ΑΡΙΣΤΟΤΕΛΕΙΟ
ΠΑΝΕΠΙΣΤΗΜΙΟ
ΘΕΣΣΑΛΟΝΙΚΗΣ

ΑΣΚΗΣΗ ΚΑΙ ΠΝΕΥΜΟΝΙΚΗ ΚΥΚΛΟΦΟΡΙΑ

ΠΑΡΟΥΣΙΑΣΗ ΠΕΡΙΣΤΑΤΙΚΩΝ

ΕΥΑΓΓΕΛΙΑ ΠΑΝΑΓΙΩΤΙΔΟΥ
ΕΙΔΙΚΕΥΟΜΕΝΗ ΠΝΕΥΜΟΝΟΛΟΓΙΑΣ
ΜΟΝΑΔΑ ΑΝΑΠΝΕΥΣΤΙΚΗΣ ΑΝΕΠΑΡΚΕΙΑΣ
Γ.Π.Ν.Θ. «Γ. ΠΑΠΑΝΙΚΟΛΑΟΥ»

Παρουσίαση περιστατικών

- Χρόνια θρομβοεμβολική πνευμονική υπέρταση
- Πνευμονική υπέρταση σε έδαφος συστηματικού σκληροδέρματος
- Διερεύνηση δύσπνοιας σε ασθενή με ιδιοπαθή πνευμονική ίνωση

Περιστατικό #1

Γυναίκα, 55 ετών

2011: Πνευμονική Εμβολή

2012: ΧΘΠΥ

2012: ενδαρτηρεκτομή

2012-2014: σιλντεναφίλη

2015: διακοπή

2018: σταθερή

2012:
πριν την ενδαρτηρεκτομή

VO_2 peak: 49% **> 84%**
AT: 35% **> 40% (40-80%)**

Breathing reserve: 25 lt **> 11 lt**

SpO_2: 97%→ 82%
VE/VCO_2@AT: 50 **< 34**

HR peak: 71% **> 90%**
BP response: normal

2015:

3 έτη μετά

VO_2 peak: 71%
AT: 37%

Breathing reserve: 29 lt

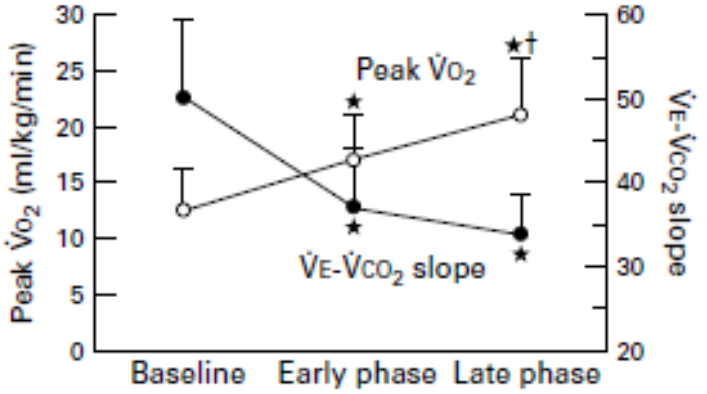
SpO_2: 98%→ 92%
VE/VCO_2@AT: 35

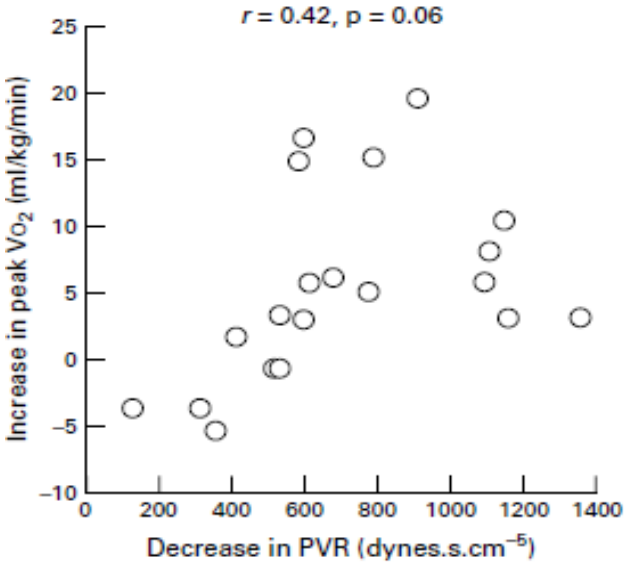
HR peak: 82%
BP response: normal

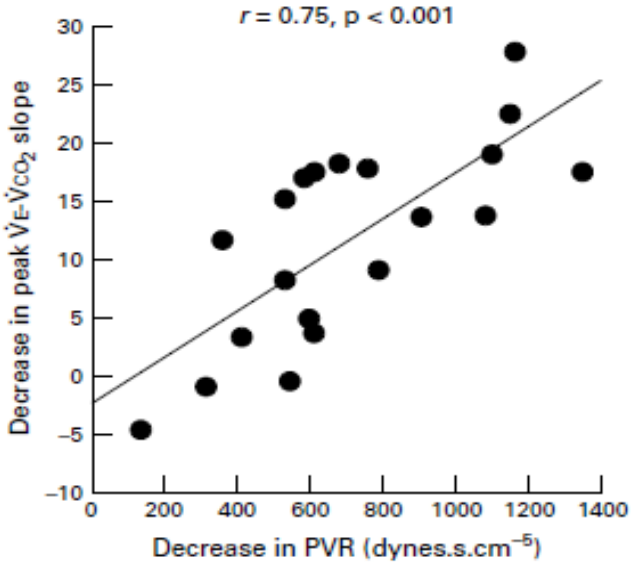
	καρδιαγγειακός	αναπνευστικός
Peak VO_2	↓	↓
AT	↓	— ή ↓
$\Delta VO_2/\Delta WR$	Συχνά ↓	—
Peak HR	— ή ↓	— ή ↓
Peak VO_2/HR	Συχνά ↓	↓
Breathing reserve	>11 lt	<11 lt
FEV_1	—	— ή ↓
SaO_2	—	Συχνά ↓
VD/VT,VE/VCO_2	— ή ↑	Συχνά ↑

Acute and chronic effects of surgical thromboendarterectomy on exercise capacity and ventilatory efficiency in patients with chronic thromboembolic pulmonary hypertension

T Iwase, N Nagaya, M Ando, T Satoh, F Sakamaki, S Kyotani, H Takaki, Y Goto, Y Ohkita, M Uematsu, N Nakanishi, K Miyatake







Iwase et al, Heart 2001

Περιστατικό #2

- Γυναίκα
- 64
- Σκληρόδερμα-Πνευμονική ίνωση
- Αρτηριακή Υπέρταση

- MRC 3

Ήπια περιοριστική διαταραχή
με σημαντική ελάττωση της διάχυσης

- FEV_1: 76%
- FEV_1/FVC%: 85%
- TLC: 52%
- DLCO: 33%
- KCO: 69%

Σταθερή από έτους

- Ήπια διάταση ΑΡ κόλπου
- Ήπια διάταση δεξιών κοιλοτήτων
- RVSP 32-38 mmHg

2015

VO_2 peak: 75% **> 84%**

AT: 46% **> 40% (40-80%)**

Breathing reserve: 9lt **>11 lt**

SpO_2: 98%→92%

VE/VCO_2@AT: 43 **< 34**

HR peak: 85% **> 90%**

mPAP=17 mmHg

2016

VO_2 peak: 64%

AT: 36%

Breathing reserve: 8 lt

SpO_2: 98%→90%

VE/VCO_2@AT: 46

HR peak: 84%

mPAP=28 mm Hg
Σιλδεναφίλη

Heart. 2017 May;103(10):774-782. doi: 10.1136/heartjnl-2016-309981. Epub 2017 Jan 6.

