



33rd Annual Ironman Sports Medicine
Conference
Thursday October 12th, 2023



Exercise Associated Collapse: From Benign to Fatal

Professor Gregory P Whyte OBE PhD DSc FBASES FACSM

Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE



Exercise Associated Collapse (EAC)



Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE

Exercise Associated Collapse (EAC)

EAC is a collapse in conscious athletes who are unable to stand or walk unaided as a result of light headedness, faintness and dizziness or syncope* causing a collapse that occurs after completion of an exertional event.

Asplund et al. BJSM 2011;45:1157-1172

EAC is principally the result of transient postural hypotension caused by lower extremity pooling of blood once the athlete stops running and the resultant impairment of cardiac baroreflexes

Holtzhausen & Noakes Clin J Sport Med 1997;7:292-301.

Exercise Associated Collapse (EAC)

EAC is the most common aetiology confronted by the medical provider attending to collapsed athletes in a finish-line tent (59-85% post-marathon), HOWEVER, providers must first maintain vigilance for other potential life-threatening aetiologies that cause collapse

Non-Serious Causes

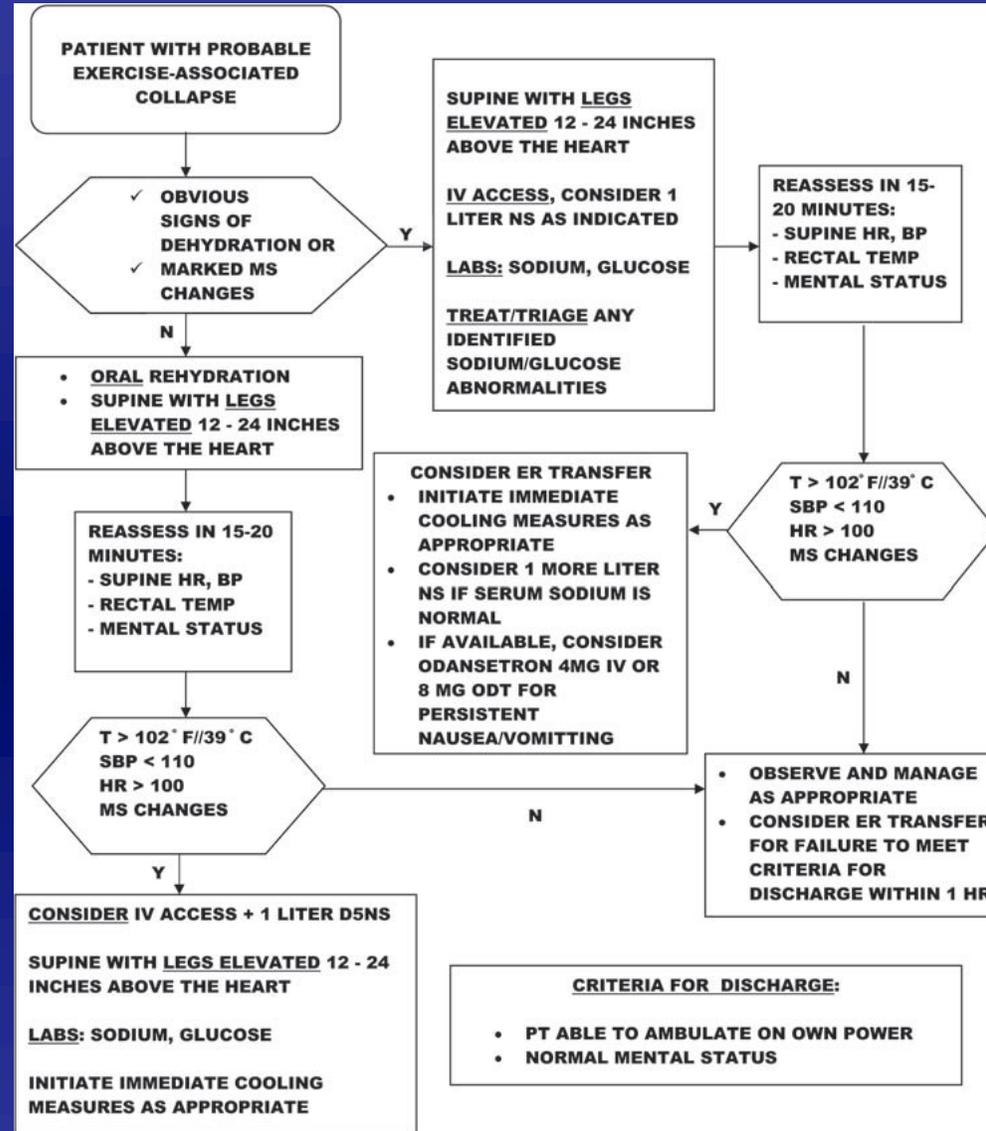
- Exhaustion
- Dehydration
- Postural Hypotension
- Muscle Cramps

