Ανάλυση ισορροπίας και κινητικότητας σπονδυλικής στήλης

Ενότητα 11: Ερευνητικά δεδομένα

Εισηγητής: Πατίκας Δ.
Τμήμα Επιστήμης Φυσικής Αγωγής & Αθλητισμού, Σερρών
Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο
ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
ΕΚΠΑΙΔΕΥΣΗ ΚΑΙ ΔΙΑ ΒΙΟΥ ΜΑΘΗΣΗ
επένδυση στην κοινωνία της γνώσης
ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ
ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ
Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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Επίδραση της όρασης στις πτώσεις

Graefes Arch Clin Exp Ophthalmol (2010) 248:527–533
DOI 10.1007/s00417-009-1260-x

LOW VISION

The relationship between visual function, duration and main causes of vision loss and falls in older people with low vision

Ecosse Lamoureux · Sandeep Gadgil ·
Konrad Pesudovs · Jill Keeffe · Eva Fenwick ·
Mohamed Dirani · Satu Salonen · Gwyn Rees

N=127
Ηλικία:76 ετών

Μικρό πρόβλημα	Μέτριο πρόβλημα	Μεγάλο πρόβλημα
37%	50%	13%

Πτώσεις το τελευταίο 12μηνο: 42% μία φορά, 13% πολλές φορές

Ερώτημα: αποτελεί η ασθενής όραση παράγοντα πρόβλεψης πτώσεων;

Table 2 Clinical characteristics of the 127 visually impaired participants of the study

Characteristics		Total (n=127)	Non-faller (n=73)	Faller (n=54)	P value[b]
Eye conditions	AMD	12 (9.4%)	9 (75%)	3 (25%)	0.11
	Cataract	27 (21.3%)	17 (63%)	10 (27%)	
	DR	25 (19.7%)	12 (48%)	13 (52%)	
	Glaucoma	42 (33.1%)	27 (64.3%)	15 (35.7%)	
	Other	21 (16.5%)	8 (38.1%)	13 (61.9%)	
Depth perception	Gross stereopsis[a]	72 (56.7%)	42 (58.3%)	30 (41.7%)	0.85
Visual acuity (LogMAR-mean ± SD)	Better eye	0.73±0.49	0.73±0.49	0.73±0.48	0.96
	Worse eye	1.59±0.65	1.56±0.65	1.64±0.64	0.50
	Binocular	0.72±0.47	0.72±0.49	0.71±0.46	0.92
Contrast sensitivity (db-mean ± SD)	Worse eye	1.04±0.45	0.49±0.53	0.39±0.48	0.33
	Better eye	0.45±0.51	1.10±0.42	0.96±0.47	0.12
	Binocular	1.02±0.47	1.10±0.45	0.93±0.50	0.11
Visual field (mean ± SD)	Points missed	16.03±12.6	13.75±14.3	17.27±10.3	0.28
Duration of impairment (years)	Median (range)	4 (1–65)	4.0 (1–65)	4.5 (1–57)	0.25

AMD = age-related macular degeneration, DR = diabetic retinopathy

[a] Data missing for two patients

[b] p values derived from chi-squared and ANOVA tests, as appropriate.

Ερώτημα: αποτελεί η ασθενής όραση παράγοντα πρόβλεψης πτώσεων;

Table 1 Characteristics of the 127 visually impaired participants of the study

Patients' characteristics		Total (127)	Non-faller (n=73)	Faller (n=54)	P value
Age (years)	Mean ± SD	76.3±8.3	76.2±8.4	76.4±8.7	0.88
Gender	Female	60 (47.2%)	33 (55%)	27 (45%)	0.72
Country of birth	Australia	50 (39.7%)	25 (50%)	25 (50%)	0.21
Smoker	Never	53 (41.7%)	27 (50.9%)	26 (49.1%)	0.36
	Current	13 (10.3%)	7 (53.8%)	6 (46.2%)	
	Past	61 (48.0%)	39 (63.9%)	22 (36.1%)	
Other conditions	Diabetes	48 (37.8%)	28 (38.4%)	20 (37.0%)	0.81
	Arthritis	44 (37.8%)	22 (30.1%)	22 (40.7%)	0.26
	History of stroke	8 (6.3%)	1 (1.4%)	7 (13.0%)	0.01[b]
	[illegible]	[illegible]	[illegible]	[illegible]	0.43
	COPD	1 (0.8%)	0 (0.0%)	1 (100%)	0.43
	Urinary incontinence	35 (27.6%)	18 (51.4%)	17(48.6%)	0.43
	Hearing impairment	[illegible]	[illegible]	[illegible]	0.05
	Foot problems	40 (31.5%)	21 (52.5%)	19 (47.5%)	0.45
Use of	Anti-depressants	8 (6.3%)	3 (37.5%)	5 (62.5%)	0.28
	[illegible]	[illegible]	[illegible]	[illegible]	0.01[b]
Physical activity	Yes	95 (74.8%)	62 (65.3%)	33 (34.7%)	<0.01[b]
	No	32 (25.2%)	11 (34.4%)	21 (65.6%)	
General health	Very good/excellent	29 (22.8%)	19 (65.5%)	10 (34.5%)	0.85
	Good	46 (36.2%)	28 (60.9%)	18 (31.1%)	
	Poor/fair	52 (40.9%)	26 (50%)	26 (50%)	
Alcohol	Regular consumption	47 (37.0%)	30 (63.8%)	17 (36.2%)	0.35
IADL[a]	Summary score (mean±SD)	11.6±4.3	12.8±3.4	10.1±4.1	<0.01[b]

[a] IADL: Instrumental Activities of Daily Living summary score ranging between 0 and 16, where a low score indicates substantial difficulty undertaking activities of daily living.

[b] $p<0.05$

Απάντηση: όχι από μόνη της.
Ωστόσο έλλειψη άσκησης σε αυτά τα άτομα είναι καθοριστικός παράγοντας

Σχέση όρασης και πτώσεων

CLINICAL INVESTIGATIONS

Visual Risk Factors for Falls in Older People

Stephen R. Lord, PhD, and Julia Dayhew, BAppSc (Occupational Therapy)

OBJECTIVES: To determine the tests most predictive of falls in community-dwelling older people from a range of visual screening tests (high and low contrast visual acuity, edge contrast sensitivity, depth perception, and visual field size). To determine whether one or more of these visual measures, in association with measures of sensation, strength, reaction time, and balance, can accurately predict falls in this grou

Key words: vision; visual acuity; contrast sensitivity; depth perception; visual field loss; older; accidental falls

A number of studies of older people's risk of falling have

Table 3. Visual and Sensorimotor Measures: Non-Faller, Once-Only Faller, Multiple Faller Comparisons