Cardiopulmonary exercise testing for detecting pulmonary arterial hypertension in systemic sclerosis.

Dumitrescu D[1,2], Nagel C[3,4], Kovacs G[5], Bollmann T[6], Halank M[7], Winkler J[8], Hellmich M[9], Grünig E[3], Olschewski H[5], Ewert R[6], Rosenkranz S[1,2].

Developing Pulmonary Vasculopathy in Systemic Sclerosis, Detected with Non-Invasive Cardiopulmonary Exercise Testing

PLoS one 2010

Daniel Dumitrescu[1,2,5]*, Ronald J. Oudiz[1,3], George Karpouzas[1,4], Arsen Hovanesyan[1,3], Amali Jayasinghe[1,2], James E. Hansen[1,2], Stephan Rosenkranz[5], Karlman Wasserman[1,2]

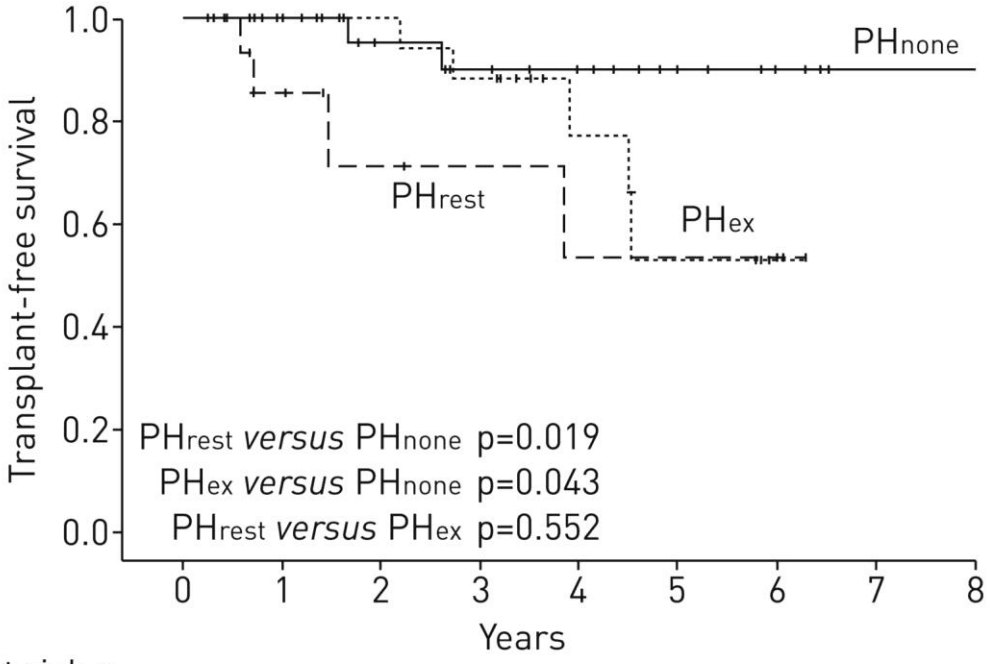
Phenotyping exercise limitation in Systemic Sclerosis: the use of Cardiopulmonary Exercise Testing

Afroditi K.Boutou, Georgia G.Pitsiou, Panagiota Siakka, Theodoros Dimitroulas, Asimina Paspala, Evdokia Sourla, Nikolaos Chavouzis, Alexandros Garyfallos, Paraskevi Argyropoulou, Ioannis Stanopoulos

Respiration 2015

Exercise pulmonary haemodynamics predict outcome in patients with systemic sclerosis

Adriana Stamm, Stéphanie Saxer, Mona Lichtblau, Elisabeth D. Hasler, Suzana Jordan, Lars C. Huber, Konrad E. Bloch, Oliver Distler, Silvia Ulrich



Patients at risk n

PHrest	17	10	5	4	3	3	2	0	0
PHex	28	23	17	15	7	4	4	0	0
PHnone	27	23	18	15	12	7	4	1	1

