head-shaking maneuver



Oh et al. 2009. J of Neurology

Apogeotropic

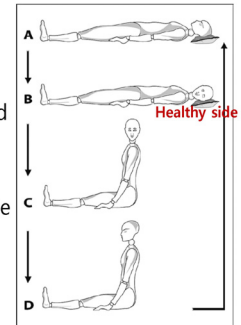
Modified Semont maneuver



Geotropic

Vannucchi-Asprella liberatory maneuver

- Repeated until no horizontal Ny.
- Minimum of 5 maneuvers
- Disappearance of the Ny beating to the healthy side was interpreted as resolution
- 85% resolved at first treatment
- 50%, 3-4 maneuvers were adequate
- 25%, 5-6 maneuvers
- 25%, 8-10 maneuvers.



Laryngoscope 112: January 2002

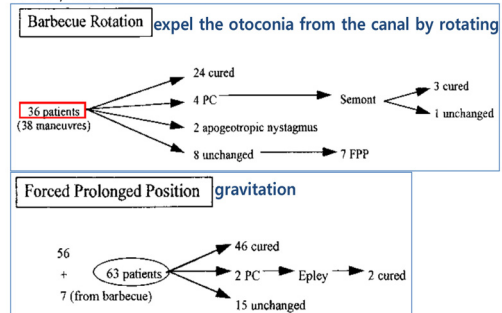
Clinical trials



Geotropic, 1998 Acta Otolaryngol

BBQ maneuver vs. FPP

- N=92, HC-BPPV



FPP was successful in more than 70% of patients;
Barbecue rotation had slightly less successful but more immediate results.

Geotropic, 2001 Otol & Neurotol

Gufoni maneuver

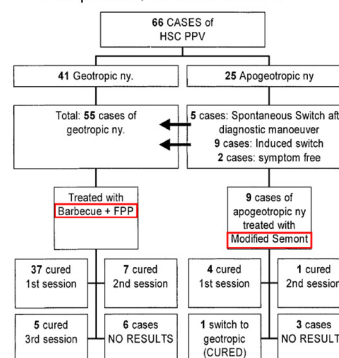
Patient	Age/Sex	Duration of symptoms (days)*	Presumed cause
1	51/M	5	Idiopathic
2	50/M	1	Idiopathic
3	30/F	20	Ear disease
4	75/F	10	Ear disease
5	40/F	2	Idiopathic
6	35/F	1	Idiopathic
7	68/F	6	Cardiovascular disease
8	81/F	1	Cardiovascular disease
9	64/F	7	Cardiovascular disease
10	50/M	8	Idiopathic
11	51/F	4	Idiopathic
12	33/F	1	Idiopathic
13	30/F	10	Idiopathic
14	50/F	1	Idiopathic
15	62/F	2	Cardiovascular disease
16	66/F	5	Cardiovascular disease
17	58/M	1	Idiopathic
18	50/F	1	Idiopathic
19	54/M	3	Idiopathic
20	78/M	3	Idiopathic
21	32/M	2	Ear disease
22	66/F	51	Cardiovascular disease
23	33/F	20	Head trauma
24	84/M	6	Cardiovascular disease
25	39/M	1	Idiopathic
26	65/M	1	Ear disease
27	68/M	1	Head trauma
28	85/F	5	Cardiovascular disease
29	46/F	3	Idiopathic
30	74/F	1	Head trauma
31	45/F	3	Cardiovascular disease
32	61/F	55	Idiopathic

- N=32, geotropic HC BPPV
- 25 (78.12%) resolved after 1st session
- 7 (21.87%) healed after a 2nd maneuver
- At follow-up 2 days after the treatment, all patients had been cured.

Geotropic and apogeotropic, 2002 Laryngoscope

Barbecue + FPP & mSemont maneuver

- Prospective, n=66 HC-BPPV



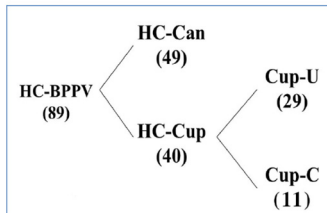
geotropic nystagmus
Barbecue + FPP
80% within the second session,
90% resolved by the third session.
apogeotropic cases,
modified Semont maneuver
75% of the patients being symptom free.