Test	Nonfallers	1 Fall	2+ Falls	Total
Visual acuity—both eyes†	1.30 (0.45)	1.51 (1.15)	2.69 (4.10)**	1.65 (2.06)
Visual acuity—worse eye†	2.91 (3.92)	3.20 (4.49)	5.04 (6.24)*	3.43 (4.68)
Visual acuity (lc)—both eyes†	2.31 (0.96)	2.66 (2.17)	4.44 (4.92)**	2.85 (2.71)
Visual acuity (lc)—worse eye†	5.06 (4.98)	4.84 (4.43)	7.19 (6.52)***	5.47 (5.28)
Contrast sensitivity (near MET)‡	20.1 (1. 9)	20.0 (3.0)	18.8 (3.7)*	19.8 (2.7)
Contrast sensitivity (distant MET)‡	20.7 (2.2)	20.8 (1.9)	19.0 (3.8)**	20.3 (2.7)
Depth perception§	1.99 (3.25)	1.98 (3.61)	5.76 (7.28)**	2.80 (4.72)
Frisby Stereoacuity score‖	139 (180)	132 (190)	303 (288)**	173 (219)
Visual field angle¶	66.7 (7.4)	67.3 (6.6)	63.2 (10.8)*	66.1 (8.2)
Proprioception#	1.75 (1.02)	1.60 (1.01)	2.06 (1.51)	1.79 (1.14)
Quadriceps strength (kg)	29.7 (11.7)	27.9 (12.0)	24.5 (10.4)***	28.2 (11.6)
Reaction time (ms)	267 (43)	278 (52)	311 (80)**	279 (57)
Sway††	159 (79)	143 (70)	229 (112)**	171 (90)

*Significant difference between multiple and nonmultiple fallers after controlling for age ($P < .05$).
**Significant difference between multiple and nonmultiple fallers after controlling for age ($P < .01$).
***Significant difference between multiple and nonmultiple fallers in bivariate analyses ($P < .05$), but not significant after controlling for age.
†Smallest visual angle (minutes) correctly reported at 4 meters.
‡Decibel log contrast.
§Centimeter difference in matching rods.
‖Frisby Stereotestscore in sec arc.
¶Visual angle from eye height to target on floor.
#Degrees difference.
††Millimeter squares traversed by swaymeter pen in 30 seconds.
MET = Melbourne Edge Test; lc = low contrast.

Table 1. Associations Between the Visual Measures and Age (r)

Test	r
Visual acuity—both eyes†	0.33*
Visual acuity—worse eye†	0.25*
Visual acuity (lc)—both eyes†	0.33*
Visual acuity (lc)—worse eye†	0.26*
Contrast sensitivity (near MET)‡	−0.37*
Contrast sensitivity (distant MET)‡	−0.35*
Depth perception§	0.32*
Frisby Stereotest score‖	0.24*
Visual field angle¶	−0.12

*$P < .01$.
†Smallest visual angle (minutes) correctly reported at 4 meters.
‡Decibel log contrast.
§Centimeter difference in matching rods.
‖Frisby Stereotest score in sec arc.
¶ Visual angle from eye height to target on floor.
MET = Melbourne Edge Test; lc = low contrast.

Table 4. Relative Risk of Multiple Falling for Persons in the Highest (Worst) Quartile Group for each Visual Test

Measure	Criterion*	RR (95% CI)	MH RR† (95%CI)
Visual acuity—both eyes	≥6/10	1.83 (0.98–3.39)	1.59 (0.85–2.98)
Visual acuity—worse eye	≥6/18	1.85 (1.01–3.38)	1.59 (0.87–2.90)
Visual acuity (lc)—both eyes	≥6/18	2.33 (1.29–4.21)	2.08 (1.17–3.71)
Visual acuity (lc)—worse eye	≥6/36	1.69 (0.91–3.15)	1.45 (0.77–2.71)
Contrast sensitivity (near MET)	≤18 decibels	1.76 (0.94–3.27)	1.46 (0.77–2.78)
Contrast sensitivity (distant MET)	≤18 decibels	2.24 (1.21–4.12)	1.93 (1.01–3.68)
Depth perception	≥2.4 cm	2.51 (1.40–4.51)	2.26 (1.24–4.14)
Frisby Stereotest score	≥215 sec arc	2.29 (1.25–4.19)	1.99 (1.11–3.59)
Visual field angle	≤60 degrees	1.21 (0.62–2.36)	1.25 (0.63–2.48)

*Criterion score for lower bound of fourth quartile.
†Risk ratio (RR) adjusted for age using the Mantel-Haenszel (MH) procedure.
CI = confidence interval; MET = Melbourne Edge Test; lc = low contrast.

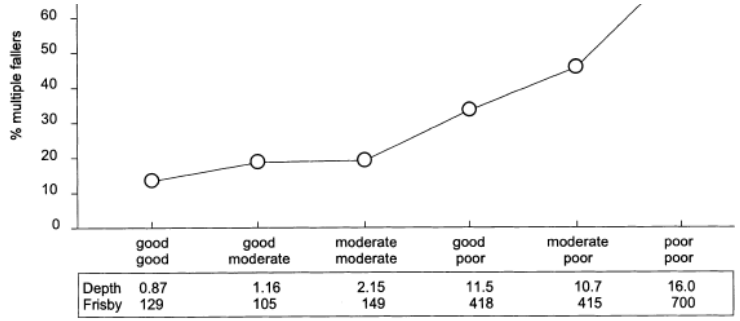
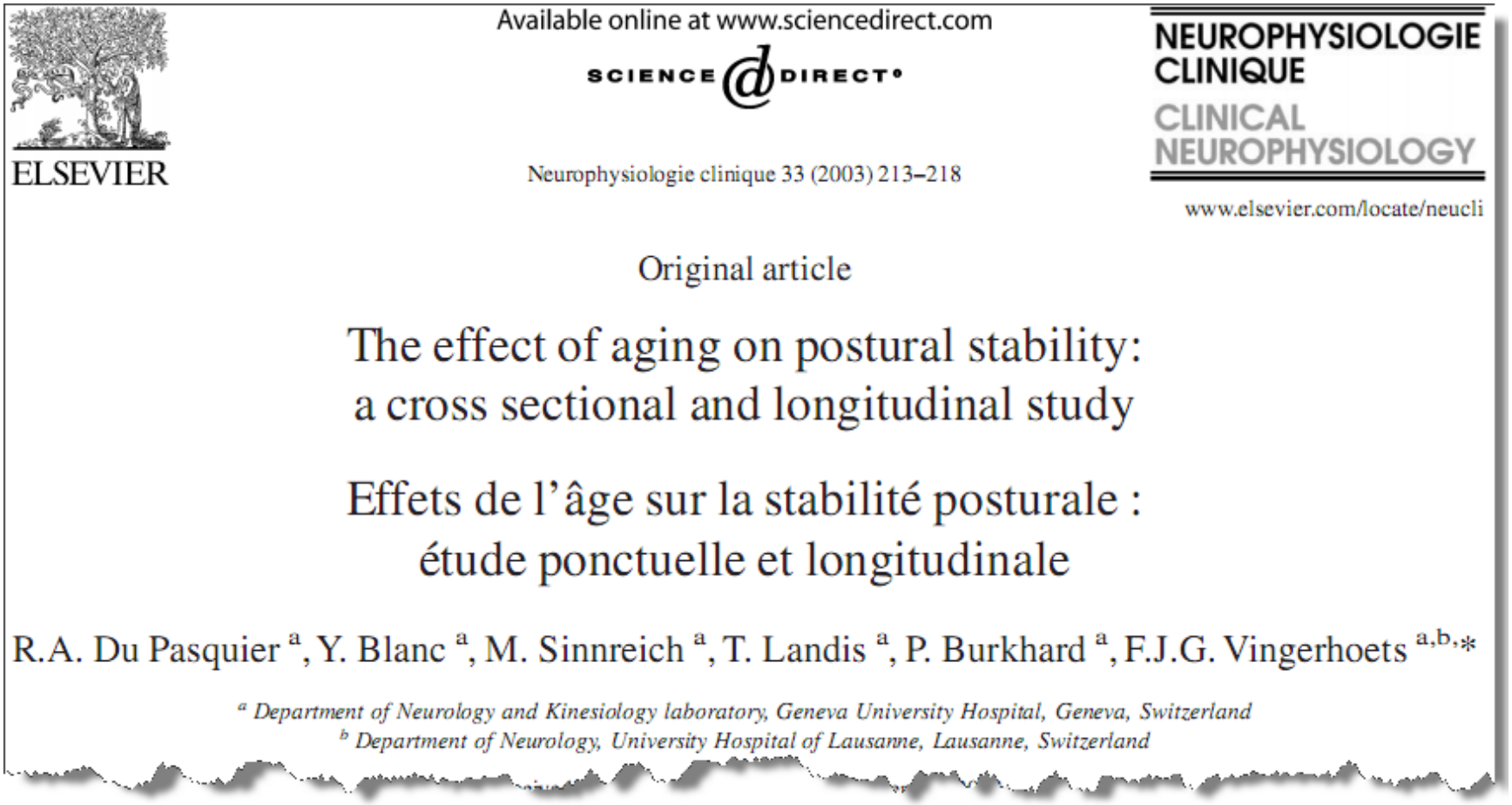


