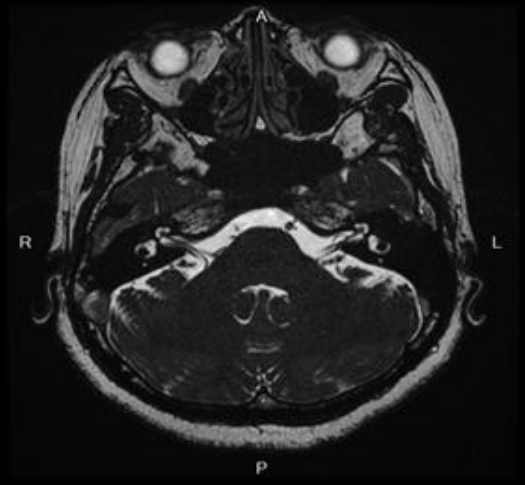
Diagnosis and Treatment of All Subtypes of BPPV



台大醫院新竹分院耳鼻喉部　葉大偉 醫師(yehdawei@gmail.com)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TUESDAY, NOVEMBER 03, 2015
20151107全國醫學會_突發性聽障併持續性向地性方向變化位置性眼振-病例報告
Sudden Deafness with Persistent Geotrophic DCPN(Direction-changing Positional Nystagmus)- Case Report
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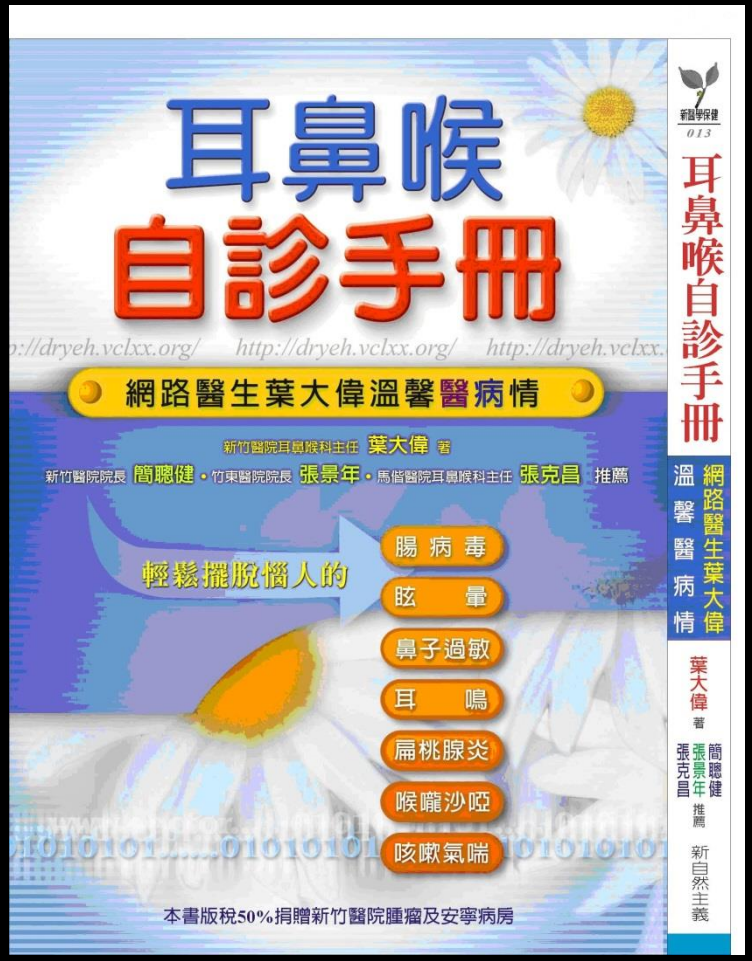
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輕鬆擺脫惱人的
腸病毒
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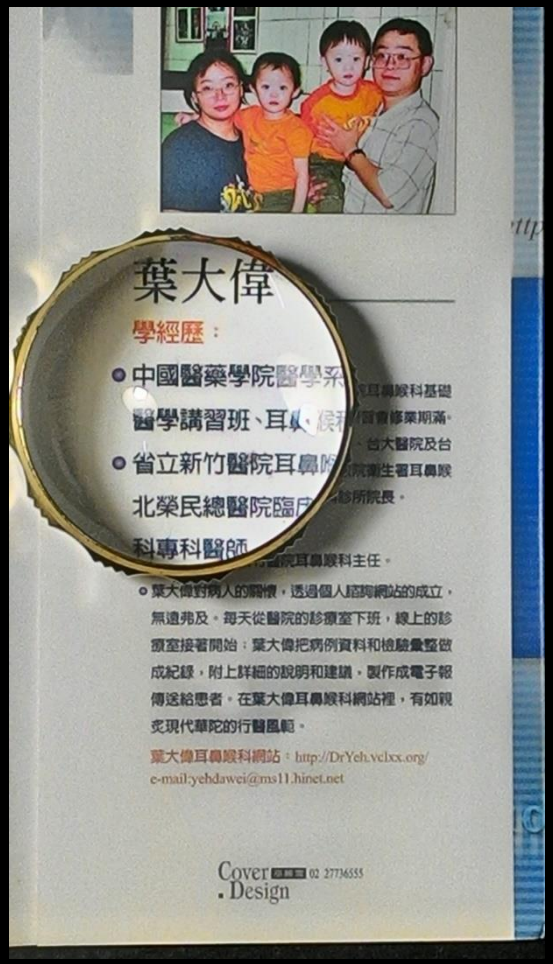
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北榮民總醫院臨
科專科醫師
院耳鼻喉科主任。
葉大偉對病人的關懷，透過個人諮詢網站的成立，無遠弗及。每天從醫院的診療室下班，線上的診療室接著開始；葉大偉把病例資料和檢驗彙整做成記錄，附上詳細的說明和建議，製作成電子報傳送給患者。在葉大偉耳鼻喉科網站裡，有如親炙現代華陀的行醫風範。
葉大偉耳鼻喉科網站：http://DrYeh.vclxx.org/
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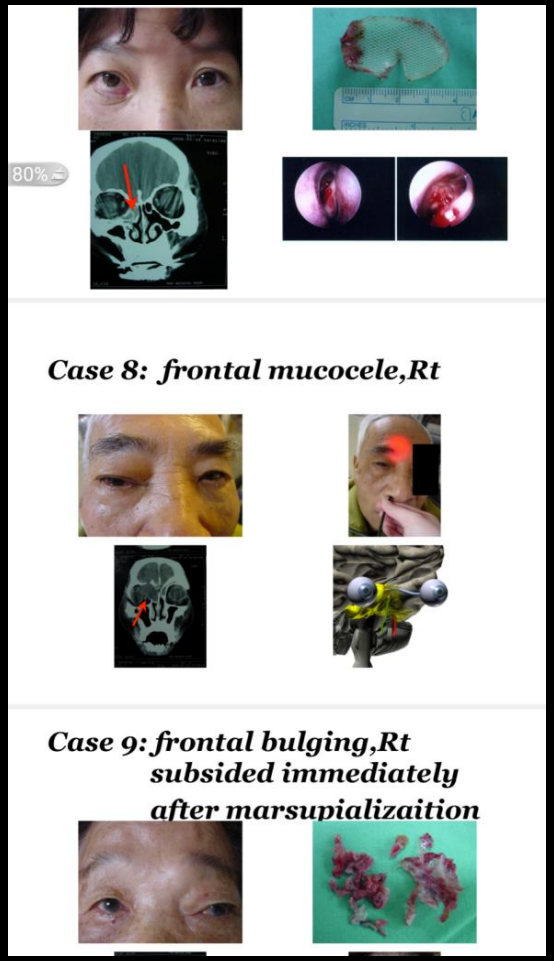
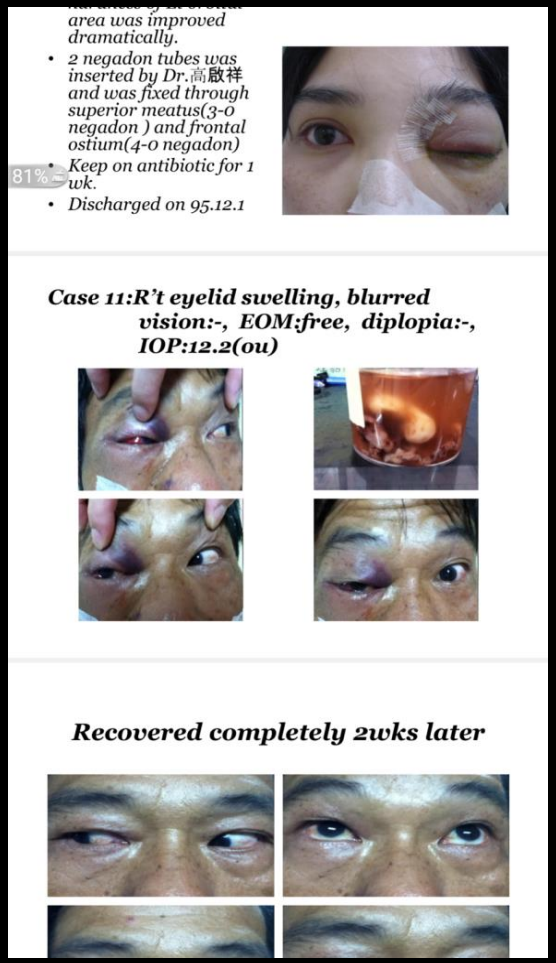
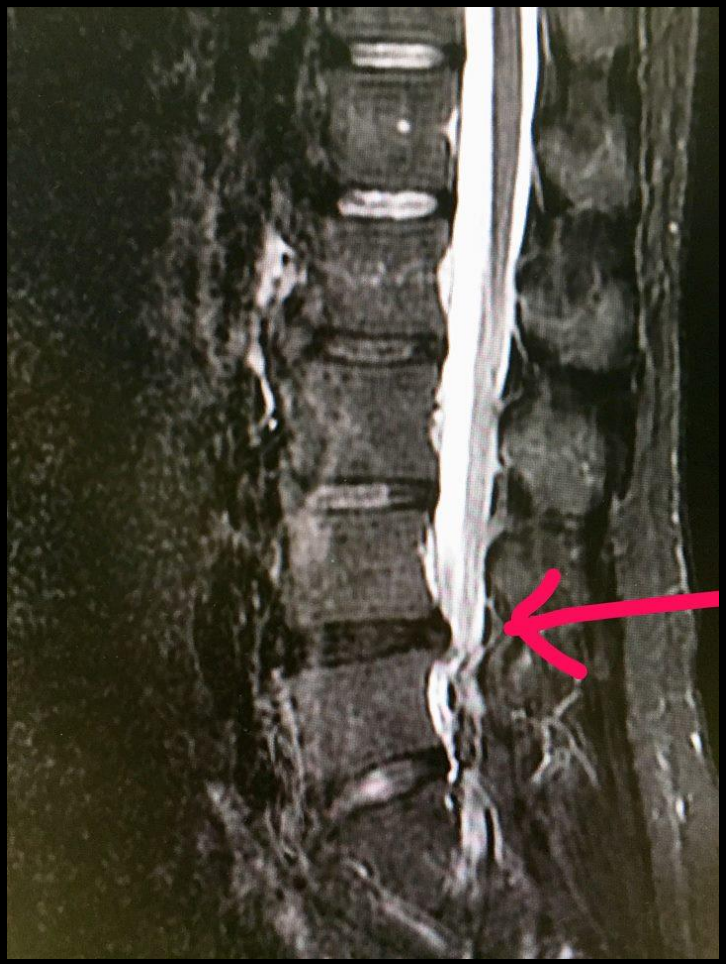
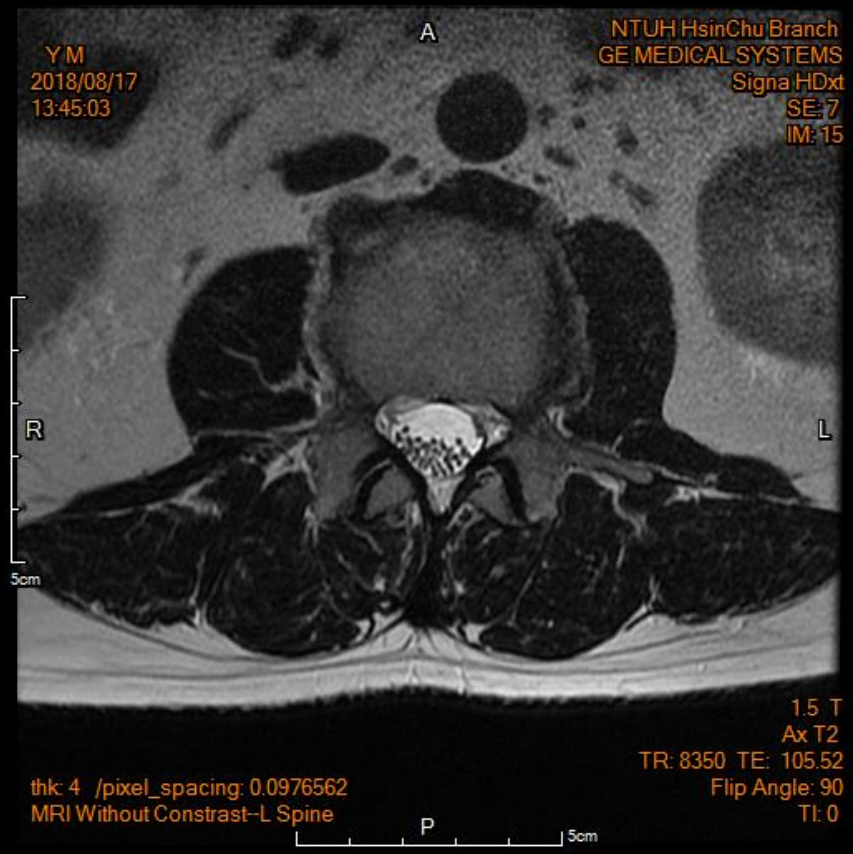
顧肚皮


R


Case 8: frontal mucocele,Rt
Case 9: frontal bulging,Rt
subsided immediately
after marsupializaition


area was improved dramatically.
2 negadon tubes was inserted by Dr.高啟祥 and was fixed through superior meatus(3-0 negadon) and frontal ostium(4-0 negadon)
Keep on antibiotic for 1 wk.
Discharged on 95.12.1
Case 11:R't eyelid swelling, blurred vision:-, EOM:free, diplopia:-, IOP:12.2(ou)
Recovered completely 2wks later

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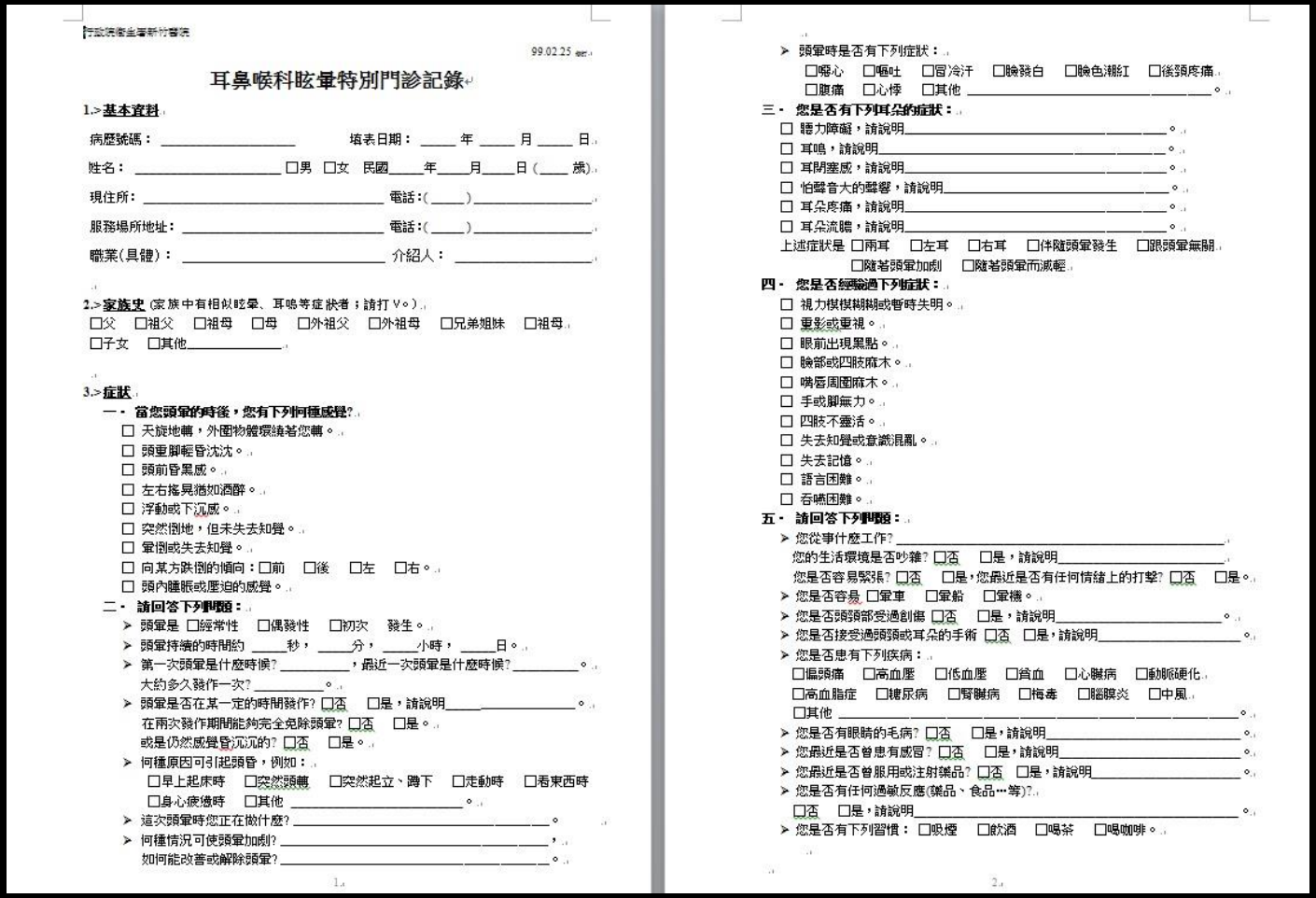


耳鼻喉科眩暈特別門診記錄

99.02.25

1.>基本資料

病歷號碼：_____　　填表日期：_____年_____月_____日

姓名：_____ □男 □女 民國_____年_____月_____日（_____歲）

現住所：_____ 電話：(_____)_____

服務場所地址：_____ 電話：(_____)_____

職業(具體)：_____ 介紹人：_____

2.>家族史 (家族中有相似眩暈、耳鳴等症狀者；請打V。)

□父 □祖父 □祖母 □母 □外祖父 □外祖母 □兄弟姐妹 □祖母
□子女 □其他_____

3.>症狀

一、當您頭暈的時後，您有下列何種感覺?

