DISCLOSURE

Relevant Financial Relationship(s)

None

Off Label Usage

None

Case Study

A 90 year-old female was admitted to hospital because confusion, diarrhea, INR > 10. Her care taker found her sitting on the toilet, without clothes, for unknown duration of time. She lives alone, with meals-on-wheels service, manages her own meds. Care taker and daughter visit q 2-3 days.

Admission to neurology service. Confusion improved. Neuro eval unremarkable. Further questions revealed: "I have sat on the toilet all night; I just could not get up!!" "I have fell 2-3 times; I don't know why!"

Past hx: HTN, hyperlipidemia, AF on warfarin, diabetes, breast CA, CAD with prior stents

Home meds: Losartan, Lasix, lovastatin, glipizide, warfarin

Case Study

Exam: afebrile, 51 Kg, 154 cm, small, frail, BP 176/95 supine, 140/90 upright, HR 89 – 90 bpm irregular, multiple echymoses on arms and legs at various stages of healing, II/VI SEM; "in good spirit"

Labs: Hgb 9.8, WBC 9.4, FBS 123, cr 0.6, INR 1.4 after vit K

EKG
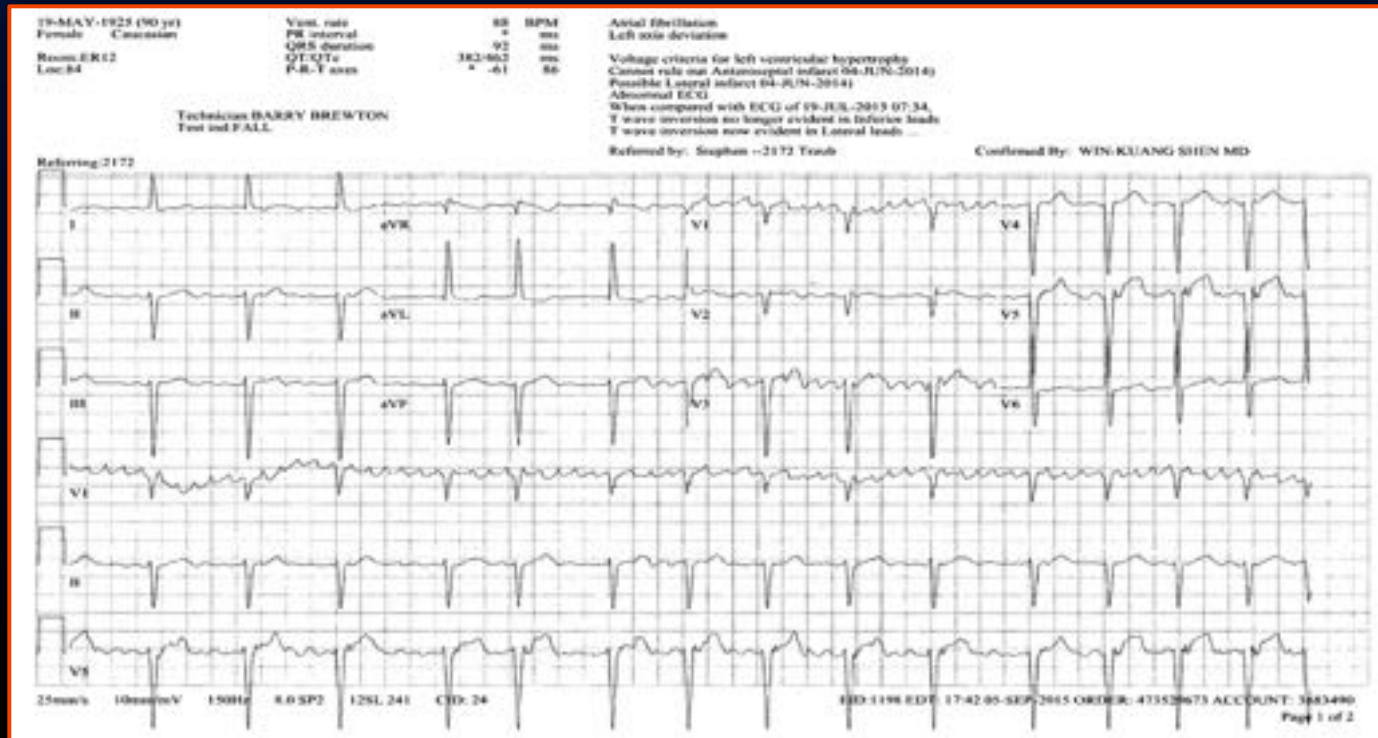
Case Study

Hospital day #2: she was ambulating with a four-wheeled walker and assistance of PT around the nursing station. She complained of left hip pain and stated "I won't make it back to my room!!" According to the nursing record: "her legs buckled; she became unconscious; she was held up by the PT, did not sustain a ground-level fall; she was placed in the chair and transferred to her bed"

After she was returned to bed, she regained consciousness; she was found to be incontinent of urine: HR 75, BP 164/86 mmHg, RR 16, SPO2 96% on RA.