Figure 2. Proportion of subjects who suffered multiple falls classified with respect to visual acuity in each eye.
Visual acuity classification: good ≤6/7.5; moderate 6/9–6/24; poor ≥6/30.[10]
Depth perception scores in cm error, Frisby stereoacuity scores in sec arc.

Επίδραση της ηλικίας στην ισορροπία



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Original article

The effect of aging on postural stability: a cross sectional and longitudinal study

Effets de l'âge sur la stabilité posturale : étude ponctuelle et longitudinale

R.A. Du Pasquier [a], Y. Blanc [a], M. Sinnreich [a], T. Landis [a], P. Burkhard [a], F.J.G. Vingerhoets [a,b,*]

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[b] *Department of Neurology, University Hospital of Lausanne, Lausanne, Switzerland*

Ερώτημα: ποια παράμετρος αξιολόγησης της ισορροπίας αλλάζει με την ηλικία;

- N=50
- Ηλικία: 20-83
- 28 επανεξετάστηκαν 2.2
- Παράμετροι αξιολόγησης (ανοικτά/κλειστά)
  - Μετατόπιση κέντρου πίεσης προσθιοπίσθια και πλάγια
  - Ταχύτητα κέντρου πίεσης προσθιοπίσθια και πλάγια

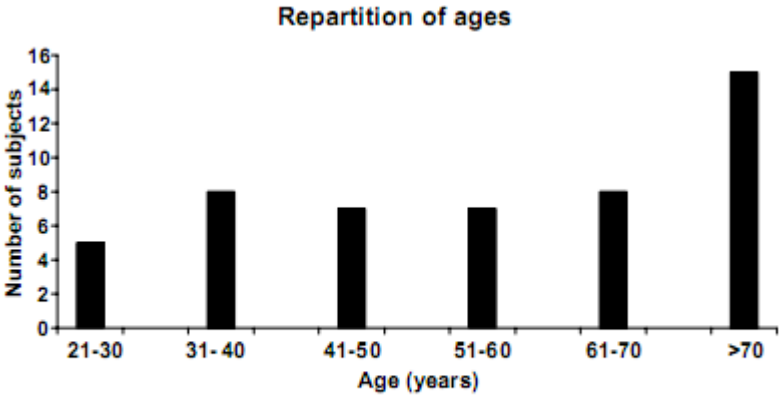

Fig. 1. Ages repartition of study subjects. The mean age was 55.4 with extreme from 25 to 83 years old.

Ερώτημα: ποια παράμετρος αξιολόγησης της ισορροπίας αλλάζει με την ηλικία;

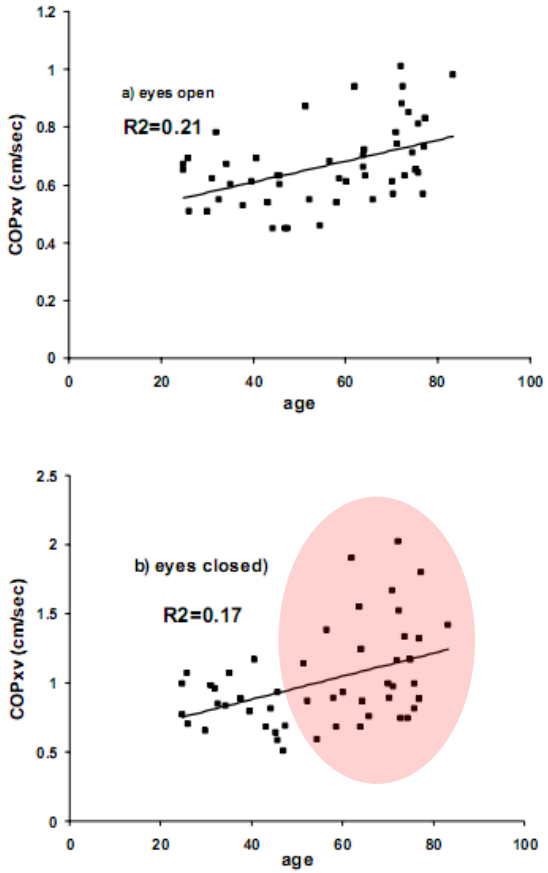

Fig. 2. A linear correlation exists between COP velocity in the antero-posterior axis and age. Closure of the eyes increased the variance of results, but this effect was more pronounced in older subjects (see text). The variance (R^2) is indicated for both conditions, eyes open and closed.