□ 天旋地轉，外圍物體環繞著您轉。
□ 頭重腳輕昏沈沈。
□ 頭前昏黑感。
□ 左右搖晃猶如酒醉。
□ 浮動或下沉感。
□ 突然倒地，但未失去知覺。
□ 暈倒或失去知覺。
□ 向某方跌倒的傾向：□前 □後 □左 □右。
□ 頭內睡眠或壓迫的感覺。

二、請回答下列問題：

➢ 頭暈是 □經常性 □偶發性 □初次 發生。
➢ 頭暈持續的時間約 _____秒，_____分，_____小時，_____日。
➢ 第一次頭暈是什麼時候?_____，最近一次頭暈是什麼時候?_____。
大約多久發作一次?_____。
➢ 頭暈是否在某一定的時間發作? □否 □是，請說明_____。
在兩次發作期間能夠完全免除頭暈? □否 □是。
或是仍然感覺昏沉沉的? □否 □是。
➢ 何種原因可引起頭昏，例如：
□早上起床時 □突然頭轉 □突然起立、蹲下 □走動時 □看東西時
□身心疲憊時 □其他 _____。
➢ 這次頭暈時您正在做什麼?_____。
➢ 何種情況可使頭暈加劇?_____，
如何能改善或解除頭暈?_____。

1

➢ 頭暈時是否有下列症狀：
□噁心 □嘔吐 □冒冷汗 □臉發白 □臉色潮紅 □後頸疼痛
□腹痛 □心悸 □其他 _____。

三、您是否有下列耳朵的症狀：

□ 聽力障礙，請說明_____。
□ 耳鳴，請說明_____。
□ 耳朵阻塞感，請說明_____。
□ 怕聲音大的聲響，請說明_____。
□ 耳朵疼痛，請說明_____。
□ 耳朵流膿，請說明_____。
上述症狀是 □兩耳 □左耳 □右耳 □伴隨頭暈發生 □跟頭暈無關
□隨著頭暈加劇 □隨著頭暈而減輕

四、您是否經驗過下列症狀：

□ 視力模模糊糊或暫時失明。
□ 重影或重視。
□ 眼前出現黑點。
□ 臉部或四肢麻木。
□ 嘴唇周圍麻木。
□ 手或腳無力。
□ 四肢不靈活。
□ 失去知覺或意識混亂。
□ 失去記憶。
□ 語言困難。
□ 吞嚥困難。

五、請回答下列問題：

➢ 您從事什麼工作?_____
您的生活環境是否吵雜? □否 □是，請說明_____
您是否容易緊張? □否 □是，您最近是否有任何情緒上的打擊? □否 □是。
➢ 您是否容易 □暈車 □暈船 □暈機。
➢ 您是否頭頸部受過創傷 □否 □是，請說明_____。
➢ 您是否接受過頭頸或耳朵的手術 □否 □是，請說明_____。
➢ 您是否患有下列疾病：
□偏頭痛 □高血壓 □低血壓 □貧血 □心臟病 □動脈硬化
□高血脂症 □糖尿病 □腎臟病 □梅毒 □腦膜炎 □中風
□其他 _____。
➢ 您是否有眼睛的毛病? □否 □是，請說明_____。
➢ 您最近是否曾患有感冒? □否 □是，請說明_____。
➢ 您最近是否曾服用或注射藥品? □否 □是，請說明_____。
➢ 您是否有任何過敏反應(藥品、食品…等)?
□否 □是，請說明_____。
➢ 您是否有下列習慣： □吸煙 □飲酒 □喝茶 □喝咖啡。

2

眩暈大哉問

BPPV

(Benign Paxysmal Position Vertigo)

Vestibular nerve and labyrinthine Disorders

Vestibular neuritis

Meniere' Dx

Perilymph fistulas

Peripheral vestibular paroxysmia

Bilateral vestibulopathy

Infectious vertigo

Autoimmune inner ear disorders

Tumors

Central vestibular disorders

Central positional vertigo

Vascular vertigo

Traumatic vertigo

Hereditary vestibular disorders

Drugs and vertigo

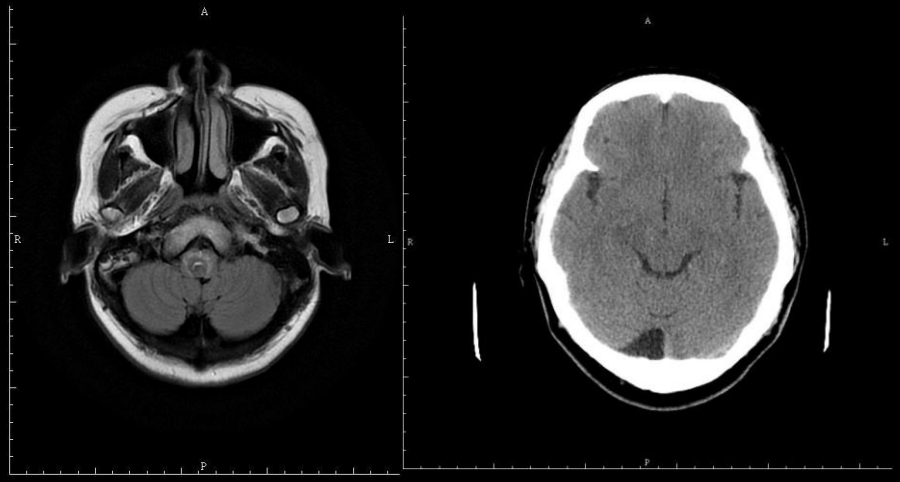
Visual vertigo

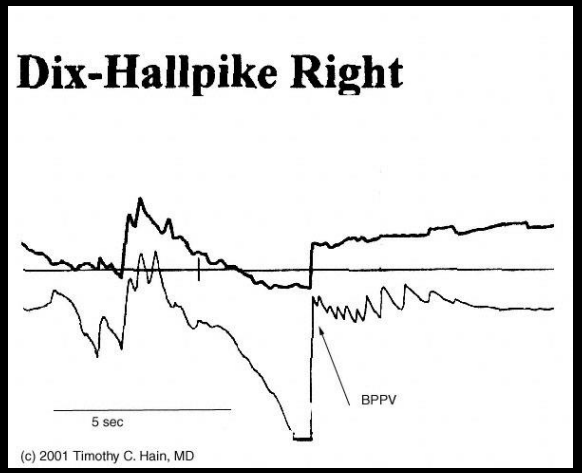
Somatosensory vertigo

Psychogenic vertigo

Physiological vertigo

History! History! History!

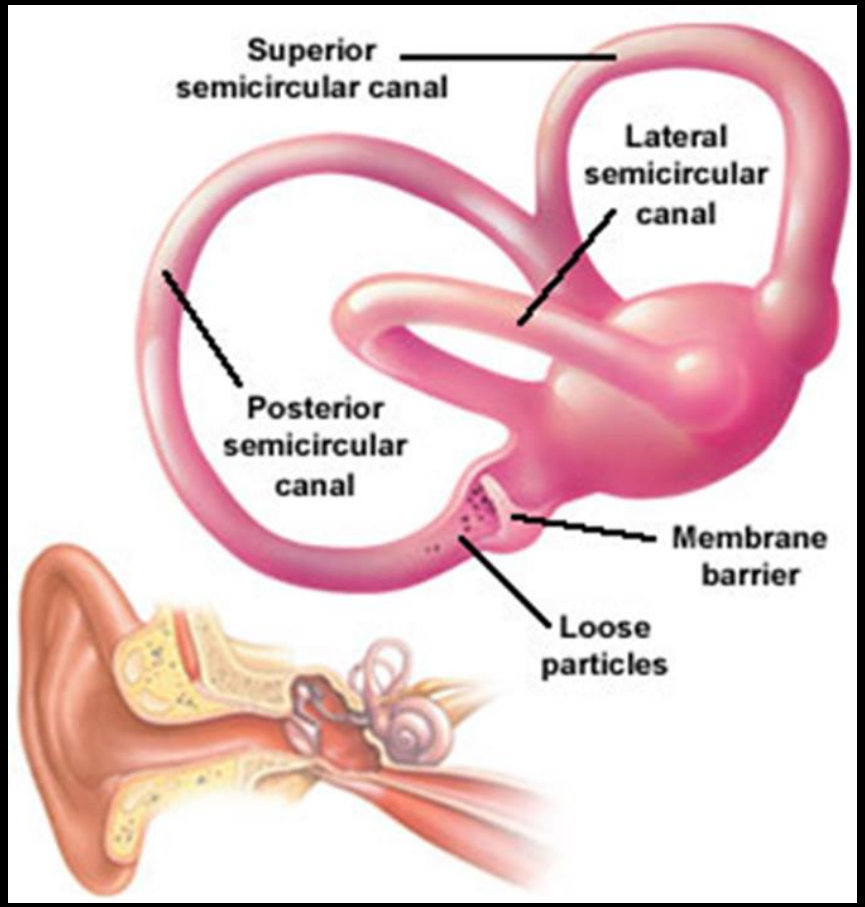


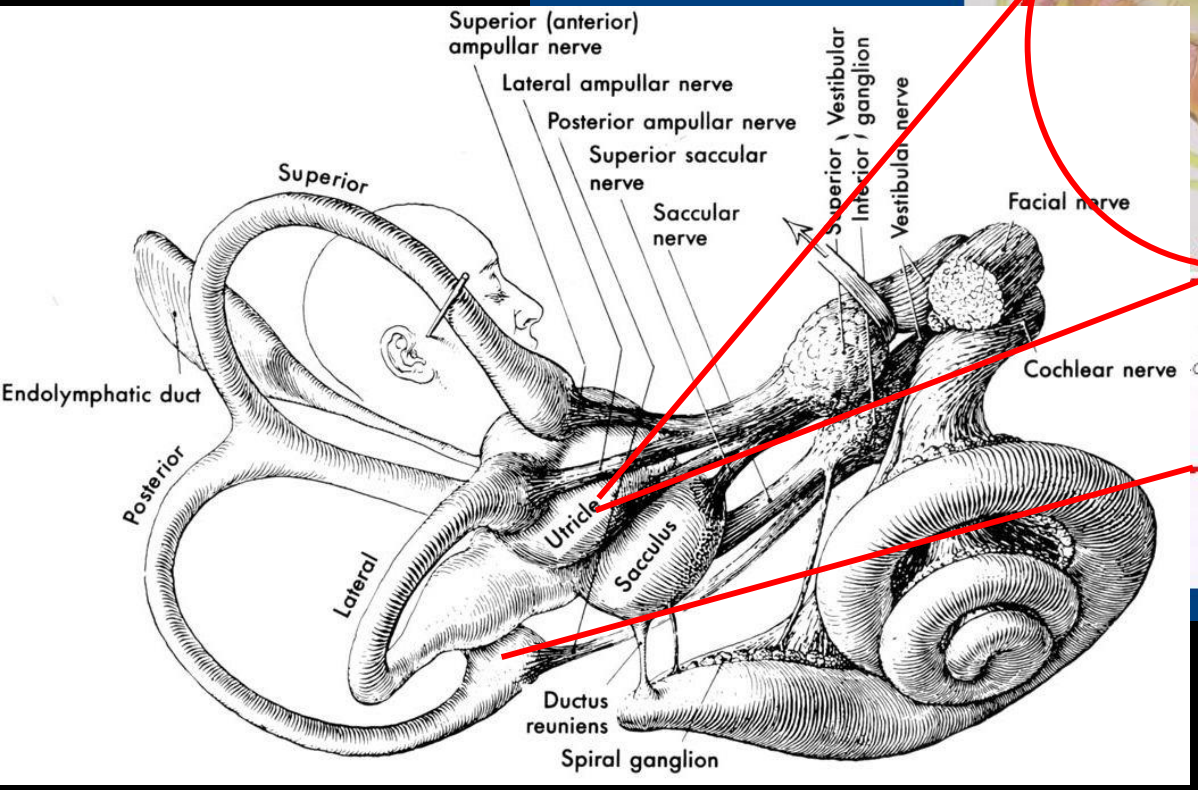


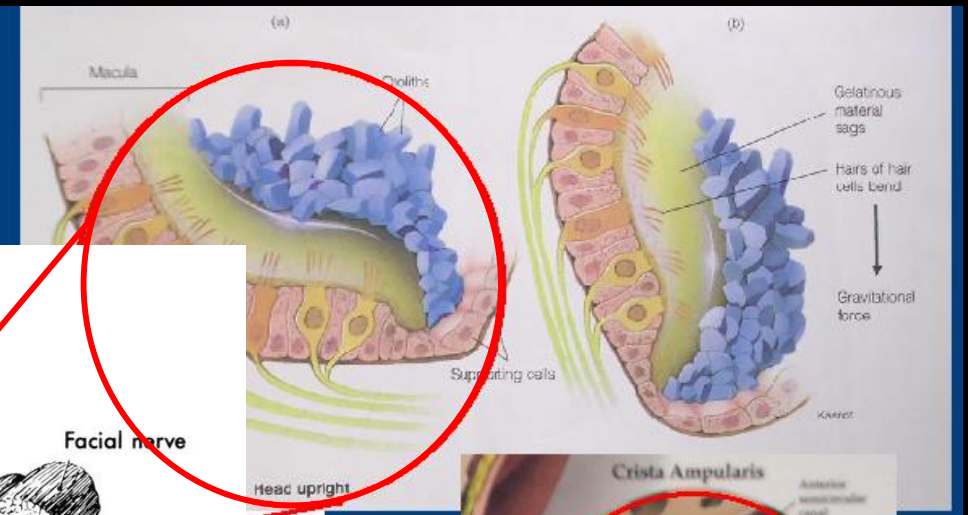
*V*estibular
*E*voked
*M*yogenic
*P*otential

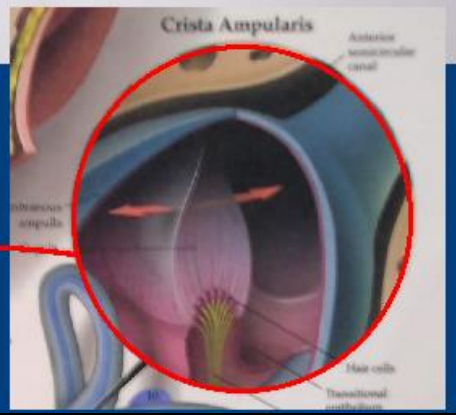
What cause BPPV?