Serious Causes

- Hyponatremia
- Heatstroke
- Hypoglycemia
- Hypothermia
- Cardiac Arrest
- Other medical Conditions i.e. seizures, diabetic coma

EAC Treatment Algorithm

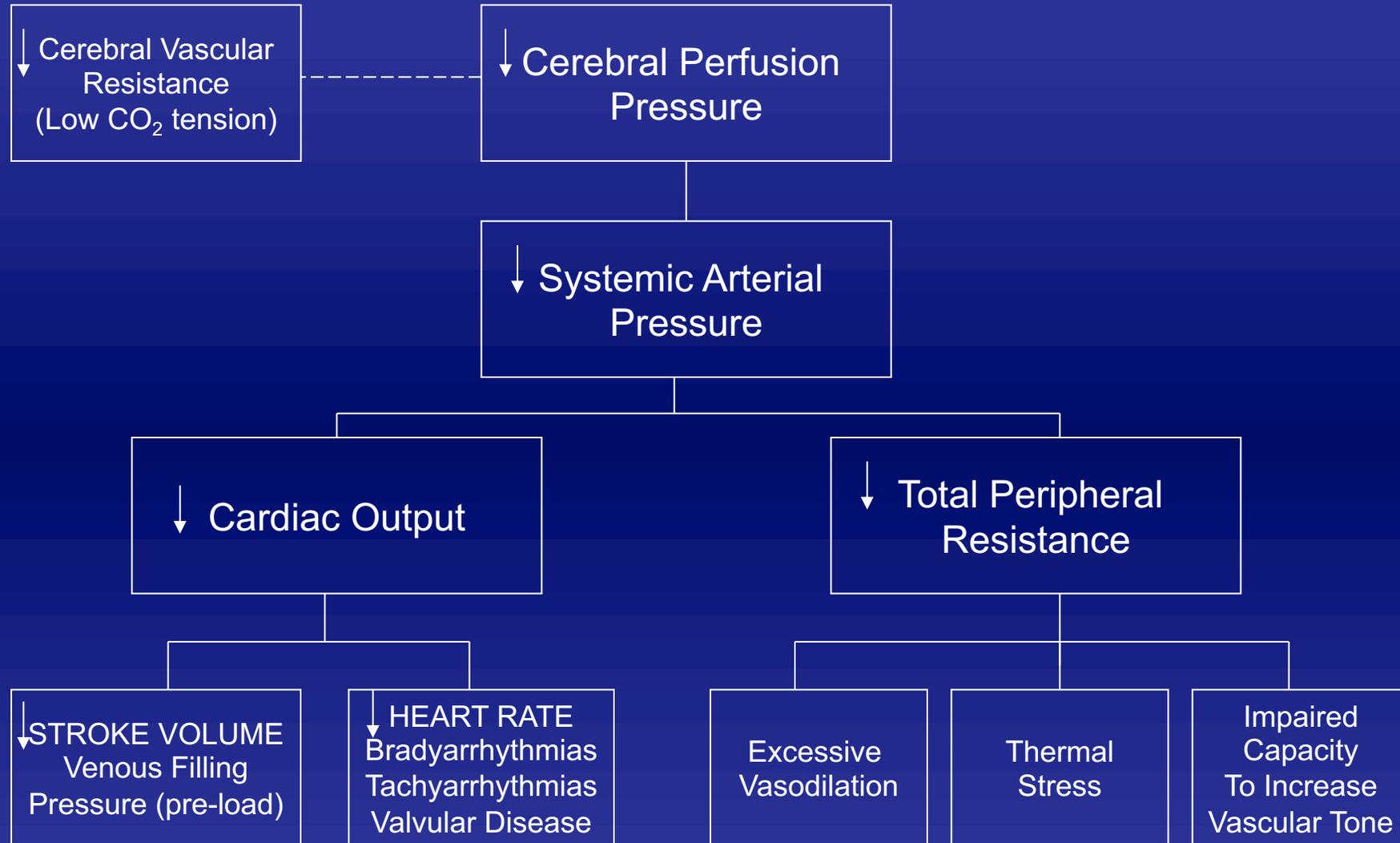
Asplund et al. *BJSM* 2011;45:1157-1172



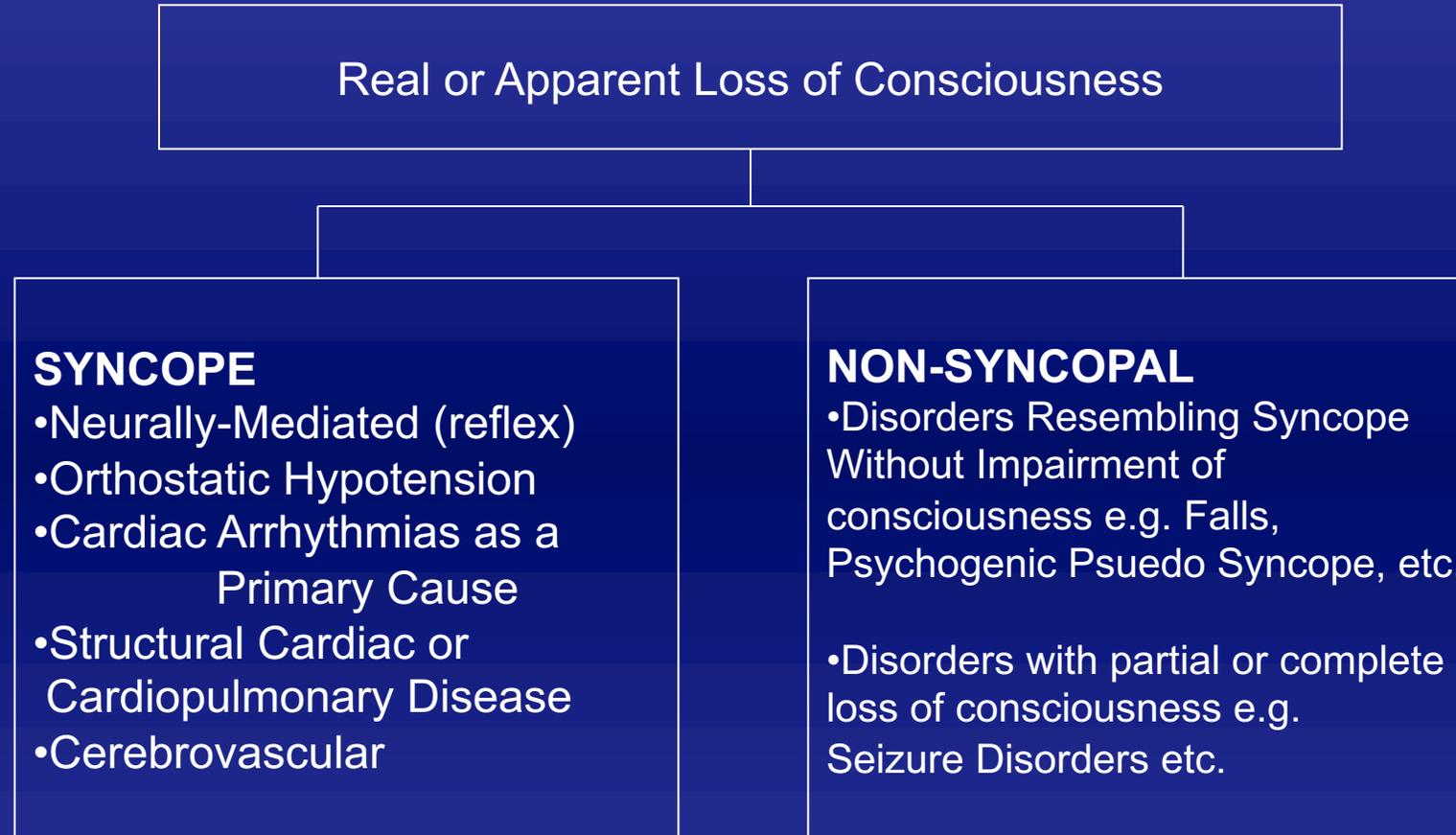
SYNCOPE

- A transient, self-limited loss of consciousness and loss of postural tone usually leading to falling
- Usually rapid onset with spontaneous, complete and prompt recovery
- Occasional pre-monitory period with various symptoms
- Underlying mechanism – Cerebral Hypoperfusion

Pathophysiology of Syncope



Syncope Classification



ESC Guidelines EHJ 2004;6:467-537

Causes of Syncope

Neurally-Mediated (Reflex)

Vaso-vagal (classical, non-classical)
Carotid Sinus
Situational
Glosopharyngeal Neuralgia