0.0038 cm/s ανά έτος
0.0041 cm/s ανά έτος (επαναμέτρηση)

Απάντηση: είναι η ταχύτητα μετατόπισης στον προσθιοπίσθιο άξονα με ανοικτά μάτια

Επίδραση της ηλικίας στην ισορροπία και τις πτώσεις

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Gait and Posture 18 (2003) 101–108
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Aging, muscle activity, and balance control: physiologic changes associated with balance impairment☆

Carrie A. Laughton [a], Mary Slavin [b], Kunal Katdare [a], Lee Nolan [a], Jonathan F. Bean [c,d], D.Casey Kerrigan [e], Edward Phillips [d], Lewis A. Lipsitz [c], James J. Collins [a,d,*]

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Ερώτημα: τι διαφορετικό έχουν οι ηλικιωμένοι που πέφτουν από αυτούς που δεν πέφτουν;

70 Ηλικιωμένοι (65-92 ετών)

33 με πτώσεις

37 χωρίς πτώσεις

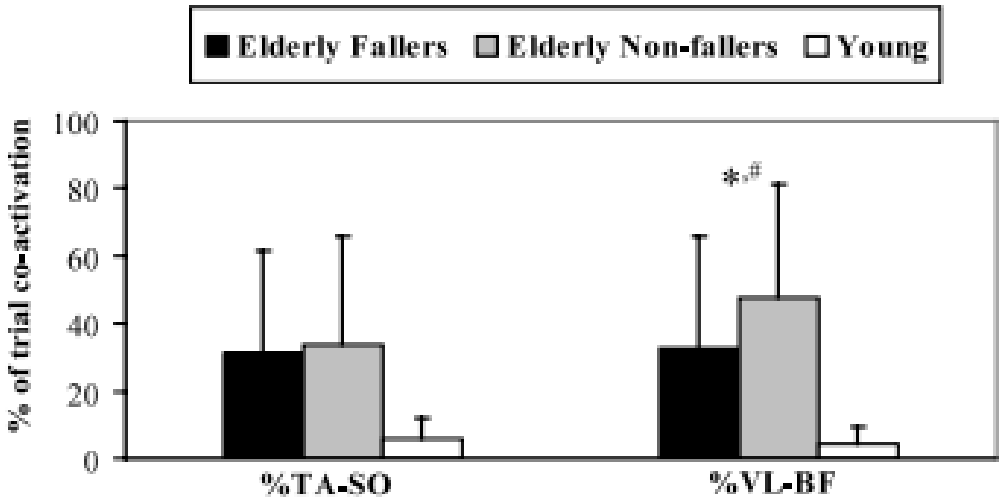
15 νεαροί (22-32 ετών)

Table 1
Traditional center-of-pressure measures for elderly fallers ($N = 33$), elderly non-fallers ($N = 37$), and young ($N = 15$)

	Mean and S.D.			Significance		
	Elderly fallers	Elderly non-fallers	Young	EF vs. EN	EF vs. Y	EN vs. Y
AP S.D. (mm)	4.97 (1.55)	4.15 (1.08)	3.54 (1.01)	–	*	–
Range AP (mm)	24.22 (7.21)	20.66 (5.43)	16.69 (4.97)	–	*	–
ML S.D. (mm)	3.17 (1.28)	2.87 (1.33)	2.26 (0.79)	–	–	–
Range ML (mm)	15.27 (6.39)	14.18 (6.44)	10.87 (3.21)	–	–	–

Four traditional parameters were considered: S.D. and range of the COP trajectory in the anteroposterior direction (AP S.D. and Range AP, respectively), and the S.D. and range of the COP trajectory in the mediolateral direction (ML S.D. and Range ML, respectively). The group means and S.D. for each parameter are shown. Significant differences ($P < 0.008$) between the elderly fallers and nonfallers (EF vs. EN), elderly fallers and young (EF vs. Y), and elderly non-fallers and young (EN vs. Y), are indicated by an asterisk *; non-significant findings are indicated by a double dash –.

Ερώτημα: τι διαφορετικό έχουν οι ηλικιωμένοι που πέφτουν από αυτούς που δεν πέφτουν;



Απάντηση: διεγείρουν περισσότερο τους αγωνιστές και ανταγωνιστές του ισχίου

Journal of Gerontology: MEDICAL SCIENCES
2003, Vol. 58A, No. 5, 419–424

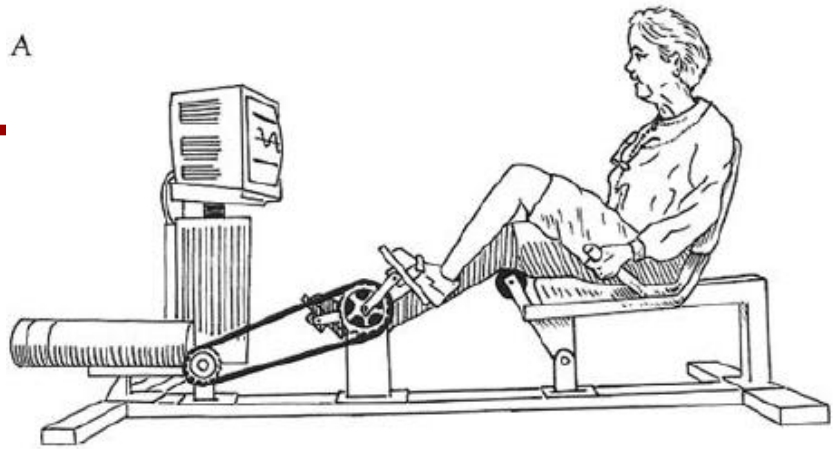
The Positive Effects of Negative Work: Increased Muscle Strength and Decreased Fall Risk in a Frail Elderly Population

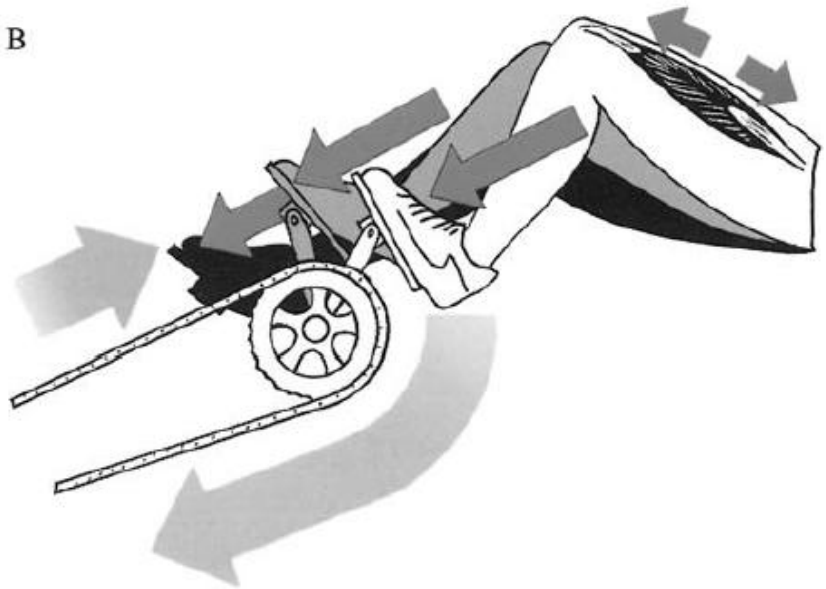
Paul C. LaStayo,[1,2] Gordon A. Ewy,[2] David D. Pierotti,[3] Richard K. Johns,[4] and Stan Lindstedt[2,3,4]

[1]Division of Physical Therapy, University of Utah, Salt Lake City.
[2]Sarver Heart Center, University of Arizona, Tucson.
[3]Department of Biological Sciences, Northern Arizona University, Flagstaff.
[4]Department of Physiological Sciences, University of Arizona, Tucson.

