

Dizziness and Syncope: What Does the Tilt Table Test Tell Us?

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Dizziness

- A symptom **NOT** a diagnosis
 - Light-headedness
 - Faintness
 - Giddiness
 - Imbalance
 - Floating sensation

Types of Dizziness

- **Vertigo**: illusion of movement, usually rotatory; vestibular system **TILTING TABLE TEST**
- **Syncope (presyncope)**: diffuse hypoperfusion of brain; cardiovascular system
- **Psychogenic**: resulting from psychiatric disorders
- **Imbalance**: Sense of imbalance primarily when walking
- **Multisensory Disequilibrium**

Case # 1

- 31-year-old male
- Postural dizziness for years
- 1 episode of near-fainting spell during working in 2018
- Occasional palpitation
- Neurological exam.: non-contributory
- E/TCD: no stenosis

Case # 2

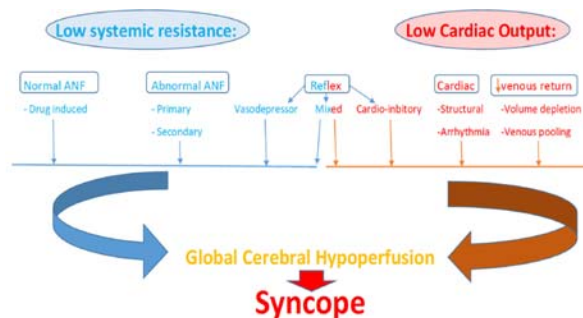
- 45-year-old female
- Vertigo sensation in 2014/10/08, then abdominal colic pain followed by fainting spell
- No chest pain, palpitations, shortness of breath
- Similar episode one year ago .
- No family history of sudden cardiac death
- No medications
- Neurological exam.: non-contributory
- EEG: normal

Q: How would you evaluate these 2 patients?

Syncope: Definition

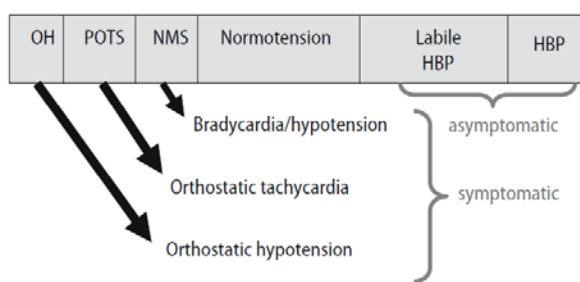
- Abrupt and self-limited loss of consciousness associated with absence of postural tone
- Relatively rapid onset. Variable warning symptoms.
- Followed by rapid and complete recovery. Last only a few minutes.
- Absence of prolonged confusion
- Presyncope---prodromal symptom of fainting and typically has the same work up as syncope.

Pathophysiology of Syncope



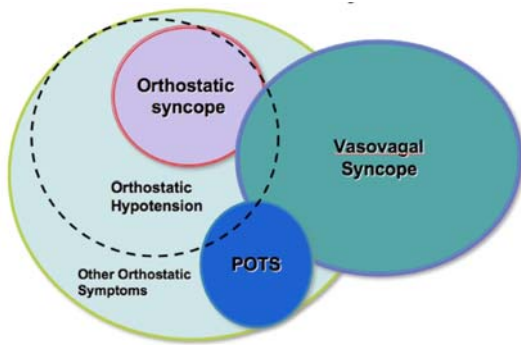
Adkisson & Benditt. Med Clin NA. 2015;99:691-730