Orthostatic Hypotension

Autonomic Failure (inc. post-exercise)
Drug (and alcohol) Induced
Volume Depletion

Cardiac Arrhythmias

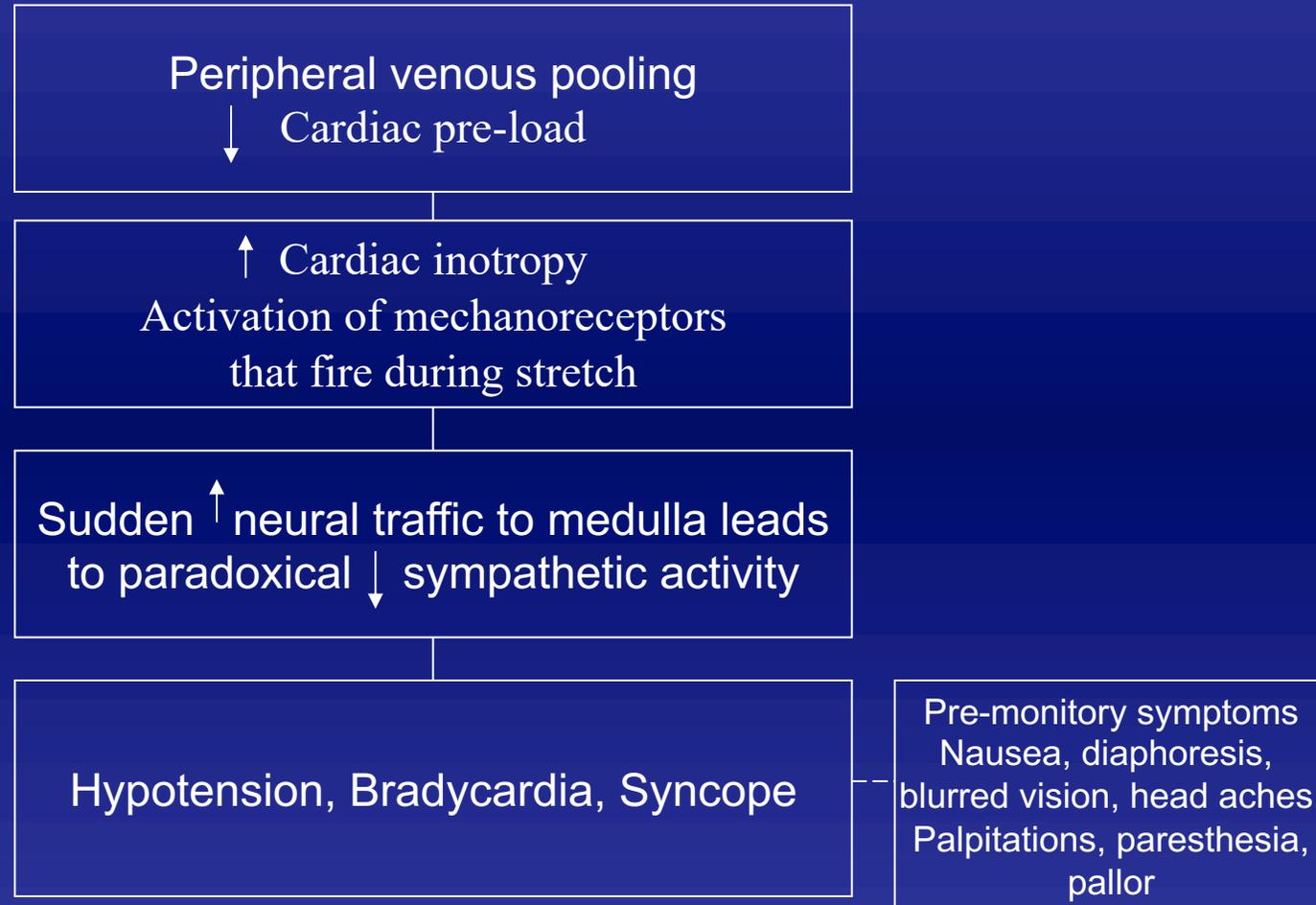
Sinus Node Dysfunction
AV conduction system disease
Paroxysmal SVT and VT
Inherited Syndromes
Implantable device malfunction
Drug-Induced Pro-Arrhythmias

Structural Cardiac or Cardiopulmonary Disease

Cardiac Valvular Disease
Acute MI/Ischaemia
Obstructive Cardiomyopathy
Atrial Myxoma
Acute Aortic Dissection
Pericardial Disease/Tamponade
Pulmonary Embolus/hypertension