Background. The objective of this study was to determine if a chronic eccentric training intervention, i.e., negative work, could limit or even reverse sarcopenia and its related impairments and functional limitations. Is high-force eccentric training tolerable by elderly people and will it result in improved muscle size, strength, balance, and fall risk?

n=21
Ηλικία: 70-93
Προπόνηση: 9 εβδομάδες
2-3 φορές/εβδομάδα
Δύναμη: 20-30 λεπτά





Ομάδα ελέγχου
n=11
Προπόνηση δύναμης (παραδοσιακή)
Από 10-15 έως 6-10 RM

Ομάδα Έκκεντρης
n=10
Έκκεντρή προπόνηση με ποδήλατο
Από ήπια αντίσταση μέχρι κάπως μεγάλη

Table 1. The Mean Values (With Units) (± 1 *SE*) of the ECC and TRAD Groups Pre and Post 11 Weeks of Resistance Training

	Eccentric Group		Traditional Group	
	Pre-Training	Post-Training	Pre-Training	Post-Training
Strength (N)	48.8 ± 6.07	78.1 ± 8.78*†	45.5 ± 5.48	52.5 ± 4.30
Fiber Area (μm^2)	3295 ± 366	5273 ± 963.5*	2999 ± 313	4218 ± 367*
Timed Up & Go (s)	16.65 ± 0.81	11.96 ± 0.72*†	17.20 ± 0.87	15.55 ± 1.45*
Stair Descent (s)	25.3 ± 2.01	20.9 ± 2.10*†	21.4 ± 2.32	22.9 ± 4.36
Berg Balance	49.7 ± 1.14	53.4 ± 0.64*	42.0 ± 2.38	44.3 ± 1.37

Notes: *Significant differences ($p < .05$) within groups from pre- to post-training; †significant differences ($p < .05$) between groups.
ECC = eccentric; TRAD = traditional.

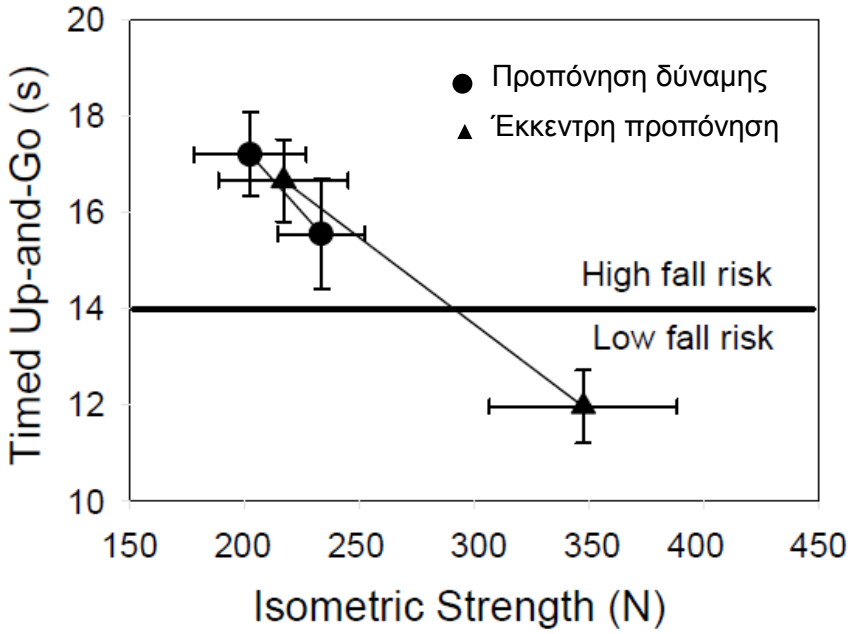


FIGURE 5. Performance of frail elderly (as measured both pretraining and posttraining) on a task dependent in part on leg strength (the "timed up and go" fall-risk assessment). Any improvement in leg strength in an elderly population likely has a clinical effect. Here the traditional resistance exercise group (circles) improved strength (15%) and time on the fall-risk assessment (1.7 seconds), though the improvement was not statistically significant ($P = .511$ and $P = .071$, respectively). The eccentric resistance group's (triangles) strength and fall-risk, however, though no different than the traditional group initially, did improve significantly ($P<.05$) in strength (60%) and with the timed up and go (4.7 seconds). In fact, the larger magnitude increase in strength was coupled to a shift in the eccentric group from a high fall risk to a low fall risk following training. Error bars = 1 SEM. Reprinted from LaStayo et al[109] with

Επίδραση της κόπωσης στην δυναμική ισορροπία

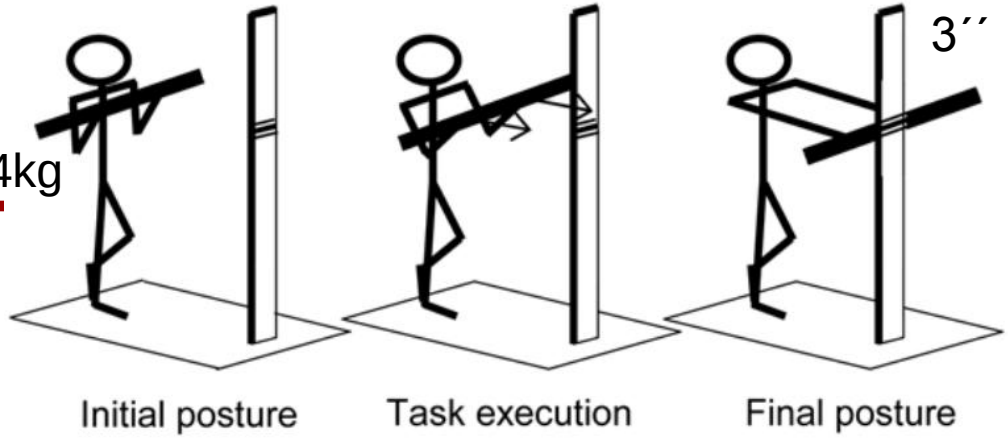
Eur J Appl Physiol (2010) 110:1187–1197
DOI 10.1007/s00421-010-1595-3

ORIGINAL ARTICLE

Effect of lower limb muscle fatigue on anticipatory postural adjustments associated with bilateral-forward reach in the unipedal dominant and non-dominant stance