European Respiratory Journal 2016

Περιστατικό #3

- Γυναίκα
- 67
- Ιδιοπαθής πνευμονική ίνωση υπό Esbriet
- Υποθυρεοειδισμός

- MRC 2
- GAP stage 1

Ήπια περιοριστική διαταραχή
με ελάττωση της διάχυσης

- FEV_1: 78%
- FEV_1/FVC%: 82%
- TLC: 61%
- DLCO: 55%
- KCO: 94%

- 428 m
- 96→88%

- Διαστολική δυσλειτουργία αριστερής κοιλίας
- RVSP 34 mmHg

2018

VO_2 peak: 106 **> 84%**

AT: 77% **> 40% (40-80%)**

Breathing reserve: 21 **>11 lt**

SpO_2: 97%→92%

VE/VCO_2@AT: 37 **< 34**

HR peak: 66% **> 90%**

RHC

sPAP 33 mmHg

dPAP 17 mmHg

mPAP 22 mmHg

PAWP 12 mmHg

CO 6,4 L/min

PVR 1,5 W

Πρωτόκολλο άσκησης

- RHC ηρεμία
  - sPAP 33 mmHg
  - dPAP 17 mmHg
  - mPAP 22 mmHg
  - PAWP 12 mmHg
  - CO 6,4 L/min
  - PVR 1,5 W
- RHC άσκησης
  - $sPAP_{max}$ 59 mmHg
  - $dPAP_{max}$ 23 mmHg
  - $mPAP_{max}$ 35 mmHg
  - $PAWP_{max}$ 14 mmHg
  - CO_{max} 6,8 L/min
  - PVR_{max} 3 W
  - TPR_{max} 5,1 W

J Am Coll Cardiol. 2017 Sep 26;70(13):1618-1636. doi: 10.1016/j.jacc.2017.08.012.

Cardiopulmonary Exercise Testing: What Is its Value?

Guazzi M[1], Bandera F[2], Ozemek C[3], Systrom D[4], Arena R[3].

Abstract

Compared with traditional exercise tests, cardiopulmonary exercise testing (CPET) provides a thorough assessment of exercise integrative physiology involving the pulmonary, cardiovascular, muscular, and cellular oxidative systems. Due to the prognostic ability of key variables, CPET applications in cardiology have grown impressively to include all forms of exercise intolerance, with a predominant focus on heart failure with reduced or with preserved ejection fraction. As impaired cardiac output and peripheral oxygen diffusion are the main determinants of the abnormal functional response in cardiac patients, invasive CPET has gained new popularity, especially for diagnosing early heart failure with preserved ejection fraction and exercise-induced pulmonary hypertension. The most impactful advance has recently come from the introduction of CPET combined with echocardiography or CPET imaging, which provides basic information regarding cardiac and valve morphology and function. This review highlights modern CPET use as a single or combined test that allows the pathophysiological bases of exercise limitation to be translated, quite easily, into clinical practice.

AHA Scientific Statement

Clinician's Guide to Cardiopulmonary Exercise Testing in Adults

2010

A Scientific Statement From the American Heart Association

EACPR/AHA Scientific Statement

2016 Focused Update: Clinical Recommendations for Cardiopulmonary Exercise Testing Data Assessment in Specific Patient Populations

Marco Guazzi, MD, PhD, FAHA, FESC, Co-Chair*; Ross Arena, PhD, PT, FAHA, FESC, Co-Chair†; Martin Halle, MD*; Massimo F. Piepoli, MD, PhD, FESC*; Jonathan Myers, PhD, FAHA; Carl J. Lavie, MD

EUROPEAN SOCIETY OF CARDIOLOGY®

European Heart Journal (2012) **33**, 2917–2927
doi:10.1093/eurheartj/ehs221

POSITION STATEMENT

EACPR/AHA Joint Scientific Statement

Clinical recommendations for cardiopulmonary exercise testing data assessment in specific patient populations


Σας ευχαριστώ!