Cardiovascular Dysregulation

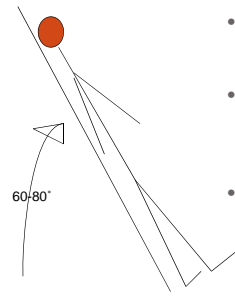


Robertson D. Clin Auton Res. 2008; 18(suppl.1):2-7

Orthostatic Intolerance Syndromes



Tilting Table Test

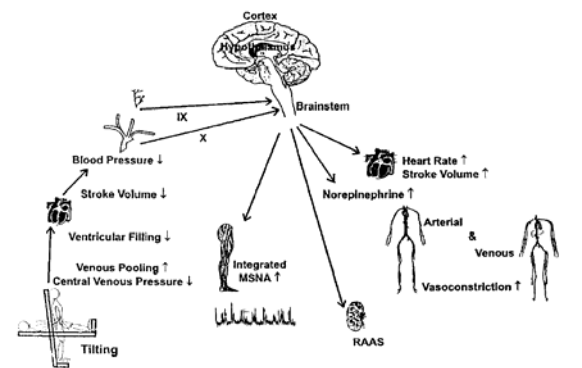


- **Goal:** provoke neurocardiogenic syncope
- **Indication:** recurrent unexplained syncope without cardiac disease
- **Protocol:** passive tilt
 - * positive response reproduces symptom

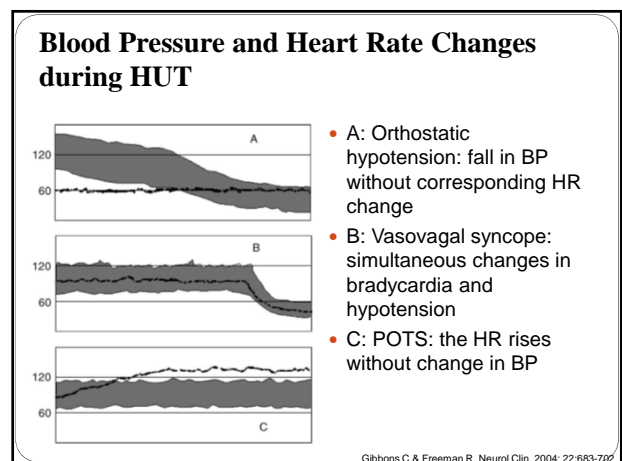
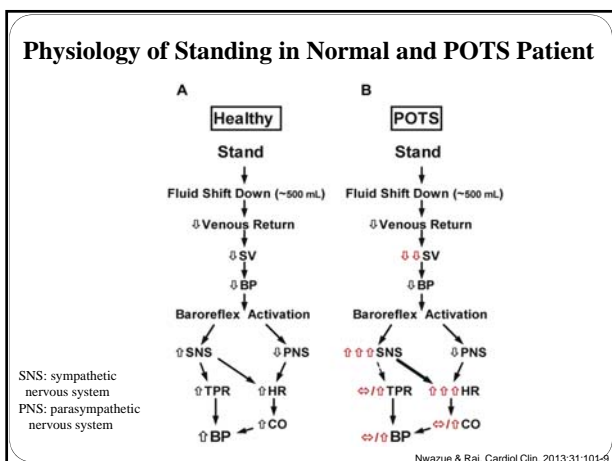
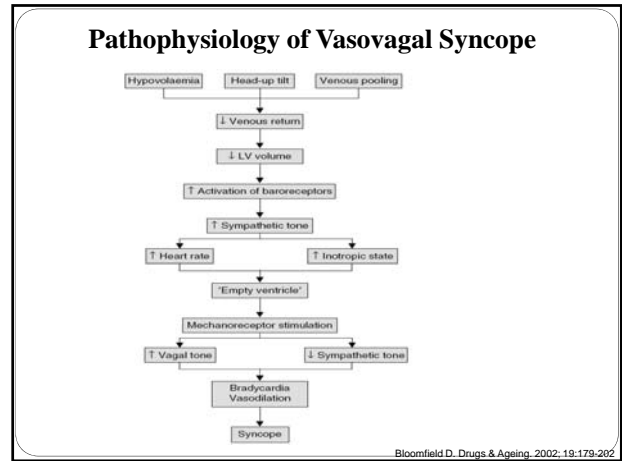
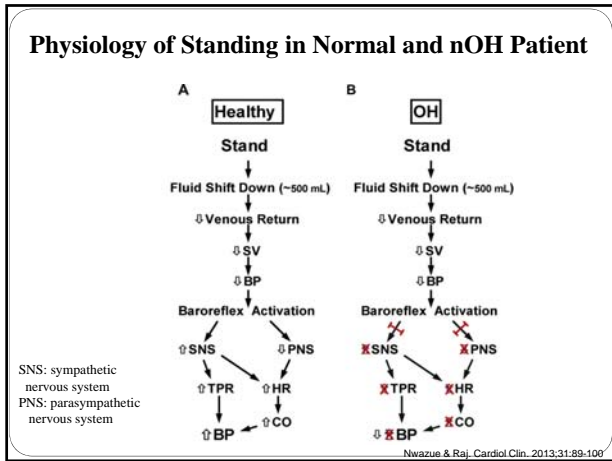
Positive Tilt Table Test