When she was asked about this episode: she stated "isn't this funny!! I just could not keep myself up!!"

Rhythm Strip From Telemetry

Case Study: Management
90 year-old woman with recurrent falls

An EP consult was requested. What would you recommend?

1. *Consider tilt table testing and carotid sinus massage*

2. *Discontinue Lasix*

3. *A single chamber PM implantation*

4. *Continue monitoring, consider an insertable loop recorder*

5. *More home care/supervision*

Learning Objectives

- *To describe the epidemiology and public health impact of falls and syncope in the elderly*

- *To list the overlap characteristics and common factors causing falls and syncope*

- *To discuss the challenges of multiple potential causes of falls/syncope*

- *To describe appropriate evaluation and management of elderly with unexplained falls and syncope*

Impact of Falls

- ~ 1/3 of individuals ≥ 65 years of age experiences a fall in the U.S.

- 8% of adults ≥ 70 yrs attend ER because of falls yearly

- 33% of fallers who attend ER are hospitalized

- In 1999, falls cost the US $32.4 billion

- Falls are the most common single reason for admission to long-term care (40%)

- Fatal falls are increasing

Kannus P, *JAMA 1999*; 2B1:1895-1899.; Center for Disease Control and Prevention, 2013

Why Age Matters?
Syncope and Falls

- **Age-related reduction in reserve capacity**
  - **Cardiopulmonary**
  - **Immune**
  - **Carbohydrate metabolism**
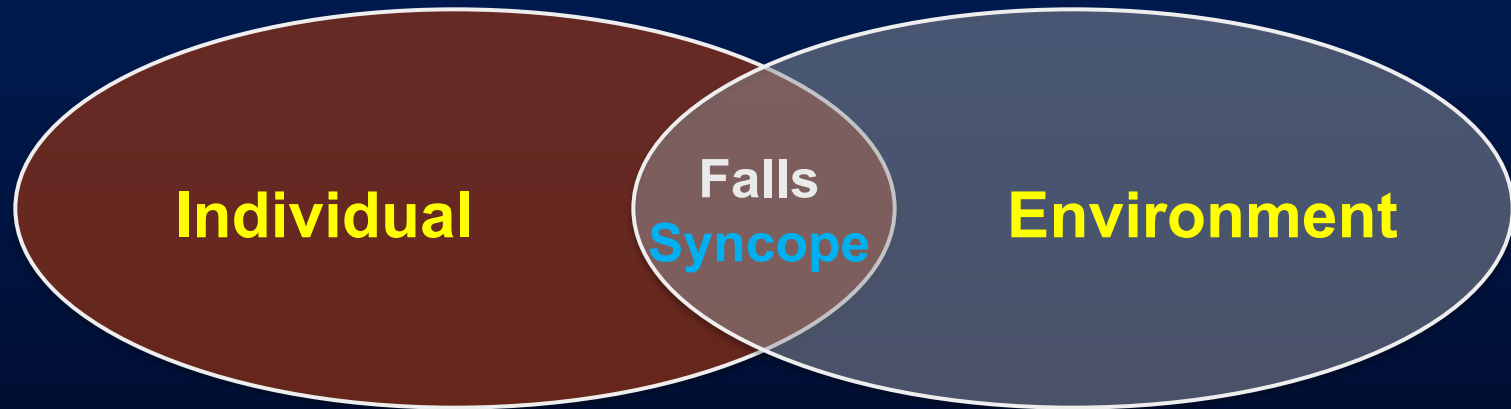 - **Hepatic/Renal**
  - **Cognitive**
- **Multiple morbidities (e.g., DM, CHD, AD, HTN)**
- **Multiple medications**
- **Poor baseline nutrition (tea and toast diet)**
- **Sensory impairment (vision and hearing loss)**