Cerebrovascular

Neurally Mediated/Reflex [inc. situational]



Orthostatic Tolerance in Athletes

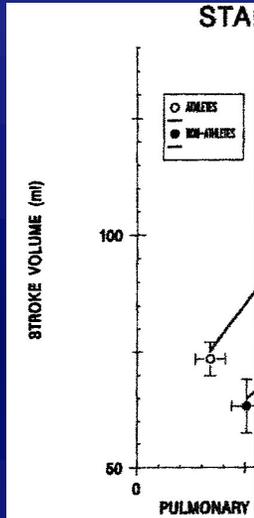


FIGURE 3. Mean group Starling curves relating pulmonary stroke volume in athletes are representative of the fits of the best polynomial

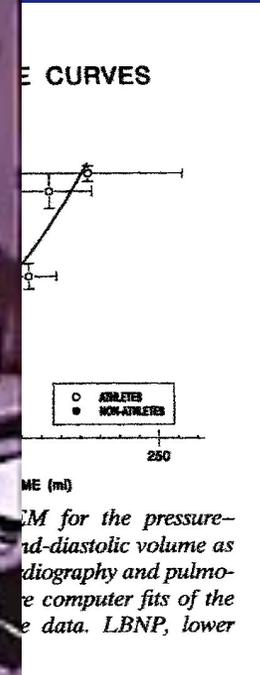
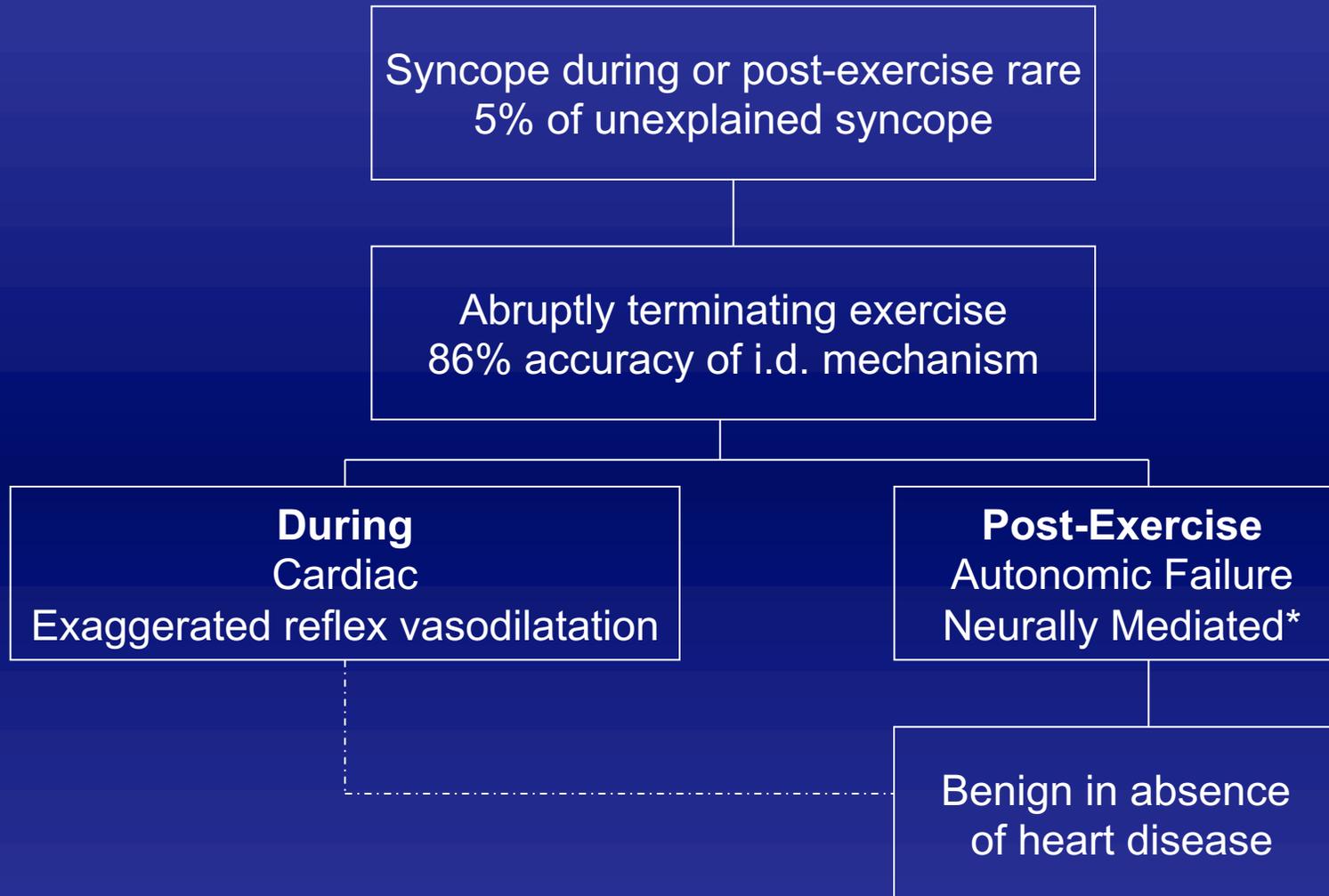