M. Mezaour · E. Yiou · S. Le Bozec

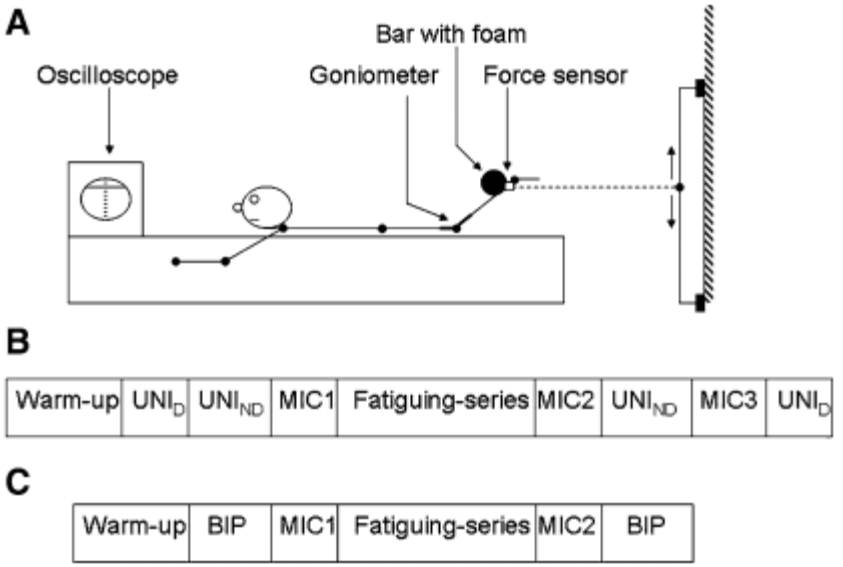
Ερώτημα: μεταβάλλεται η ενεργοποίηση των μυών που συμμετέχουν στην ισορροπία όταν αυτοί είναι κοπωμένοι



10 επαναλήψεις
15΄΄ διάλειμμα

Yiou et al. 2009

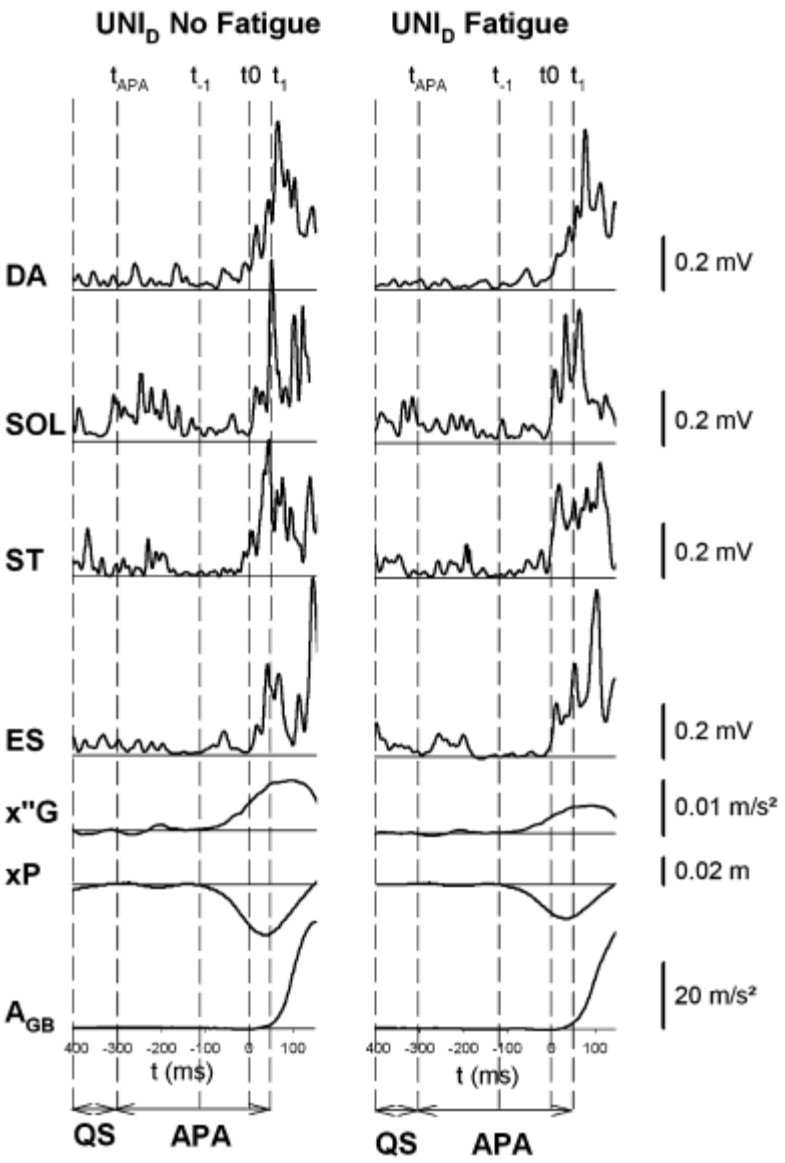
Κόπωση
καμπτήρες του γόνατος
Εκτείνοντες της κνήμης
30΄΄ στο 60% ΜΒΣ 30΄΄ ξεκούραση
(15΄΄ όριο)



N=14

N=10

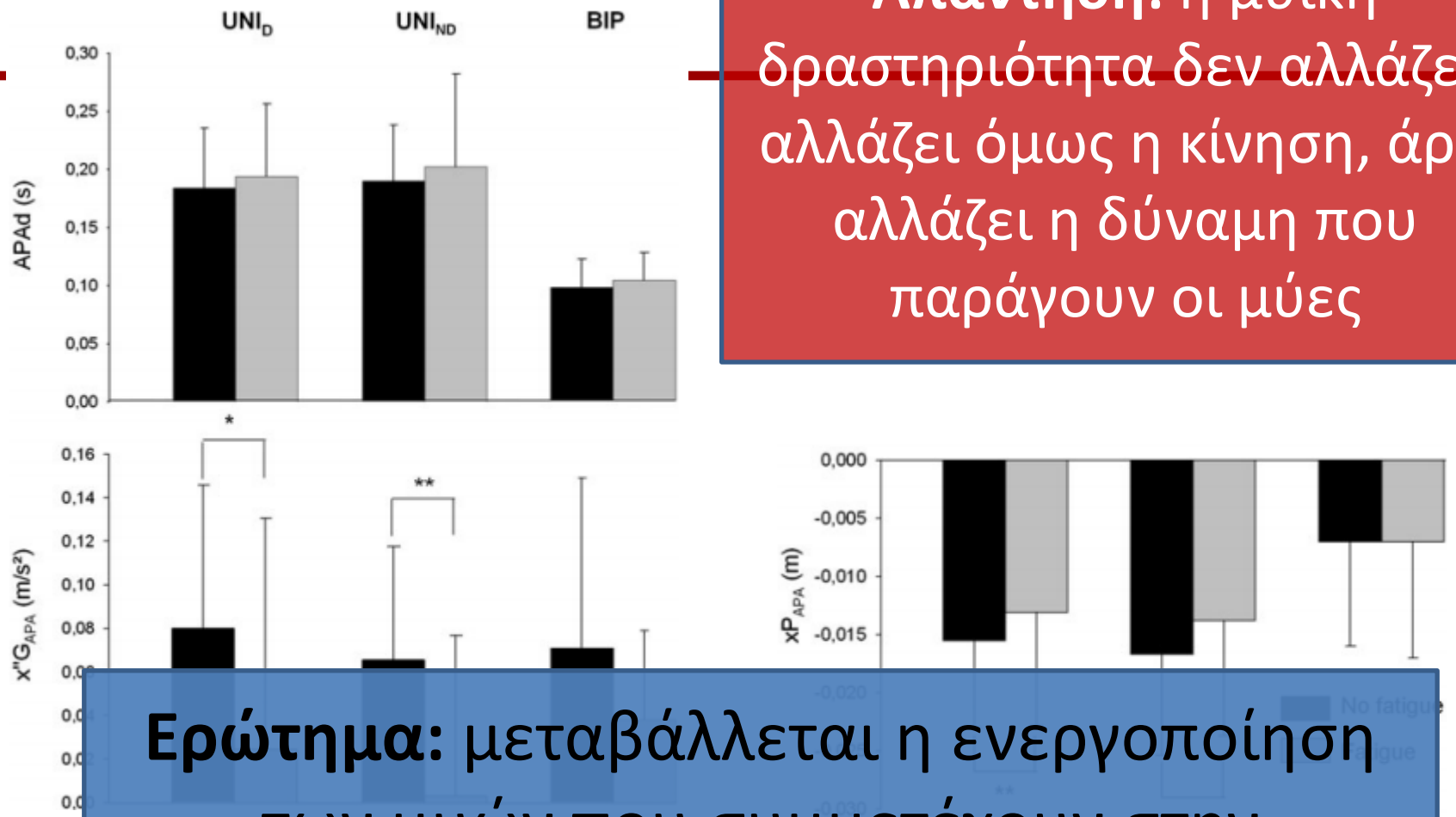
Fig. 1 Experimental set up used during the fatiguing procedure (**a**), and order of the series in the main experiment (**b**) and the complementary experiments (**c**). UNI$_D$, UNI$_{ND}$, BIP: standing on the dominant leg, non-dominant leg and both leg, respectively. *MIC* maximal voluntary isometric contraction. MIC was evaluated three times in **b** and two times in **c**