Age (yrs)	Frailty Prevalence (%)
>65	~8
70	15
75	28
80	32
85	38
90	40

Causes of Falls in Elderly Adults

Cause	Mean percentage (%)	Range (%)
'Accident'/environment related	31	1-53
Gait/balance disorders or weakness	17	4-39
Dizziness/vertigo	13	0-30
Drop attack	9	0-52
Confusion	5	0-14
Postural hypotension	3	0-24
Visual disorder	2	0-5
Syncope	0.3	0-3
Other specified causes	15	2-39
Unknown	5	0-21

Rubenstein: Age and Aging, 2006

Overlap of Falls & Syncope

- Amnesia for loss of consciousness makes acquisition of an accurate history difficult

- Cognitive impairment influences the accuracy of recall for events

- Gait and balance instability and slow protective reflexes are frequent in community-dwelling older people; in these circumstances moderate hemodynamic changes insufficient to cause syncope may result in falls

Brignole: Age and Aging, 2006

Unexplained Falls
Prevalence of Carotid Sinus Hypersensitivity

Kenny et al: J Cardiovasc Electrophysiol 14:S74, 2003 (suppl)
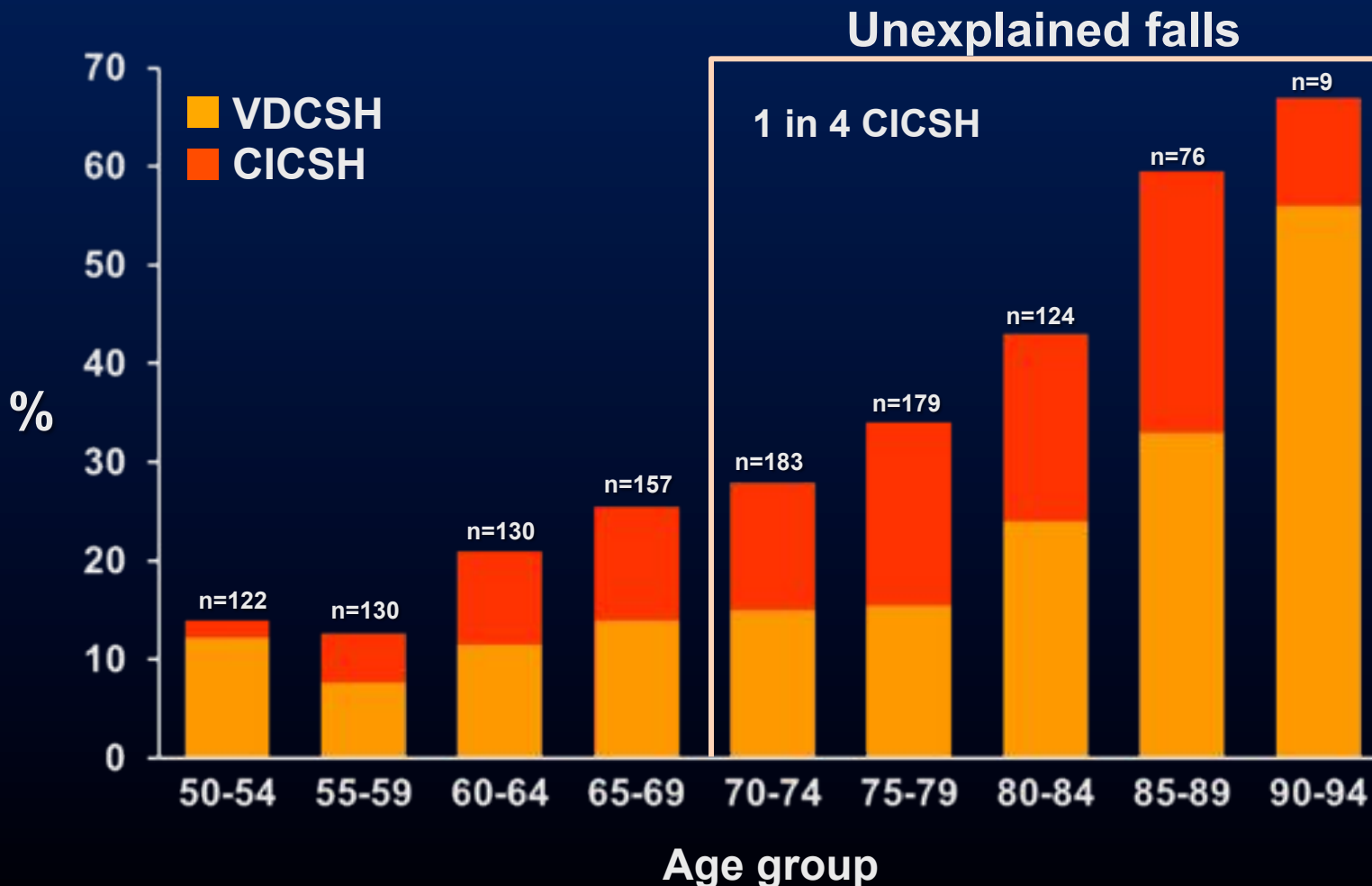
Pacing in Elderly
Recurrent Falls with Carotid Sinus Hypersensitivity