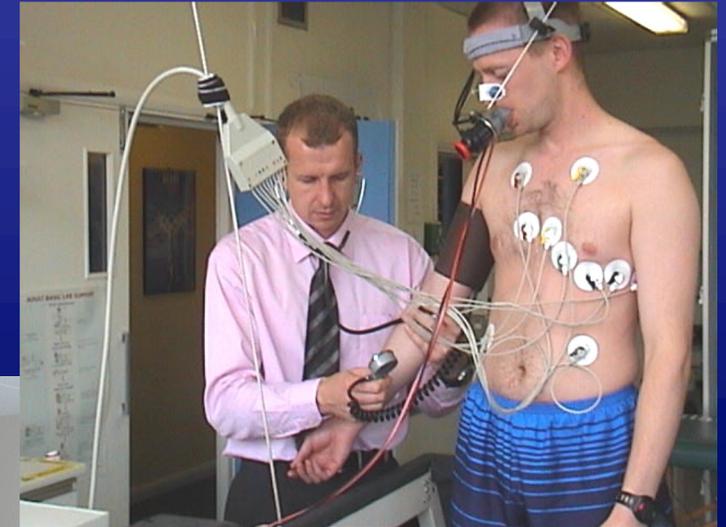
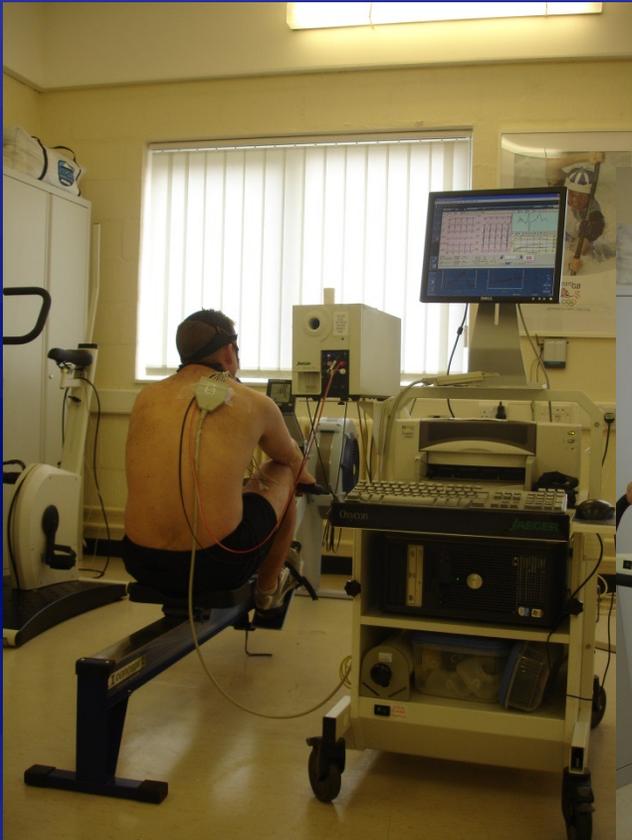
FIGURE 4. Mean group Starling curves relating pulmonary stroke volume in athletes are representative of the fits of the best polynomial

1991;84:1016-1023

Integrated Cardio-pulmonary Stress Testing



Integrated Cardio-pulmonary Stress Testing



Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE

Age: 35 y
Height: 182 cm
Physician:

Sex: Male
Weight: 70 kg
Referral:

HR 102
BP 190/80

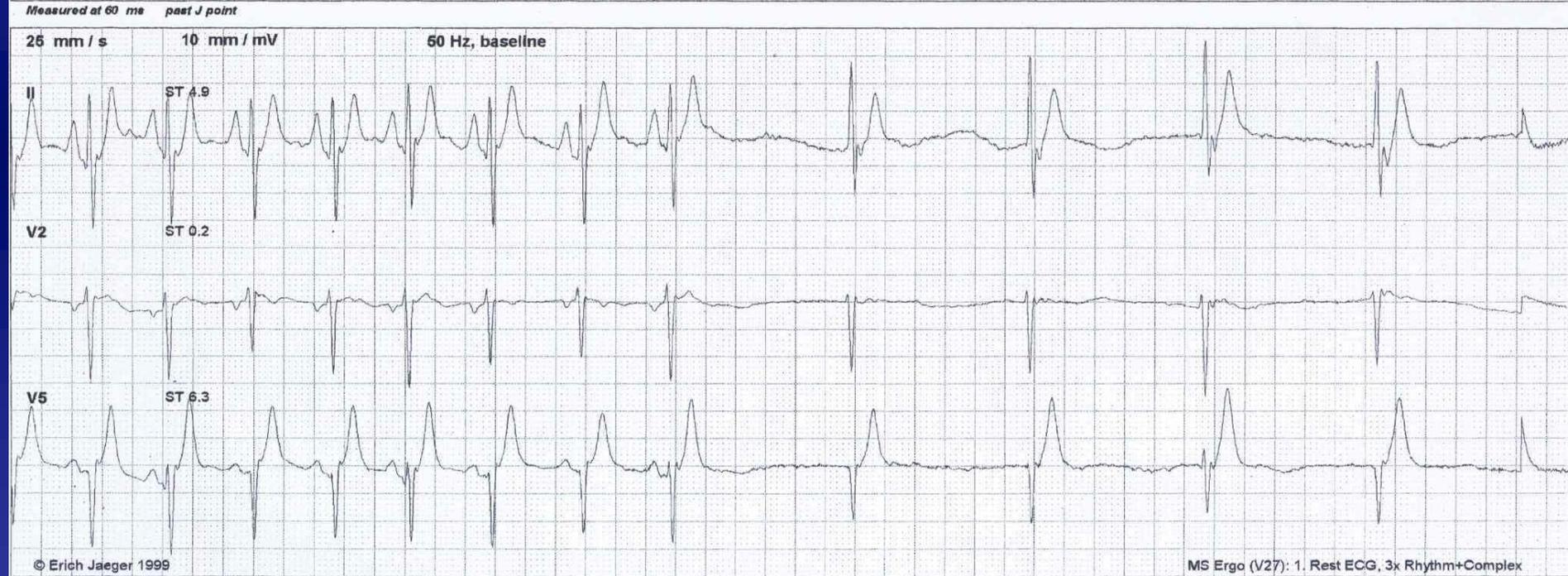
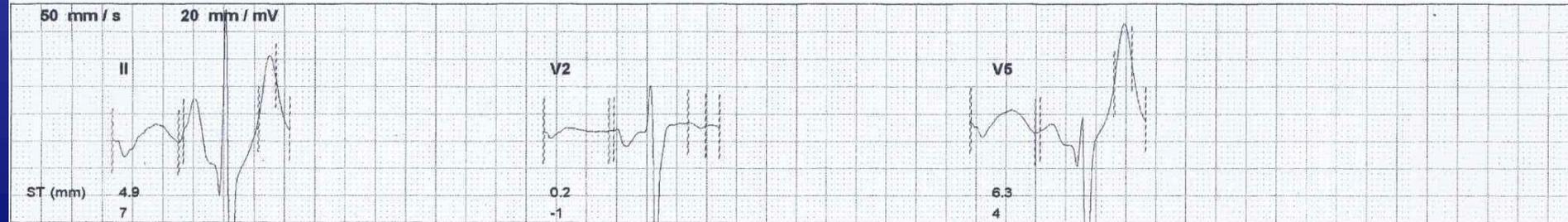
Time: 19:06

Rest Measurements:

< P: -75 ° P: 217 ms QT: 350 ms
< R: -99 ° PR: 233 ms QTc B: 283
< T: 65 ° QRS: 246 ms

Computer Interpretation: (manual, not overread)