- *Age*
- *Vestibular neuritis*
- *Trauma*
- *Migraine*
- *Meniere's Dx*



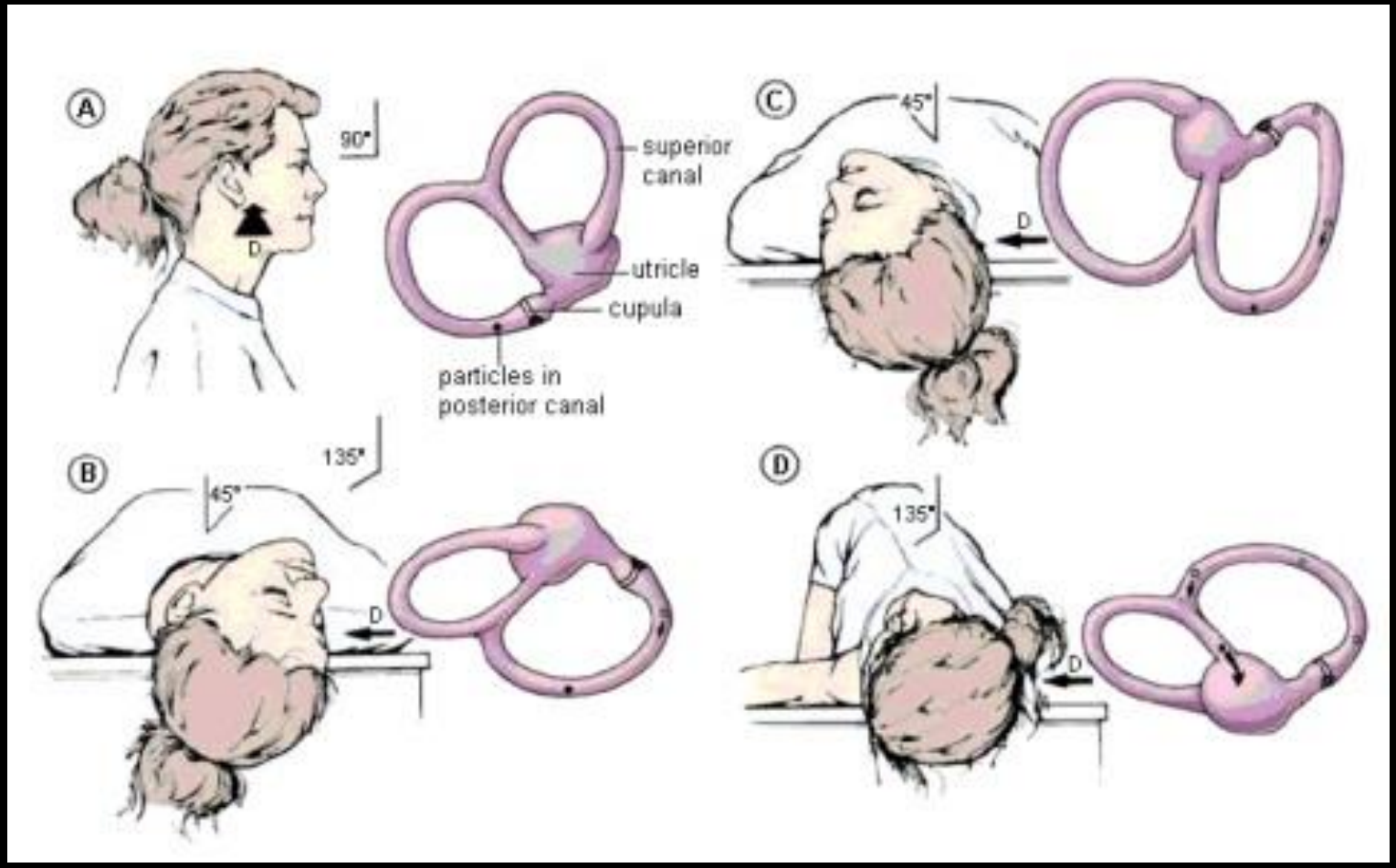

Superior (anterior) ampullar nerve
Lateral ampullar nerve
Posterior ampullar nerve
Superior saccular nerve
Saccular nerve
Superior vestibular ganglion
Inferior vestibular ganglion
Vestibular nerve
Facial nerve
Cochlear nerve
Cochlea
Superior
Endolymphatic duct
Posterior
Lateral
Utricle
Sacculus
Ductus reuniens
Spiral ganglion


(a)
(b)
Macula
Otoliths
Gelatinous material sags
Hairs of hair cells bend
Gravitational force
Supporting cells
Head upright


Crista Ampularis

Dix-Hallpike maneuver for PC-BPPV

Epley maneuver for PC-BPPV



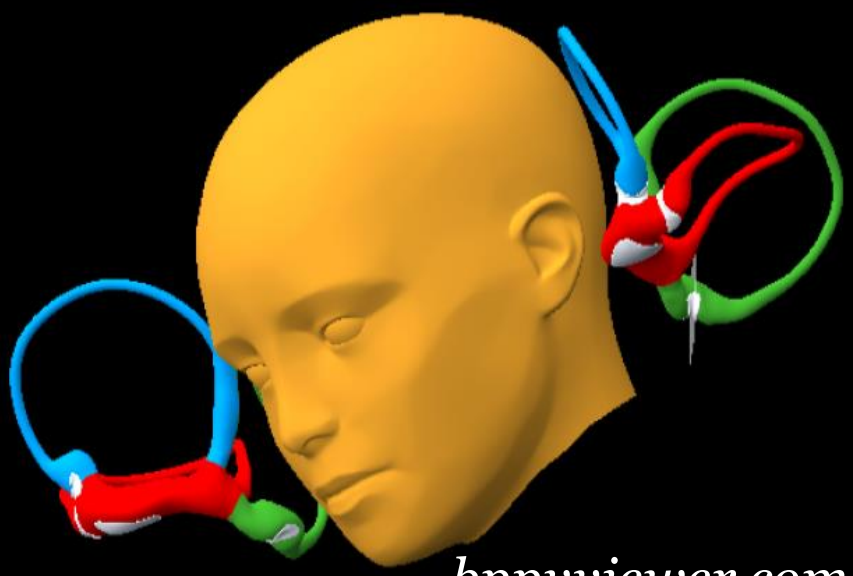

耳石置位術（右後半規管）
Canalith Repositioning Procedure
(for right PSC-BPPV)
©[redacted]-BPPV Project
Leader: Dr. [redacted]

Intractable PC-BPPV?

- *Misdiagnosis*
- *Malpractice of CRP(Canalith Repositioning Procedure)*
- *Others…*

cupulolithiasis:

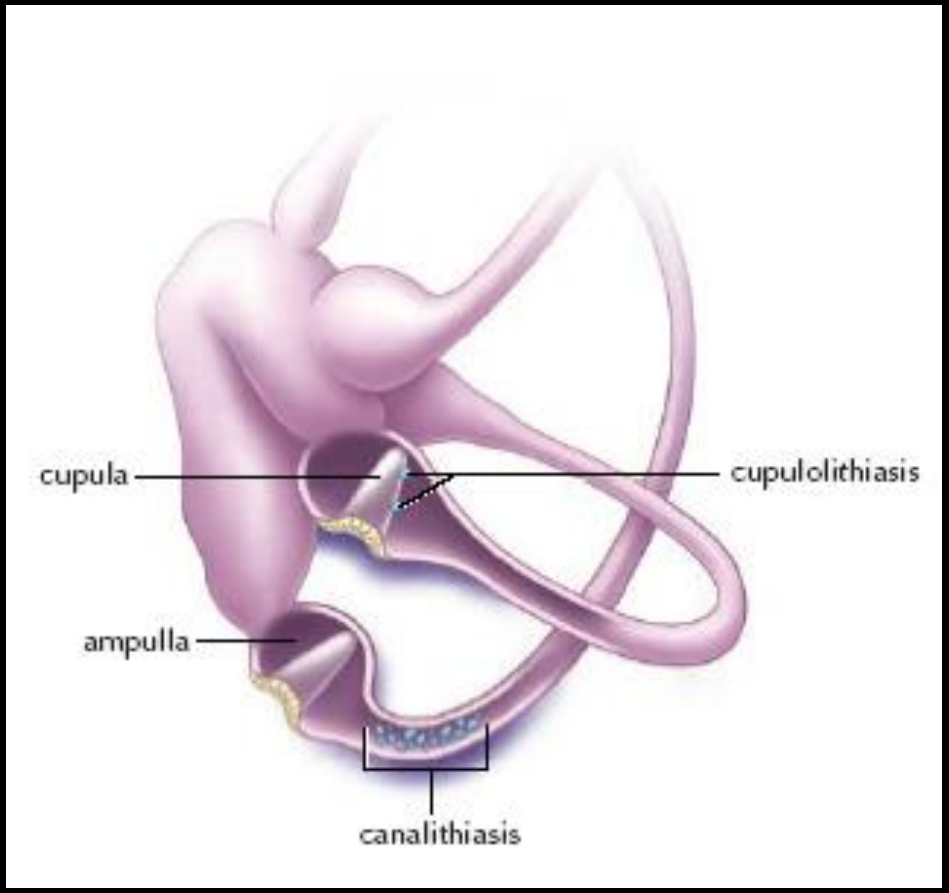
- *no latency*
- *longer duration*



bppvviewer.com

Ewald's law

- *First law states eye movements are in the plane of the canal being stimulated.*
- *Second law states that excitation of any canal creates a greater respnse than inhibition.*
- *Third law clarifies the direction of polarization of the cristae and states that ampullopetal flow creates a stronger response in the lateral canal, and ampullofugal flow creates the strongest response in tha anterior and posterior canals.*

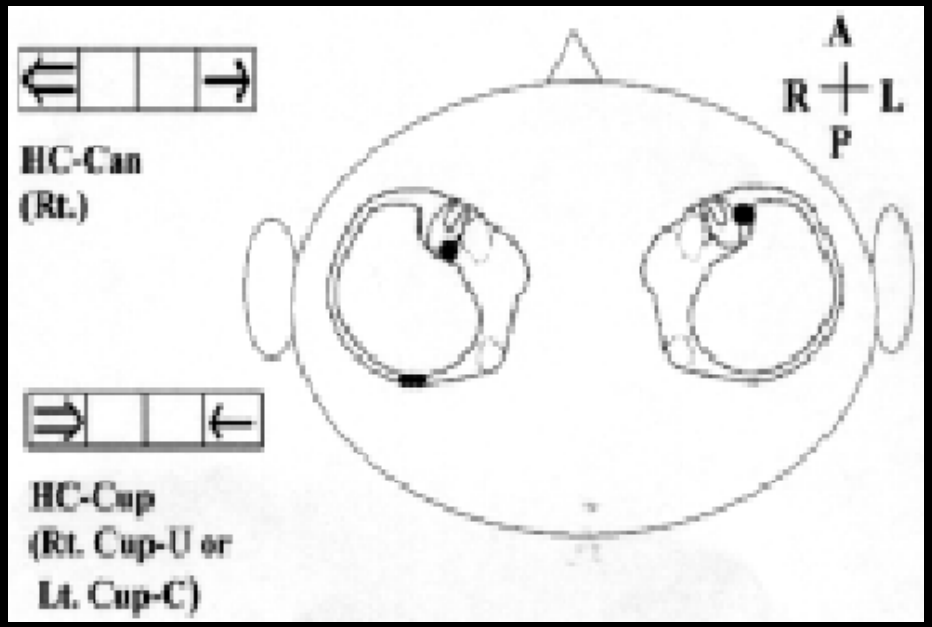


- 水平半規管之內淋巴流向壺膜為刺激，流離壺膜為抑制。
- 垂直半規管之內淋巴流離壺膜為刺激，流向壺膜為抑制。

Head roll test for HC-BPPV

HC-BPPV: Geotropic Ny. VS. ApoGeotropic Ny.

向地型眼振　　逆地型眼振



水平半規管良性陣發性位置性眩暈的分類與其治療原則
中耳醫誌第39 卷第6 號2004　邱文耀 蔡世哲 于篤學 李信賢

Geotropic Nystagmus => Canalithiasis

Apogeotropic Nystagmus => Cupulolithiasis

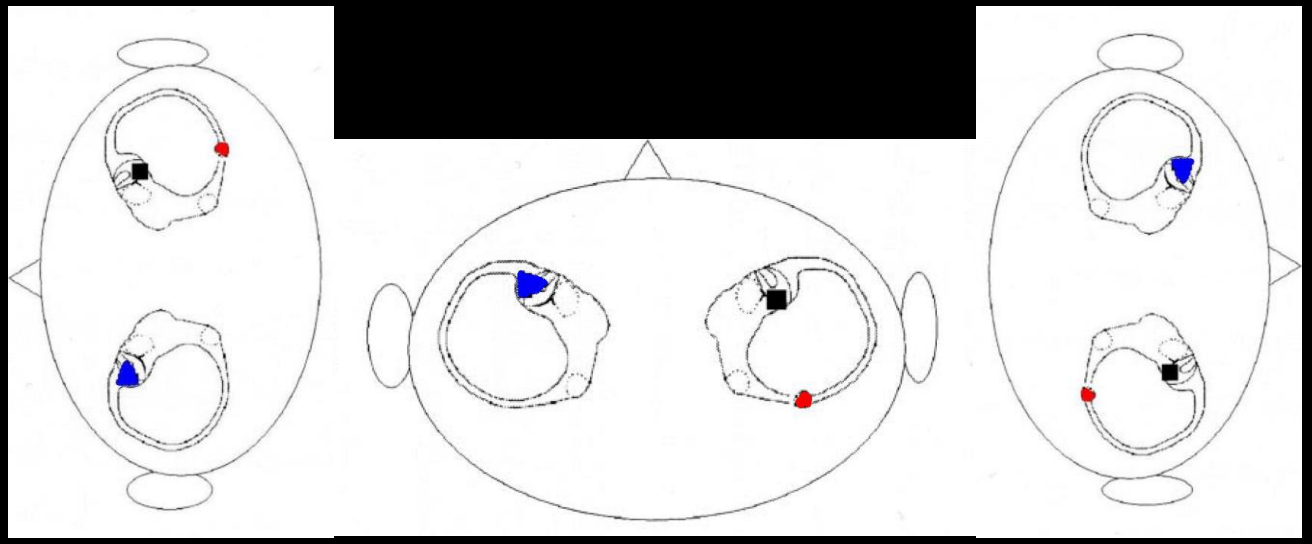
canal side of cupulolithiasis(管側)
utricle side of cupulolithiasis(嚢側)

Canalithiasis

管　耳石型

<- *Dx:Canalithiasis of HC-BPPV,Lt* =>

管 耳石型

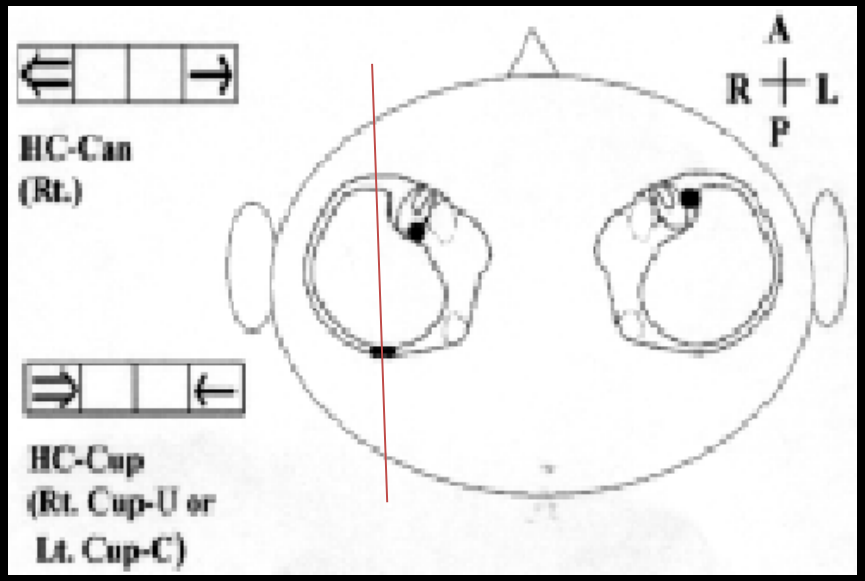


貴汝見地，不貴汝行履

- **Q:** 管耳石型呈向地型眼振？
- **A:** *Ampullopetal flow*即流向*utricle*方向者，會出現同側眼振。
  *Ampullofugal flow*即流離*utricle*方向者，會出現對側眼振。

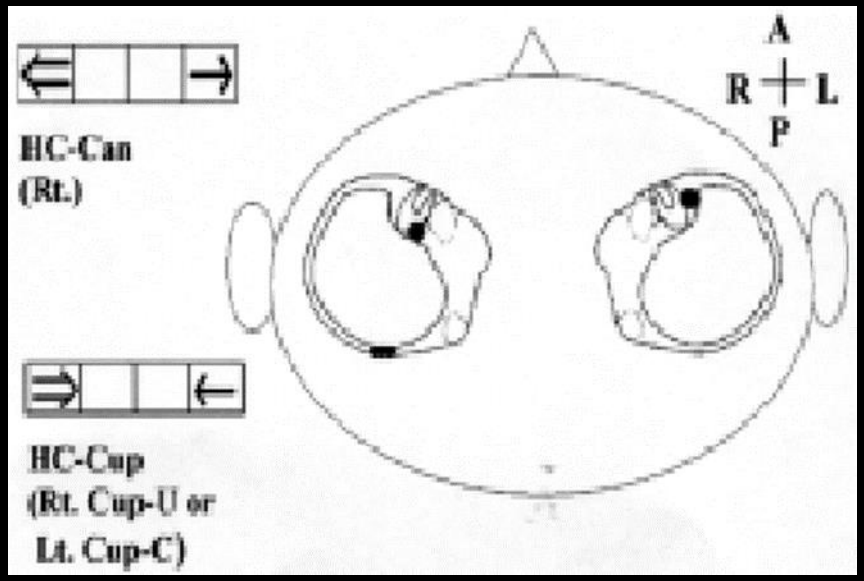
  (口訣)：頂帽偏移的方向即眼振慢相方向。

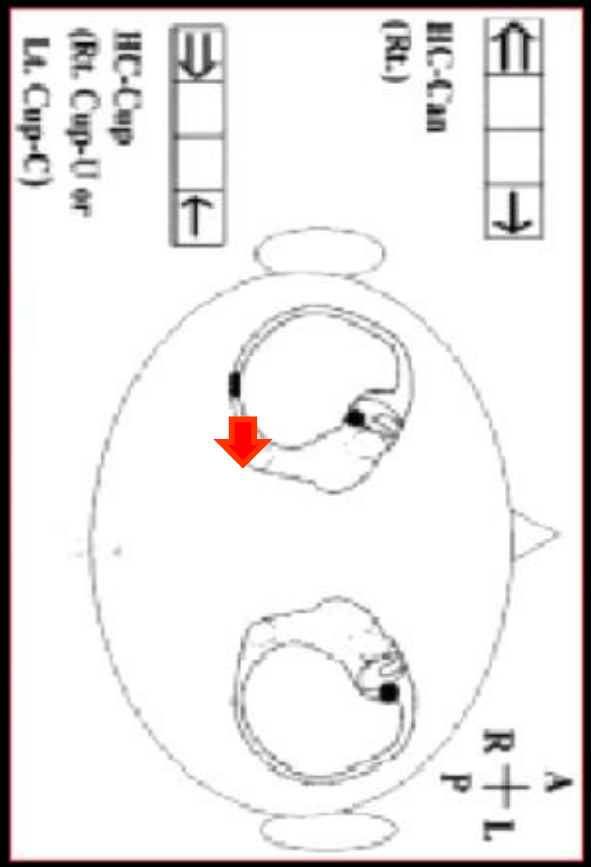
- **Q:** 管耳石型眼振強側為患耳？
- **A:** *Ewald's second law*
  or
  行經途徑較長來解釋



FPP (Forced Prolonged Position)

強迫姿勢法：躺向眼振較弱側12小時



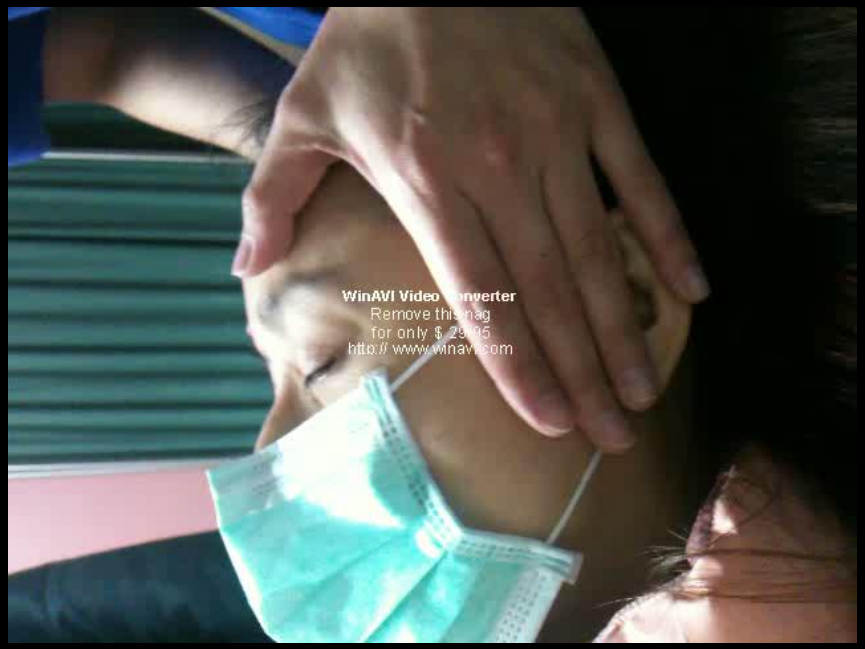


Quiz: lesion side?

Cupulolithiasis

顶帽　沉石型

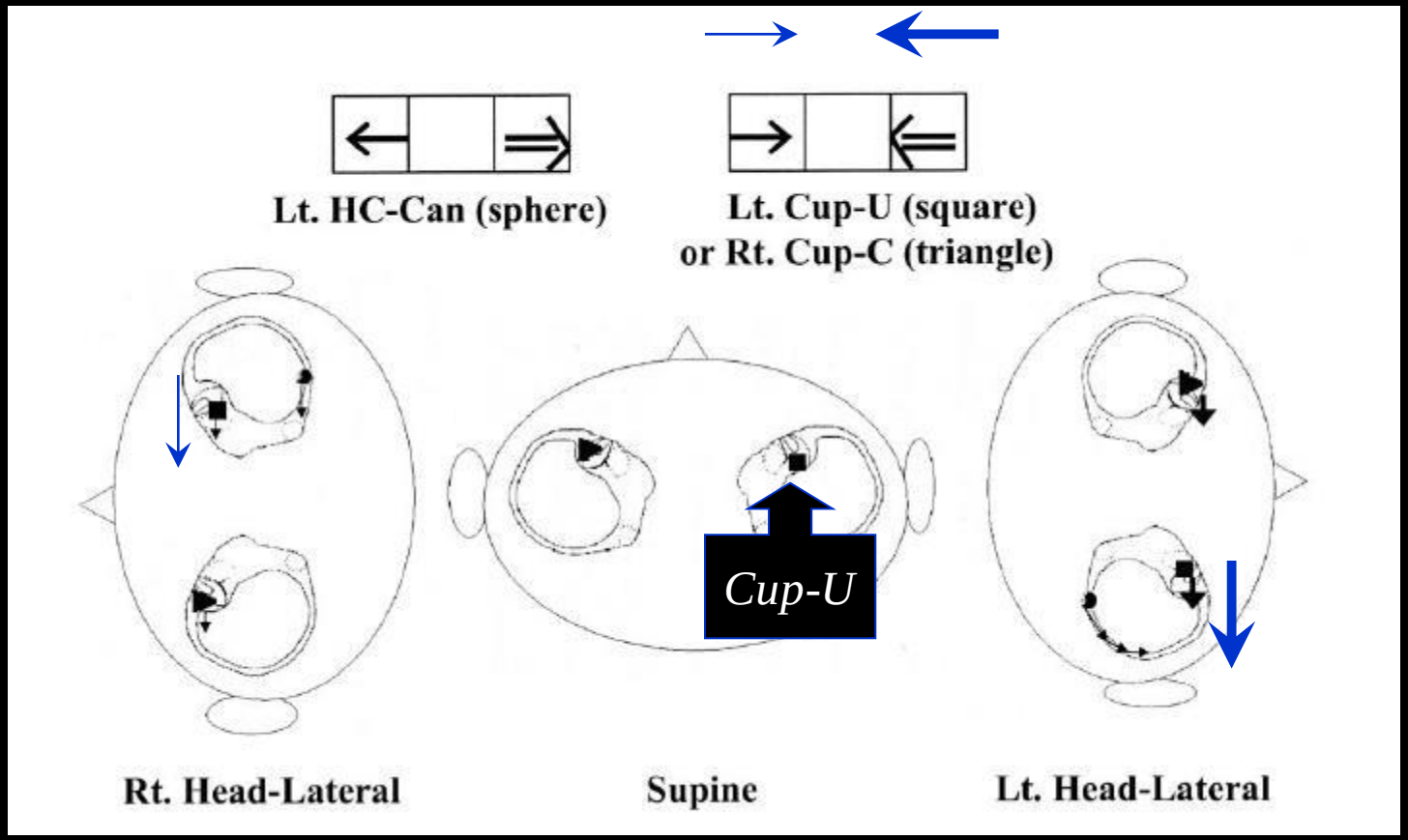
->*Cupulolithiasis of HC-BPPV,Lt* ? ? <=



HC-Cup:*cupulolithiasis of HC-BPPV*

Cup-U: utricle side of cupulolithiasis

Cup-C: canal side of cupulolithiasis



A single therapy for all subtypes of horizontal canal positional vertigo. Laryngoscope. 2005 Aug;115(8):1432-5

HC-Cup:*cupulolithiasis of HC-BPPV*

Cup-U: utricle side of cupulolithiasis

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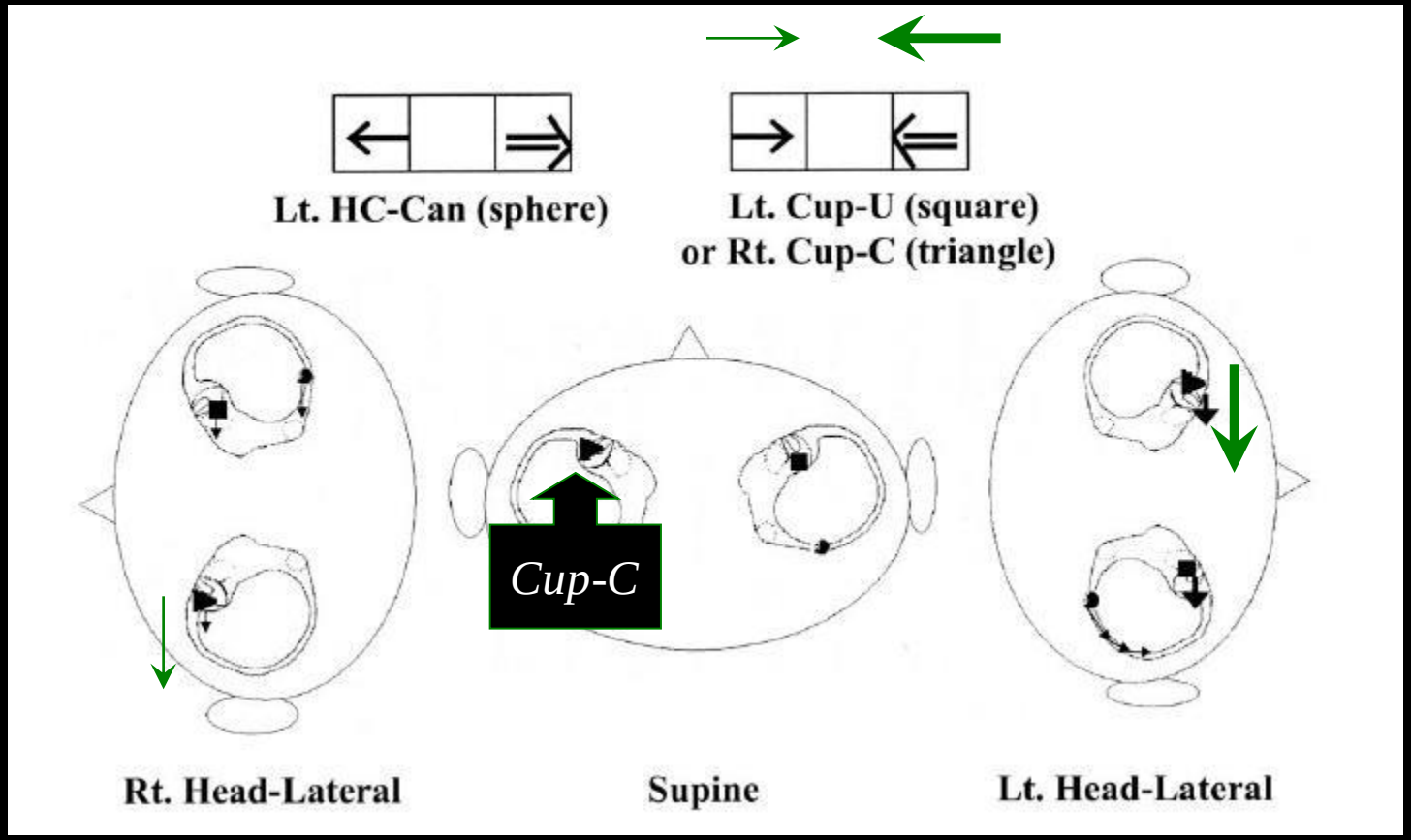
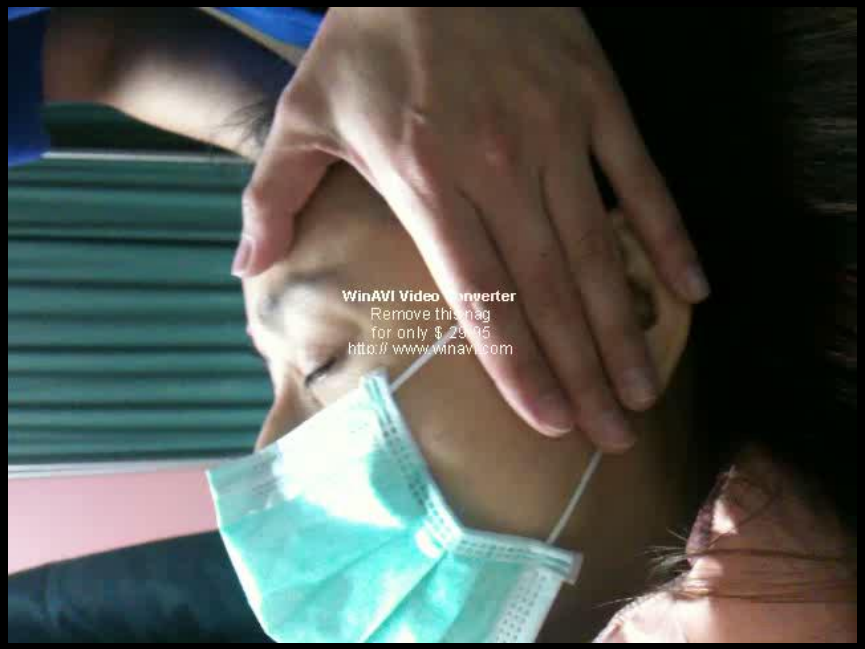
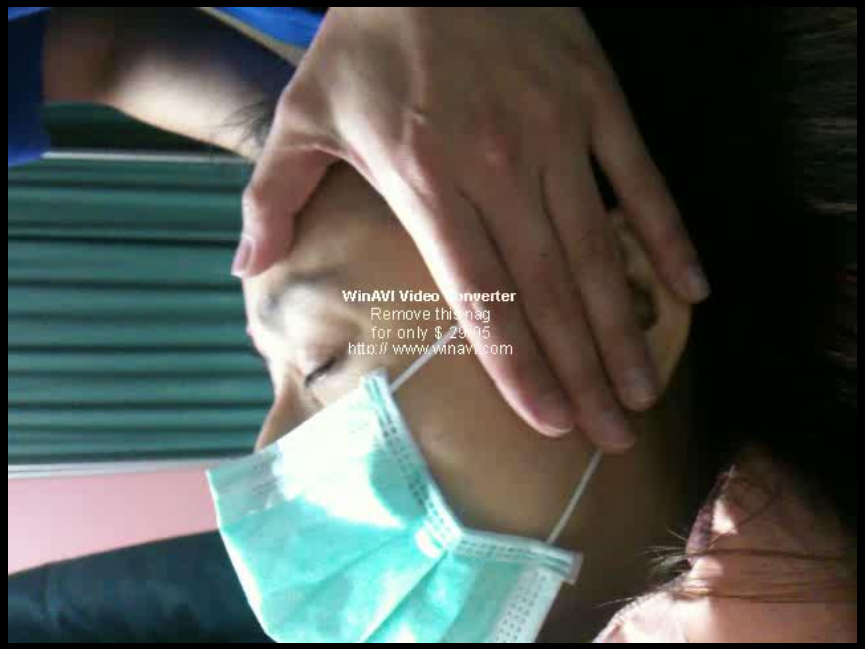


A single therapy for all subtypes of horizontal canal positional vertigo. Laryngoscope. 2005 Aug;115(8):1432-5