Time to First Fall: Survival Analysis

DDDR/RDR pacemaker on

ODO pacemaker off

Cum survival

Days to first fall

Parry, Kenny et al: Heart 95:405, 2009
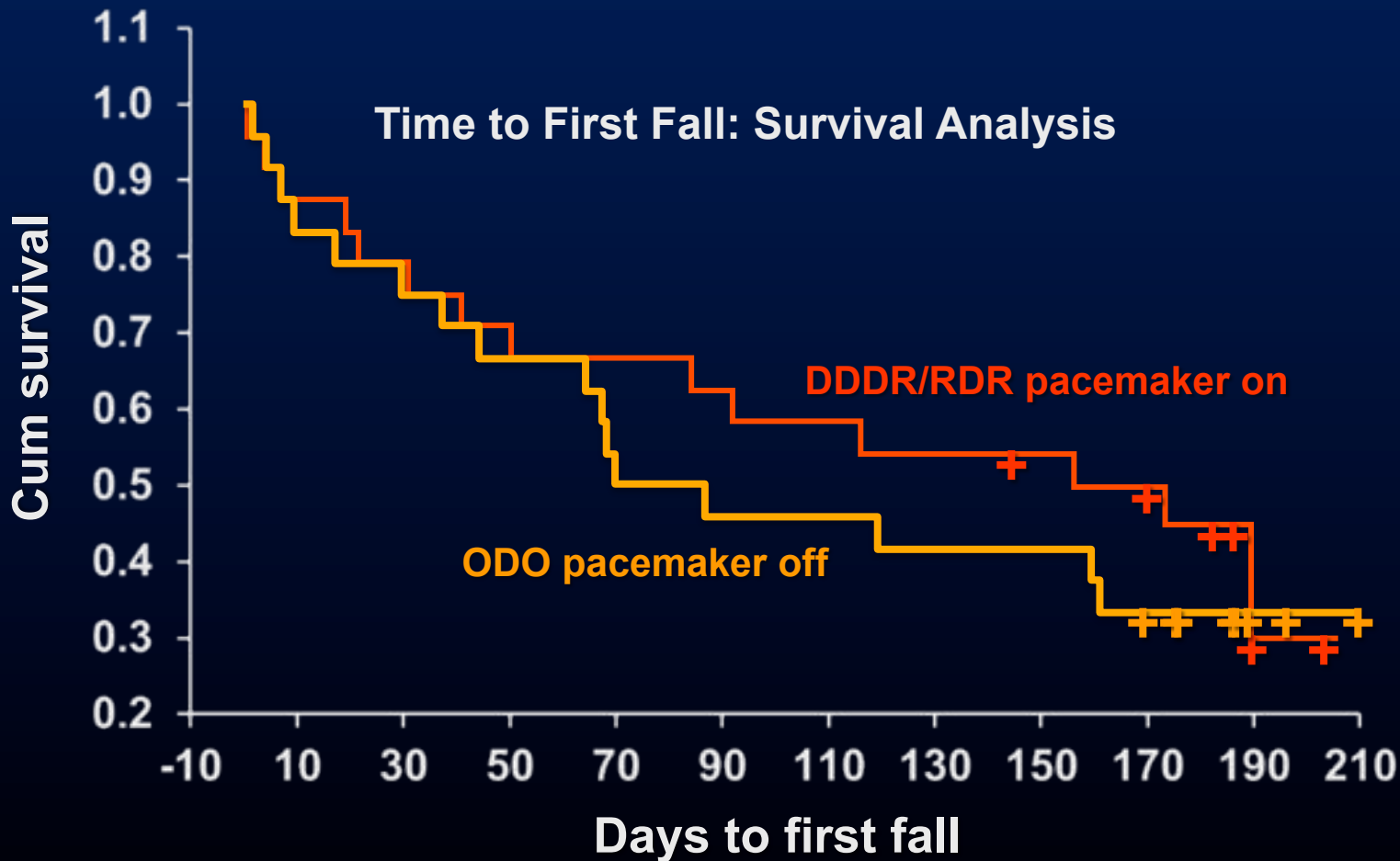
Recurrence of Syncope in Untreated and Paced Patients Affected by CSS