Physician Confirmation _____

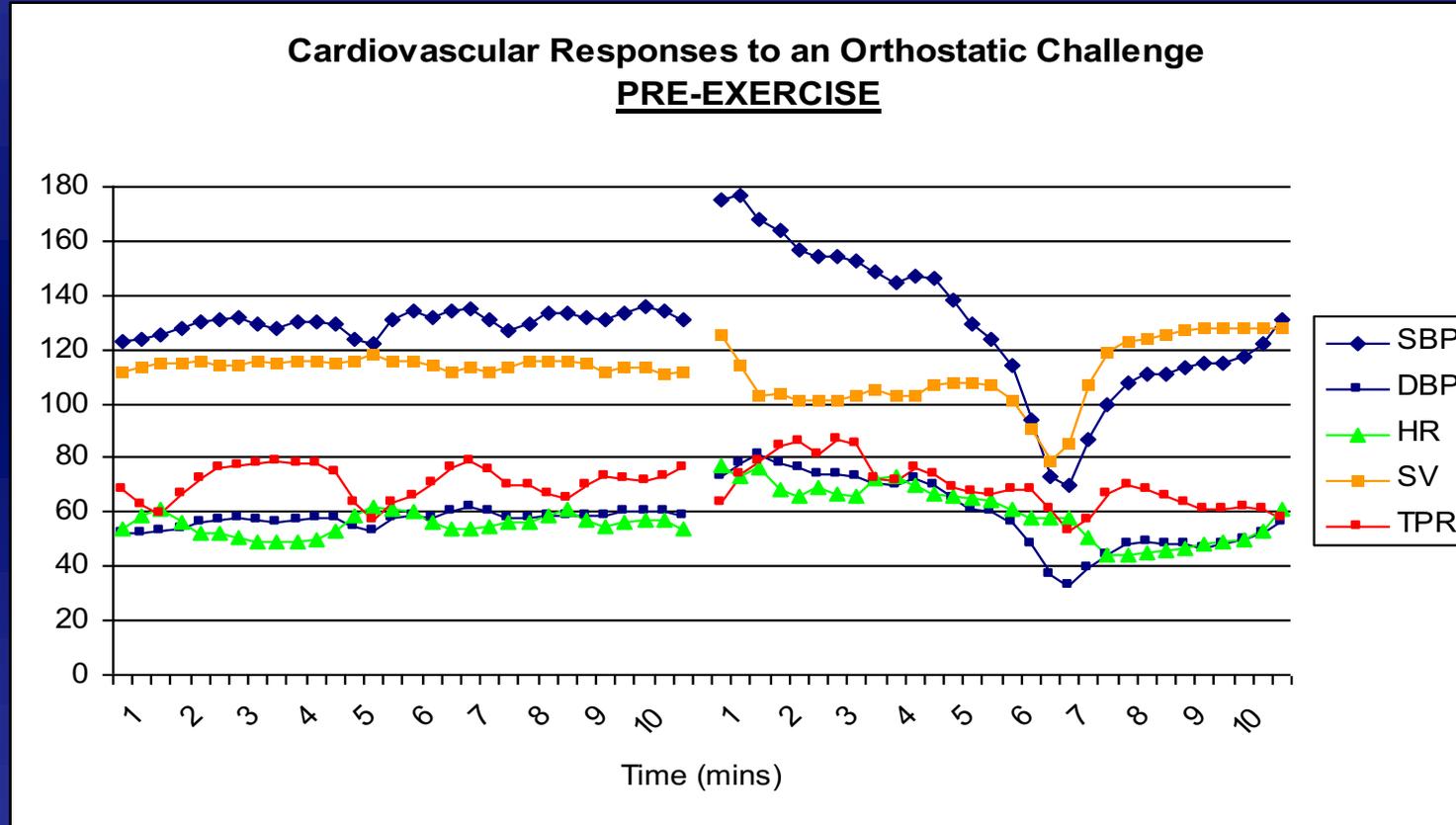




Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE



Orthostatic Intolerance Pre-Exercise



Treatment

Neurally Mediated (reflex) syncope [inc. vaso-vagal]

- Reassurance [Athlete, Coach, Family, Peers]
- Education
 - Avoid triggering events
 - Recognise pre-monitory symptoms
 - Manoeuvres to abort episode
- Continue to exercise [avoid sudden cessation of activity]
- Volume expanders – increase salt/electrolyte intake
- ‘Tilt-training’ [particularly in recurrent group]
- Isometric counter pressure
- Compression clothing *Privett SE, George KP, Whyte GP, et al. Clin J Sport Med 2010;20:362–7.*

* Drugs [Beta-blockers, disopyramide, scopolamine, clonidine, theophylline, fludrocortisone, ephedrine, etilefrine, midodrine, serotonin reuptake inhibitors]



Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE



FOLLOW-UP IS ALWAYS INDICATED IN FRANK SYNCOPE



IRONMAN[®]
WORLD CHAMPIONSHIP
MEDICAL SYMPOSIUM

Outrigger Kona Resort – Kailua-Kona, Hawai'i
OCTOBER 8–12, 2023

THANK YOU

Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE



Research Institute for Sport & Exercise Sciences
FACULTY OF SCIENCE