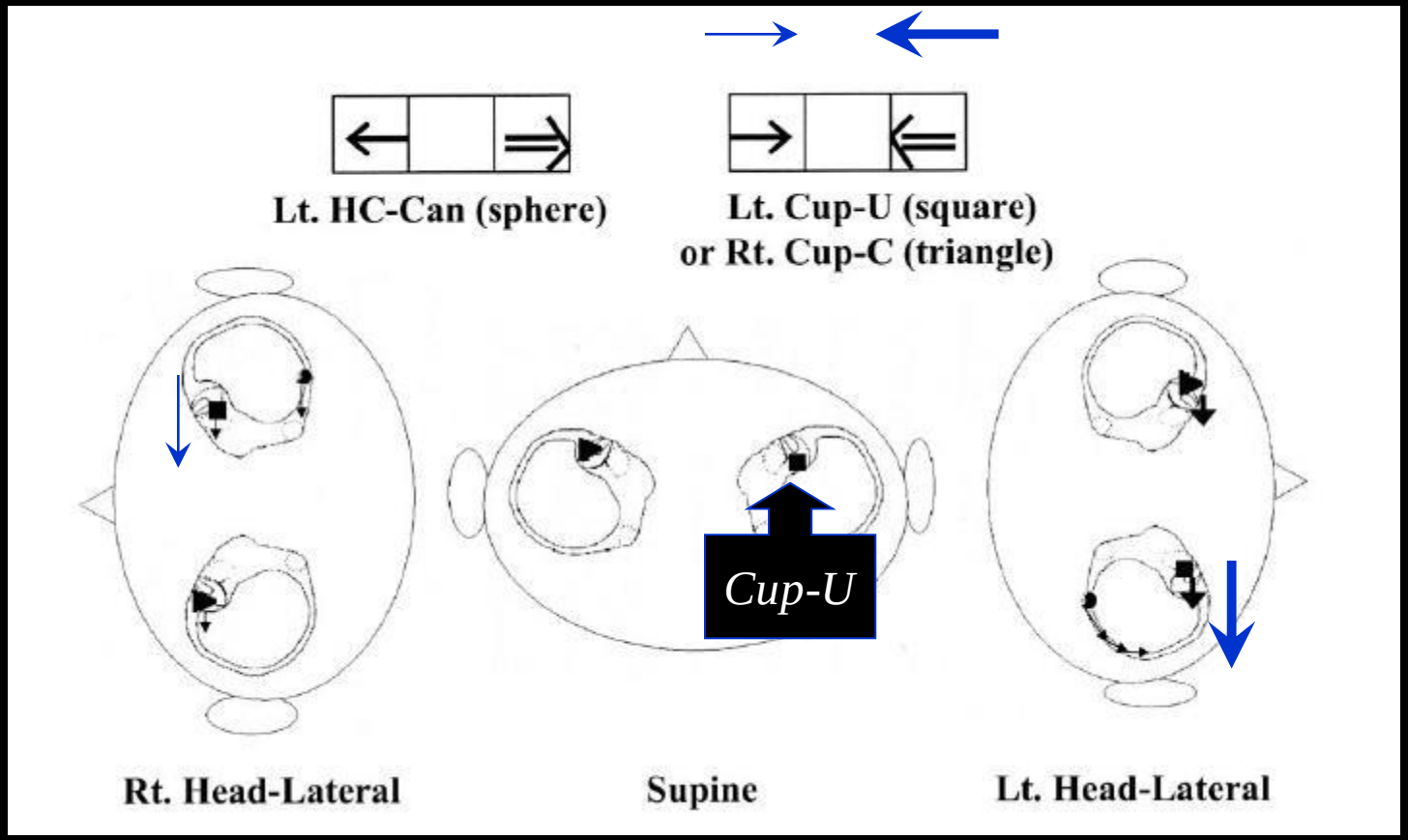
->*Cupulolithiasis of HC-BPPV,Lt*（✘）<=



->*Cupulolithiasis of HC-BPPV* （✔） <=

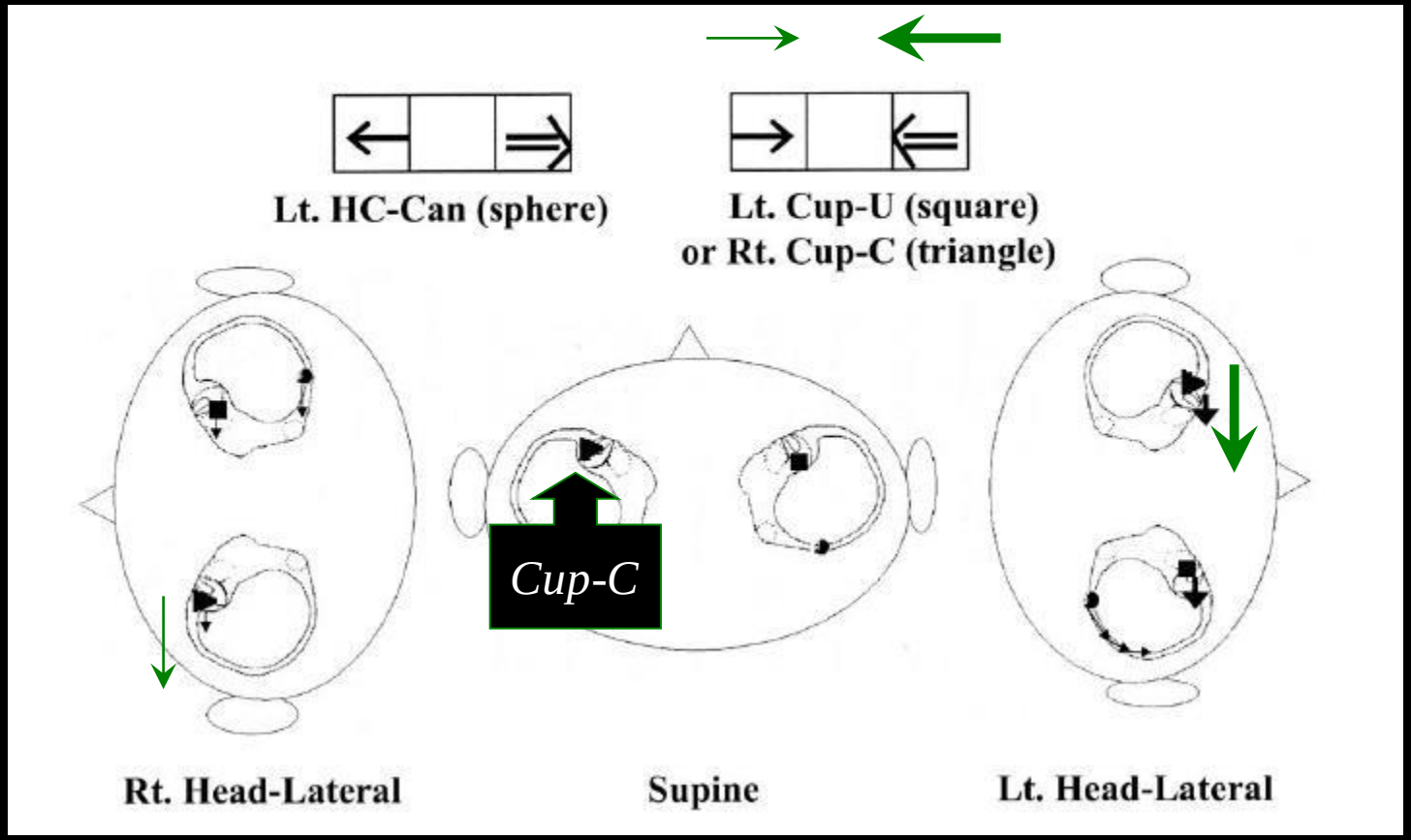


Cup-U,Lt

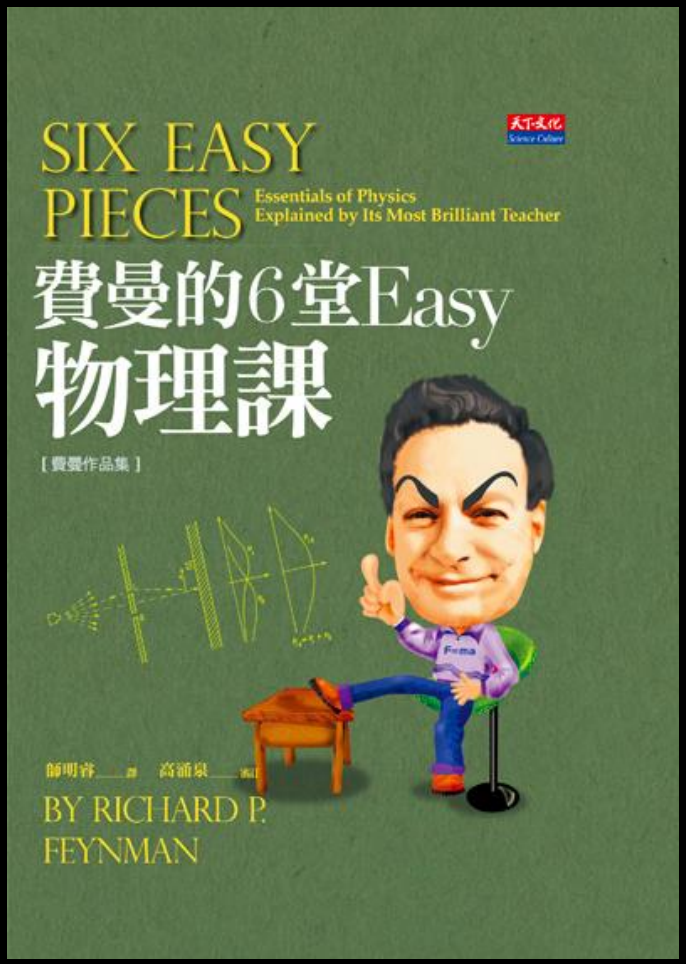


A single therapy for all subtypes of horizontal canal positional vertigo. Laryngoscope. 2005 Aug;115(8):1432-5

<= *Cup-C,Rt* ->

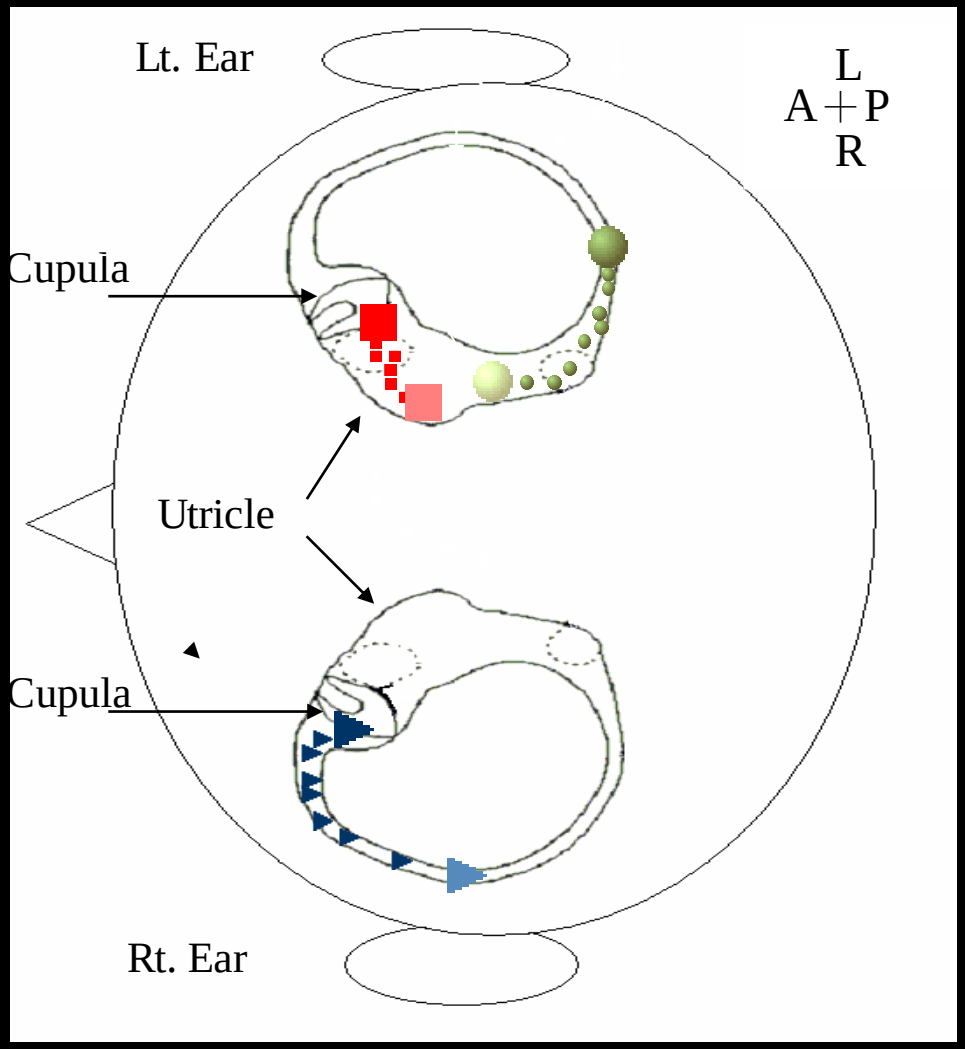


A single therapy for all subtypes of horizontal canal positional vertigo. Laryngoscope. 2005 Aug;115(8):1432-5


SIX EASY PIECES
Essentials of Physics Explained by Its Most Brilliant Teacher
費曼的6堂Easy物理課
【費曼作品集】
BY RICHARD P. FEYNMAN

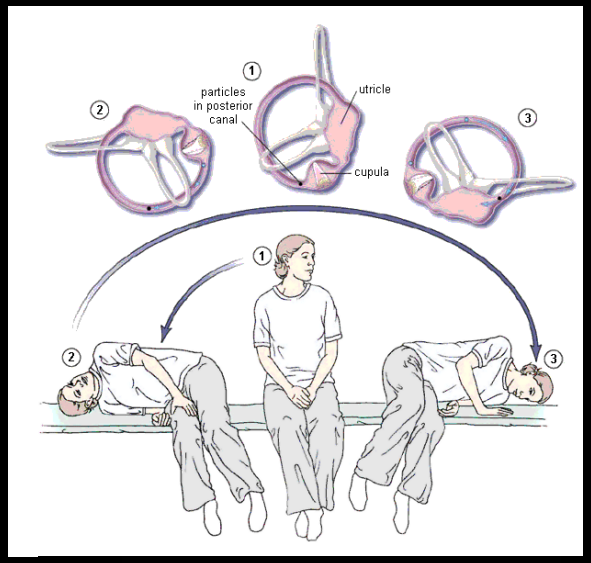
Quiz: lesion side?

永遠躺向眼振較弱側或自覺較不暈的那一側

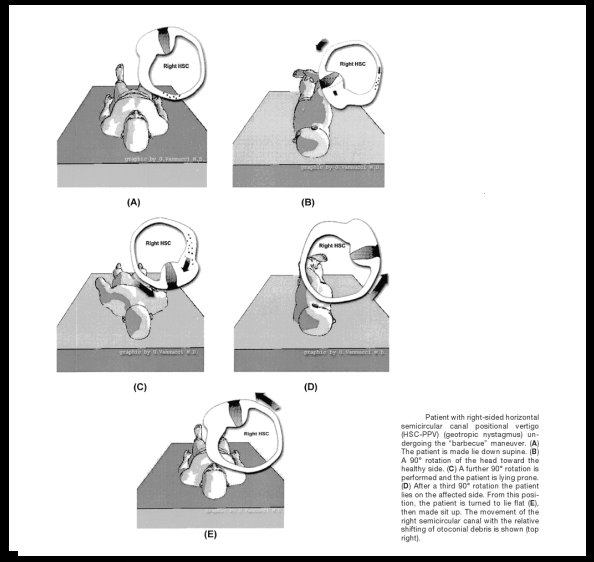


Methods seldom used:

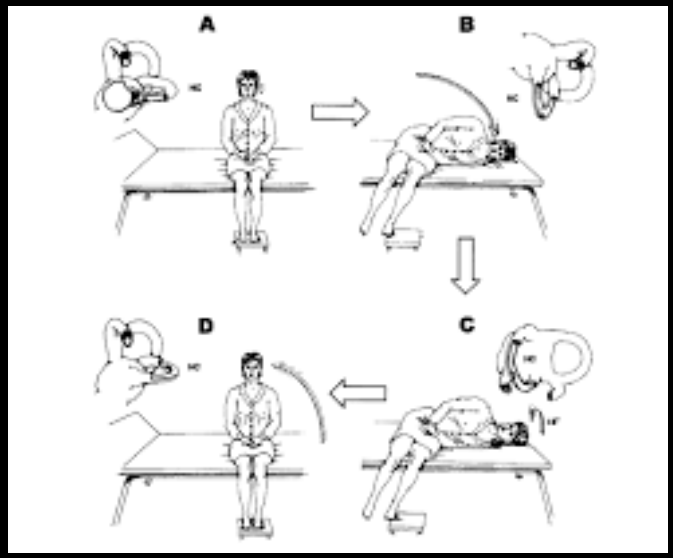
(Semont maneuver for PC-BPPV
barbecue maneuver for HC-Can
Gufoni maneuver for both HC-Can & Cup-C of HC-Cup)



Video 5

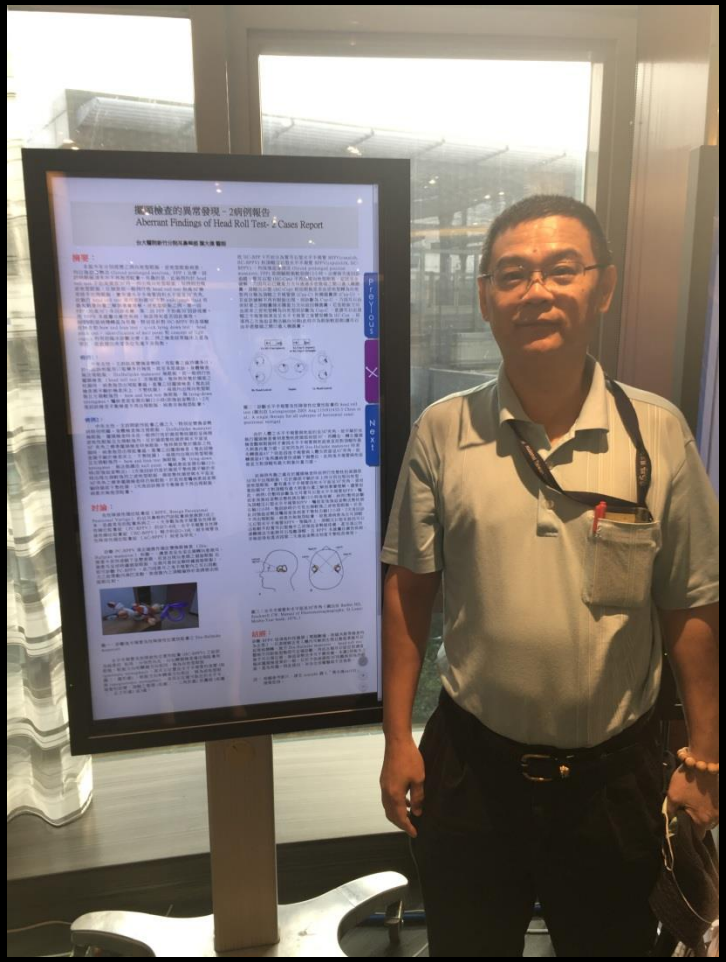


Video 6



Video 7

PC-BPPV: daily
HC-Can: weekly
HC-Cup: monthly



醫學會報告

97年：地方醫學會「以快速轉頭法治療水平半規管良性陣發性位置性眩暈」
98年：地方醫學會「方向變換性逆地型眼振的可能機轉
全國醫學會「多媒體影音部落格於神經耳科教學之應用」
99年：地方醫學會「僅經轉頭測驗即致逆地型眼振轉換為向地型眼振之病例報告」
全國醫學會「耳科學之雲端計劃」

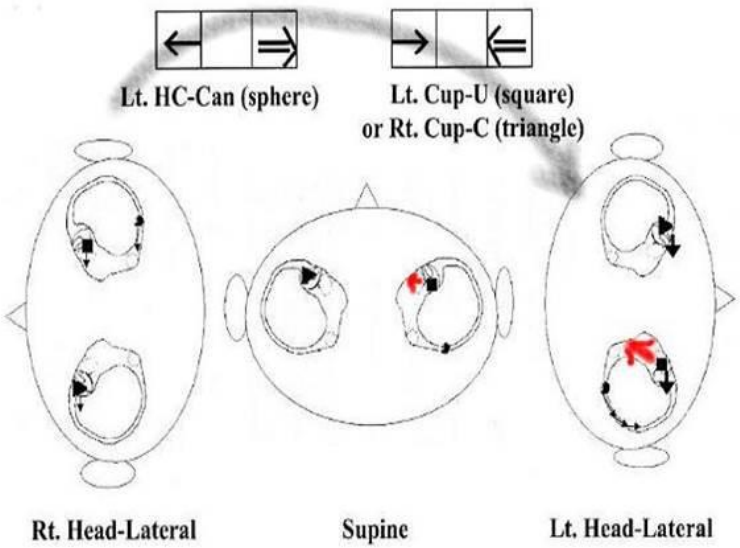
100年：地方醫學會「經head-on-the-knees position致向地型眼振轉換為逆地型眼振之病例報告」
全國醫學會「如何提高HC-Cup患耳側之預測率？
103年：地方醫學會「BPPV的診斷和治療」
104年：全國醫學會「突發性聽障併持續性向地性方向變化位置性眼振－病例報告」
105年：中華醫學會「BPPV的診斷與治療」
全國醫學會「擺頭檢查的異常發現－2病例報告」

Intractable HC-BPPV?