No therapy
Pacemaker

Brignole 92

Blanc 84

Claesson 07

Claesson 07

Menozzi 93

Brignole 92

Sugrue 86

Crilley 97

Morley 82

Brignole 92

Claesson 07

Walter 78

Lopes 11

Sugrue 86

Claesson 07

Blanc 84

Stryjer 86

Brignole 92

%

Years

Patients with Unknown, Single, and Multiple Causes of Syncope in Each Age Group

	Diagnosis (no.)									
	0		**1**		**2**		**3**		**4**	
	Patients		Patients		Patients		Patients		Patients	
Age (yr)	No.	%	No.	%	No.	%	No.	%	No.	%
<40	49	19.9	169	68.7	27	11.0	1	0.4	0	
40-64	62	22.6	166	60.4	41	14.9	6	2.2	0	
65-75	44	16.3	167	61.9	49	18.2	10	3.7	0	
76-79	19	16.5	66	57.4	26	22.6	4	3.5	0	
≥80	21	20.0	56	53.3	26	24.8	1	1.0	1	
Total	195	19.3	624	61.7	169	16.7	22	2.2	1	

Syncope vs. Falls
Key Elements of Focused Evaluation

History

- Differentiating accidental falls from "unexplained" falls

- Presence or absence of LOC or near LOC in patients with unexplained falls

- Is syncope suspected?

- Heightened awareness of the accuracy of history

Exam

- Orthostatic vital signs

- Cardiac examination (rate, rhythm, murmurs)