Geotropic and apogeotropic, 2005 Laryngoscope

A Single Therapy for All Subtypes of Horizontal Canal Positional Vertigo

FPP with lying on the side of the weaker nystagmus

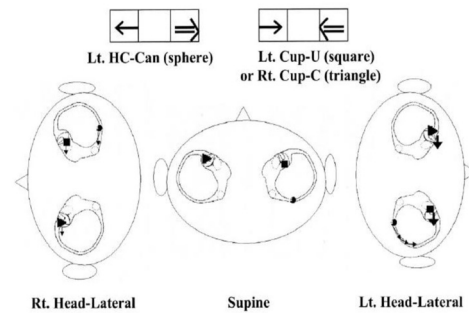
- Prospective, n=89 HC-BPPV



Geotropic and apogeotropic, 2005 Laryngoscope

A Single Therapy for All Subtypes of Horizontal Canal Positional Vertigo

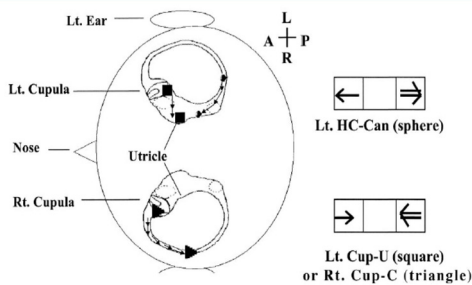
FPP with lying on the side of the weaker nystagmus



Geotropic and apogeotropic, 2005 Laryngoscope

A Single Therapy for All Subtypes of Horizontal Canal Positional Vertigo

FPP with lying on the side of the weaker nystagmus, combined with careful observation of nystagmus evolution, was found to be effective treatment for all subtypes of HC-BPPV in this series.



Geotropic, 2009 Am J of Otolaryngology

Gufoni maneuver

- Prospective study of 58 patients affected by HC BPPV

Table 1

Outcome of treatment of BPPV of LSC by Gufoni's manoeuvre

Patients	Outcome
46 (79.3%)	Complete resolution
8 (13.8%)	BPPV of PSC conversion
4 (6.9%)	No benefits
58	

Geotropic, 2010 Audiol & Neurotol

BBQ + FPP vs. Gufoni maneuver

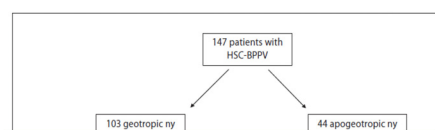


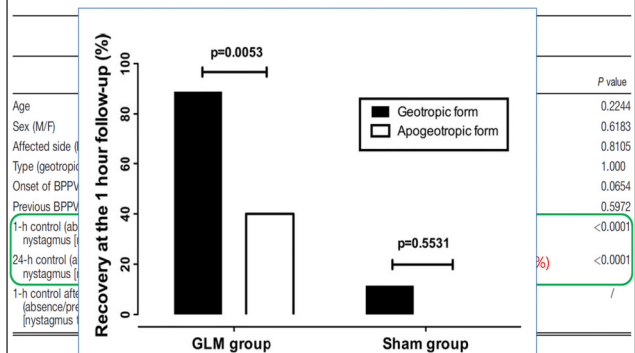
Table 2. Results of the treatment (mean outcome indicator: no nystagmus in the Pagnini-McClure positioning maneuver)