- *Always HC-Cup=> Rapid head rotation*
- *Methods for deciding the lesion side:*
  bow and lean nystagmus
  lying-down nystagmus
  head pitch down nystagmus
  pseudospontaneous nystagmus
  null point
- *Intractable HC-Can? => concept of light cupula*

Radpid head rotation for HC-Cup(97年醫學會)

以快速轉頭法治療水平半規管良性陣發性位置性眩暈
Management of Horizontal Canal BPPV by Rapid Head Rotation



署立新竹醫院 葉大偉 醫師

A single therapy for all subtypes of horizontal canal positional vertigo. Laryngoscope. 2005 Aug;115(8):1432-5 Chiou WY, Lee HL, Tsai SC, Yu TH, Lee XX.

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  pseudospontaneous nystagmus
  null point
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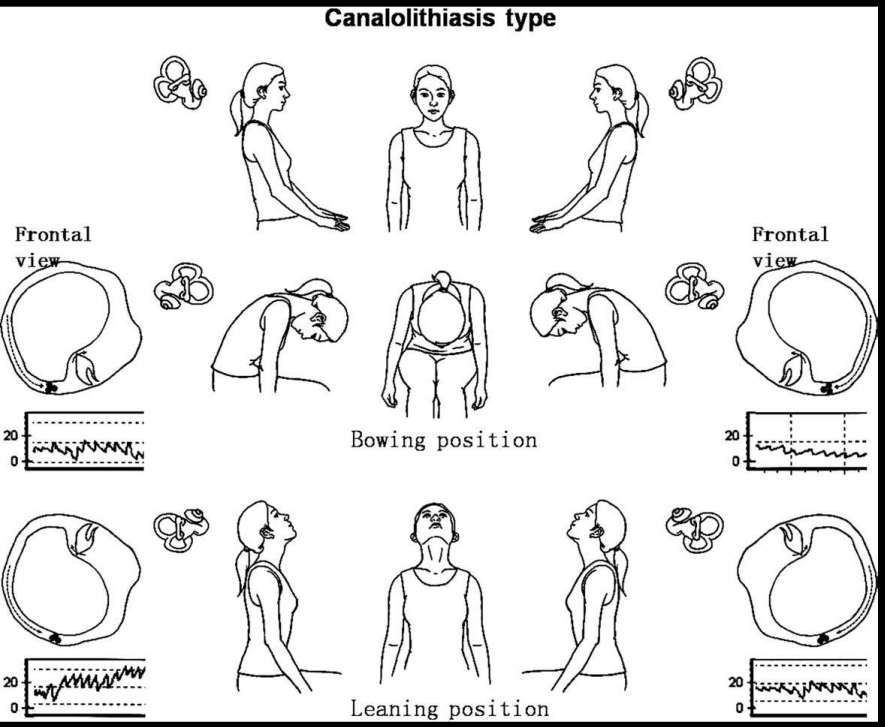
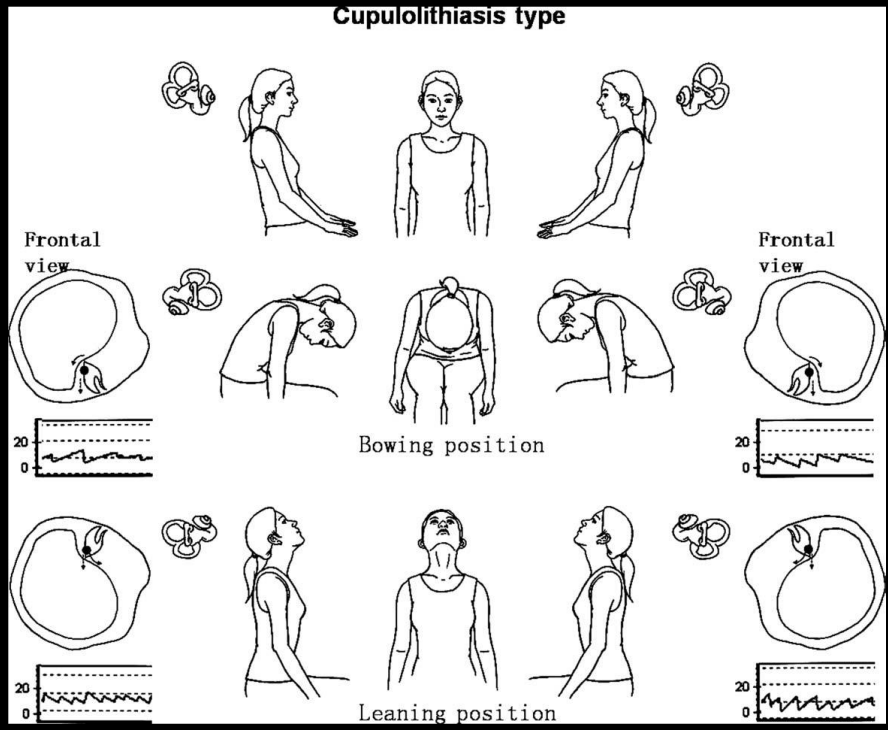
Bow and lean nystagmus(99年醫學會)

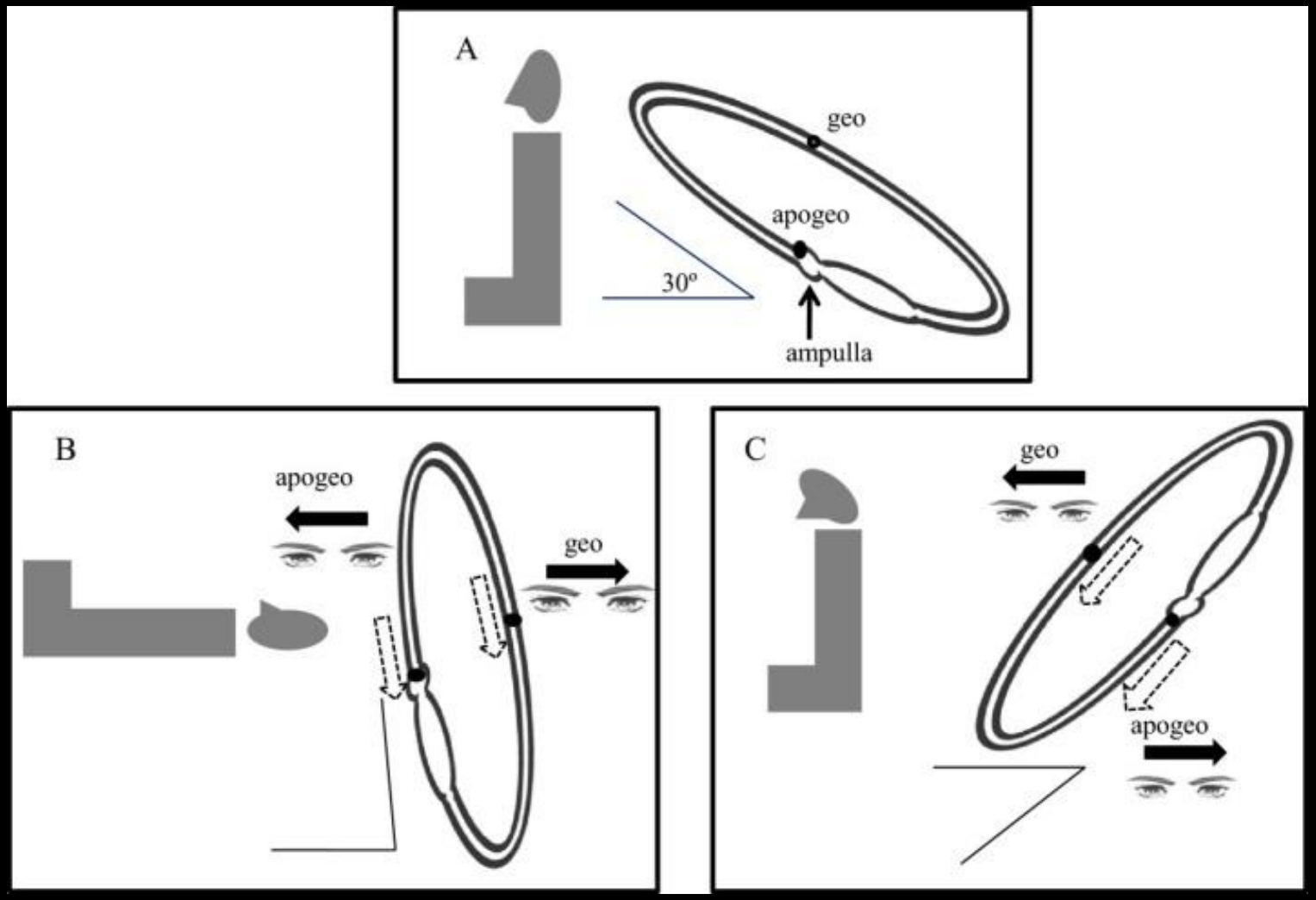




Laryngoscope. 2010 Nov;120(11):2339-46.
Efficacy of the "bow and lean test" for the management of horizontal canal benign paroxysmal positional vertigo.

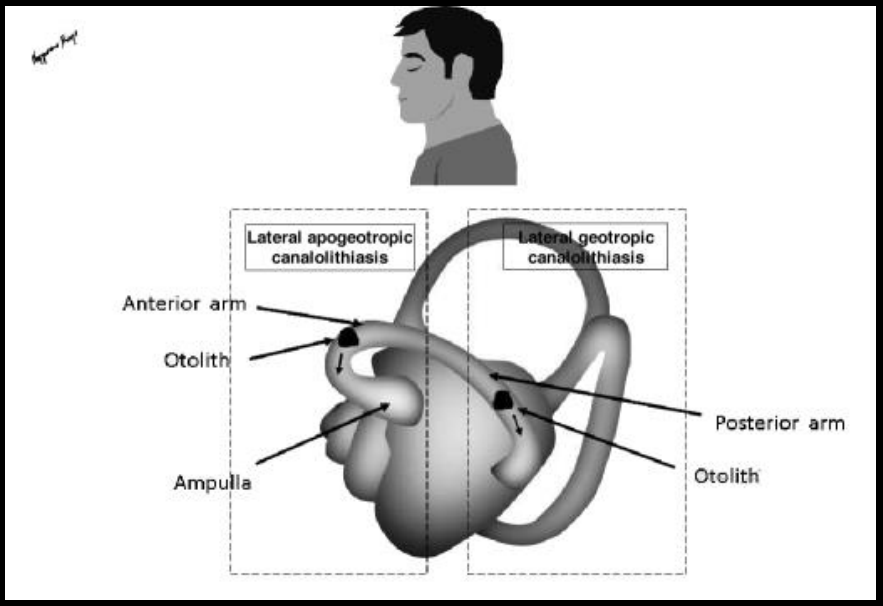
口訣：*HC-Can躺向健側*
lying down nyst.

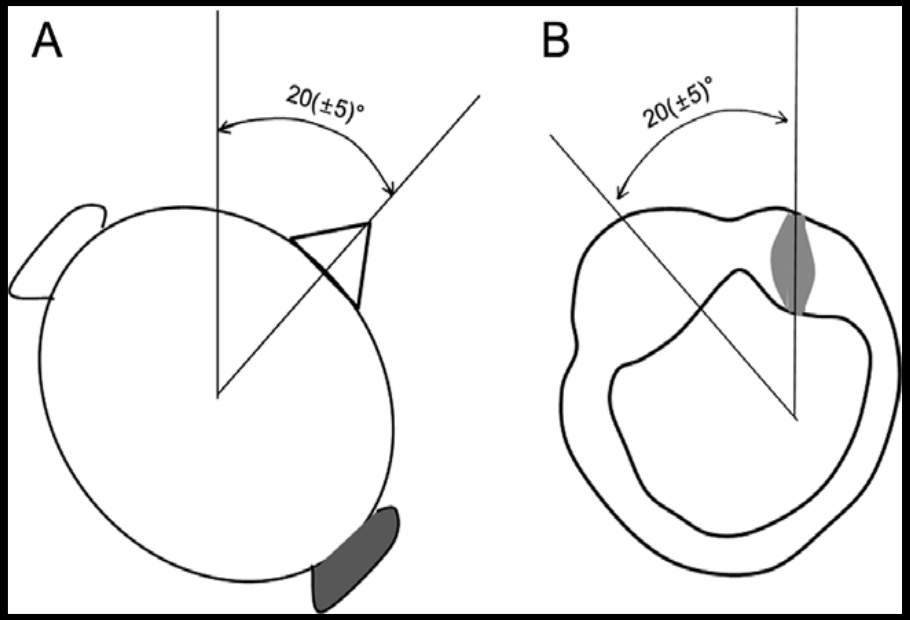
HC-Cup仆向健側
head pitch nyst.



http://bmcophthalmol.biomedcentral.com/articles/10.1186/1471-2415-14-136

pseudospontaneous nyst. /null point(100年醫學會)





Mechanism of pseudospontaneous nystagmus

"Secondary signs of lateralization" in apogeotropic lateral canalolithiasis
Acta Otorhinolaryngol Ital. 2010 April; 30(2): 78–86.
L Califano, MG Melillo, S Mazzone, and A Vassallo

Acta Otorhinolaryngol Ital. 2008 April; 28(2): 73–78.
G Asprella-Libonati

Intractable HC-BPPV?

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  head pitch down nystagmus
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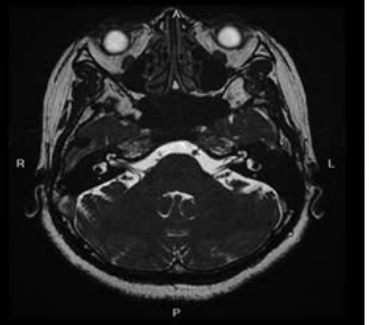
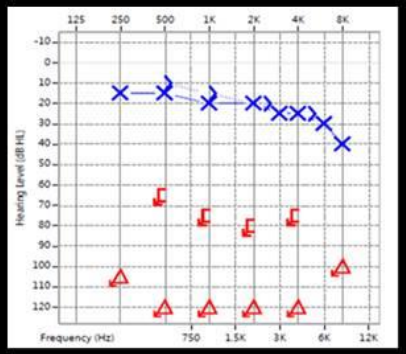
- *Intractable HC-Can? => concept of light cupula*

Concept of Light cupula(104年醫學會)