- Additional evaluation for falls

  Distance visual acuity

  Gait and balance evaluation*

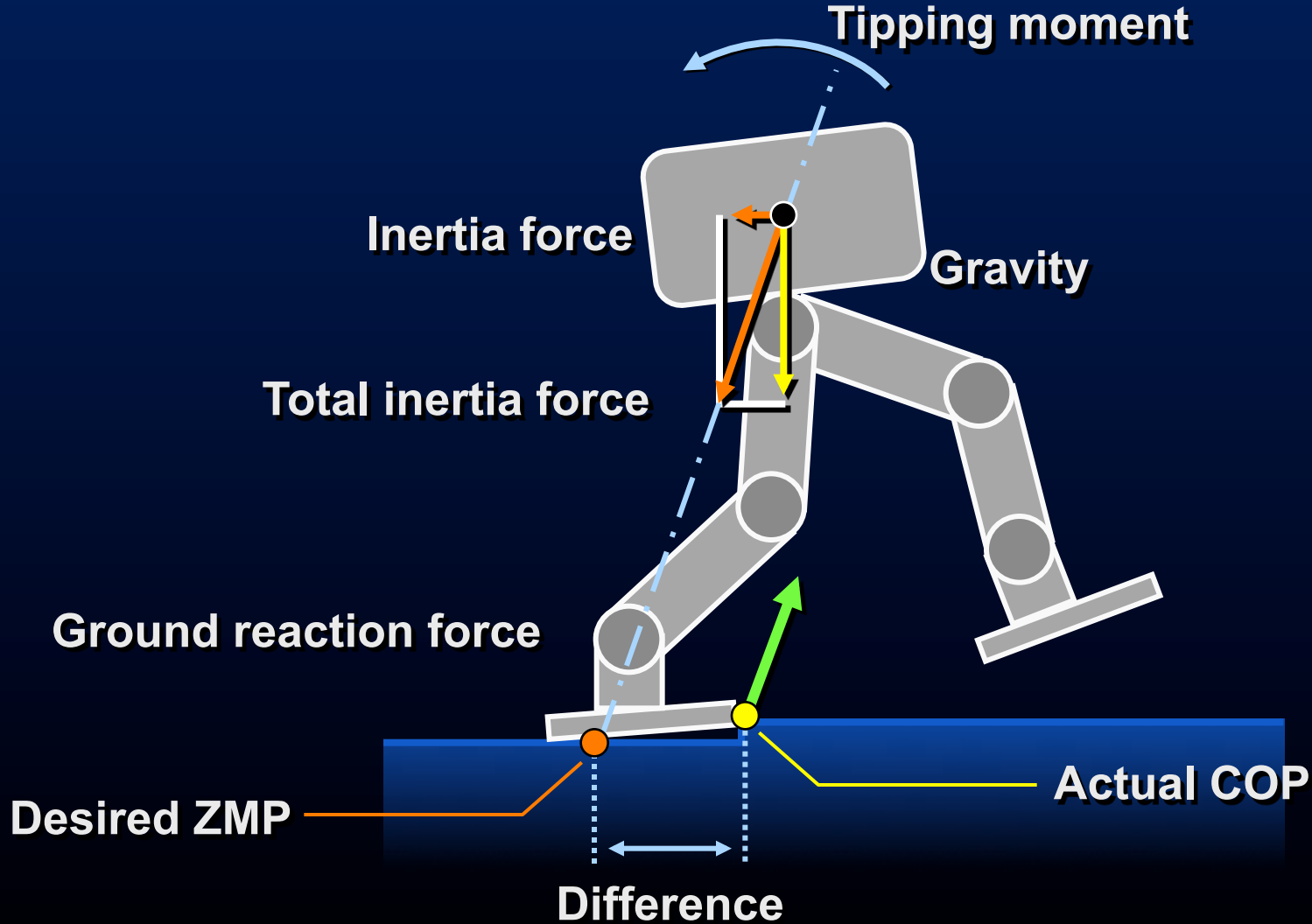 Neuro-Muscular examination
  - Cognitive screen
  - Sensation
  - Proprioception
  - Muscle bulk, tone, strength, reflexes, and range of motion
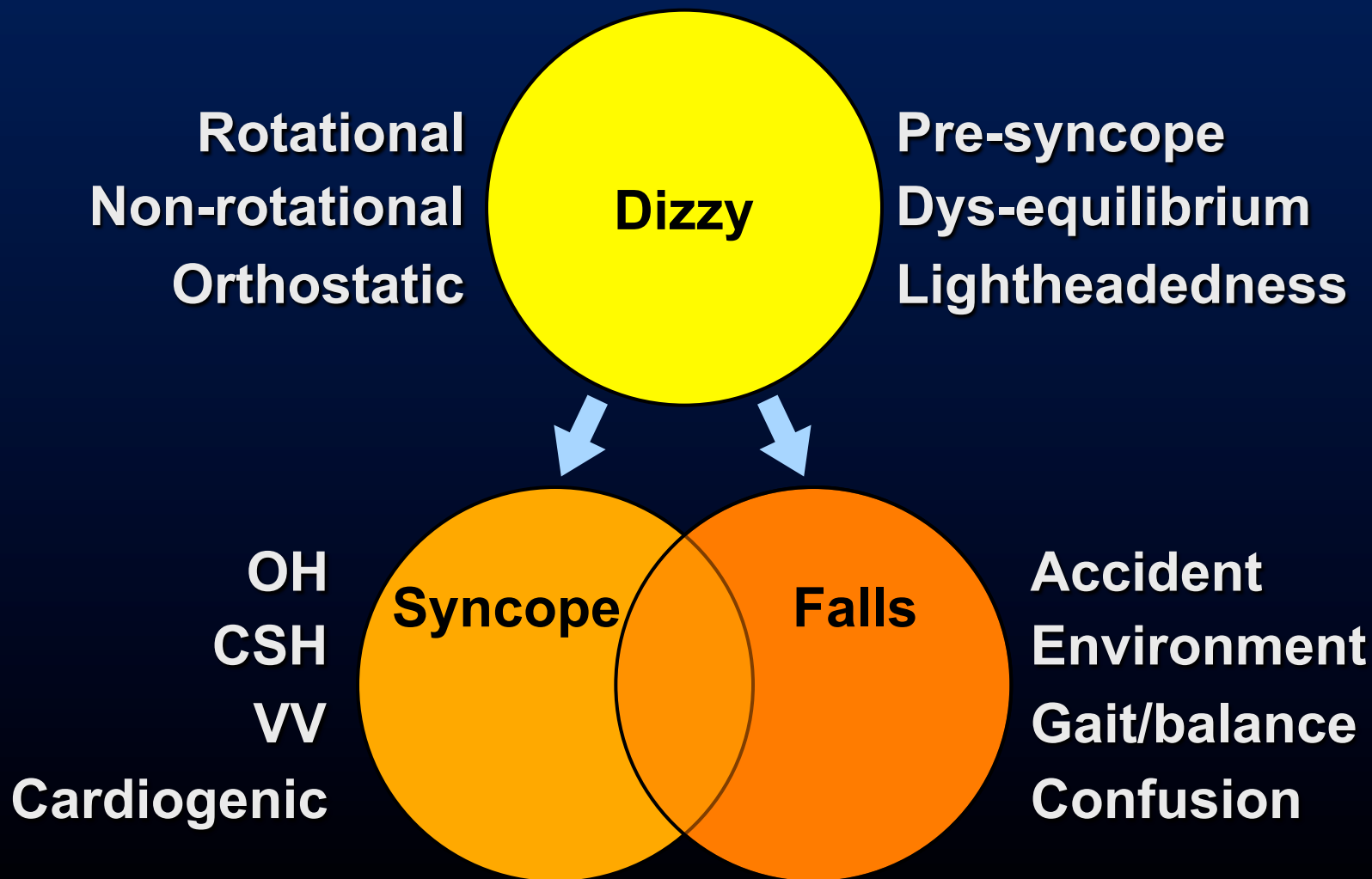 - Higher neurologic function (cerebellar, motor cortex, basal ganglia)

Prevention of Falls

Source		
American Geriatrics	Clinical practice guideline on	http://www.americangeriatrics.org/health_care_professionals/clinical_practice/clinical_guidelines_recommendations/prevention_of_falls_summary_of_recomm
CDC	STEADI toolkit	www.cdc.gov/injury/steadi
Centers for Medicare Centers for Medicare	Welcome to Medicare (Initial Preventive Physical Examination) Visit Welcome to Medicare (Initial	www.cms/gov/Outreach-and-Education/ Medicare_Learning_Network_MLN/
Centers for Medicare and Medicaid Services Centers for Medicare	Annual Wellness visit	www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MNL/ www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MNL/
National Council on Aging	Fact sheets about Medicare coverage for fall-related clinical services Fact sheets about Medicare	www.ncoa.org/improve-health/falls-
National Institute on Aging	Go4Life exercise DVD and manual	http://go4life.nia.nih.gov

Prevention of Falls

Tipping moment

Inertia force

Gravity

Total inertia force

Ground reaction force

Desired ZMP

Actual COP

Difference

Takenaka: Age and Aging, 2006