- Hemodynamics
 - Hypotension
 - Bradycardia
 - Mixed
 - **Cerebral dysautoregulation:** cerebral vasoconstriction and decreased CBFV in the absence of hypotension
- Reproduction of Symptoms
 - Syncope
 - Pre-syncope
 - **Orthostatic intolerance**

Neurohumoral Response to Orthostatic Stress



Mosqueda-Garcia R et al. Circulation. 2000; 102:2898-2906



P	TIME	S	D	MEAN	HEART RATE
+		131	73	88	100
		118	70	81	93
		122	64	81	95
T		76	53	59	96
		81	55	61	103
		87	57	62	103
		88	59	67	103
		90	55	64	100
		86	55	61	101
		86	55	61	96
		83	54	62	97
	83	57	63	98	
10min		81	55	61	96
+		113	66	77	86
		118	60	77	82

P	TIME	S	D	MEAN	HEART RATE
+		140	72	91	62
		132	69	92	60
		124	75	93	61
		126	73	92	61
		128	74	92	64
		122	68	88	58
		124	66	89	61
		126	70	94	61
T		113	72	93	81
		125	72	97	91
		121	70	92	101
		118	65	93	100
		113	67	95	105
		129	67	89	108
		119	61	85	114
		126	65	80	114
		134	75	93	121
		121	81	93	115

**POTS: diagnostic criteria:
HR increase > 30 bpm after HUT**

手背 BP 記錄表

P	TIME	S	D	MEAN	HEART RATE
+		125	66	91	61
		132	59	77	67
T		130	74	91	76
		124	63	83	76
		141	95	122	96
		137	71	97	86
		112	67	100	75
		112	69	84	96
		127	91	111	123
		78	59	69	112
		72	35	45	126
		119	87	98	93
+		113	72	93	88
		148	75	106	102
		121	56	79	106
+		107	60	78	108
		86	56	67	101
		111	61	83	95
		120	65	80	94

POTS?!

Syncope Related to Cerebral Hypoperfusion

- Insufficient venous return: orthostatic syncope
- Insufficient cardiac output: cardiogenic syncope
- Insufficient vascular tone/resistance: orthostatic syncope
- Insufficient baroreflex function: reflex syncope/neurocardiogenic syncope
- Increased resistance to cerebral blood flow (cerebral vasoconstriction): **cerebral syncope?**

HUT: Normal Results

P	TIME	S	D	MEAN	HEART RATE
平		117	66	83	89
		123	67	84	87
平		117	67	88	64
		120	64	70	66
		122	63	84	66
		122	66	84	66
		120	68	84	66
		119	67	82	66
		117	65	83	65
		123	67	87	66
		124	76	88	67
		128	68	78	66
平		115	60	85	67
		125	69	70	55