Η ηλεκτρομυογραφική δραστηριότητα δεν άλλαξε μετά την κόπωση

Fig. 2 Biomechanical and EMG profiles in the F and NF conditions (one subject in the UNI_D stance). *DA*, *SOL*, *ST*, *ES*: deltoidus anterior, soleus, semitendinosus, erector spinae, respectively. $x''G$, xP, A_{GB}: antero-posterior centre-of-gravity acceleration, centre-of-pressure displacement, grasp-bar acceleration, respectively. t_{APA}, t_{-1}, t_0, t_{+1}: onset of APA time-window, onset of xP trace variation, onset of DA muscle activity, end of APA time-window, respectively. These traces are synchronized on t_0. *QS*, *APA*: quiet standing, anticipatory postural adjustments, respectively

Απάντηση: η μυϊκή δραστηριότητα δεν αλλάζει, αλλάζει όμως η κίνηση, άρα αλλάζει η δύναμη που παράγουν οι μύες



Ερώτημα: μεταβάλλεται η ενεργοποίηση των μυών που συμμετέχουν στην ισορροπία όταν αυτοί είναι κοπωμένοι

Fig. 4 Comparison of the anticipatory postural dynamics between the ... and ... conditions, in the BIP stance and the UNI_D/UNI_{ND} ... stance (... trial). APAd, $x''G_{APA}$, xP_{APA}: duration of APA, anticipatory centre-of-gravity acceleration and anticipatory centre-of-pressure displacement, respectively. * $P < 0.05$, ** $P < 0.01$

Σακχαρώδης διαβήτης και περπάτημα

Walking Stability and Sensorimotor Function in Older People With Diabetic Peripheral Neuropathy

Hylton B. Menz, BPod, PhD, Stephen R. Lord, MA, PhD, Rebecca St George, BA, BSc, Richard C. Fitzpatrick, MBBS, PhD

ABSTRACT. Menz HB, Lord SR, St George R, Fitzpatrick RC. Walking stability and sensorimotor function in older people with diabetic peripheral neuropathy. Arch Phys Med Rehabil 2004;85:245-52.

Objective: To evaluate, in older people with diabetic peripheral neuropathy (DPN) and in age-matched controls, accel- eration patterns of the head and trunk when walking to deter-

proprioception,[4] and kinesthesia.[5] The loss of sensation associated with diabetic peripheral neuropathy (DPN) is thought to contribute to impaired balance, altered gait patterns, and increased risk of falling. People with DPN exhibit greater postural sway when standing,[4,6-10] and numerous gait studies have revealed characteristic changes in walking patterns associated with DPN, including decreased power generation at the ankle,

Ερώτημα: ποιες είναι οι συνέπειες στο περπάτημα κατά τη περιφερική νευροπάθεια

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- Δείγμα (55-91 ετών)
  - N=30 διαβητικοί και
  - N=30 όχι διαβητικοί ίδιας ηλικίας
- Παράμετροι αξιολόγησης
  - Ταχύτητα
  - Μήκος διασκελισμού
  - Επιτάχυνση κεφαλής και λεκάνης

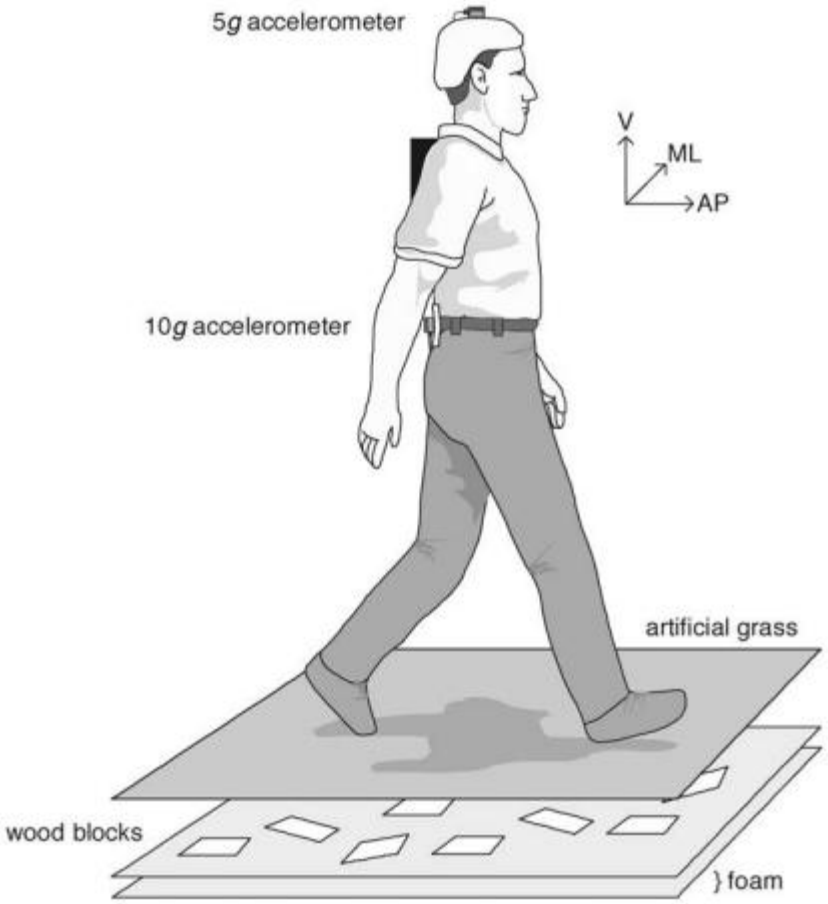

Fig 1. Testing procedure. Abbreviation: V, vertical.