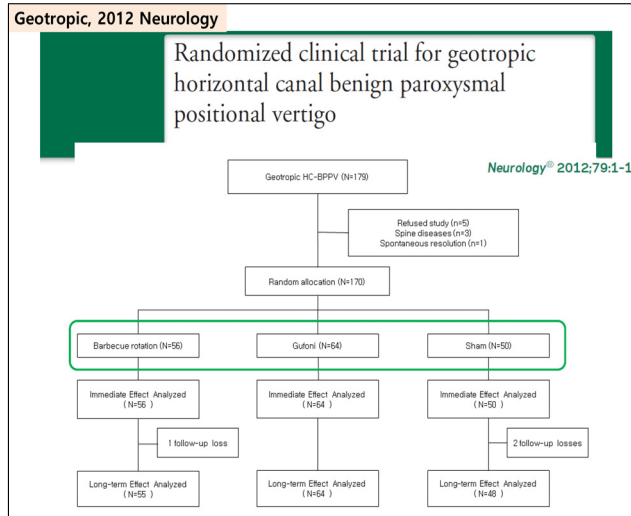
	Symptom-free patients		p value (comparison between the 2 groups)
	barbecue + FPP method	Gufoni maneuver	
once a day			
1st session	33 (61%)	50 (86.2%)	0.0024
2nd session	38 (70.3%)	52 (89.6%)	0.0103
3rd session	43 (79.6%)	54 (93.1%)	0.036
30 days of follow-up	44/54 (81.4%)	54/58 (93.1%)	0.0631
PSC switch during treatment	1 (1.8%)	4 (6.9%)	

Geotropic and apogeotropic, 2013 Laryngoscope

Gufoni maneuver

- Double-blind randomized controlled trial, n=72





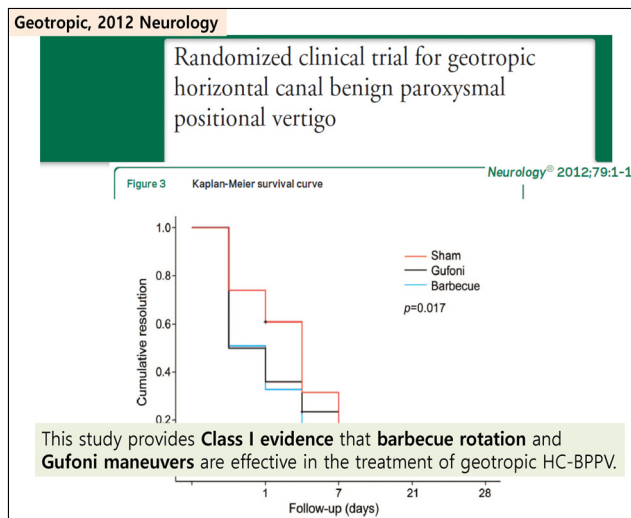
Geotropic, 2012 Neurology

Randomized clinical trial for geotropic horizontal canal benign paroxysmal positional vertigo

Neurology® 2012;79:1-1

Table 2 Immediate therapeutic efficacies of each treatment maneuver and treatment outcome of patients with transition and recurrence after each maneuver during follow-up for 1 month

Treatment	Barbecue rotation (n = 55)	Gufoni (n = 54)	Sham (n = 48)	Total (n = 157)	p Value ^a
First application, n (%)	28 (50.9)	31 (48.4)	12 (25.0)	71 (42.5)	0.014
Second application, n (%)	38 (69.1)	39 (60.9)	17 (35.4)	94 (56.3)	0.002
Transitions to PC-BPPV, n (%) ^b	1 (1.8), resolved	2 (3.1), resolved	0	3 (1.8), resolved	
Recurred with HC-BPPV geo, n (%) ^c	2 (3.6), resolved	2 (3.1), resolved	1 (2.0), resolved	5 (4.1), resolved	
HC-BPPV apo, n (%) ^d			1 (2.0), resolved	1 (0.5), resolved	
PC-BPPV, n (%) ^e	1 (1.8), resolved			1 (0.5), resolved	