Normal range: <25%

Cerebral Syncope

Abnormal late phase II response: Hypo- α adrenergic state

Chung et al. Eur Neurol. 2005;54:98-102

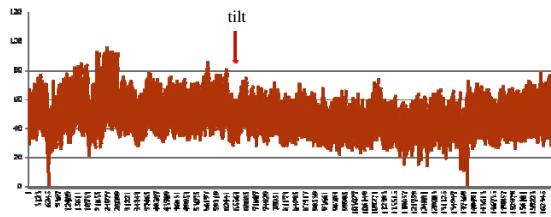
Back to Our Case #1: Tilt Table Test Results

Position	Time (minutes)	SBP	DBP	Mean	Heart rate
Baseline	1	119	63	83	85
Baseline	6	118	63	83	84
Tilt	1	122	74	74	141
Tilt	2	127	69	86	125
Tilt	3	99	66	78	117
Tilt	4	113	67	92	125
Tilt	5	115	73	90	126
Tilt	6	113	69	87	131
Tilt	7	113	66	85	131
Tilt	8	112	65	80	135
Tilt	9	107	67	84	129
Tilt	10	109	63	90	129
Lying down	1	119	65	84	84
Lying down	3	119	63	84	83

Case #2: Tilt Table Test Results (201410)

Cerebral Dysautoregulation

MCA flow drop: 33% after tilting (Normal: < 25%)

Case #2: FU Tilt Table Test Results (201507)

MCA flow drop: 24% after tilting (Normal: < 25%)

After 7 months' therapy (Nimodipine 30 mg bid)

Cerebral Autoregulation in Chronic Dizziness

Study Aims

- to quantitatively evaluate the dynamic cerebral autoregulation in normal subjects and chronic dizzy patients with normal caloric test to explore the role of dysfunction of cerebral autonomic regulations on patients with chronic dizziness.

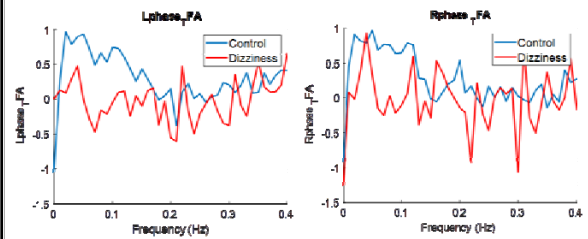
Material and Method

- Patients:
 - Male or female, aged over 20 years old
 - Chronic (> 3m) nonvertiginous dizziness
 - Normal video-oculography and caloric testing
- Head-up tilt test and TCD monitoring

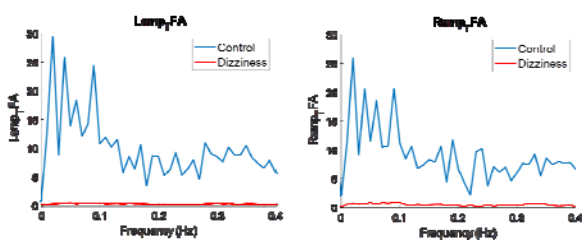
Results

- Participants:
 - thirty-two normal subjects (11 male and 21 female, mean age: 31 years old)
 - five chronic dizziness patients (one male and four female, mean age: 46 years old)
- Head-up tilt test and TCD monitoring
 - patient group all had abnormal phase, gain and coherence performance under both low frequency (LF) and high frequency (HF) spectrum than controls, especially in the LF band

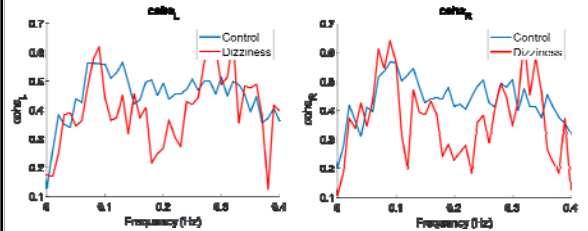
Results: Phase



Results: Gain



Results: Coherence



Conclusions

- Overall, our findings confirmed that there was an imbalance in the central autonomic nervous system accommodation mechanism in chronic dizzy patient group.