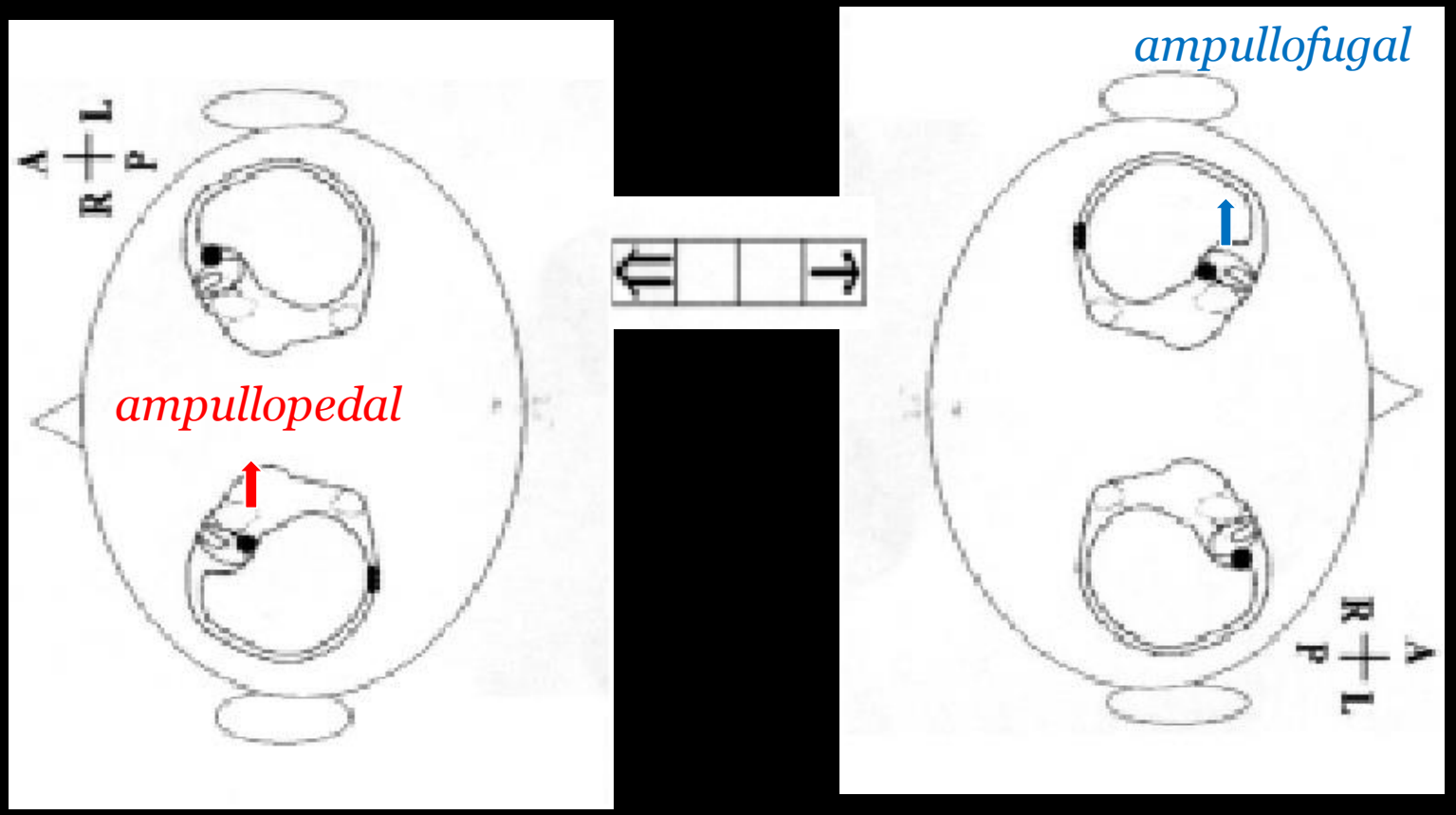
突發性聽障併持續性向地性方向變化位置性眼振－病例報告

Sudden Deafness with Persistent Geotrophic DCPN(Direction-changing Positional Nystagmus)- Case Report

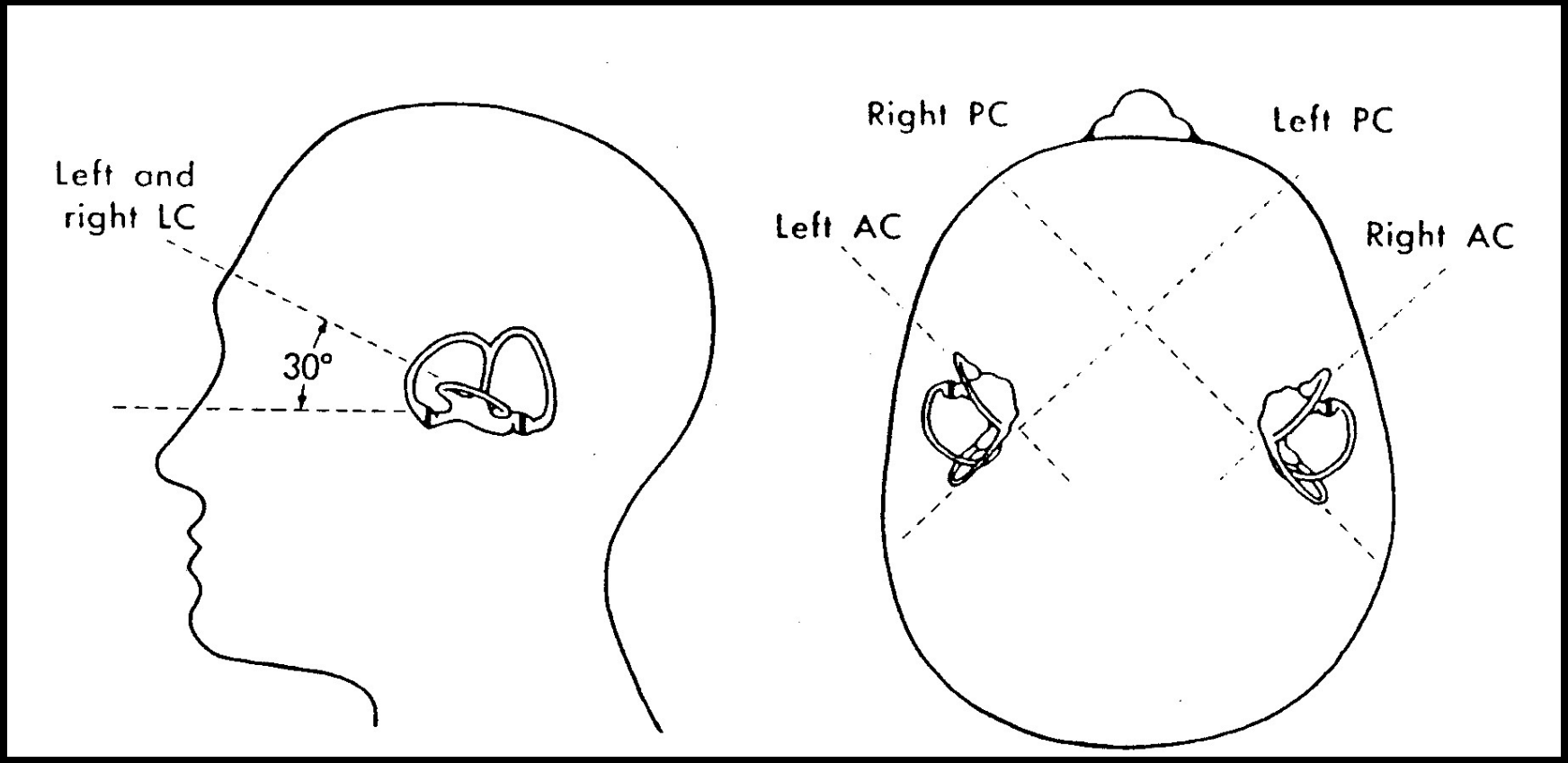




葉大偉　醫師
台大醫院新竹分院耳鼻喉部


A
R
L
P
ampullopedal
ampullofugal
A
R
L
P

AC-BPPV: rare



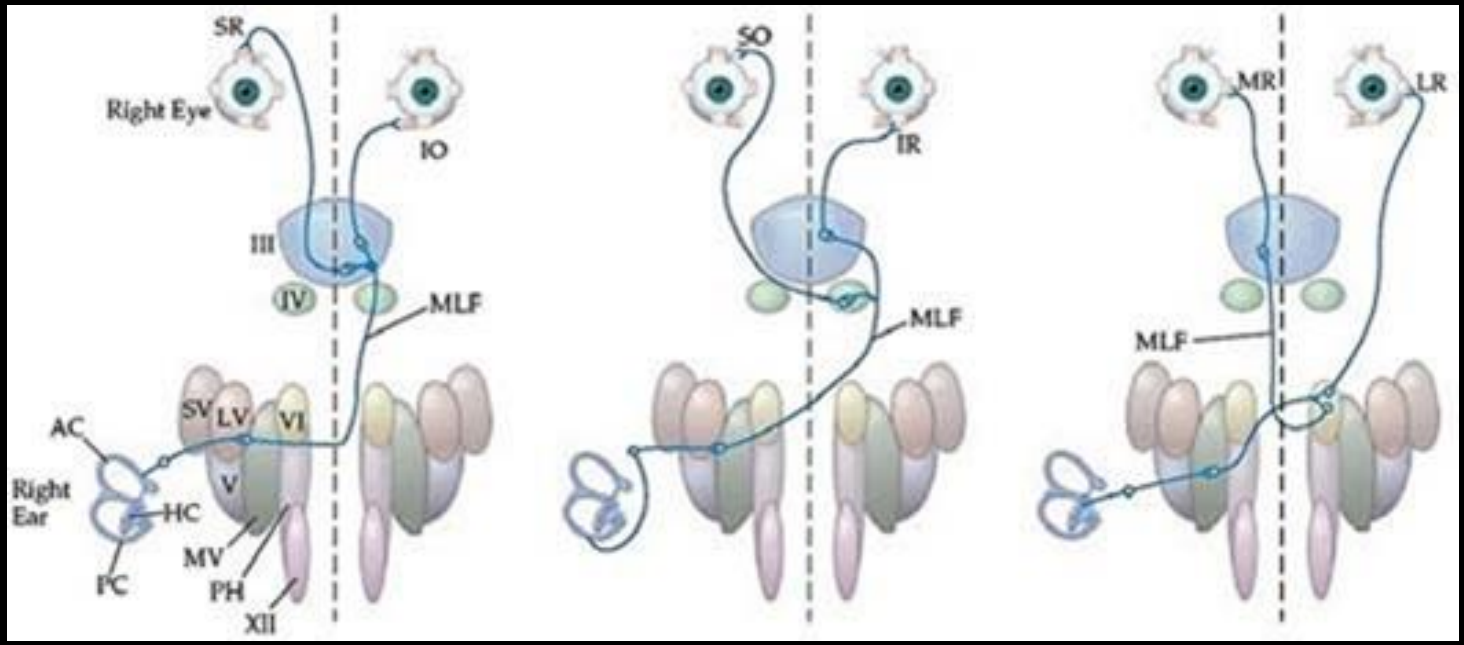
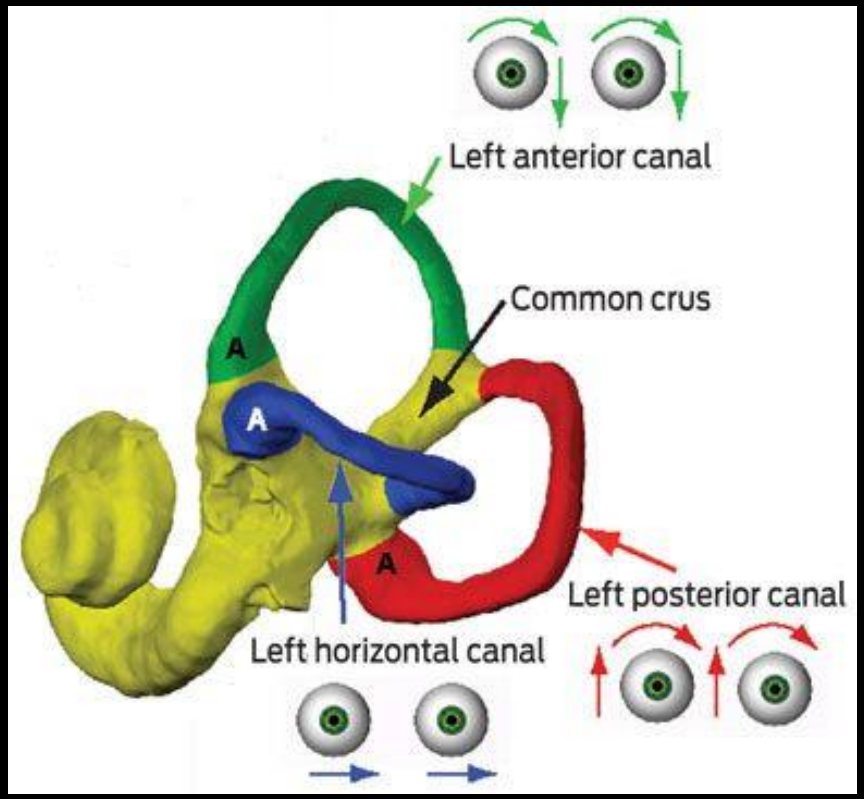
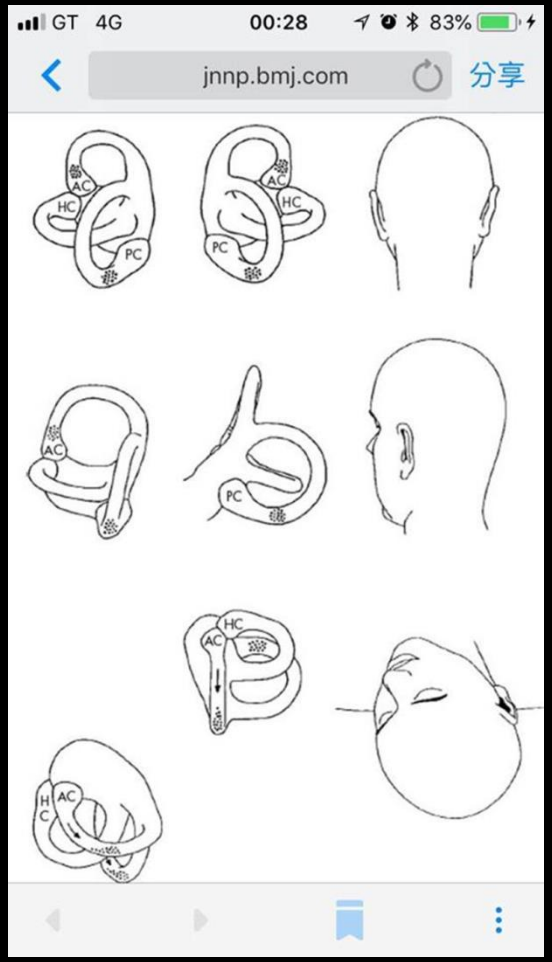


Fig source: what-when-how.com

Lt DH: *Rt AC: ampullofugal (downward, counterclockwise) or ampullopetal (upward, clockwise)*
Lt AC: ampullofugal ~> common crus ~> Lt Post. canal





BPPV檢查和治療方式的演進

- *Adler (1987) : first formal description*
- *Barany (1921) : first case report in a 27-year-old woman*
- *BPPV formally defined by Dix and Hallpike (1952)*
- *Schuknecht (1969,1972): "Heaby Cupula" ,cupulolithiasis theory*
- *Lim (1973) : canalithiasis theory*
- *Hall (1979)*
- *Brandt & Daroff (1980)*
- *Semont, Fereyss and Vitt (1988)*
- *Pagnini (1989) : HC-BPPV*
- *Parnes & McClure (1990)*
- *Epley (1992) : Canalith Repositioning Procedure*
- *Baloh (1995) : Cup-U after Canalith Repositioning Procedure*
- *Steddin (1996) : transition of canalithiasis to cupulolithiasis*
- *Vannucchi (1997): FPP*

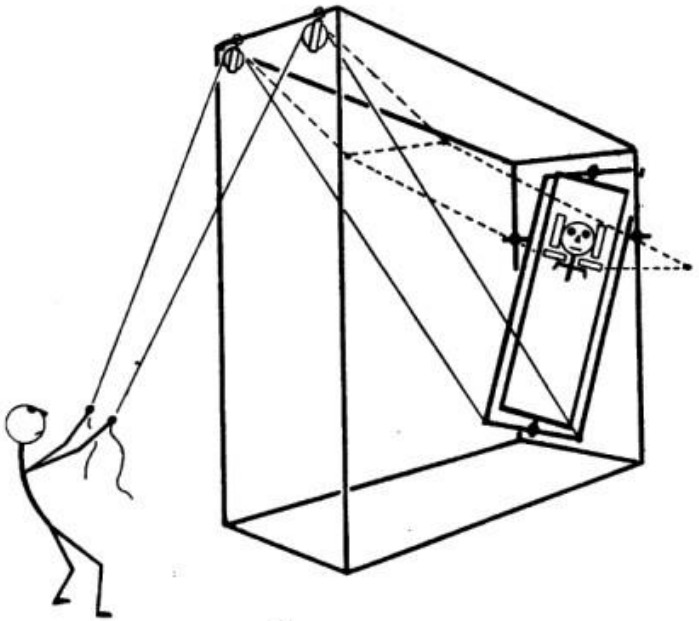


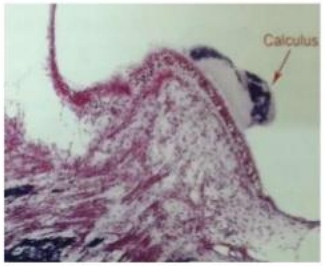
FIG. 7.

By means of apparatus shown in Fig. 7 it is possible to move the patient *en masse* into the critical position,

Dix, M.R.; Hallpike, C.S.: The pathology, symptomatology and diagnosis of certain common disorders of the vestibular system. Proc. R. Soc. Med. *45:* 341–354 (1952).

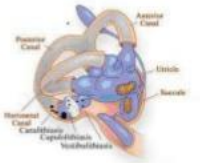
Pathophysiology

Cupulolithiasis



- Schuknecht first described cupulolithiasis

- Could not explain
  - ➢ Adaptability
  - ➢ Fatiguability



Schuknecht HF. Cupulolithiasis. Arch Otolaryngol 1969;90:765-778

Epley

Schuknecht

Persistent direction-changing positional nystagmus:
Another variant of benign positional nystagmus?

Robert W. Baloh, MD; Qing Yue, MD; Kathleen M. Jacobson, BA; and Vicente Honrubia, MD

Article abstract—Positional nystagmus that does not fatigue, persists as long as the position is held, and changes direction in different head positions has typically been attributed to central vestibular lesions. We recently studied three patients who presented with positional nystagmus having these features but almost certainly of benign peripheral origin. All three had an initial history typical of benign positional vertigo and, in two, the persistent direction-changing positional nystagmus occurred after the patient underwent a maneuver to remove debris from the posterior semicircular canal. The positional nystagmus profile and clinical course are consistent with the debris leaving the posterior semicircular canal and becoming attached to the cupula of the horizontal semicircular canal.

NEUROLOGY 1995;45:1297-1301

Positional vertigo is a common symptom that is usually secondary to a benign inner ear disorder.[1-3] Oc-

tional vertigo with the positioning maneuver designed to remove debris from the posterior semicir-

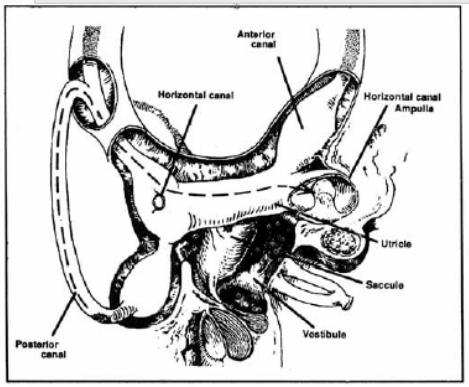


Figure 2. Schematic drawing of the inner ear showing how the debris could move from the posterior semicircular canal and attach to the cupula of the horizontal semicircular canal (dashed line and arrow).

and resulting in inhibition of the horizontal canal ampullary nerve on that side and nystagmus away from the undermost ear. The reverse would occur when the patient turns onto the other side, the side of the normal ear. In this case, the mass is on the underside of the cupula and the cupula deviates toward the utricle, also producing nystagmus beating away from the ground. The nystagmus persists as long as the position is held while the mass remains attached to the cupula. The dynamics of the build-up and decay of the positional nystagmus are explained by the dynamics of the horizontal VOR. The stimulus is a constant acceleration that results in a gradual build-up in slow phase velocity determined by the dominant time constant (the time it takes for the response to reach approximately 63% of the maximum value[16]). An average time constant of the horizontal VOR in normal human subjects is about 12 seconds,[17] which is consistent with the gradual build-up in slow phase velocity of the static positional nystagmus in our three patients (figure 1). The gradual decay in slow phase velocity after reaching a peak response can be explained on the

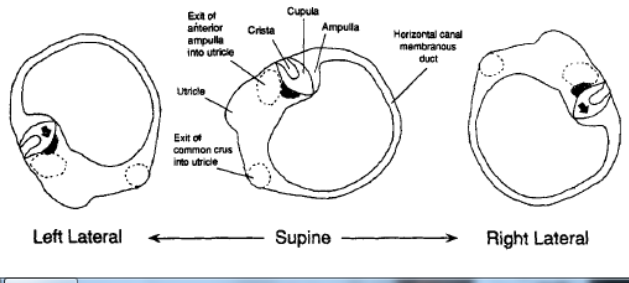
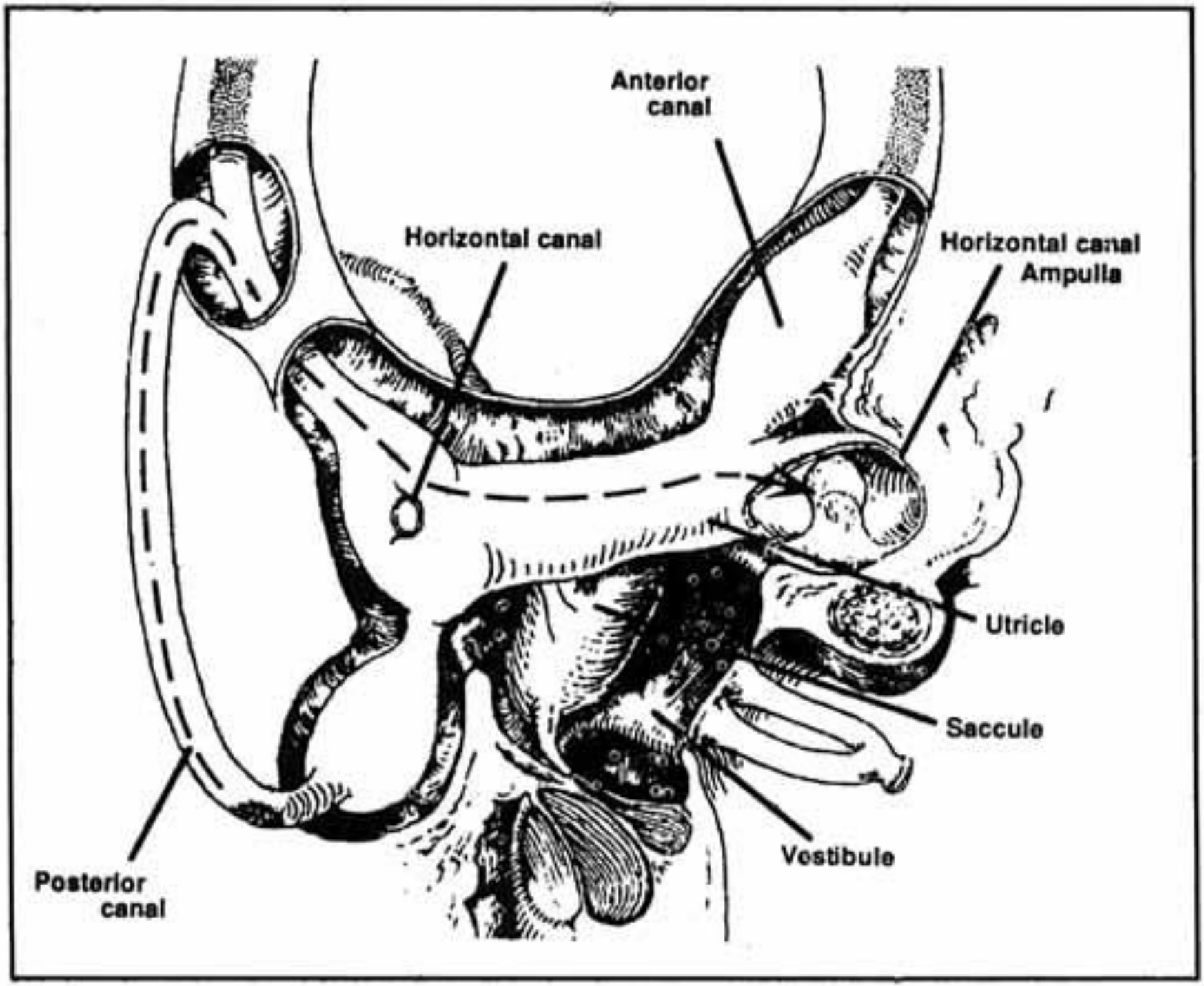


Figure 3. Schematic drawing illustrating how a mass attached to the cupula of the right horizontal semicircular canal can produce apogeotropic direction-changing positional nystagmus. The shape of the horizontal canal is taken from drawings of a semicircular membranous canal dissected from a fetus by Curthoys and Oman.[21] The position of the utricle and ampulla relative to the head was derived from CTs of normal human temporal bones with cuts through the horizontal semicircular canals. Arrows indicate the direction of cupula deviation.


Anterior canal
Horizontal canal
Horizontal canal Ampulla
Utricle
Saccule
Vestibule
Posterior canal

Horizontal Canal Benign Paroxysmal Positioning Vertigo (h-BPPV): Transition of Canalolithiasis to Cupulolithiasis

Sven Steddin, Dipl Ing, and Thomas Brandt, MD

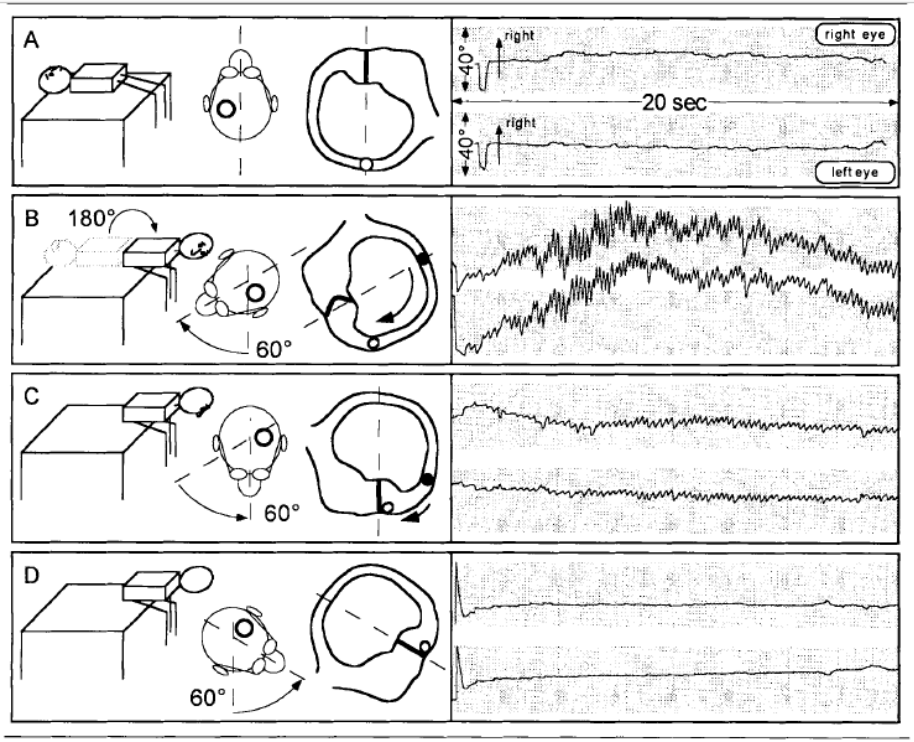
We report on 2 patients with typical features of horizontal canal benign paroxysmal positioning vertigo (h-BPPV). A vigorous head positioning in these patients from supine to a bending-over, head-on-the-knees position reversed the direction of nystagmus from geotropic

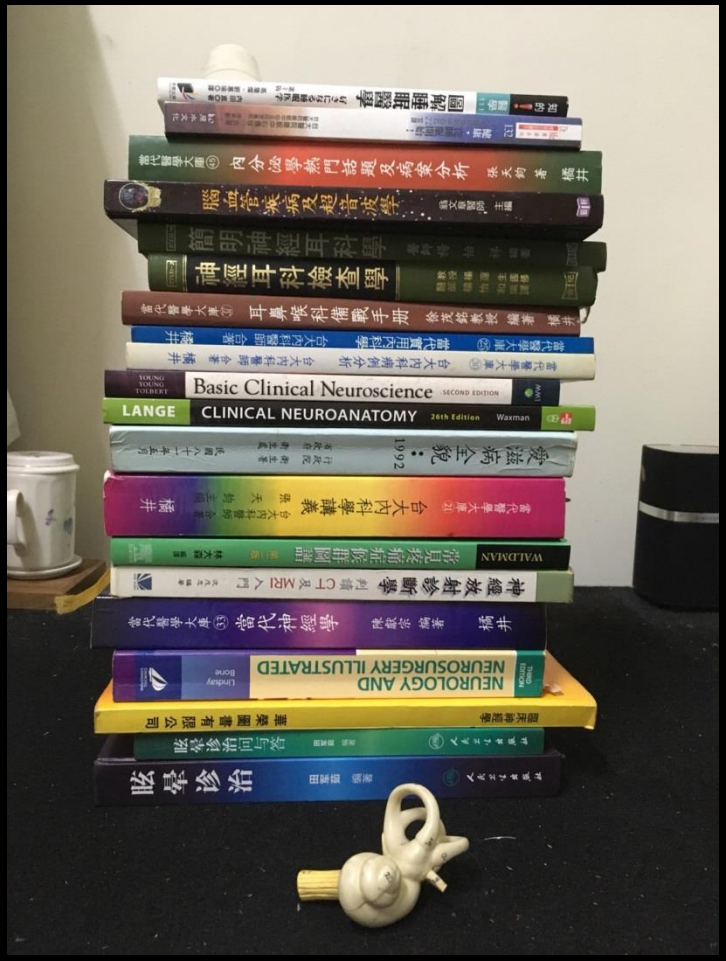
free-floating debris sometimes settles on and adheres to the cupula [8–10], thus converting from canalolithiasis to cupulolithiasis. We observed such a transition between the two mechanisms within the horizontal semicircular canal in patients with horizontal BPPV (h-BPPV) when testing new positioning maneuvers.

Case Reports

Case 1

A 49-year-old male patient presented with left-sided BPPV of the horizontal canal. A transient, self-limiting episode had first occurred 2 months earlier. In the supine position, he experienced intense attacks of vertigo when turning his head to the right or left side. These attacks were more pronounced with movements to the left. The nystagmus was purely horizontal with fast phases in the direction of the head movement. The attacks had a duration of 50 to 60 seconds, and there was no fatigue of vertigo and nystagmus on repeated


A
right
right eye
40°
20 sec
right
40°
left eye
B
180°
60°
C
60°
D
60°


Basic Clinical Neuroscience
SECOND EDITION
LANGE
CLINICAL NEUROANATOMY
26th Edition
Waxman
NEUROLOGY AND
NEUROSURGERY ILLUSTRATED

「認真是拚不過迷戀的」　侯文詠

耳石症之外，生活上到處滿是

對稱之美


CREATED WITH
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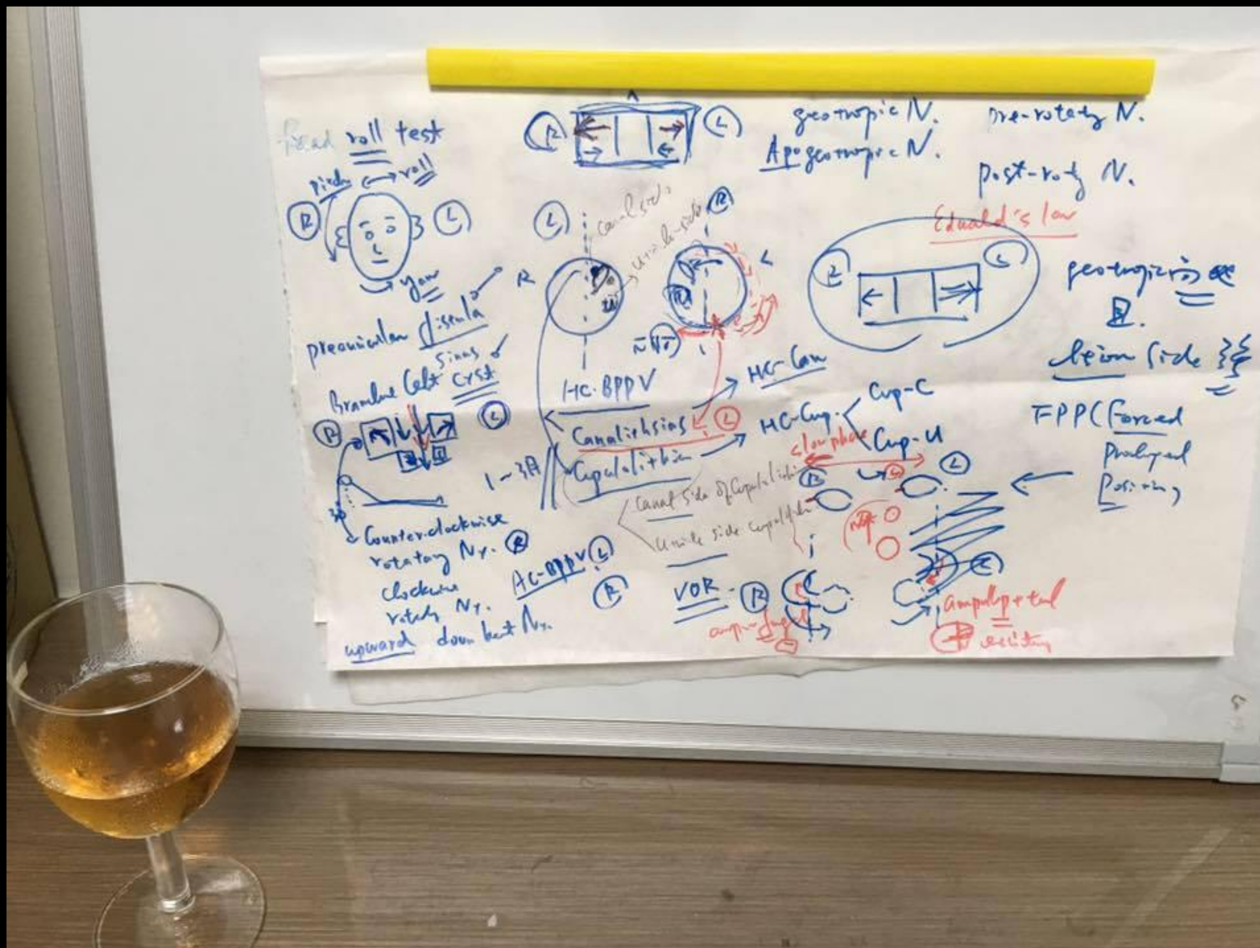
Take home message

- *Epley maneuver for PC-BPPV*
  FPP for HC-BPPV

- *Intractable PC-BPPV may be due to*
  - *misdiagnosis*
  - *malpractice of CRP(Canalith Repositioning Procedure)*

- *Intractable HC-BPPV always found in HC-Cup*
  - *rapid head rotation for HC-Cup*
  - *tools to decide lesion side*
  - *concept of light cupula*



Head roll test
pitch
roll
yaw
geotropic N.
Apogeotropic N.
pre-rotatory N.
post-rotatory N.
Ewald's law
HC-BPPV
HC-Can
HC-Cup.
Cup-C
Cup-U
Canalithiasis
Cupulolithiasis
slow phase
FPP (Forced Prolonged Positioning
Counter-clockwise rotatory Ny.
clockwise rotatory Ny.
AC-BPPV
VOR
upward down beat Ny.
ampullopetal
ampullofugal