Apogeotropic, 2005 Otol & Neurotol

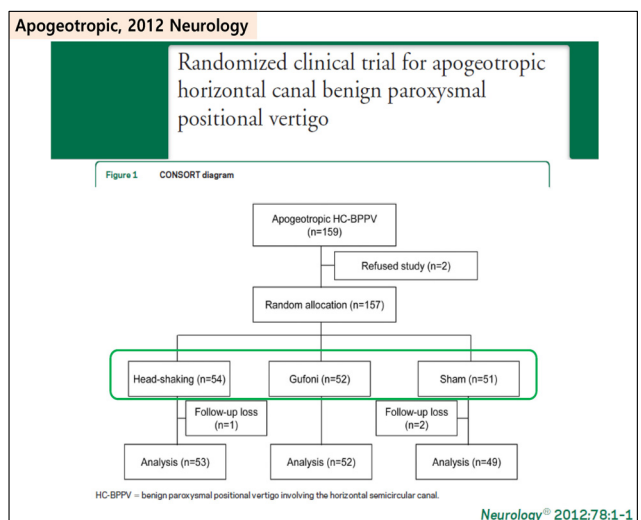
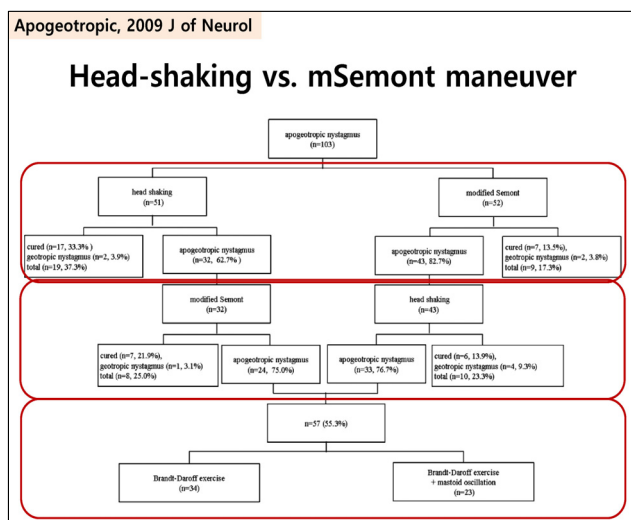
Gufoni maneuver

- Apogeotropic HC BPPV

Paroxysmal	Non paroxysmal
free floating within the endolymph of the anterior arm of the HC (canalithiasis)	heavy debris attached to the cupula of HC (cupulolithiasis)

(n=5, canalolithiasis)

Results: The repositioning maneuver resulted in a transformation from the apogeotropic variant into a geotropic variant of horizontal canal benign paroxysmal positional vertigo in all patients.



Apogeotropic, 2012 Neurology

Randomized clinical trial for apogeotropic horizontal canal benign paroxysmal positional vertigo

Table 1 Comparison of clinical findings between the groups

	Head-shaking (n = 53)	Gufoni maneuver (n = 52)	Sham (n = 49)	p Value	Total (n = 154)
Mean age ± SD, y (range)	60.5 ± 12.4 (22-86)	57.8 ± 13.5 (18-84)	61.5 ± 14.9 (20-89)	0.38 ^a	59.9 ± 13.6 (18-89)
Sex ratio (men: women)	23:30	13:39	23:26	0.05 ^b	59:95
Affected side (right: left)	29:24	28:24	24:25	0.83 ^b	81:73
Idiopathic BPPV, n (%)	46 (86.8)	51 (98.1)	47 (95.9)	0.15 ^a	144 (93.5)
Duration of vertigo, d, n (%)					
<7	43 (81.1)	43 (82.7)	42 (85.7)	0.82 ^a	128 (83.1)
>7	10 (18.9)	9 (17.3)	7 (14.3)		26 (16.9)

Abbreviation: BPPV = benign paroxysmal positional vertigo.

^aAnalysis of variance.

^b χ^2 .

Neurology® 2012;78:1-1

Apogeotropic, 2012 Neurology

Randomized clinical trial for apogeotropic horizontal canal benign paroxysmal positional vertigo

Table 2 Resolution of vertigo and nystagmus after each maneuver

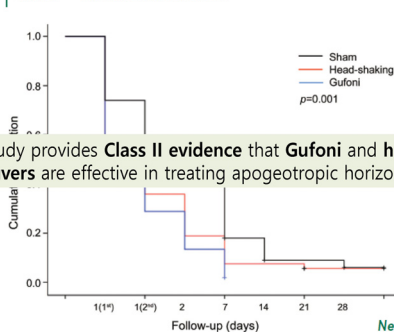
Follow-up	Gufoni maneuver (n = 52)	Head-shaking (n = 53)	Sham (n = 49)	p Value ^a
1 st day, n (%)				
1 st application ^b	31 (59.6)	25 (47.2)	11 (22.4)	0.001
2 nd application ^{b,c}	38 (73.1)	33 (62.3)	17 (34.7)	<0.001
2 nd day, n (%)				
1 st week, n (%)	45 (86.5)	41 (77.4)	22 (44.9)	<0.001
4 th week, n (%)	51 (98.1)	51 (96.2)	48 (98.0)	0.801
Transitions, n (%) ^d				
Geotropic	40 (76.9)	28 (52.8)	10 (20.4)	
Geotropic	39 (75.0)	26 (49.1)	9 (18.5)	<0.001
PC-BPPV	1	2	1	
Recurrences, n (%) ^d				
Geotropic HC-BPPV	2 (3.8)	0 (0)	1 (2.0)	0.36
PC-BPPV	1			

Neurology® 2012;78:1-1

Apogeotropic, 2012 Neurology

Randomized clinical trial for apogeotropic horizontal canal benign paroxysmal positional vertigo

Figure 3 Cumulative therapeutic effects



This study provides **Class II evidence** that **Gufoni and head-shaking maneuvers** are effective in treating apogeotropic horizontal BPPV.

Neurology® 2012;78:1-1

Apogeotropic, 2008 JNNP



Positional nystagmus in patients with chronic dizziness

Ken Johkura, Takayuki Momoo and Yoshiyuki Kuroiwa

J. Neurol. Neurosurg. Psychiatry published online 11 Jun 2008;

Objective: To investigate whether mild, unrecognized benign paroxysmal positional vertigo (BPPV) is a cause of isolated chronic dizziness in the elderly.

Patients and Methods: We evaluated the prevalence of extremely weak, horizontal, direction-changing apogeotropic positional nystagmus (HAPN) that had not been detected by conventional examination in 200 patients with isolated chronic dizziness and 155 age-matched control subjects without dizziness.

Characteristics	Patients with isolated chronic dizziness (n = 200)	Control subjects without dizziness (n = 155)	p
No. (%) of participants with very weak HAPN	98 (49.0)	25 (16.1)	< 0.0001
No. (%) of participants with another type of very weak nystagmus	24 (12.0)	5 (3.2)	
No. (%) of participants without nystagmus	78 (39.0)	125 (80.7)	
No. (%) of participants with a history of BPPV	69 (34.5)	18 (11.6)	< 0.0001

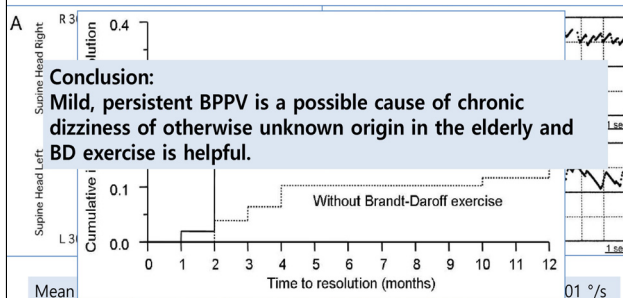
Apogeotropic, 2008 JNNP



Positional nystagmus in patients with chronic dizziness

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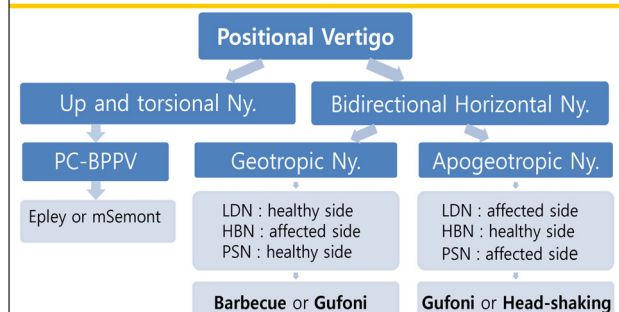
J. Neurol. Neurosurg. Psychiatry published online 11 Jun 2008;



Conclusion:
Mild, persistent BPPV is a possible cause of chronic dizziness of otherwise unknown origin in the elderly and BD exercise is helpful.

Summary

Treatment for BPPV



Verifying ampullofugal direction of the otolithic mass !