Table 2: Physiologic Comparisons Between Control Participants and Participants With DPN

	Control	DPN
1. Visual acuity: high contrast‖	1.06 ± 0.39	1.32 ± 0.77
1. Visual acuity: low contrast‖	1.95 ± 0.69	2.26 ± 1.56
2. Contrast sensitivity¶	19.53 ± 2.41	19.30 ± 1.91
3. Depth perception**	25.00 ± 39.14	22.90 ± 28.59
4. Vibration sense††	38.70 ± 25.09	65.85 ± 22.48‡
5. Tactile sensitivity‡‡	4.34 ± 0.51	4.78 ± 0.56‡
6. Proprioception‖‖	1.63 ± 0.79	2.41 ± 1.45†
7. Ankle dorsiflexion strength (kg)	10.42 ± 3.53	11.68 ± 5.36
7. Knee extension strength (kg)	40.26 ± 16.71	41.28 ± 19.76
8. Reaction time: hand (ms)*	245.25	242.05
8. Reaction time: foot (ms)*	305.90	334.35†
9. Sway on floor: eyes open¶¶	68.73 ± 30.61	116.27 ± 93.15‡
9. Sway on floor: eyes closed¶¶	92.70 ± 33.01	148.33 ± 103.30‡
9. Sway on foam: eyes open¶¶	172.23 ± 119.55	263.37 ± 156.09‡
9. Sway on foam: eyes closed¶¶	281.73 ± 138.42	441.80 ± 222.56‡
10. Coordinated stability***	3.90 ± 5.68	17.47 ± 10.11‡

NOTE. Values are mean ± standard deviation (SD). High scores on 1, 3, 4, 5, 6, 8, 9, and 10 and low scores on 2 and 7 indicate impaired performance.
*Median values.
†Significant difference at $P<.05$.
‡Significant difference at $P<.01$.
‖Smallest visual angle (min) correctly reported at 3m.
¶Decibel log contrast.
**Difference in matching rods (mm).
††Microns of motion perpendicular to body surface.
‡‡Pressure exerted by monofilament ($\log_{10}$ 0.1mg).
‖‖Difference in matching position of lower limbs (deg).
¶¶Millimeter squares traversed by pen on swaymeter in 30s.
***Number of errors.

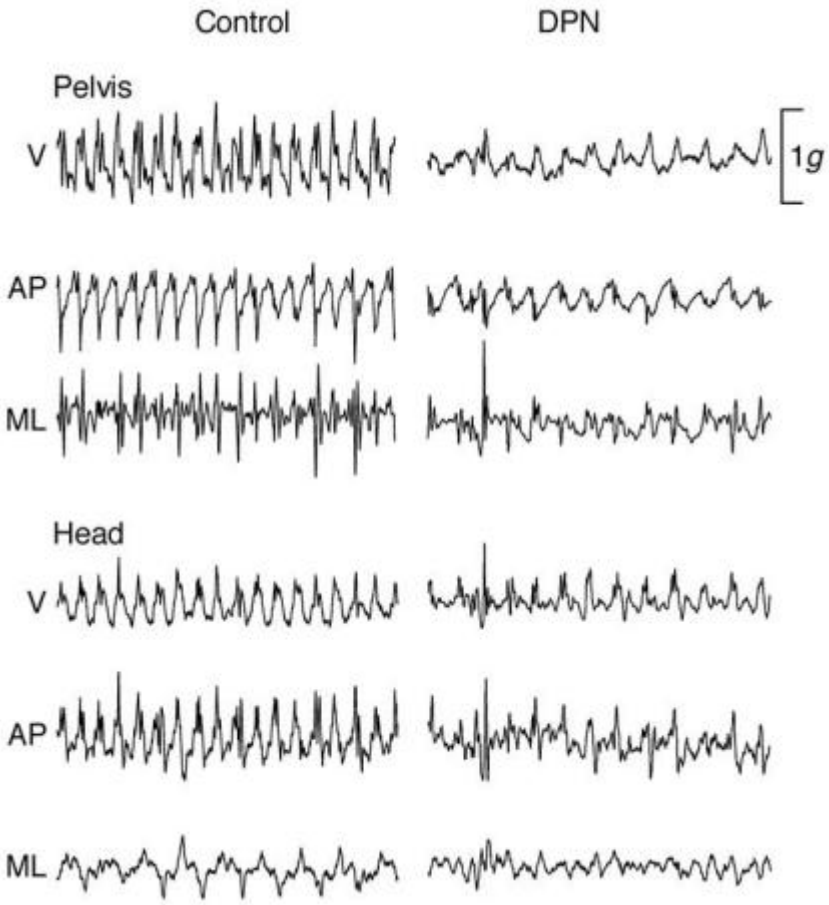

Table 3: Basic Gait Parameters

	Surface	Control	DPN
Velocity			
	Level	1.21±0.18	0.98±0.22†
	Irregular	1.12±0.20	0.84±0.27†
Cadence			
	Level	106.4±7.47	99.2±9.01†
	Irregular	101.0±9.18	90.3±12.02†
Step length			
	Level	68.2±8.07	59.4±11.48†
	Irregular	66.5±8.61	54.7±13.03†
Step time variability			
	Level	0.038±0.02	0.044±0.03
	Irregular	0.052±0.02	0.077±0.06*

NOTE. Values are mean ± SD.
*Significant difference at $P<.025$.
†Significant difference at $P<.010$.

Table 6: Associations Between Velocity, Step Length, and Peripheral Sensation Tests for all Participants

	Control				DPN			
	Velocity		Step Length		Velocity		Step Length	
	Level	Irregular	Level	Irregular	Level	Irregular	Level	Irregular
Vibration sense	.10	.01	.27	.23	−.43*	−.42*	−.39*	−.39*
Tactile sensitivity	−.22	−.28	−.26	.01	−.60†	−.51†	−.47†	−.51†

*$P<.05$.
†$P<.01$.

Ερώτημα: ποιες είναι οι συνέπειες στο περπάτημα κατά τη περιφερική νευροπάθεια

- Υιοθετούν πιο συντηρητικό τρόπο βάδισης
- Διαφοροποιήσεις είναι εμφανέστερες όταν η επιφάνεια είναι ανώμαλη
- Φαίνεται πως οι αισθητικότητα των ασθενών σχετίζεται με τα χαρακτηριστικά βάδισης

Τέλος Ενότητας

Επεξεργασία: Ανθή Ξενοφώντος

Θεσσαλονίκη, Χειμερινό Εξάμηνο 2013-14

Ευρωπαϊκή Ένωση
Ευρωπαϊκό Κοινωνικό Ταμείο

ΕΠΙΧΕΙΡΗΣΙΑΚΟ ΠΡΟΓΡΑΜΜΑ
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επένδυση στην κοινωνία της γνώσης
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ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ

ΕΣΠΑ 2007-2013
πρόγραμμα για την ανάπτυξη
ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης