Rekomen-dacijos!

Albertas Skurvydas
2022

Dvi pratimų stratgijos!

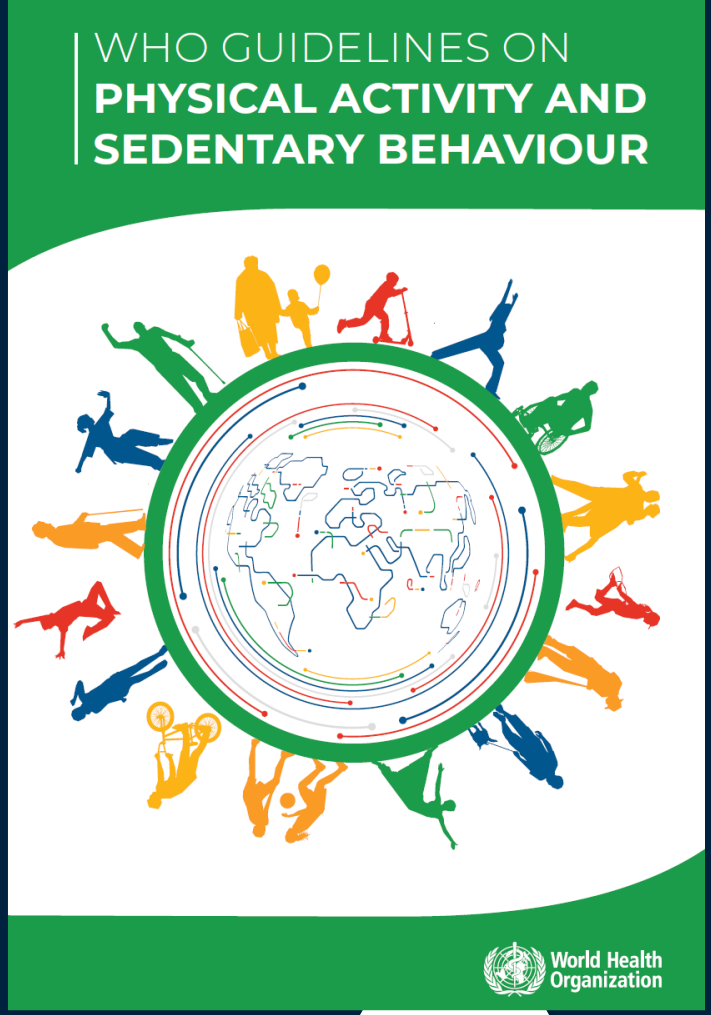
Cell
Leading Edge
Review
40 FOUR DECADES OF EXCITING BIOLOGY SINCE 1974

Integrative Biology of Exercise

John A. Hawley,[1,2,*] Mark Hargreaves,[3] Michael J. Joyner,[4] and Juleen R. Zierath[5,6,*]

Figure 4. Schematic of the Major Signaling Pathways Involved in the Control of Skeletal Muscle Hypertrophy and Mitochondrial Biogenesis

WHO-2020!

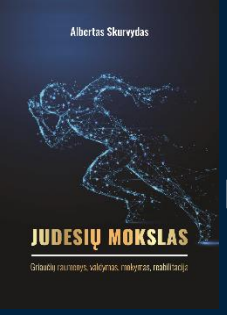


Kas naujo?

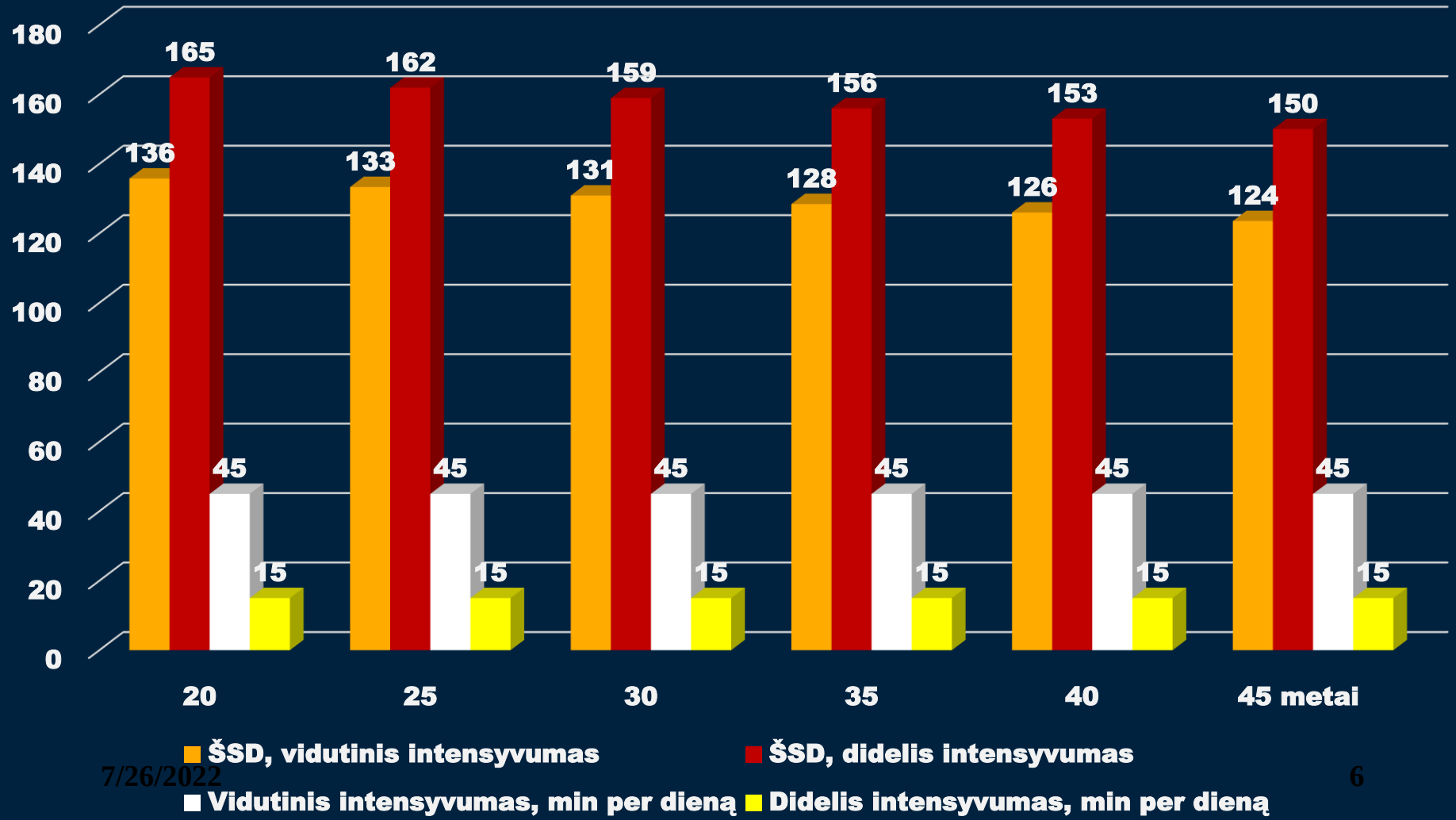
Būtinas fizinis aktyvumas įvairaus amžiaus Žmonėms

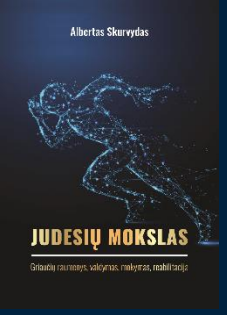
(parengiau pagal WHO, 2020)

Amžius, sveikata	Vidutinio ir didelio intensyvumo aerobinis fizinis aktyvumas	Jėgos pratimai	Pusiausvyros palaikymo, tempimo ir judesių valdymo pratimai	Kiti patarimai
1) 5-17 metai	Ne mažiau kaip 420 min per savaitę	3 kartus per savaitę		Bet koks judėjimas yra žymiai geriau nei sėdėjimas!
2) 18-64 metai	Ne mažiau kaip 300 min per savaitę	2 kartus per savaitę		
3) >65 metų	Ne mažiau kaip 300 min per savaitę	2 kartus per savaitę	3 kartus per savaitę	
4) Nėščioms moterims	Ne mažiau kaip 150 min per savaitę	2 kartus per savaitę	Lengvi ištempimai	
5)>18 metų, sergantys diabetu, vėžiu, depresija, hipertenzija ir kitomis lėtinėmis ligomis	Ne mažiau kaip 300 min per savaitę	2 kartus per savaitę		
6) Negalią turintys	Ne mažiau kaip 150 min per savaitę	2 kartus per savaitę		

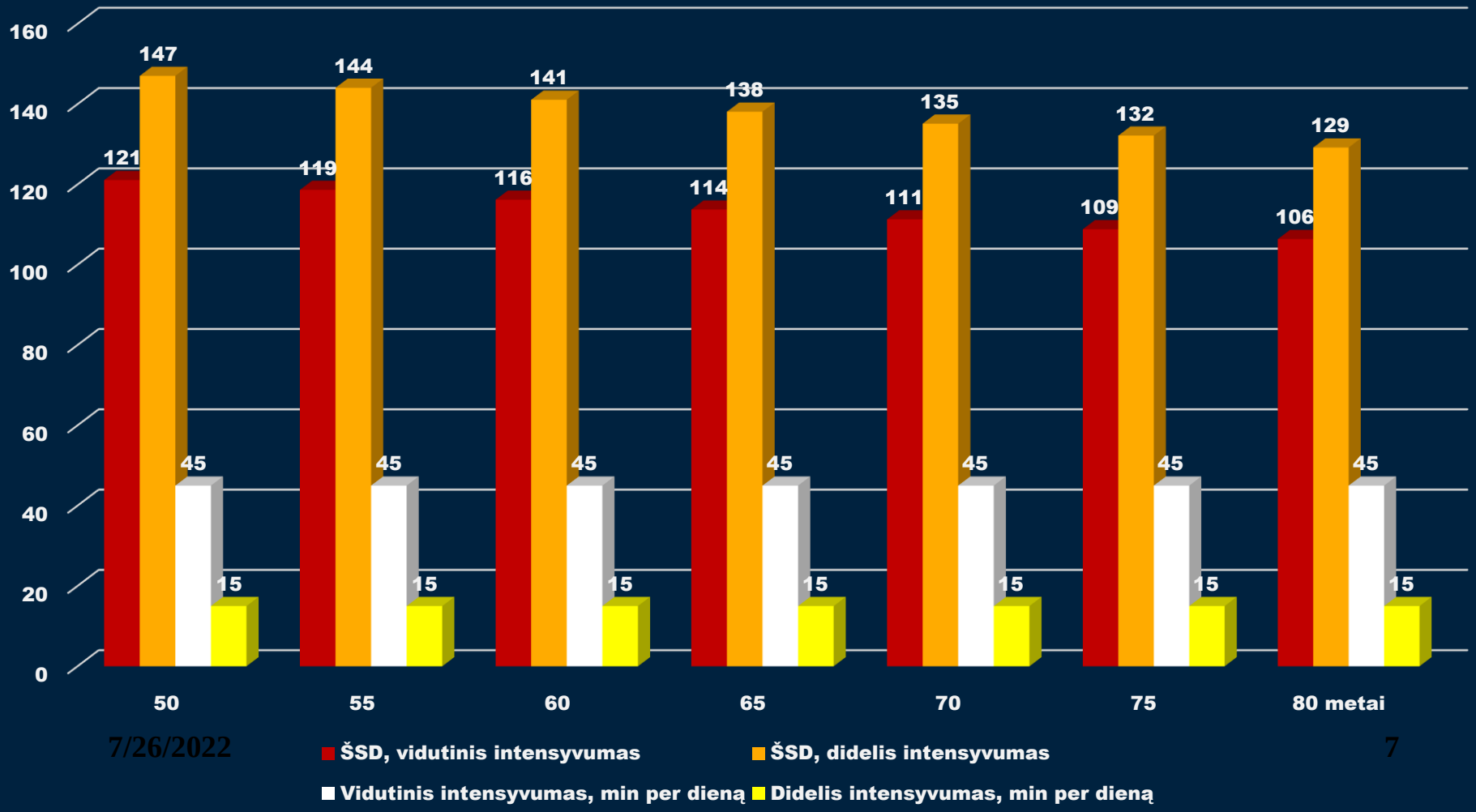


Kiek ir kokiu intensyvumu (širdies susitraukimo dažnumas, min/kartai) per dieną reikia judėti, kad širdis būtų sveika skirtingo amžiaus Žmonėms





Kiek ir kokiu intensyvumu (širdies susitraukimo dažnumas, min/kartai) per dieną reikia judėti, kad širdis būtų sveika (50-80 metų vyrams ir moterims)



Mechaninis stimulas: susitraukimas vs ištempimas!

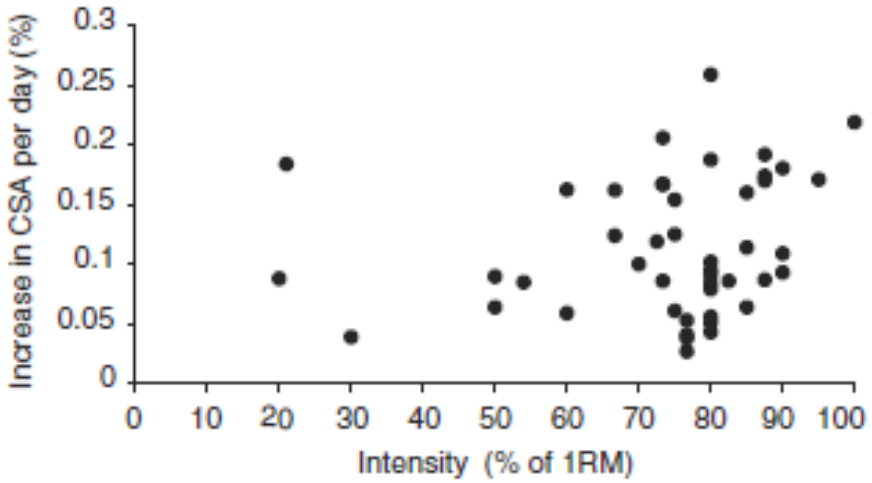


Fig. 2. Peak intensity of training vs percentage increase in cross-sectional area (CSA) per day of the quadriceps during dynamic external resistance training (number of study groups = 46). **RM** = repetition maximum.

REVIEW ARTICLE

Sports Med 2007; 37 (3): 225-264
0112-1642/07/0003-0225/$44.95/0

The Influence of Frequency, Intensity, Volume and Mode of Strength Training on Whole Muscle Cross-Sectional Area in Humans

Mathias Wernbom,[1] *Jesper Augustsson*[1,2] and *Roland Thomeé*[1,2]

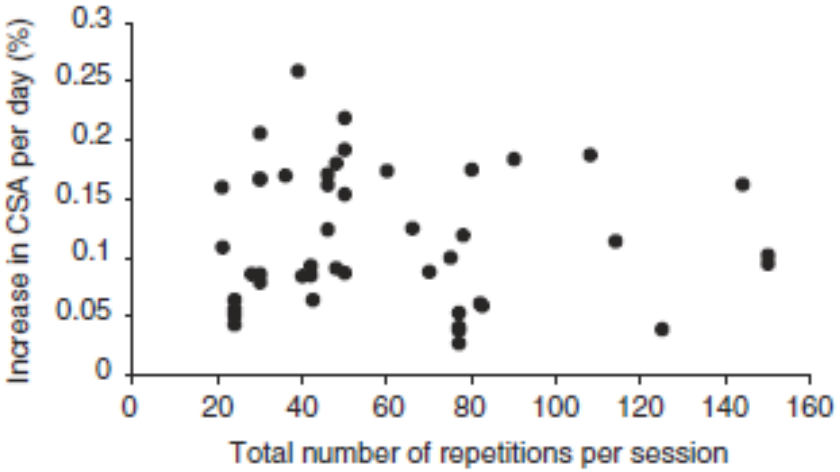


Fig. 3. Total number of repetitions vs percentage increase in cross-sectional area (CSA) per day of the quadriceps during dynamic external resistance training (number of study groups = 45).

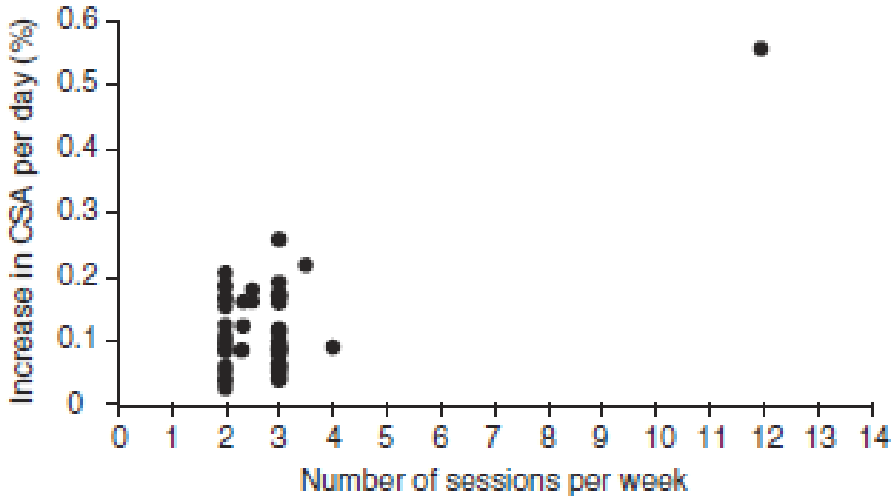


Fig. 1. Frequency of training vs percentage increase in cross-sectional area (CSA) per day of the quadriceps during dynamic external resistance training (number of study groups = 47).

Tik ilgos RS gali būti labai greitos!

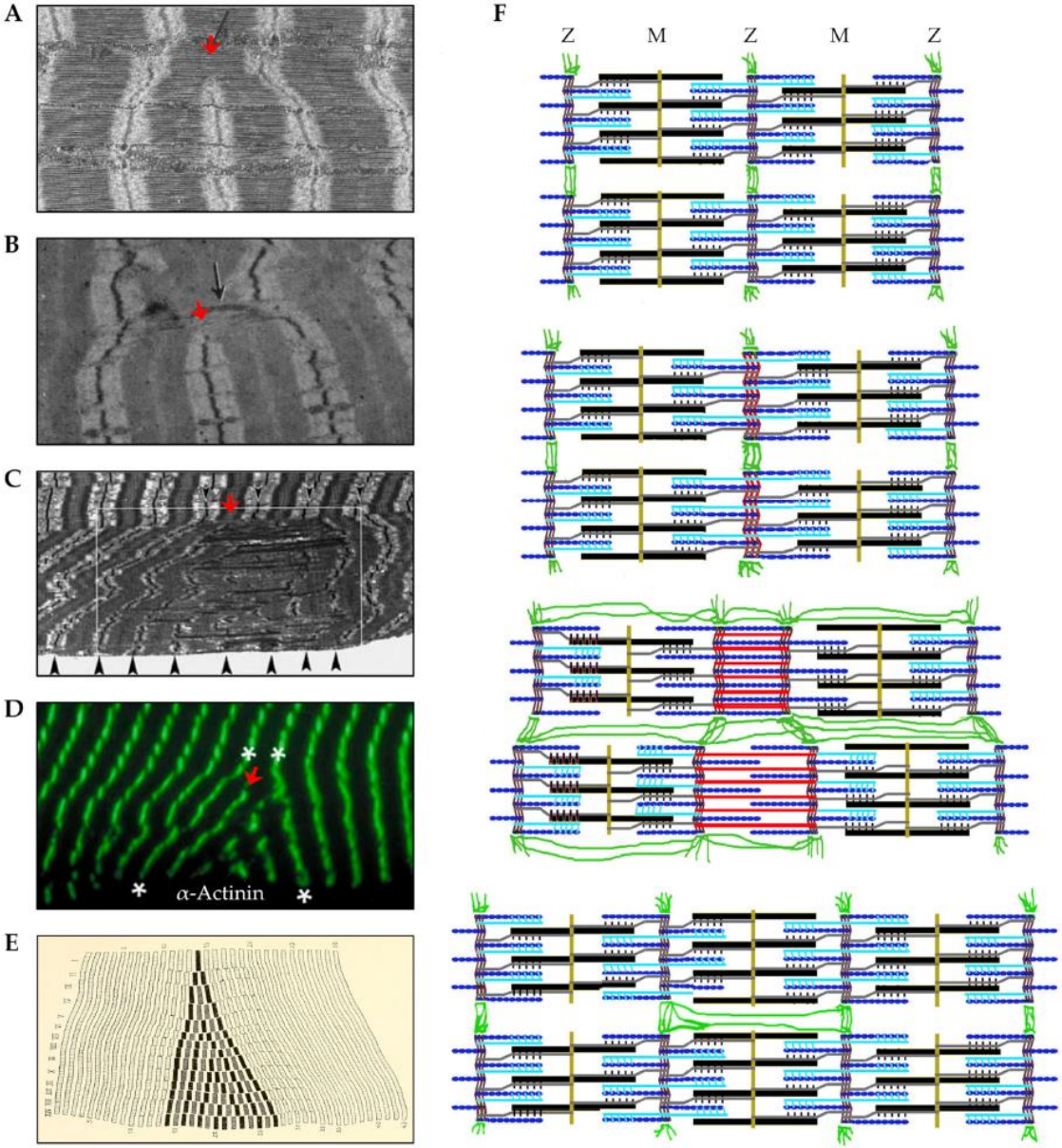
Ilgink RS!

Review

Identifying the Structural Adaptations that Drive the Mechanical Load-Induced Growth of Skeletal Muscle: A Scoping Review

Kent W. Jorgenson [1], Stuart M. Phillips [2] and Troy A. Hornberger [1,*]

Cells 2020



Trys jėgos treniravimo krypty s!

a) maksimalių pastangų (įveikiami labai dideli pasipriešinimai – 90 ir daugiau % nuo maksimalių reikšmių);

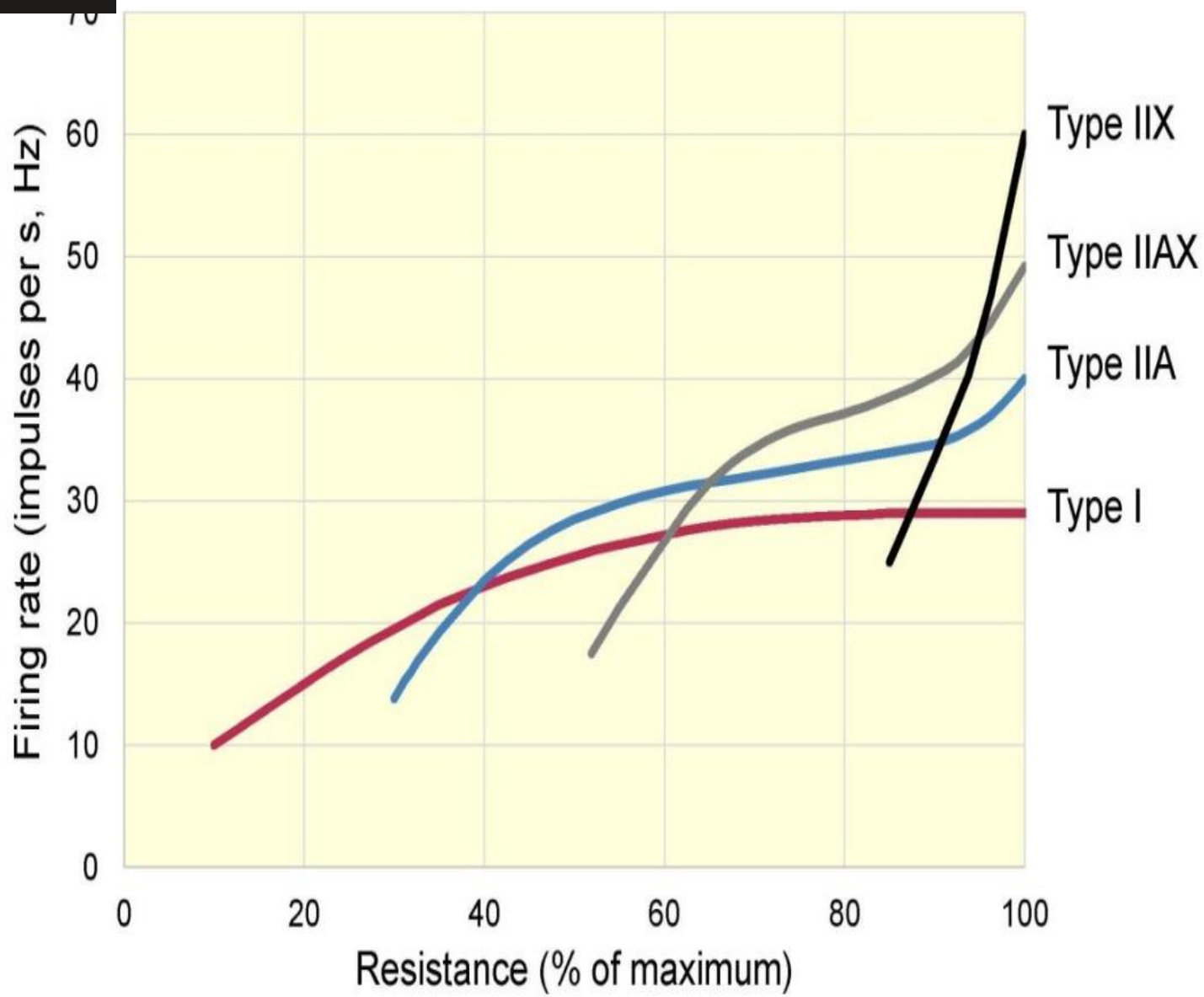
b) kartojimo arba submaksimalių pastangų (didelis pasipriešinimas įveikiamas nuo 8 iki 15 kartų);

c) dinaminis-balistinis (kiek galima greičiau įveikiamas palyginti nedidelis pasipriešinimas).

Muscle fibre activation and fatigue with low-load blood flow restricted resistance exercise—An integrative physiology review

Wernbom, Mathias; Aagaard, Per

Published in:
Acta Physiologica



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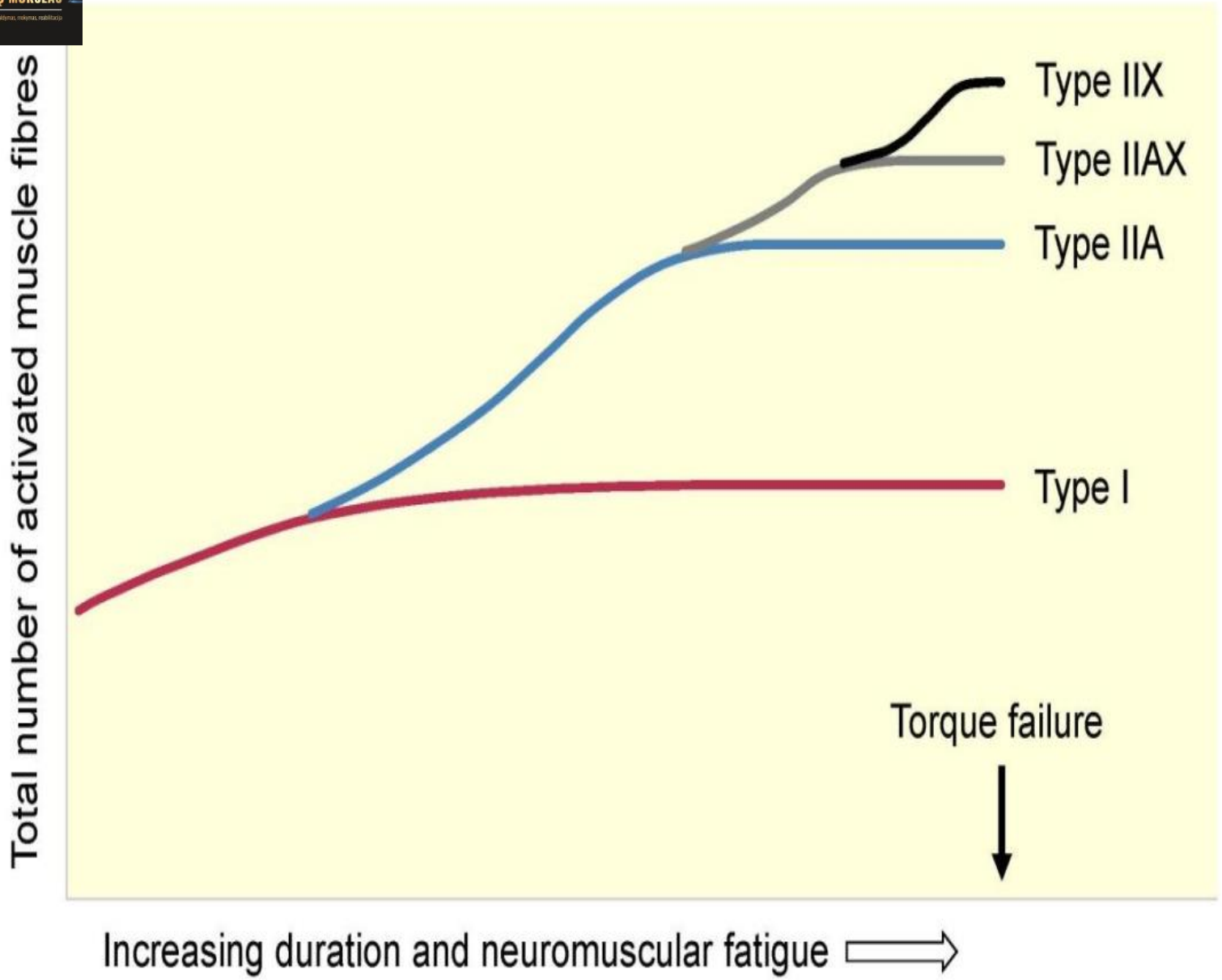
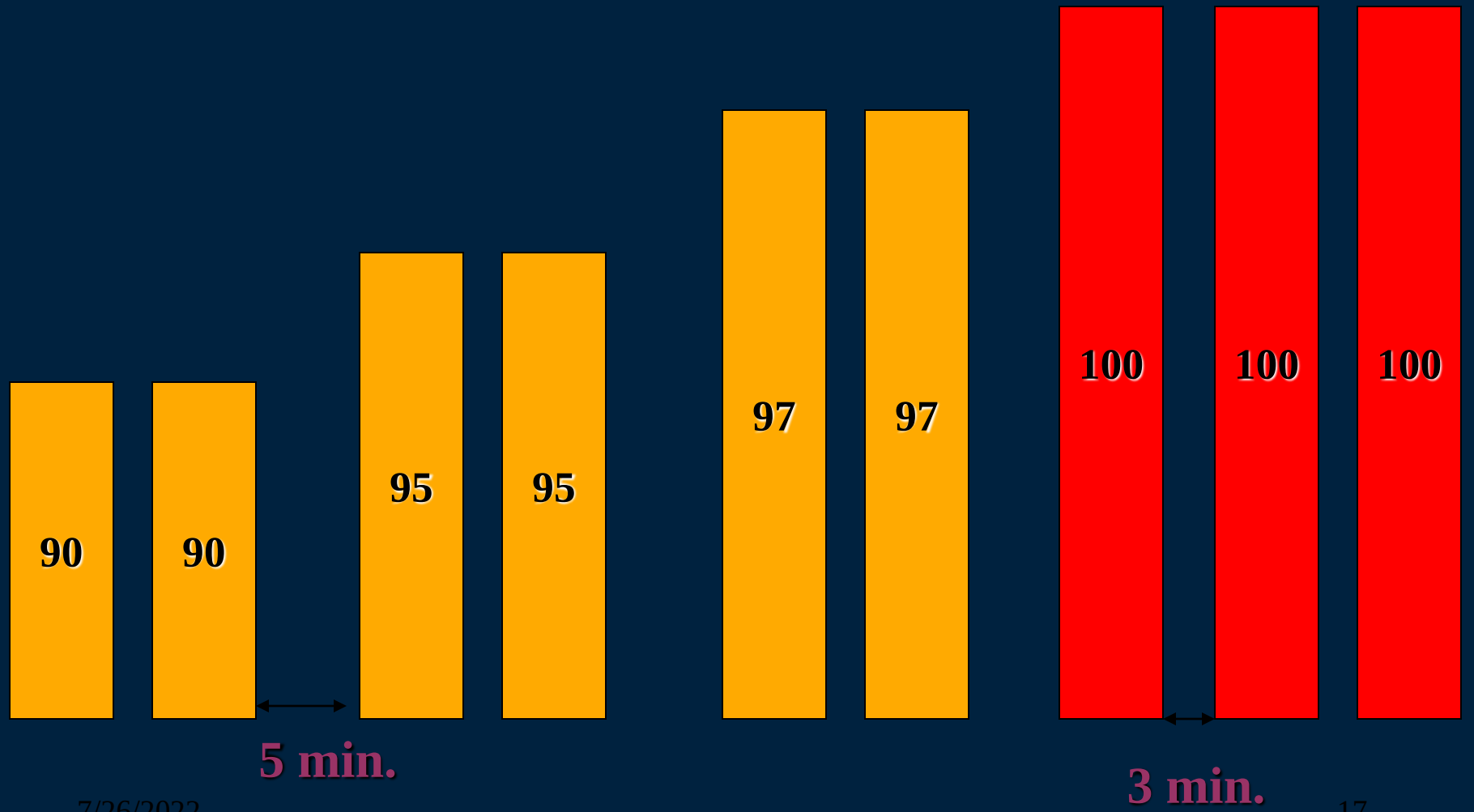


„Nervinės“ ir „hipertrofinės “ jėgos treniravimas!

“Nervinės” jėgos ugdymas

2 pratimai



Fiziniai krūviai, aktyvinantys testosterono sintezę

Intensyvumas: > 10 RM

> 2/3 raumenyno

Pratybų trukmė: apie 30 min.

Pratybų dažnis: 2-3 k/s.

Mezociklas: apie 4 sav.; 3 mezociklai per metus

Greitųjų RS treniravimo keturi modeliai!

Greitųjų raumeninių skaidulų treniravimo 4 Modeliai

	Intensyv-umas	Kartoji mai	Serijos	Poilsis tarp serijų, min.	Treniročių dažnumas per savaitę, kartais	Treniruočių savaičių skaičius
Geitumas, 20 m iš eigos	>99 %	20 metrų bėgimas iš eigos	5	3-7, pilnas atsigavimas	3	3
Galingumas, DJ šuoliai nuo 50 cm	>99	3 kas 30 s	5	3-7, pilnas atsigavimas	3	3
„Nervinė“ jėga, štangos rovimas	>95	3 kas 30 s	5	3-7, pilnas atsigavimas	3	3
„Hipertr-ofinė“ jėga	75	Iki galo	3	1-2	3	3

Sausgyslių treniravimo klasika!

Sports Med (2013) 43:267–286
DOI 10.1007/s40279-013-0019-z

SYSTEMATIC REVIEW

Achilles and Patellar Tendinopathy Loading Programmes

A Systematic Review Comparing Clinical Outcomes and Identifying Potential Mechanisms for Effectiveness

Peter Malliaras · Christian J. Barton · Neil D. Reeves · Henning Langberg

Table 3 Characteristics of Alfredson, Stanish and Curwin, Silbernagel and HSR programmes

Programmes	Type of exercise	Sets, reps	Frequency	Progression	Pain
Alfredson	Eccentric	3, 15	Twice daily	Load	Enough load to achieve up to moderate pain
Stanish and Curwin	Eccentric-concentric, power	3, 10–20	Daily	Speed then load	Enough load to be painful in third set
Silbernagel	Eccentric-concentric, eccentric, faster eccentric-concentric, balance exercise [30, 41], plyometric [23]	Various	Daily	Volume, type of exercise	Acceptable if within defined limits[a]
HSR	Eccentric-concentric	4, 15–6	3×/week	15–6 RM	Acceptable if was not worse after

Rheumatology 2006;45:508–521
Advance Access publication 20 February 2006
doi:10.1093/rheumatology/kel046

Review

Current concepts in the management of tendon disorders

J. D. Rees[1,2], A. M. Wilson[1] and R. L. Wolman[1]

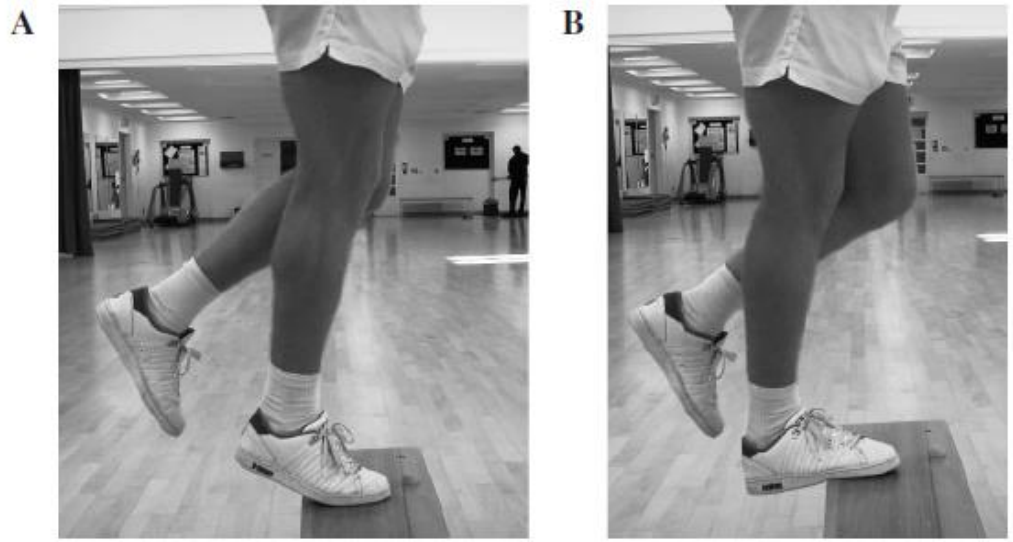


FIG. 4. Eccentric loading of the right gastrocnemius muscle/Achilles tendon showing the starting position (**A**) and finishing position (**B**). Three sets of 15 repetitions are performed twice per day, 7 days per week for 12 weeks. The exercises are repeated with the knee flexed to load the soleus muscle. The contralateral leg performs recovery to the starting position.

Physiol Rev
84: 649–698, 2004; 10.1152/physrev.00031.2003.

Role of Extracellular Matrix in Adaptation of Tendon and Skeletal Muscle to Mechanical Loading

MICHAEL KJÆR

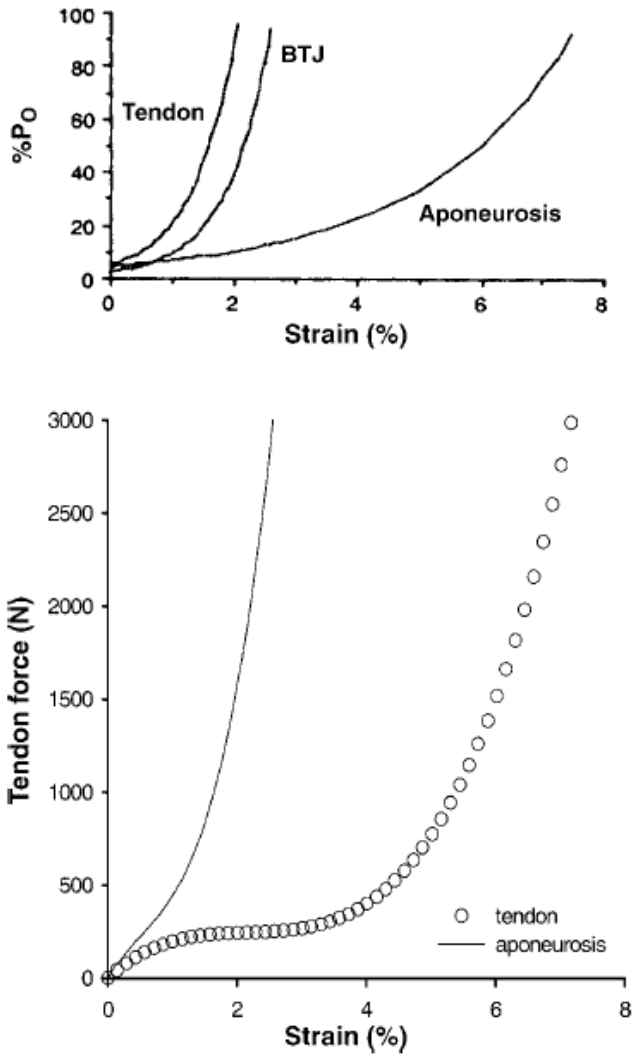


FIG. 6. Load-strain relationship for tendon and muscle aponeurosis during passive and active muscle contraction. *Top*: determination of load-strain on frog semitendinosis during passive loading of structures up to a tension equal to maximum active isometric tension (P_o). The relationship for tendon, bone-tendon junction (BTJ), and aponeurosis is given, and passive loading expressed in $\%P_o$. Note that the strain of the aponeurosis by far exceeds that of the tendon. *Bottom*: tendon load-strain on human Achilles tendon and triceps surae aponeurosis determined on human tendon/muscle with ultrasonography during calf muscle contraction. Note that in the active, contractiing state, the strain of the free tendon is severalfold higher than that of the adjacent aponeurosis. [From Lieber et al. (403) (*top*) and Magnusson et al. (427) (*bottom*), with permission.]

REVIEW

The evolution of eccentric training as treatment for patellar tendinopathy (jumper's knee): a critical review of exercise programmes

Håvard Visnes, Roald Bahr

Br J Sports Med 2007;**41**:217–223. doi: 10.1136/bjsm.2006.032417

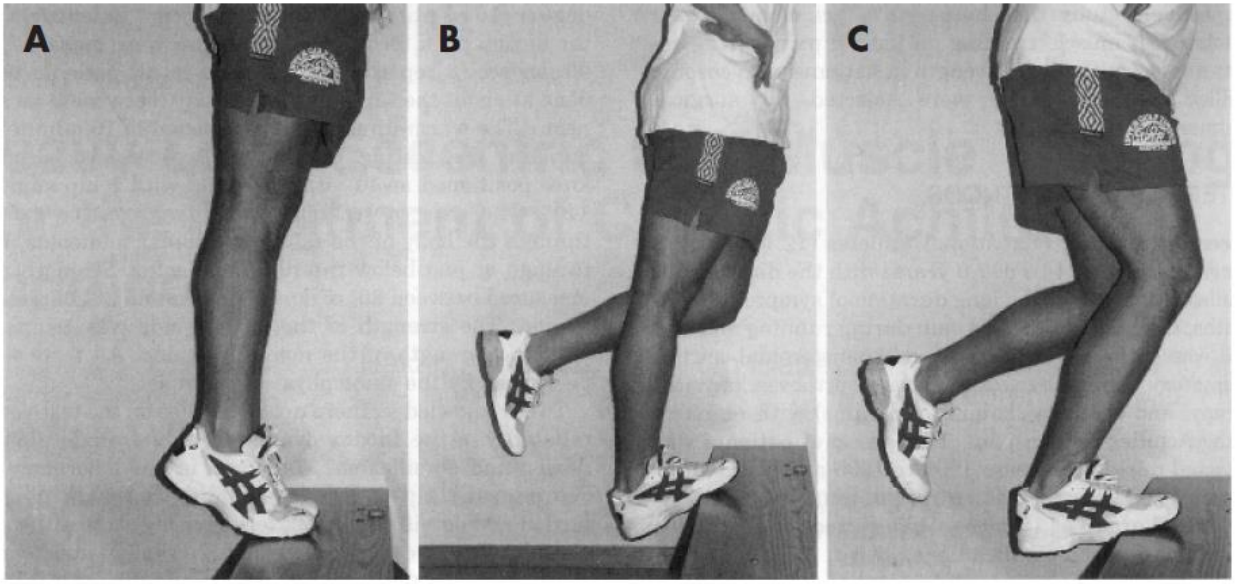


Figure 2 The Alfredson Achilles tendon programme:[13] from an upright position and standing with all weight on the forefoot and the ankle joint in plantar flexion (A), the calf muscles are loaded eccentrically by having the patient lower the heel with the knee straight (B) or slightly flexed (C).

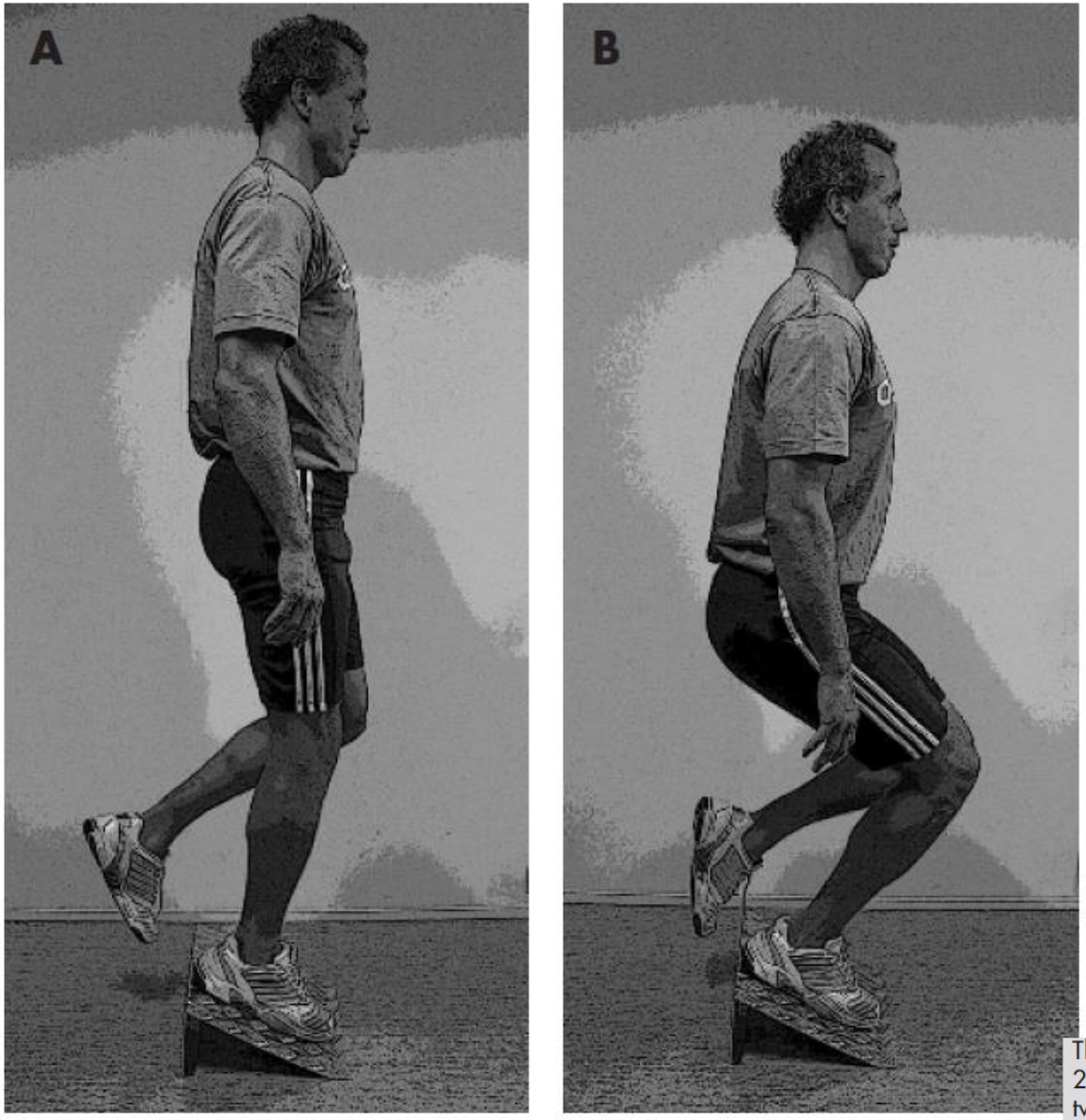


Figure 3 The patellar training programme. (A) Starting position for eccentric training on a 25° decline board with the entire weight on the injured leg. From this position, the knee was slowly flexed to 90°. (B) En position for eccentric training.

REVIEW

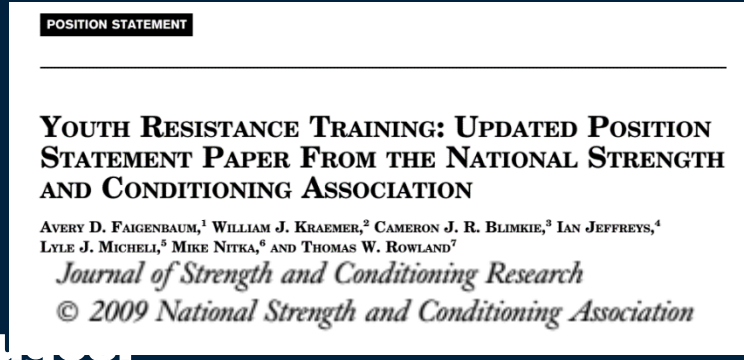
The evolution of eccentric training as treatment for patellar tendinopathy (jumper's knee): a critical review of exercise programmes

Håvard Visnes, Roald Bahr

Br J Sports Med 2007;**41**:217–223. doi: 10.1136/bjsm.2006.032417

The players performed the eccentric training programme on a 25° decline board. Each training session was to be completed two times daily with three sets of 15 repetitions in each session. The exercises could be performed without warming up. The downward component (eccentric component) was on the affected leg, and the upward component on the asymptomatic leg. If both legs were injured, the subjects were instructed to use their arms to assist during the concentric phase and train only one leg at a time. They were instructed to take 2 s for each eccentric component of each exercise, and to avoid bending

Vaikų jėgos ir galingumo treniravimas!


POSITION STATEMENT

YOUTH RESISTANCE TRAINING: UPDATED POSITION STATEMENT PAPER FROM THE NATIONAL STRENGTH AND CONDITIONING ASSOCIATION

AVERY D. FAIGENBAUM,[1] WILLIAM J. KRAEMER,[2] CAMERON J. R. BLIMKIE,[3] IAN JEFFREYS,[4] LYLE J. MICHELI,[5] MIKE NITKA,[6] AND THOMAS W. ROWLAND[7]

Journal of Strength and Conditioning Research

1. Užtikrinti, kad jėgos treniruotės būtų saugios.
2. Prieš trenirutę atlikti 5-10 min pramankštą.
3. Pradėti nuo nedidelių svorių ir stengtis teisingai atlikti pratimus.
4. Atlikti 1-3 serijos po 6-15 pakartojimų viršutinių ir apatinių galūnių raumenų jėgos ugdymo pratimuose.
5. Būtinai įtraukti specifinius pratimus pilvo preso ir apatinės nugaros dalies raumenų treniravimui.
6. Atlikti agonistų ir antagonistų, vienos ir kitos kūno pusės raumenų treniravimą.
7. Atlikti 1-3 serijos po 3-6 pakartojimų virštinių ir apatinių galūnių raumenų galingumo ugdymo pratimuose.
8. Didinti svorį, kai jėga padidėja 5-10 %.
9. Pradėti treniruotis nuo 2-3 kartų per savaitę.
10. Nuolatos registruoti dienoraštyje pasiekimus.
11. Vis atnaujinti būtina treniruotės pratimus, kad treniruotės nebūtų monotoniškos.
12. Treniruočių krūviams turi būti adekvati mityba, skysčių vartojimas ir pilnavertis miegas.
13. Treneriai ir tėvai turi ne tik prižūrėti, bet ir paraginti sportuoti.

POSITION STATEMENT

Youth Resistance Training: Updated Position Statement Paper From the National Strength and Conditioning Association

Avery D. Faigenbaum,[1] William J. Kraemer,[2] Cameron J. R. Blimkie,[3] Ian Jeffreys,[4] Lyle J. Micheli,[5] Mike Nitka,[6] and Thomas W. Rowland[7]

Journal of Strength and Conditioning Research

Table 3. Recommendations for progression during resistance training for power.*

	Novice	Intermediate	Advanced
Muscle action	ECC and CON	ECC and CON	ECC and CON
Exercise choice	MJ	MJ	MJ
Intensity	30–60% 1RM VEL	30–60% 1RM VEL 60–70% 1RM STR	30–60% 1RM VEL 70 to ≥80% 1RM STR
Volume	1–2 sets × 3–6 reps	2–3 sets × 3–6 reps	≥3 sets × 1–6 reps
Rest intervals (min)	1	1–2	2–3
Velocity	Moderate/fast	Fast	Fast
Frequency ($d \cdot wk^{-1}$)	2	2–3	2–3

*ECC = eccentric; CON = concentric; MJ = multi-joint; 1RM = 1 repetition maximum; VEL = velocity; STR = strength; rep = repetition.

POSITION STATEMENT

YOUTH RESISTANCE TRAINING: UPDATED POSITION STATEMENT PAPER FROM THE NATIONAL STRENGTH AND CONDITIONING ASSOCIATION

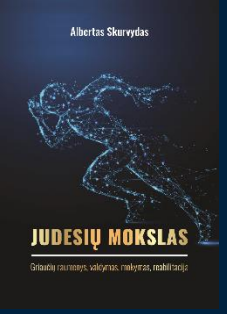
AVERY D. FAIGENBAUM,[1] WILLIAM J. KRAEMER,[2] CAMERON J. R. BLIMKIE,[3] IAN JEFFREYS,[4] LYLE J. MICHELI,[5] MIKE NITKA,[6] AND THOMAS W. ROWLAND[7]

Journal of Strength and Conditioning Research

TABLE 2. Recommendations for progression during resistance training for strength.*

	Novice	Intermediate	Advanced
Muscle action	ECC and CON	ECC and CON	ECC and CON
Exercise choice	SJ and MJ	SJ and MJ	SJ and MJ
Intensity	50–70% 1RM	60–80% 1RM	70–85% 1RM
Volume	1–2 sets × 10–15 reps	2–3 sets × 8–12 reps	≥3 sets × 6–10 reps
Rest intervals (min)	1	1–2	2–3
Velocity	Moderate	Moderate	Moderate
Frequency ($d \cdot wk^{-1}$)	2–3	2–3	3–4

*ECC = eccentric; CON = concentric; SJ = single joint; MJ = multi-joint; 1RM = 1 repetition maximum; rep = repetition.



Original Research

the Journal of Strength and Conditioning Research™

Resistance Training for Older Adults: Position Statement From the National Strength and Conditioning Association

Maren S. Fragala,[1] Eduardo L. Cadore,[2] Sandor Dorgo,[3] Mikel Izquierdo,[4] William J. Kraemer,[5] Mark D. Peterson,[6] and Eric D. Ryan[7]

Resistance Training Programs for Older Adults Should Follow the Principles of Individualization, Periodization, and Progression. Program design of resistance training for older adults should make use of the same principles that have been well established for younger populations (17,341), yet individualization may be even more important for the older adult.

Resistance Training for Older Adults: Position Statement From the National Strength and Conditioning Association

Table 1

Resistance training general recommendations for healthy older adults.†

Program variable	Recommendation†	Details
Sets	1–3 sets per exercise per muscle group	1 set for beginners and older adults with frailty progressing to multiple sets (2–3) per exercise.
Repetitions	8–12 or 10–15	Perform 6–12 reps with variation for muscular strength for healthy older adults. Perform 10–15 repetitions at a lower relative resistance for beginners.
Intensity	70–85% of 1RM	Begin at a resistance that is tolerated and progress to 70–85% of 1RM using periodization. Lighter loads are recommended for beginners, or individuals with frailty, or special considerations such as cardiovascular disease and osteoporosis. Exercises should be performed in a repetition-range intensity zone that avoids going to failure to reduce joint stress.
Exercise selection	8–10 different exercises	Include major muscle groups targeted through multijoint movements (e.g., chest press, shoulder press, triceps extension, biceps curl, pull-down, row, lower-back extension, abdominal crunch/curl-up, quadriceps extension or leg press, leg curls, and calf raise).
Modality	Free-weight or machine-based exercises	Beginners, frail older adults, or those with functional limitations benefit from machine-based resistance training (selectorized weight or pneumatic resistance equipment), training with resistance bands, and isometric training. High functioning older adults gain added benefit from free-weight resistance training (e.g., barbells, dumbbells, kettlebells, and medicine balls).
Frequency	2–3 days per week, per muscle group	Perform on 2–3 nonconsecutive days per week, per muscle group, may allow favorable adaptation, improvement, or maintenance.
Power/explosive training	40–60% of 1RM	Include power/explosive exercises where high-velocity movements are performed during the concentric phase at moderate intensities (i.e., 40–60% of 1RM) to promote muscular power, strength, size, and functional tasks.
Functional movements	Exercises to mimic tasks of daily living	Healthy, high functioning older adults benefit from the inclusion of multijoint, complex, and dynamic movements, with base of support or body position variations.

*RM = repetition maximum.

†General guidelines are provided. Resistance training programs should include variation in intensity and program variables. Strength exercises should be performed before endurance training during concurrent training sessions to optimize strength gains.

Moterys vs vyrai!

Sex Differences in Resistance Training: A Systematic Review and Meta-Analysis

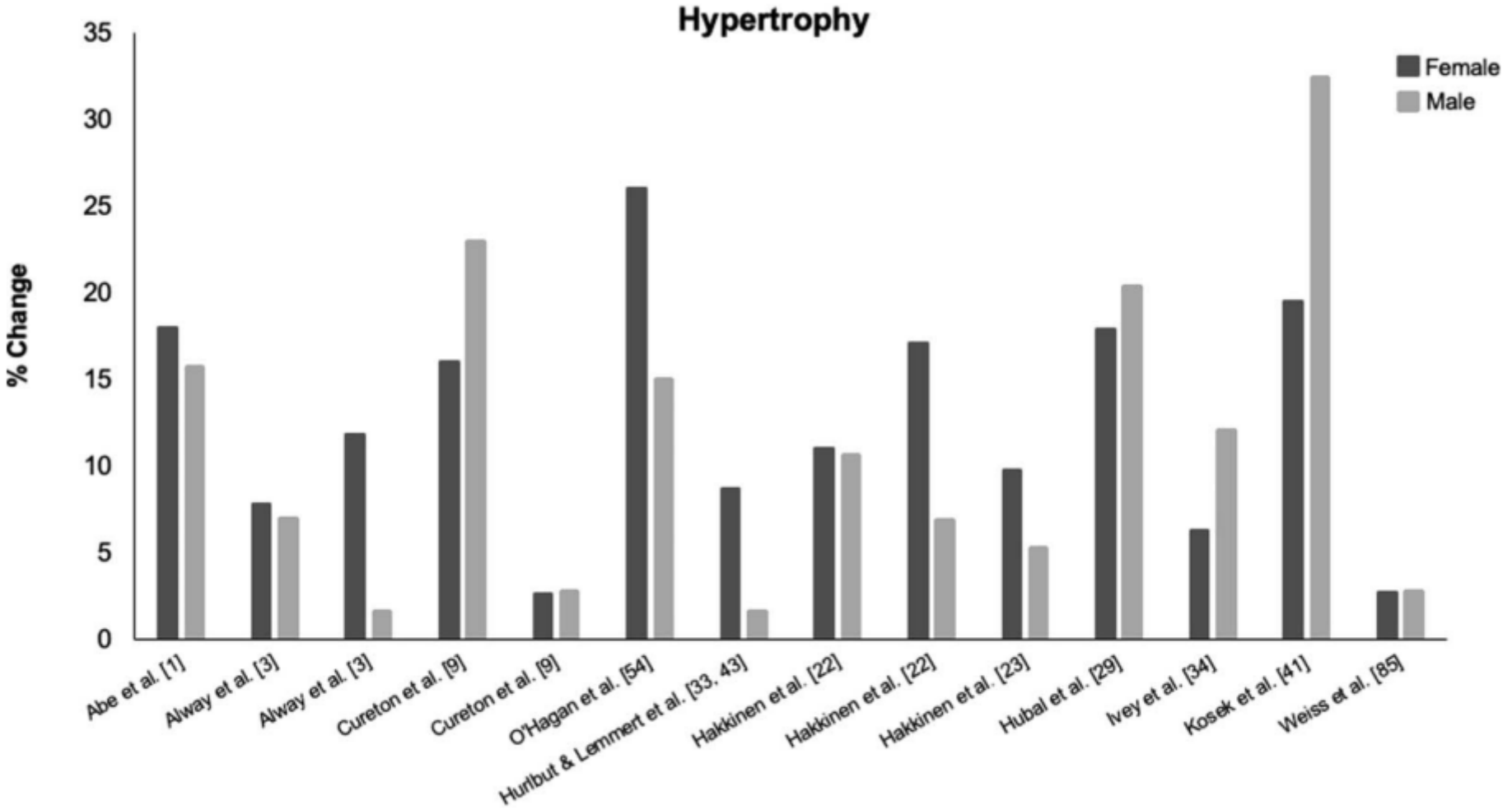


Figure 3. Percent change in muscle hypertrophy in males and females.

Strength Cond Res 34(5): 1448–1460, 2020

the Journal of Strength and Conditioning Research™

Sex Differences in Resistance Training: A Systematic Review and Meta-Analysis

Brandon M. Roberts,[1] Greg Nuckols,[2] and James W. Krieger[3]

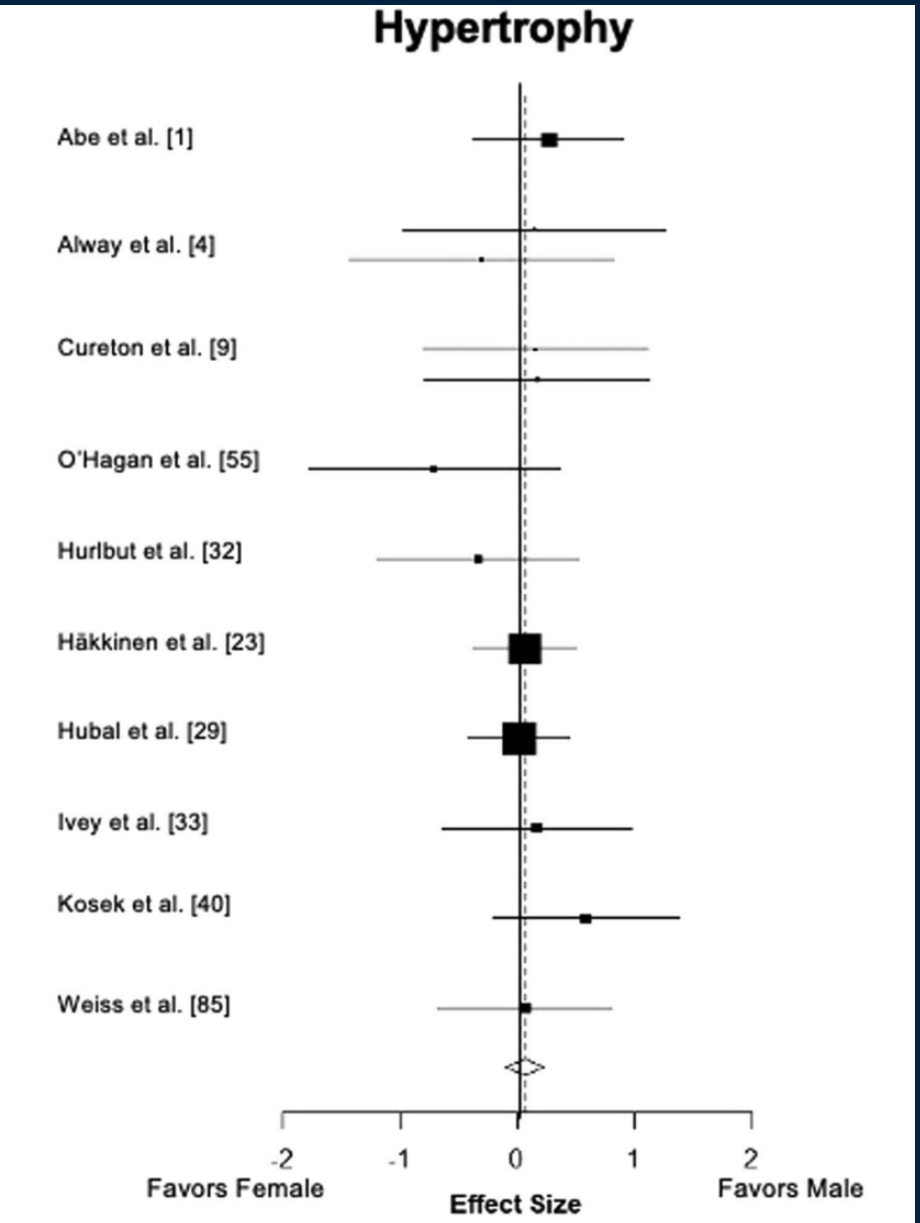


Figure 2. Forest plot of studies comparing changes in hypertrophy in males and females. The data shown are mean ± 95% CI; the size of the plotted squares reflects the statistical weight of each study. CI = confidence interval.

Strength Cond Res 34(5): 1448–1460, 2020

Brief Review

the Journal of Strength and Conditioning Research™

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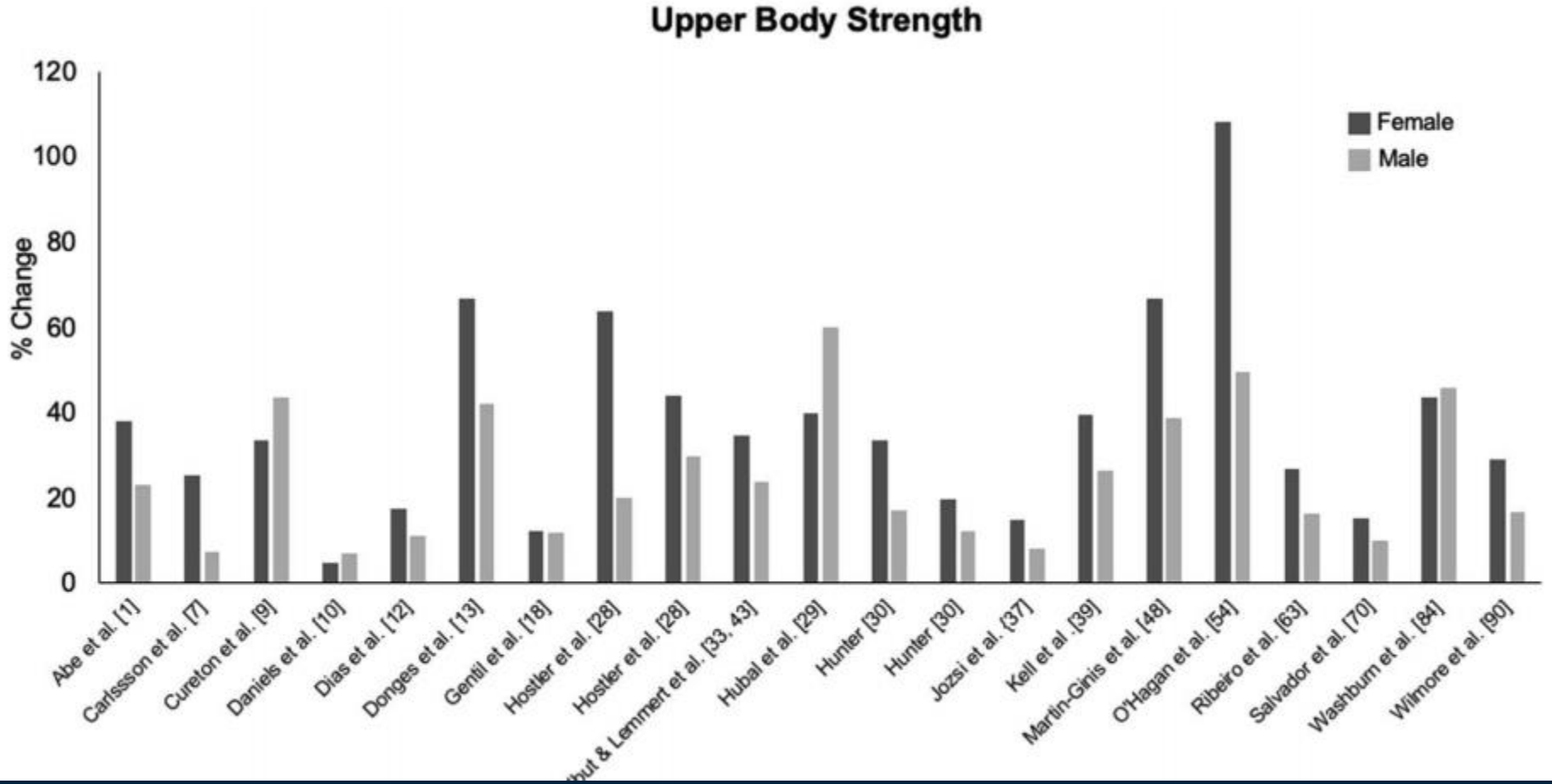

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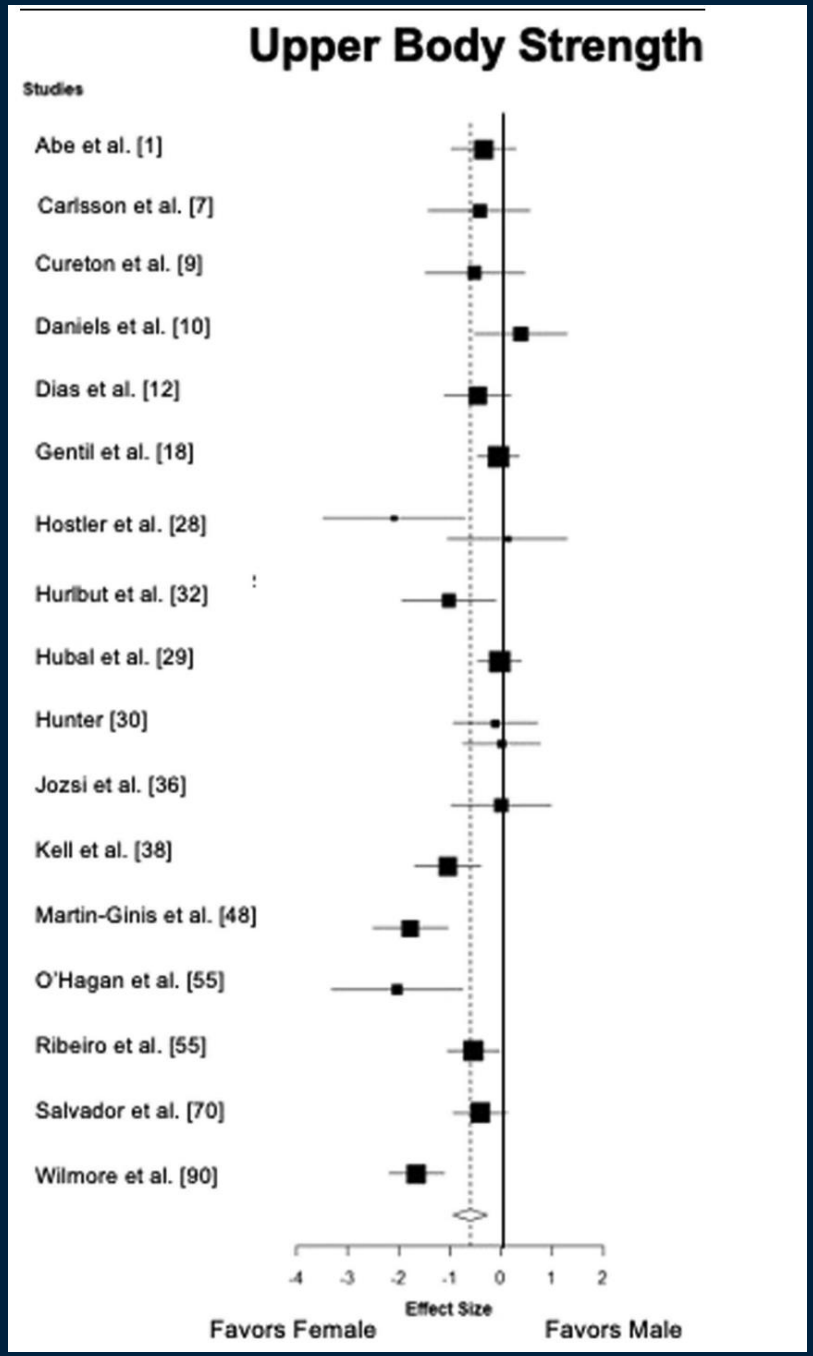

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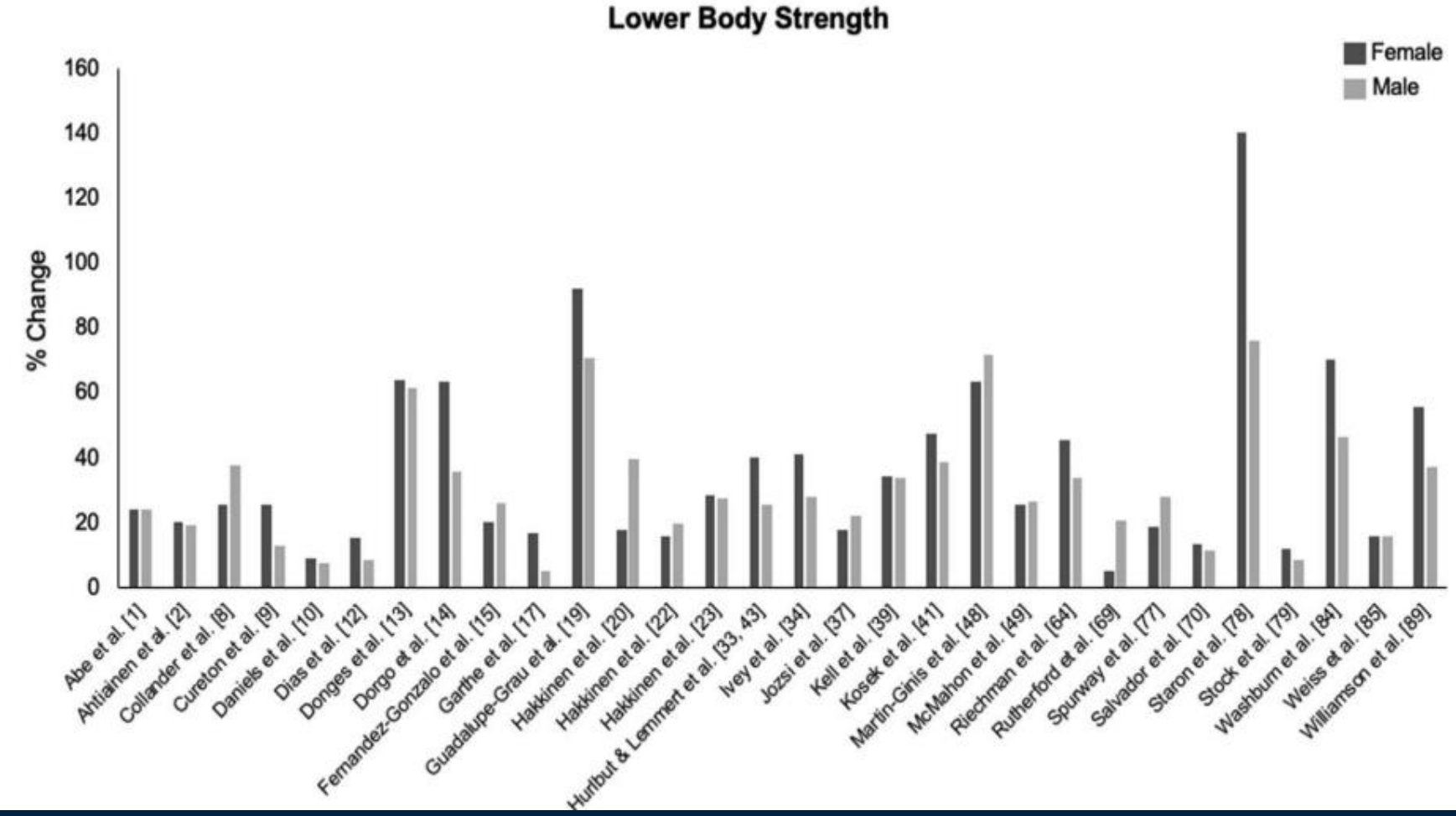
Sex Differences in Resistance Training: A Systematic Review and Meta-Analysis

Brandon M. Roberts,[1] Greg Nuckols,[2] and James W. Krieger[3]



Strength Cond Res 34(5): 1448–1460, 2020

Brief Review

the Journal of Strength and Conditioning Research™

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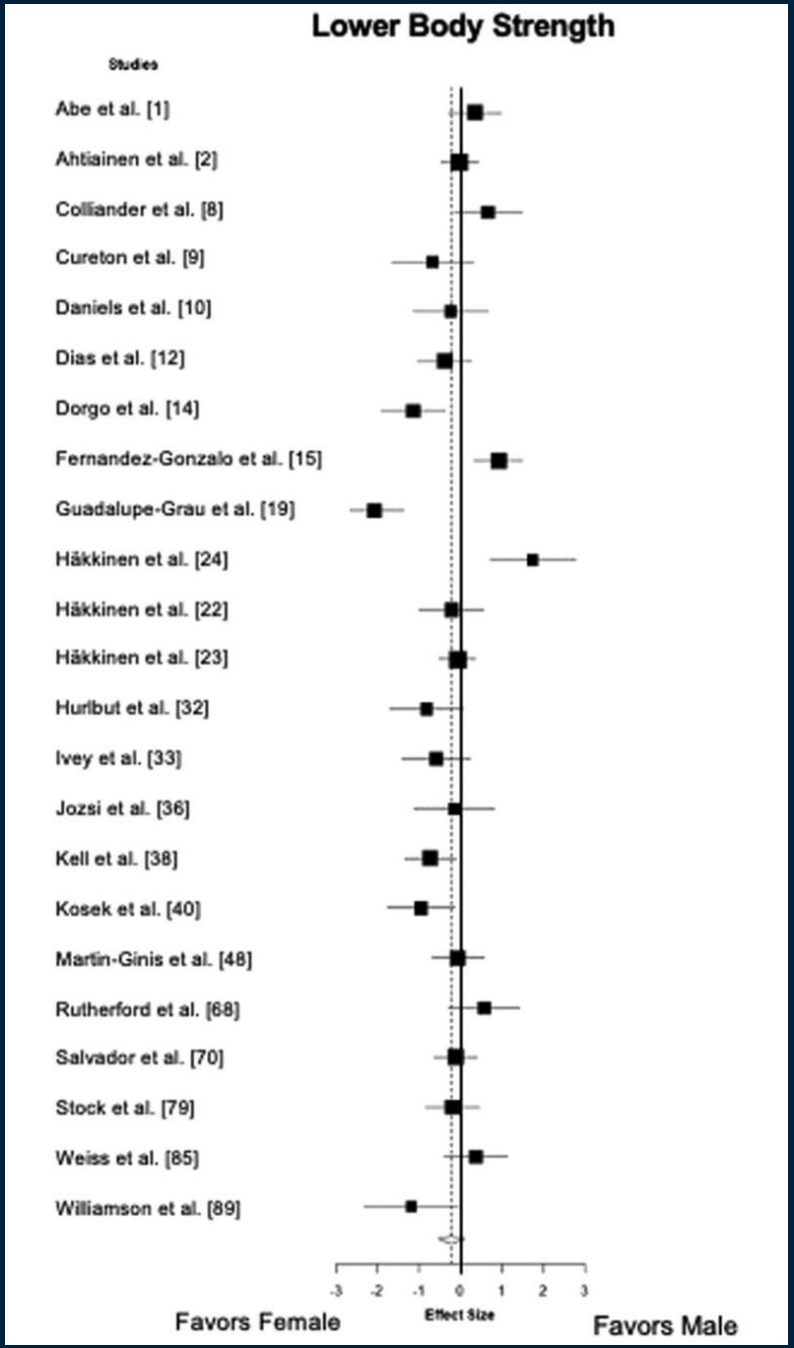


ACSM rekomendacijos!

9 pratimai!

Nr. 1.


A
B


Why High Intensity Interval Training Isn't Just for the Kids
1MD

Nr. 2.

Nr. 3.

Nr. 4.

Nr. 5.

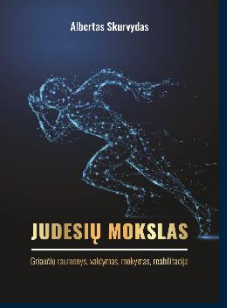

Station #5
Leg Extension
Leg Curl
Body-Solid
LEG EXTENSION
LEG CURL
Body-Solid

Nr. 6.

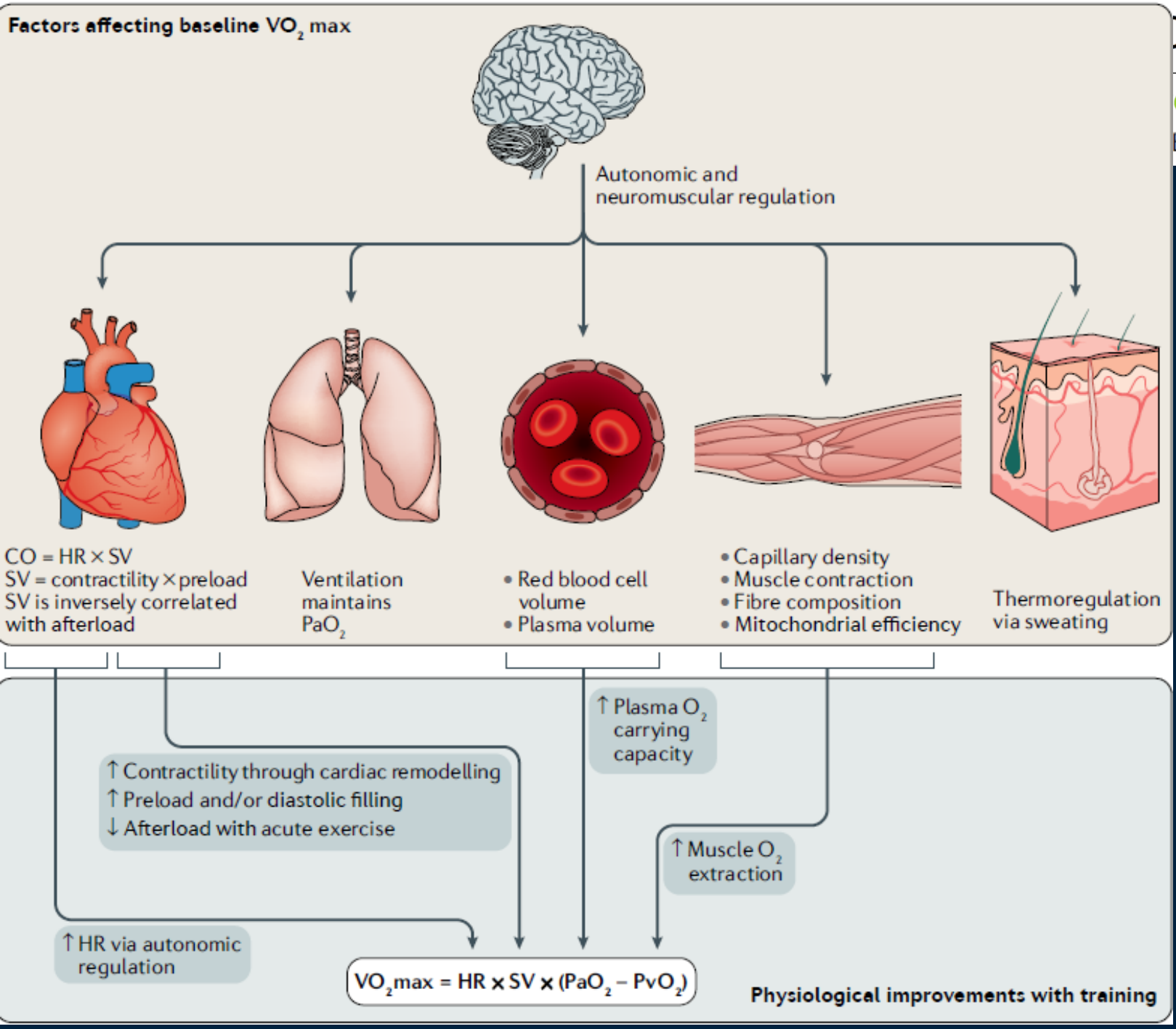
Nr. 7.

Nr. 8.

Nr. 9.



Širdis ir mitochondrijos!


Factors affecting baseline VO_2 max
Autonomic and neuromuscular regulation
CO = HR × SV
SV = contractility × preload
SV is inversely correlated with afterload
Ventilation maintains PaO_2
• Red blood cell volume
• Plasma volume
• Capillary density
• Muscle contraction
• Fibre composition
• Mitochondrial efficiency
Thermoregulation via sweating
↑ Plasma O_2 carrying capacity
↑ Contractility through cardiac remodelling
↑ Preload and/or diastolic filling
↓ Afterload with acute exercise
↑ Muscle O_2 extraction
↑ HR via autonomic regulation
$VO_2max = HR \times SV \times (PaO_2 - PvO_2)$
Physiological improvements with training

Cell Metabolism 27, May 1, 2018

Maximizing Cellular Adaptation to Endurance Exercise in Skeletal Muscle

John A. Hawley,[1,*] Carsten Lundby,[2] James D. Cotter,[3] and Louise M. Burke[1,4]

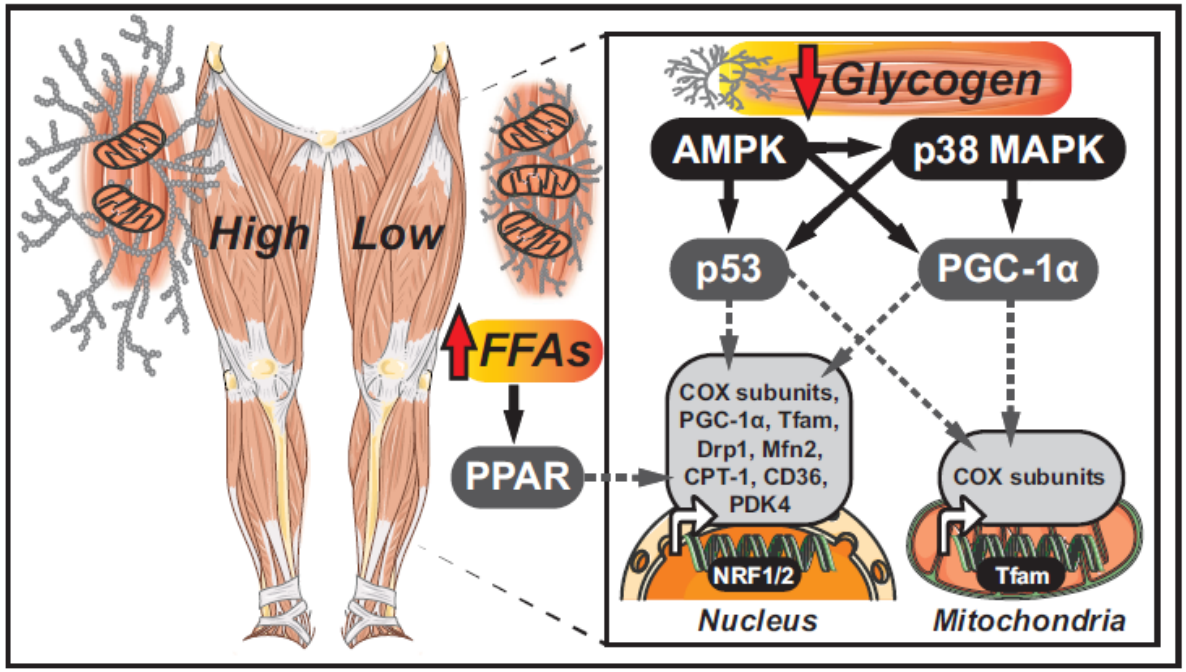


Figure 1. Turning up the Signal: Training with Low Carbohydrate Availability

Skeletal muscle signaling responses after a single bout of endurance exercise are amplified in the face of low glycogen availability. The precise mechanisms responsible for this augmented activation are not resolved but likely involve the peroxisome proliferator-activated receptor γ coactivator 1α (PGC-1α) and downstream targets. In this regard, the classical role of the AMP-activated protein kinase (AMPK) is to act as a sensor of the immediate energy status of the cell by monitoring the concentrations of AMP and ATP. However, the discovery and characterization of glycogen-binding sites within the carbohydrate-binding domain (CBD) on the AMPK β-subunits indicate that this regulatory domain may also allow AMPK to act as a sensor of endogenous glycogen stores. In this case, the CBMs act as sensors enabling AMPK to gauge the state of cellular glycogen, increasing AMPK activity when stores are low and decreasing activity when stores are replete. As such, exercise sessions repeated over weeks and months in the face of low glycogen availability have the potential to modulate numerous adaptive processes in skeletal muscle, ultimately driving enhanced adaptation and the phenotype-specific characteristics observed in highly trained individuals.

Cell Metabolism 27, May 1, 2018

Maximizing Cellular Adaptation to Endurance Exercise in Skeletal Muscle

John A. Hawley,[1,*] Carsten Lundby,[2] James D. Cotter,[3] and Louise M. Burke[1,4]

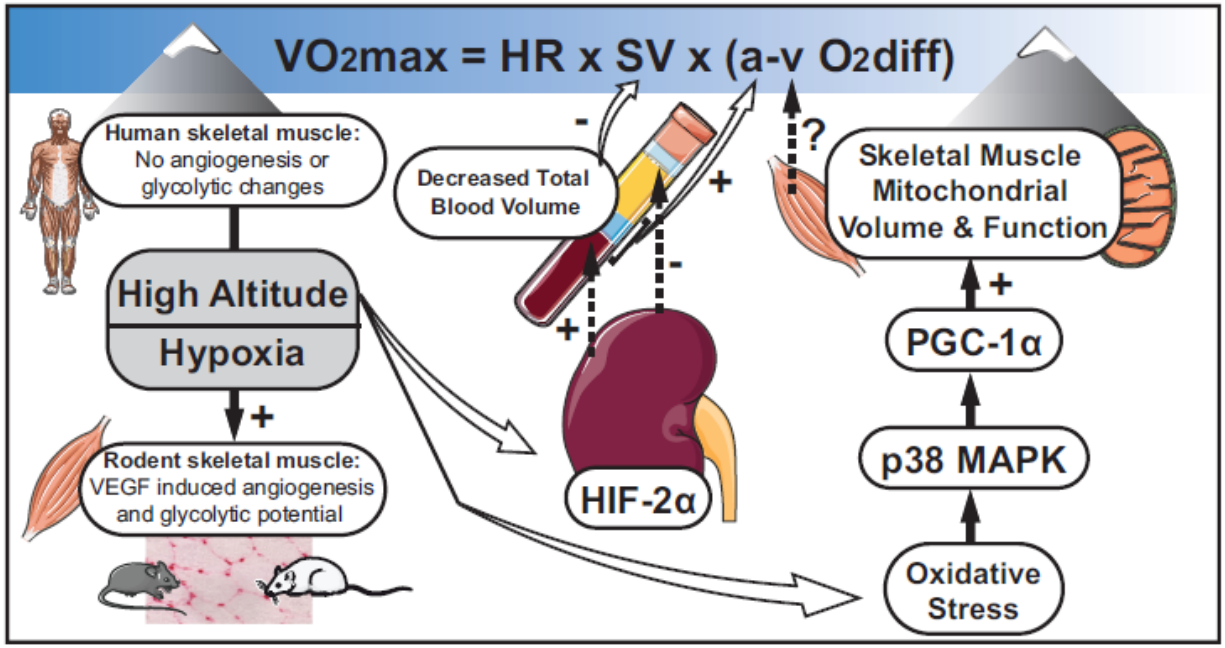


Figure 2. Into Thin Air: Altitude and Hypoxic Training to Enhance Adaptation

An altitude-induced increase in hematocrit would typically be expected to improve exercise capacity. However, the concomitant decrease in total blood volume (since plasma volume is decreased more than RBC volume is increased) will limit maximal cardiac output and maximal O_2 uptake (VO_2max). Thus, while hematological adaptations to altitude exposure are generally perceived to be beneficial for enhancing VO_2max, this is not necessarily the case. While angiogenesis has not been observed in human skeletal muscle following altitude exposure or hypoxic training, skeletal muscle mitochondrial biogenesis is increased, although whether this confers an advantage for VO_2max remains speculative.

Cell Metabolism 27, May 1, 2018

Maximizing Cellular Adaptation to Endurance Exercise in Skeletal Muscle

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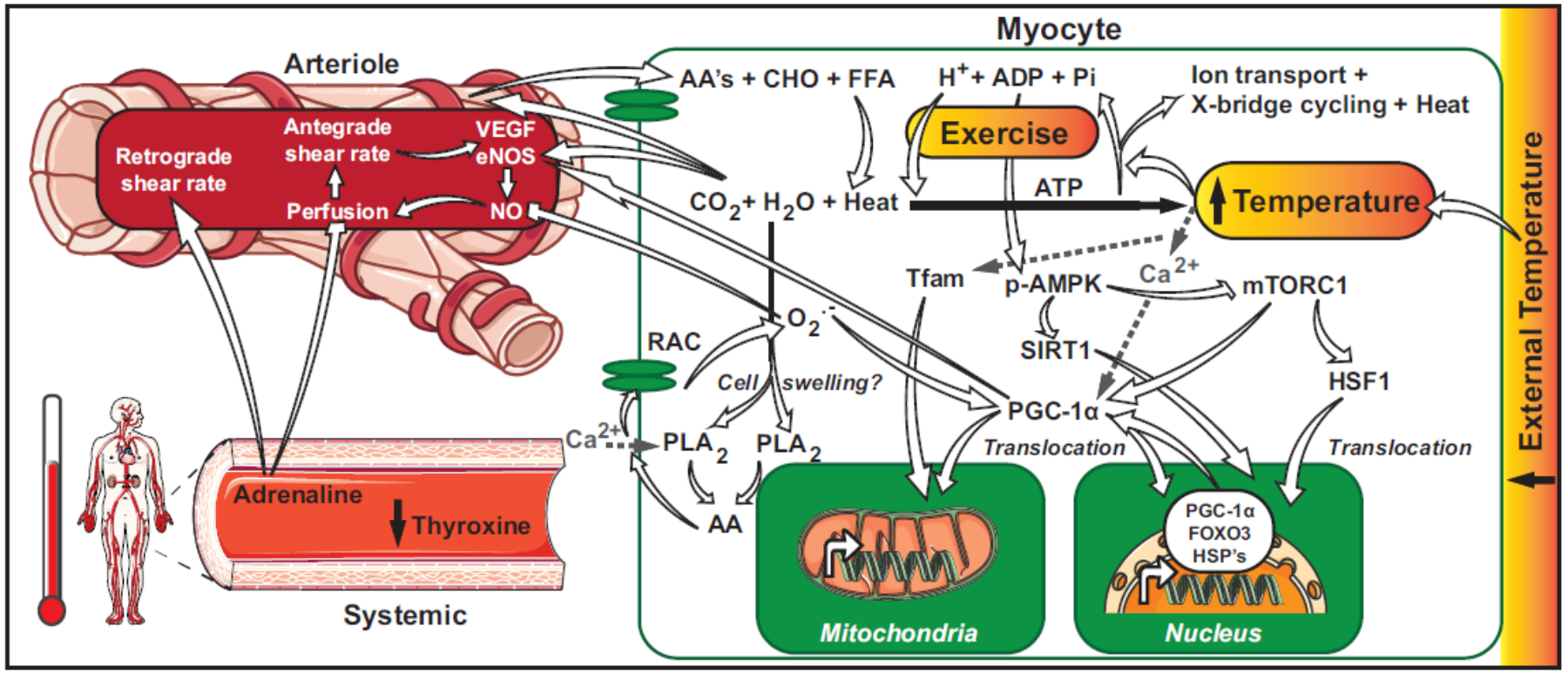
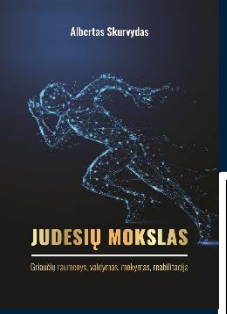


Figure 3. Heat Acclimation: Hot Choice or Hot Air for Enhancing Endurance Training Adaptation?



Penkios strategijos!

	Intensyv-umas	Trukmė	Serijos	Poilsis tarp serijų	Treniročių dažnumas per savaitę, kartais	Treniruočių savaičių skaičius
SIT-1	170 % VO2m	20 s	8	10 s	2	3
SIT-2	P_{max}	30 s	5	4 min	2	3
HIT-1	90 % VO2m	60 s	10	60 s	2	3
SIT-3	P_{max}	30 s	5	10 min	2	3
HIT-2	95 % VO2m	120 s	5	60 s	2	3

Medicine
REVIEW
published: 03 September 2021
doi: 10.3389/fcvm.2021.734278

Optimizing Outcomes in Cardiac Rehabilitation: The Importance of Exercise Intensity

Jenna L. Taylor, Amanda R. Bonikowske and Thomas P. Olson*

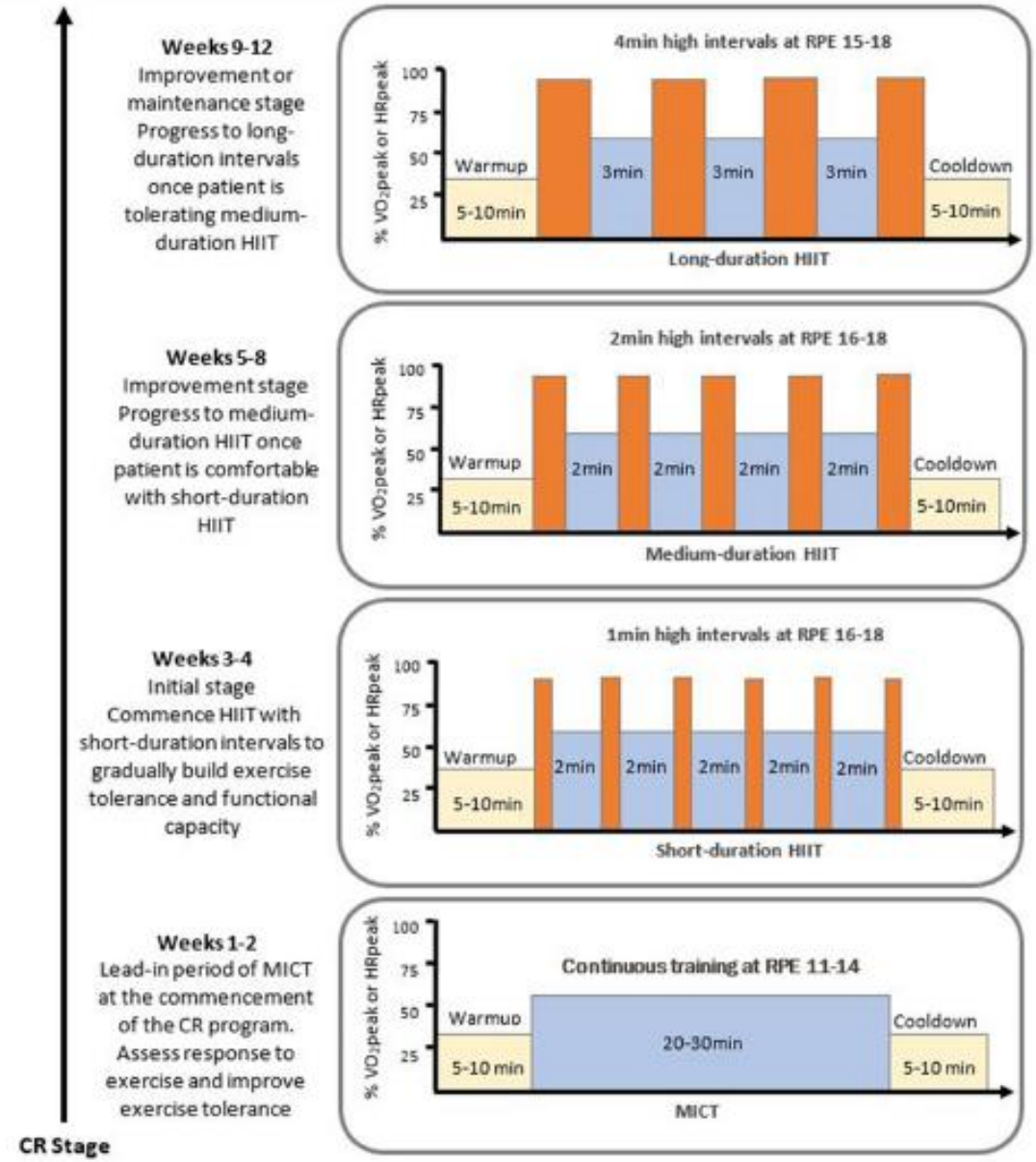
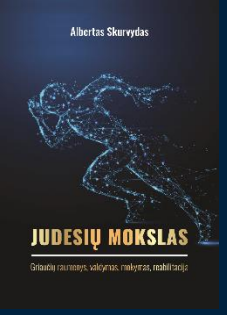


FIGURE 2 | Example of a HIIT progression model within a cardiac rehabilitation program. Exercise intensity remains constant for each HIIT protocol with high intensity intervals eliciting 85-95 %HRpeak and RPE 15-18, and the low intensity intervals involving recovery at 50-75 %HRpeak or RPE 11-14. CR, cardiac rehabilitation; HIIT, high intensity interval training; HRpeak, peak heart rate; MICT, moderate intensity continuous training; RPE, rating of perceived exertion on 6-20 Borg scale; VO_2peak, peak oxygen consumption. This figure has been adapted from the previously published work of (158); with permission of Mayo Foundation for Medical Education and Research, all rights reserved.

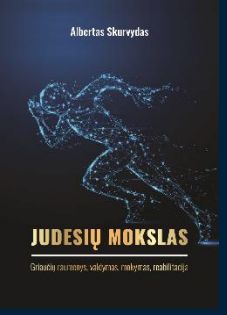


High-intensity interval training in patients with lifestyle-induced cardiometabolic disease: a systematic review and meta-analysis

Kassia S Weston,[1] Ulrik Wisløff,[2] Jeff S Coombes[1]

What are the new findings?

- High-intensity interval training (HIIT) is superior to moderate-intensity continuous training in improving cardiorespiratory fitness in lifestyle-induced cardiometabolic diseases.
- HIIT is well-tolerated, safe and improves the quality of life.
- Central and peripheral adaptations are responsible for the superior benefits of HIIT.



High-intensity interval training in patients with lifestyle-induced cardiometabolic disease: a systematic review and meta-analysis

Kassia S Weston,[1] Ulrik Wisløff,[2] Jeff S Coombes *Br J Sports Med* 2014;

Table 2 Protocol recommendations for HIIT

Frequency	**3×/Week**
Duration	40 min
Modality	Treadmill/hill, cycle ergometer. Increasing speed or incline
Intensity	Interval=85–95% PHR Rest=passive–70% PHR
Interval times	4×4 min intervals 3×3 min recovery
Warm-up	10 min at 60% PHR
Cool-down	5 min at 50% PHR

HIIT, homeostasis model assessment-insulin resistance; PHR, peak heart rate.

atients
lic disease:
sis
orts Med 2014;

Box 1 Adaptations occurring significantly more with HIIT compared to MICT

- ↑VO_2peak
- ↓Systolic and diastolic blood pressure
- ↑High density lipoproteins
- ↓Triglycerides and fasting glucose
- ↓Oxidative stress and inflammation
- ↓FATP-1 and FAS
- ↑Adiponectin, insulin sensitivity and β-cell function
- ↑PGC-1α
- ↑Maximal rate of Ca^{2+} reuptake
- ↑Availability of nitric oxide
- ↑Cardiac function
- ↑Enjoyment of exercise
- ↑Quality of life

FATP-1, fatty acid transport protein 1; FAS, fatty acid synthase; HIIT, high-intensity interval training; MICT, moderate-intensity continuous training


Albertas Skurvydas
JUDESIŲ MOKSLAS
Gyvasčių raumenys: valdymas, mokymas, reabilitacija

Mityba!

Naujausios rekomendacijos apie atletų mitybą!

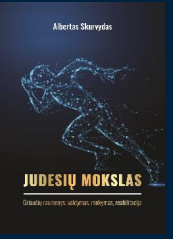
1) Norint pagreitinti atletų organizmo **atsigavimą** po didelės apimties treniruočių krūvių, rekomenduojama suvartoti 0,8**8–1.2 g/kg** kūno svorio **angliavandenių** per dieną.

2) Norint, kad organizmas **atsigautų labai greitai** (greičiau nei per 4 val. po krūvio), rekomenduojama: a) suvartoti aukšto glikemijos indekso (>70) **angliavandenių (1,2 g/kg/val.);** b) **kofeino (**3–8 mg/kg); c) **angliavandenių (0,8 g/kg/val.) + baltymų (0,2–0,4 g/kg/val.).**

3) Norint, kad mažiau **pavargtų galvos smegenys ir raumenys** >60 min. trunkančio krūvio metu (intensyvumas >70 proc. nuo MDS), rekomenduojama vartoti **angliavandenius kartu su 6–8 proc. elektrolitų** tirpalu kas 10–15 min. (30–60 g/val. angliavandenių).

4) Norint **suintensyvinti baltymų sintezę**, rekomenduojama kas 3–4 val. per dieną suvartoti baltymų (**0,2–0,4 g/kg**). Prieš miegą suvartojant 30–40 g kazeino baltymų (kurio labai daug yra piene), pagreitėja baltymų sintezė miego metu

(**Kerksick, C.** M., Arent, S., Schoenfeld, B. J., Stout, J. R., Campbell, B., ..., Antonio, J. (2017 Aug. 29). International society of sports nutrition position stand: nutrient timing. *International Society of Sports Nutrition*, *14*, 33. doi: 10.1186/s12970-017-0189-4. eCollection 2017).



Sveikata ir mityba: Lancet!

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

GBD 2017 Diet Collaborators*

Lancet 2019; 393: 1958–72

	Exposure definition	Optimal level of intake (optimal range of intake)	Data representativeness index (%)
Diet low in fruits	Mean daily consumption of fruits (fresh, frozen, cooked, canned, or dried fruits, excluding fruit juices and salted or pickled fruits)	250 g (200–300) per day	94·9
Diet low in vegetables	Mean daily consumption of vegetables (fresh, frozen, cooked, canned, or dried vegetables, excluding legumes and salted or pickled vegetables, juices, nuts, seeds, and starchy vegetables such as potatoes or corn)	360 g (290–430) per day	94·9
Diet low in legumes	Mean daily consumption of legumes (fresh, frozen, cooked, canned, or dried legumes)	60 g (50–70) per day	94·9
Diet low in whole grains	Mean daily consumption of whole grains (bran, germ, and endosperm in their natural proportion) from breakfast cereals, bread, rice, pasta, biscuits, muffins, tortillas, pancakes, and other sources	125 g (100–150) per day	94·9
Diet low in nuts and seeds	Mean daily consumption of nut and seed foods	21 g (16–25) per day	94·9
Diet low in milk	Mean daily consumption of milk including non-fat, low-fat, and full-fat milk, excluding soy milk and other plant derivatives	435 g (350–520) per day	94·9
Diet high in red meat	Mean daily consumption of red meat (beef, pork, lamb, and goat, but excluding poultry, fish, eggs, and all processed meats)	23 g (18–27) per day	94·9
Diet high in processed meat	Mean daily consumption of meat preserved by smoking, curing, salting, or addition of chemical preservatives	2 g (0–4) per day	36·9
Diet high in sugar-sweetened beverages	Mean daily consumption of beverages with ≥50 kcal per 226·8 serving, including carbonated beverages, sodas, energy drinks, fruit drinks, but excluding 100% fruit and vegetable juices	3 g (0–5) per day	36·9

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

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Lancet 2019; 393: 1958–72

Diet low in fibre	Mean daily intake of fibre from all sources including fruits, vegetables, grains, legumes, and pulses	24 g (19–28) per day	94·9
Diet low in calcium	Mean daily intake of calcium from all sources, including milk, yogurt, and cheese	1·25 g (1·00–1·50) per day	94·9
Diet low in seafood omega-3 fatty acids	Mean daily intake of eicosapentaenoic acid and docosahexaenoic acid	250 mg (200–300) per day	94·9
Diet low in polyunsaturated fatty acids	Mean daily intake of omega-6 fatty acids from all sources, mainly liquid vegetable oils, including soybean oil, corn oil, and safflower oil	11% (9–13) of total daily energy	94·9
Diet high in trans fatty acids	Mean daily intake of trans fat from all sources, mainly partially hydrogenated vegetable oils and ruminant products	0·5% (0·0–1·0) of total daily energy	36·9
Diet high in sodium	24 h urinary sodium measured in g per day	3 g (1–5) per day*	26·2

*To reflect the uncertainty in existing evidence on optimal level of intake for sodium, 1–5 g per day was considered as the uncertainty range for the optimal level of sodium where less than 2·3 g per day is the intake level of sodium associated with the lowest level of blood pressure in randomised controlled trials and 4–5 g per day is the level of sodium intake associated with the lowest risk of cardiovascular disease in observational studies.

Table: Dietary risk factor exposure definitions, optimal level, and data representativeness index, 1990–2017

Health effects of dietary risks in 195 countries, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017

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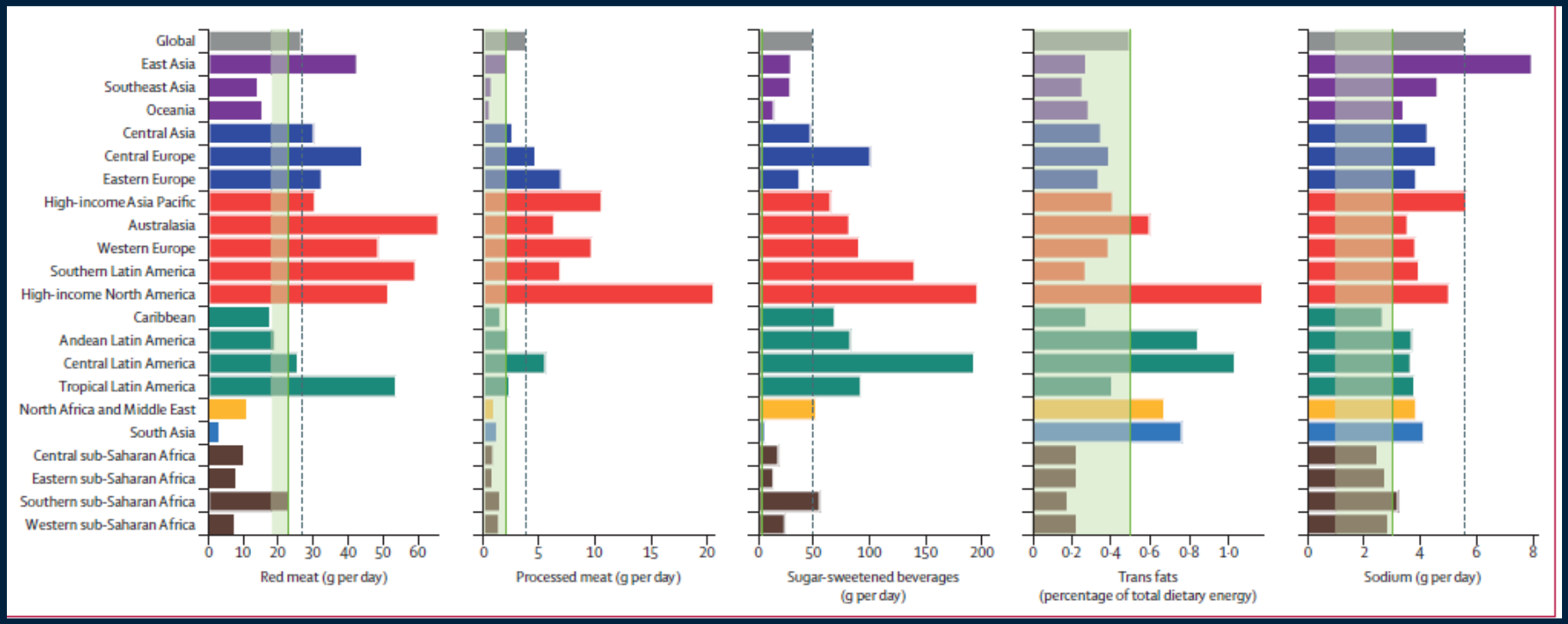

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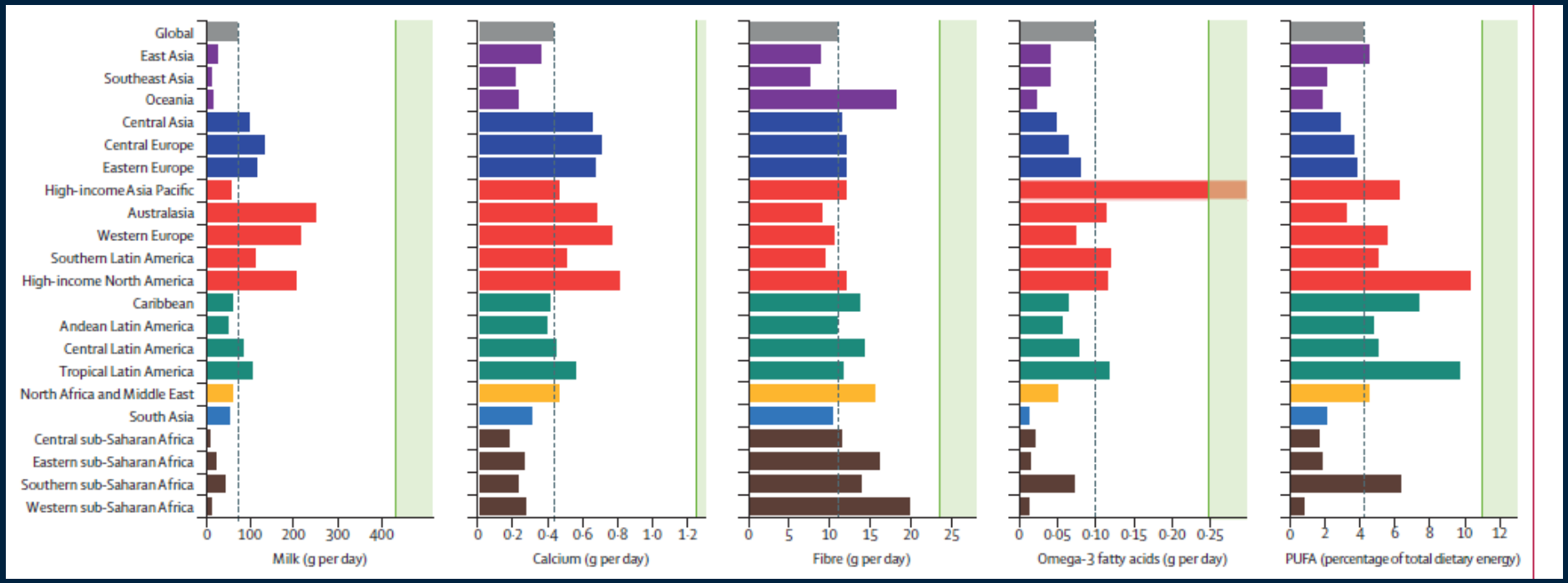

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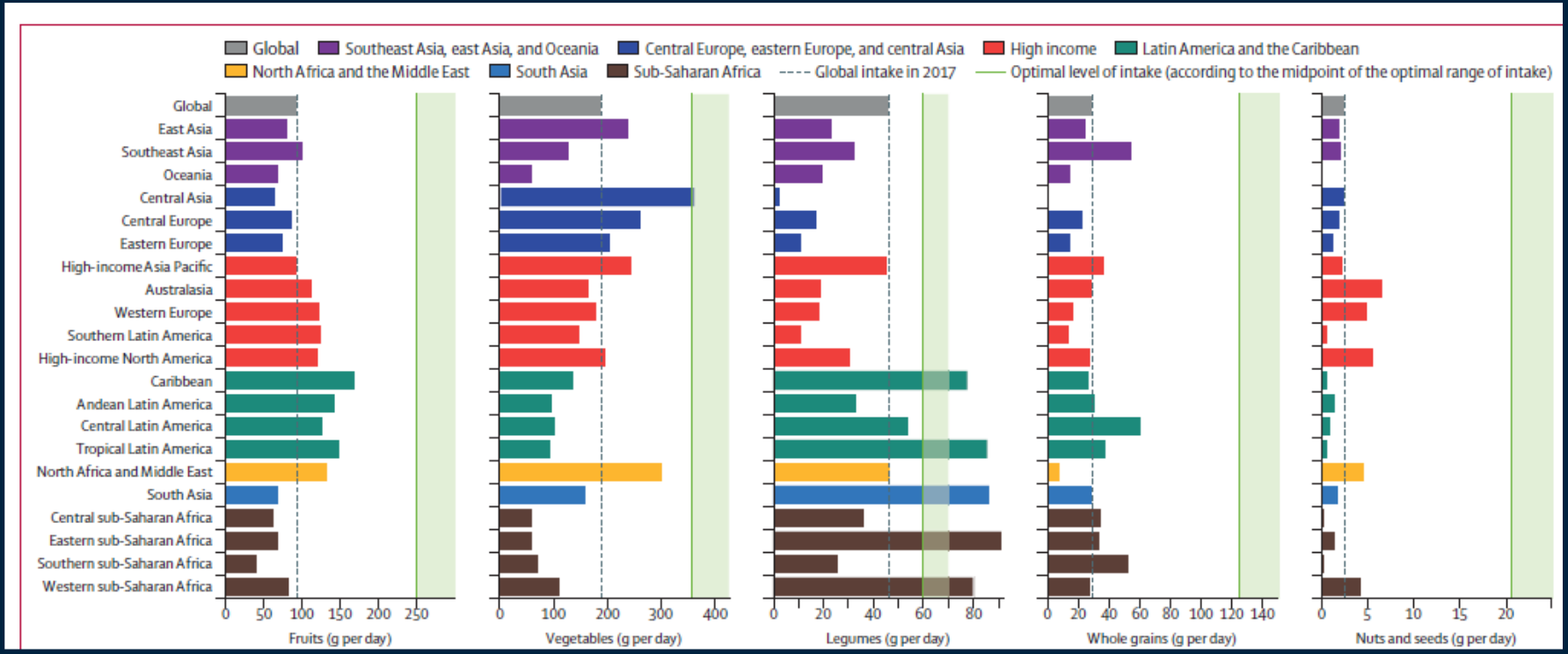

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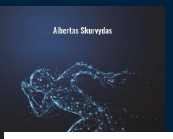
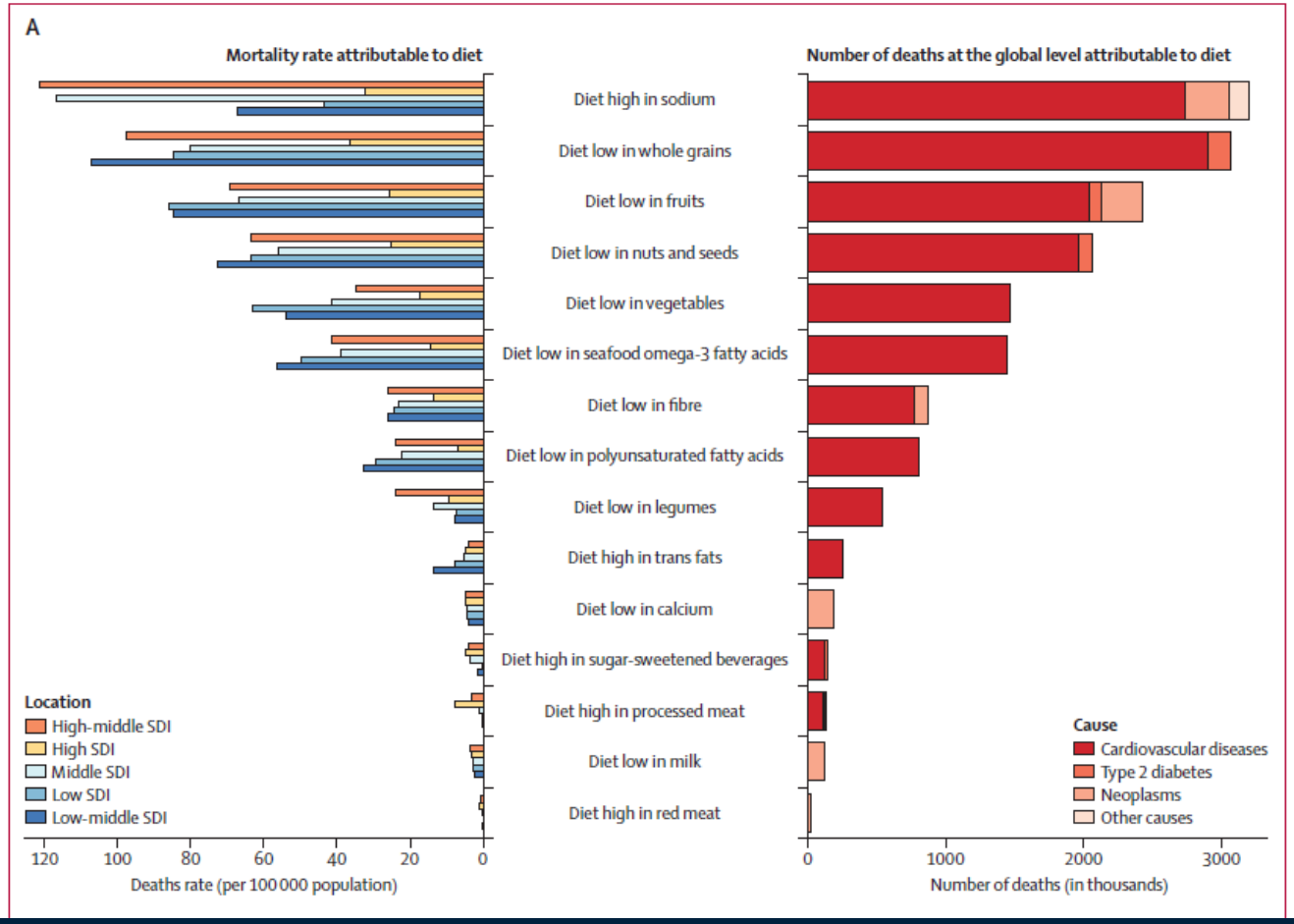
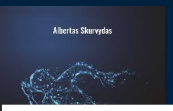




ESC European Society of Cardiology
European Heart Journal (2021) 42, 3227–3337
doi:10.1093/eurheartj/ehab484
ESC GUIDELINES

2021 ESC Guidelines on cardiovascular disease prevention in clinical practice

1. Kuo daugiau valgyti augalinės kilmės maistą, saikingai apribojant gyvulinės kilmės;
2. Maisto racione sočiųjų riebiųjų rūgščių neturi sudaryti daugiau, kaip 10 procentų;
3. Trans-riebalų naudojimą apriboti visiškai;
4. Druskos ne daugiau, kaip 5 g per dieną;
5. Pilno grūdo maistas turi sudaryti apie 30-45 g per dieną;
6. Apie 200 g ir daugiau daržovių per dieną;
7. Apie 200 g ir daugiau vaisių per dieną;
8. Perdirbtos ir raudonos mėsos ne daugiau, kaip 350-500 g per savaitę;
9. Žuvies apie 2 kartus per savaitę;
10. Apie 30 g nesūrių riešutų per dieną;
11. Alkoholio ne daugiau, kaip 100 g per savaitę;
12. Prasaldintų gėrimų, tame tarpe ir vaisių sulčių, visiškai apriboti.



In each case, dietary intake was improved from the TW through feasible to optimal levels (rounded off):

- Whole grains (fresh weight): TW 50 g, FA 137.5 g, and OD 225 g (e.g., 2 thin slices of rye bread and 1 small bowl of whole grain cereal, and some whole grain rice). For whole grains, 225 g of fresh weight corresponds to about 75 g dry weight, equivalent of 7 servings/day);
- Vegetables: TW 250 g, FA 325 g, and OD 400 g (5 servings, e.g., 1 big tomato, 1 sweet pepper, mixed salad leaves, a half avocado, and a small bowl of vegetable soup);
- Fruits: TW 200 g, 300 g, and OD 400 g (5 servings, e.g., 1 apple, banana, orange, kiwi, and a handful of berries);
- Nuts: TW 0 g, FA 12.5 g, and OD 25 g (1 handful of nuts);
- Legumes: TW 0 g, FA 100 g, and OD 200 g (e.g., 1 big cup of soaked beans/lentils/peas);
- Fish: TW 50 g, FA 125 g, and OD 200 g (e.g., 1 big slice of herring);
- Eggs: TW 50 g, FA 37.5 g, and OD 25 g (half an egg);
- Milk/dairy: TW 300 g, FA 250 g, and OD 200 g (e.g., 1 cup of yoghurt);
- Refined grains: TW 150 g, FA 100 g, OD 50 g (e.g., refined grains in bread if mixed whole/refined bread);

- Red meat: TW 100 g, FA 50 g, and OD 0 g;
- Processed meat: TW 50 g, FA 25 g, and OD 0 g;
- White meat: TW 75 g, FA 62.5 g, and OD 50 g;
- Sugar-sweetened beverages: TW 500 g, FA 250 g, and OD 0 g;
- Added plant oils: TW 25 g, FA 25 g, and OD 25 g.

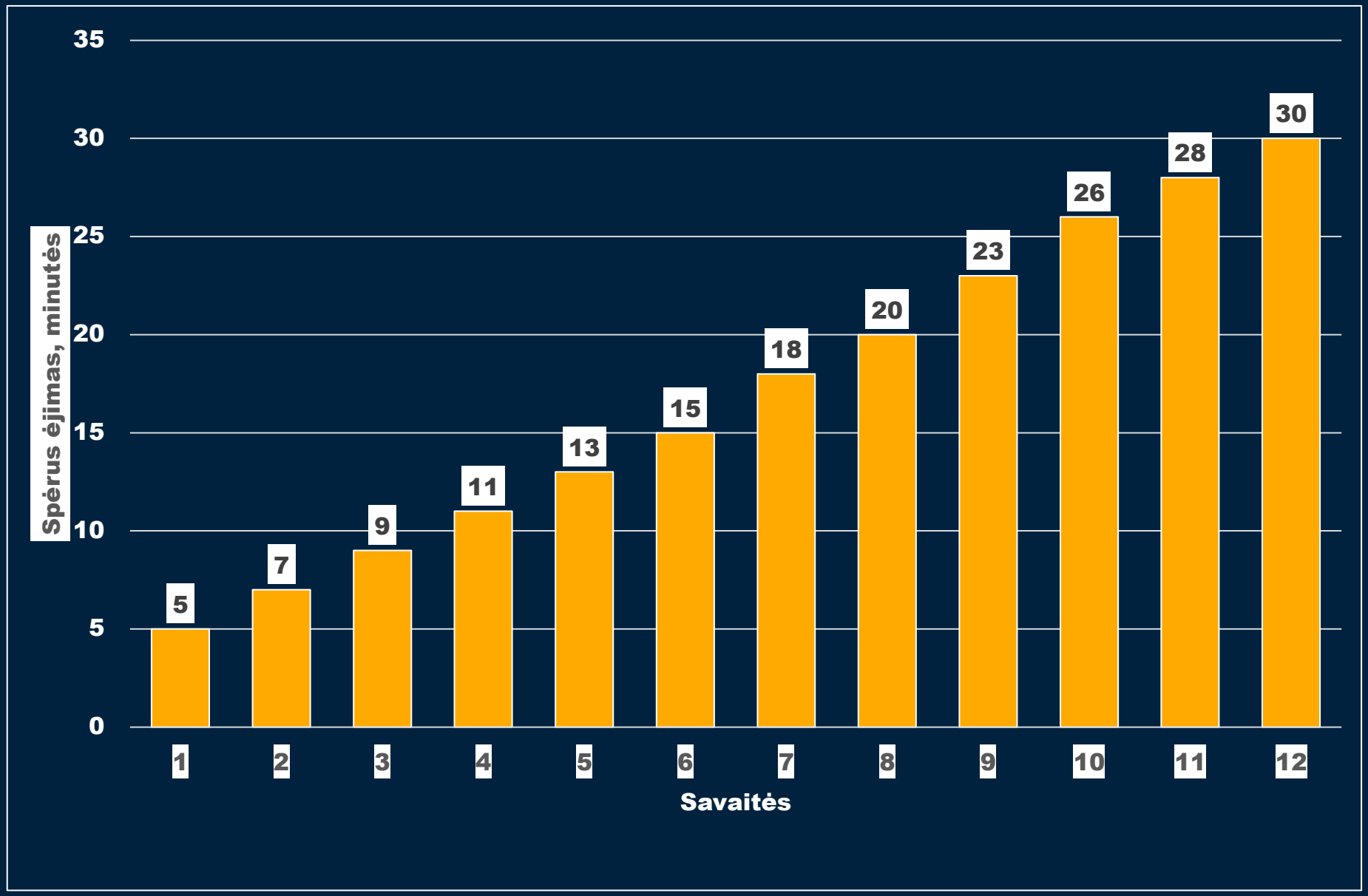
Estimating impact of food choices on life expectancy: A modeling study

Lars T. Fadnes[1,2]*, Jan-Magnus Økland[1,3], Øystein A. Haaland[1,3☯], Kjell Arne Johansson[1,2,3☯]

Citation: Fadnes LT, Økland J-M, Haaland ØA, Johansson KA (2022) Estimating impact of food choices on life expectancy: A modeling study. PLoS Med 19(2): e1003889. https://doi.org/10.1371/journal.pmed.1003889

Mayo klinkos patarimai

Myo Clinics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Spėrus ėjimas, minutės
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11
12
Savaitės

MAYO CLINIC

5K run: 7-week training schedule for beginners

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
	On run/walk days, walkers walk only. Runners run for 15 seconds/walk for 45 seconds.						
Week 1	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 3 miles (4.8 km)	Rest or walk
	On run/walk days, walkers walk only. Runners run for 15 seconds/walk for 45 seconds.						
Week 2	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 3.5 miles (5.6 km)	Rest or walk
	On run/walk days, walkers walk only. Runners run for 20 seconds/walk for 40 seconds.						
Week 3	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 2 miles (3.2 km) with Magic Mile*	Rest or walk
	On run/walk days, walkers walk only. Runners run for 20 seconds/walk for 40 seconds.						
Week 4	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 4 miles (6.4 km)	Rest or walk
	On run/walk days, walkers walk only. Runners run for 25 seconds/walk for 35 seconds.						
Week 5	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 2 miles (3.2 km) with Magic Mile*	Rest or walk
	On run/walk days, walkers walk only. Runners run for 25 seconds/walk for 35 seconds.						
Week 6	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	Run/walk 4.5 miles (7.2 km)	Rest or walk
	On run/walk days, walkers walk only. Runners run for 30 seconds/walk for 30 seconds.						
Week 7	Run/walk 30 minutes	Walk 30 minutes	Run/walk 30 minutes	Walk 30 minutes	Rest	**5K race day**	Rest or walk

Source: Galloway, J. Galloway's 5K/10K Running. 2nd. ed. Aachen, Germany: Meyer & Meyer Sport; 2008:38. Used with permissi

Testai!

S, superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

ACSM's Guidelines for Exercise Testing and Prescription
EIGHTH EDITION

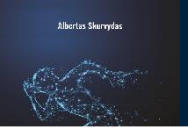
TABLE 4.9. UPPER BODY STRENGTH[a]

MALES

Bench Press Weight Ratio = $\frac{\text{weight pushed in lbs}}{\text{body weight in lbs}}$

	AGE						
%	<20	20–29	30–39	40–49	50–59	60+	
99	>1.76	>1.63	>1.35	>1.20	>1.05	>.94	
95	1.76	1.63	1.35	1.20	1.05	.94	S
90	1.46	1.48	1.24	1.10	.97	.89	
85	1.38	1.37	1.17	1.04	.93	.84	
80	1.34	1.32	1.12	1.00	.90	.82	E
75	1.29	1.26	1.08	.96	.87	.79	
70	1.24	1.22	1.04	.93	.84	.77	
65	1.23	1.18	1.01	.90	.81	.74	
60	1.19	1.14	.98	.88	.79	.72	G
55	1.16	1.10	.96	.86	.77	.70	
50	1.13	1.06	.93	.84	.75	.68	
45	1.10	1.03	.90	.82	.73	.67	
40	1.06	.99	.88	.80	.71	.66	F
35	1.01	.96	.86	.78	.70	.65	
30	.96	.93	.83	.76	.68	.63	
25	.93	.90	.81	.74	.66	.60	
20	.89	.88	.78	.72	.63	.57	P
15	.86	.84	.75	.69	.60	.56	
10	.81	.80	.71	.65	.57	.53	
5	.76	.72	.65	.59	.53	.49	
1	<.76	<.72	<.65	<.59	<.53	<.49	VP
n	60	425	1,909	2,090	1,279	343	

Total n = 6,106



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	FEMALES AGE						
%	<20	20–29	30–39	40–49	50–59	60+	
99	>.88	>1.01	>.82	>.77	>.68	>.72	
95	.88	1.01	.82	.77	.68	.72	S
90	.83	.90	.76	.71	.61	.64	
85	.81	.83	.72	.66	.57	.59	
80	.77	.80	.70	.62	.55	.54	E
75	.76	.77	.65	.60	.53	.53	
70	.74	.74	.63	.57	.52	.51	
65	.70	.72	.62	.55	.50	.48	
60	.65	.70	.60	.54	.48	.47	G
55	.64	.68	.58	.53	.47	.46	
50	.63	.65	.57	.52	.46	.45	
45	.60	.63	.55	.51	.45	.44	
40	.58	.59	.53	.50	.44	.43	F
35	.57	.58	.52	.48	.43	.41	
30	.56	.56	.51	.47	.42	.40	
25	.55	.53	.49	.45	.41	.39	
20	.53	.51	.47	.43	.39	.38	P
15	.52	.50	.45	.42	.38	.36	
10	.50	.48	.42	.38	.37	.33	
5	.41	.44	.39	.35	.31	.26	
1	<.41	<.44	<.39	<.35	<.31	<.26	VP
n	20	191	379	333	189	42	

Total n = 1,154

S, superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

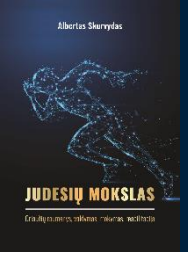

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TABLE 4.10. LEG STRENGTH[a]

	AGE				
PERCENTILE	20–29	30–39	40–49	50–59	60+
Men					
90	2.27	2.07	1.92	1.80	1.73
80	2.13	1.93	1.82	1.71	1.62
70	2.05	1.85	1.74	1.64	1.56
60	1.97	1.77	1.68	1.58	1.49
50	1.91	1.71	1.62	1.52	1.43
40	1.83	1.65	1.57	1.46	1.38
30	1.74	1.59	1.51	1.39	1.30
20	1.63	1.52	1.44	1.32	1.25
10	1.51	1.43	1.35	1.22	1.16
Women					
90	1.82	1.61	1.48	1.37	1.32
80	1.68	1.47	1.37	1.25	1.18
70	1.58	1.39	1.29	1.17	1.13
60	1.50	1.33	1.23	1.10	1.04
50	1.44	1.27	1.18	1.05	0.99
40	1.37	1.21	1.13	0.99	0.93
30	1.27	1.15	1.08	0.95	0.88
20	1.22	1.09	1.02	0.88	0.85
10	1.14	1.00	0.94	0.78	0.72

[a]One repetition maximum leg press with leg press weight ratio = weight pushed/body weight.

Adapted from Institute for Aerobics Research, Dallas, 1994. Study population for the data set was predominantly white and college educated. A Universal DVR machine was used to measure the 1-RM. The following may be used as descriptors for the percentile rankings: well above average (90), above average (70), average (50), below average (30), and well below average (10).

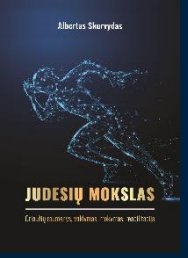

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TABLE 4.11. FITNESS CATEGORIES BY AGE GROUPS AND SEX FOR PUSH-UPS

	AGE									
CATEGORY	20–29		30–39		40–49		50–59		60–69	
SEX	M	F	M	F	M	F	M	F	M	F
Excellent	36	30	30	27	25	24	21	21	18	17
Very good	35	29	29	26	24	23	20	20	17	16
	29	21	22	20	17	15	13	11	11	12
Good	28	20	21	19	16	14	12	10	10	11
	22	15	17	13	13	11	10	7	8	5
Fair	21	14	16	12	12	10	9	6	7	4
	17	10	12	8	10	5	7	2	5	2
Needs improvement	16	9	11	7	9	4	6	1	4	1

M, male; F, female.

Source: Canadian Physical Activity, Fitness & Lifestyle Approach: CSEP-Health & Fitness Program's Appraisal & Counseling Strategy, 3rd ed, ©2003. Used with permission from the Canadian Society for Exercise Physiology.

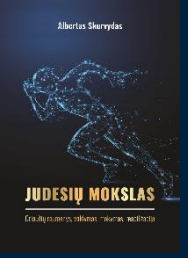

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TABLE 4.12. FITNESS CATEGORIES BY AGE GROUPS AND SEX FOR PARTIAL CURL-UP

	AGE									
CATEGORY	20–29		30–39		40–49		50–59		60–69	
SEX	M	F	M	F	M	F	M	F	M	F
Excellent	25	25	25	25	25	25	25	25	25	25
Very good	24	24	24	24	24	24	24	24	24	24
	21	18	18	19	18	19	17	19	16	17
Good	20	17	17	18	17	18	16	18	15	16
	16	14	15	10	13	11	11	10	11	8
Fair	15	13	14	9	12	10	10	9	10	7
	11	5	11	6	6	4	8	6	6	3
Needs improvement	10	4	10	5	5	3	7	5	5	2

M, male; F, female.

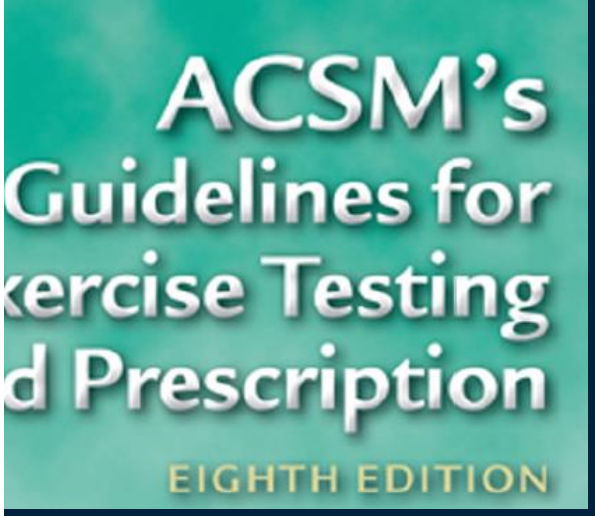
Source: Canadian Physical Activity, Fitness & Lifestyle Approach: CSEP-Health & Fitness Program's Appraisal & Counseling Strategy, 3rd ed, ©2003. Used with permission from the Canadian Society for Exercise Physiology.

TABLE 4.13. YMCA BENCH PRESS TEST: TOTAL LIFTS

CATEGORY	AGE											
	18–25		26–35		36–45		46–55		56–65		>65	
SEX	M	F	M	F	M	F	M	F	M	F	M	F
Excellent	64	66	61	62	55	57	47	50	41	42	36	30
	44	42	41	40	36	33	28	29	24	24	20	18
Good	41	38	37	34	32	30	25	24	21	21	16	16
	34	30	30	29	26	26	21	20	17	17	12	12
Above average	33	28	29	28	25	24	20	18	14	14	10	10
	29	25	26	24	22	21	16	14	12	12	9	8
Average	28	22	24	22	21	20	14	13	11	10	8	7
	24	20	21	18	18	16	12	10	9	8	7	5
Below average	22	18	20	17	17	14	11	9	8	6	6	4
	20	16	17	14	14	12	9	7	5	5	4	3
Poor	17	13	16	13	12	10	8	6	4	4	3	2
	13	9	12	9	9	6	5	2	2	2	2	0
Very poor	<10	6	9	6	6	4	2	1	1	1	1	0

M, male. F, female.

Reprinted with permission from Golding LA, editor. *YMCA Fitness Testing and Assessment Manual*, 4th ed. Champaign (IL): Human Kinetics; 2000.



repetitions at a rate of 30 lifts or reps·min^{-1}. Men are tested using an 80-pound (36.3-kg) barbell and women using a 35-pound (15.9-kg) barbell. Subjects are scored by the number of successful repetitions completed (24). The YMCA test is an excellent example of a test that attempts to control for repetition duration and posture alignment, thus possessing high reliability. Normative data for the YMCA bench press test are presented in Table 4.13.

TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER

MALES

	AGE 20–29				AGE 30–39				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	32:00	61.2	2.02	8:22	30:00	58.3	1.94	8:49	
95	28:31	56.2	1.88	9:10	27:11	54.3	1.82	9:31	S
90	27:00	54.0	1.81	9:34	26:00	52.5	1.77	9:52	
85	26:00	52.5	1.77	9:52	24:45	50.7	1.72	10:14	
80	25:00	51.1	1.73	10:08	23:30	47.5	1.67	10:38	E
75	23:40	49.2	1.68	10:34	22:30	47.5	1.63	10:59	
70	23:00	48.2	1.65	10:49	22:00	46.8	1.61	11.09	
65	22:00	46.8	1.61	11:09	21:00	45.3	1.57	11:34	
60	21:15	45.7	1.58	11:27	20:20	44.4	1.55	11:49	G
55	21:00	45.3	1.57	11:34	20:00	43.9	1.53	11 :58	
50	20:00	43.9	1.53	11:58	19:00	42.4	1:49	12:25	
45	19:26	43.1	1.51	12:11	18:15	41.4	1.46	12:44	
40	18:50	42.2	1.49	12:29	18:00	41.0	1.45	12:53	F
35	18:00	41.0	1.45	12:53	17:00	39.5	1.41	13:25	
30	17:30	40.3	1.43	13:08	16:15	38.5	1.38	13:48	
25	17:00	39.5	1.41	13:25	15:40	37.6	1.36	14:10	
20	16:00	38.1	1.37	13:58	15:00	36.7	1.33	14:33	P
15	15:00	36.7	1.33	14:33	14:00	35.2	1.29	15:14	
10	14:00	35.2	1.29	15:14	13:00	33.8	1.25	15:56	
5	12:00	32.3	1.21	16:46	11:10	31.1	1.18	17:30	
1	8:00	26:6	1.05	20:55	8:00	26.6	1.05	20:55	VP
		n = 2,606				n = 13,158			

Total n = 15,764

S, Superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

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TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER (*Continued*)

MALES

	AGE 40–49				AGE 50–59				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	29:06	57.0	1.90	9:02	27:15	54.3	1.82	9:31	
95	26:16	52.9	1.79	9:47	24:00	49.7	1.69	10:27	S
90	25:00	51.1	1.73	10:09	22:00	46.8	1.61	11:09	
85	23:14	48.5	1.66	10:44	20:31	44.6	1.55	11:45	
80	22:00	46.8	1.61	11:09	19:35	43.3	1.52	12:08	E
75	21:02	45.4	1.58	11:32	18:32	41.8	1.47	12:37	
70	20:15	44.2	1.54	11:52	18:00	41.0	1.45	12:53	
65	20:00	43.9	1.53	11:58	17:00	39.5	1.41	13:25	
60	19:00	42.4	1.49	12:25	16:10	38:3	1.38	13.53	G
55	18:02	41.0	1.45	12:53	16:00	38.1	1.37	13:58	
50	17:34	40.4	1.44	13:05	15:02	36.7	1.33	14:33	
45	17:00	39.5	1.41	13:25	14:56	36.6	1.33	14:35	
40	16:12	38.4	1.38	13:50	14:00	35.2	1.29	15:14	F
35	15:38	37.6	1.36	14:10	13:05	33.9	1.26	15:53	
30	15:00	36.7	1.33	14:33	12:38	33.2	1.24	16:16	
25	14:20	35.7	1.31	15:00	12:00	32.3	1.21	16:46	
20	13:35	34.6	1.28	15:32	11:10	31.1	1.18	17:30	P
15	12:45	33.4	1.24	16:09	10:15	29.8	1.14	18:22	
10	11:40	31.8	1.20	17:04	9:15	28.4	1.10	19:24	
5	10:00	29.4	1.13	18:39	7:30	25.8	1.03	21:40	
1	7:00	25.1	1.01	22.22	4:20	21.3	0.90	27:08	VP
	n = 16,534				n = 9,102				

Total n = 25,636

S, Superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

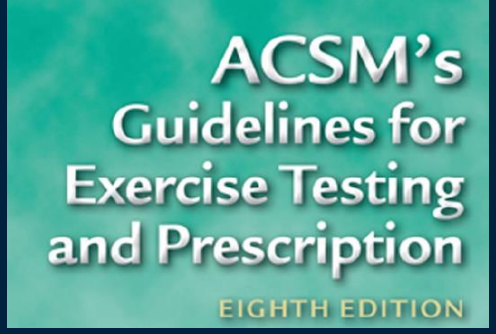

TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER (*Continued*)

MALES

	AGE 60–69				AGE 70–79				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	25:02	51.1	1.74	10:09	24:00	49.7	1.69	10:27	
95	21:33	46.1	1.60	11:20	19:00	42.4	1.49	12:25	S
90	19:30	43.2	1.51	12:10	17:00	39.5	1.41	13:25	
85	18:00	41.0	1.45	12:53	16:00	38.1	1.37	13:57	
80	17:00	39.5	1.41	13:25	14:34	36.0	1.32	14:52	E
75	16:00	38.1	1.37	13:58	13:25	34.4	1.27	15:38	
70	15:00	36.7	1.33	14:33	12:27	33.0	1.23	16:22	
65	14:30	35.9	1.31	14:55	12:00	32.3	1.21	16:46	
60	13:51	35.0	1.29	15:20	11:00	30.9	1.17	17:37	G
55	13:04	33.9	1.26	15:53	10:30	30.2	1.15	18:05	
50	12:30	33.1	1.23	16:19	10:00	29.4	1.13	18:39	
45	12:00	32.3	1.21	16:46	9:20	28.5	1.11	19:19	
40	11:21	31.4	1.19	17:19	9:00	28.0	1.09	19:43	F
35	10:49	30.6	1.17	17:49	8:21	27.1	1.07	20:28	
30	10:00	29.4	1.13	18:39	7:38	26.0	1.04	21:28	
25	9:29	28.7	1.11	19:10	7:00	25.1	1.01	22:22	
20	8:37	27.4	1.08	20:13	6:00	23.7	0.97	23:55	P
15	7:33	25.9	1.03	21:34	5:00	22.2	0.93	25:49	
10	6:20	24.1	0.99	23:27	4:00	20.8	0.89	27:55	
5	4:55	22.1	0.93	25:58	3:00	19.3	0.85	30:34	
1	2:29	18.6	0.83	31:59	2:00	17.9	0.81	33:30	VP
		n = 2,682				n = 467			

Total n = 3,149

S, Superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

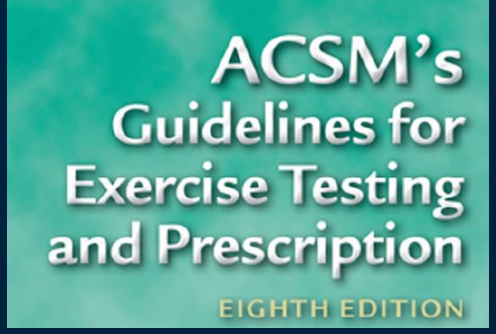

TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER (*Continued*)

FEMALES

	AGE 20–29				AGE 30–39				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	27:43	55.0	1.84	9:23	26:00	52.5	1.77	9:52	
95	24:24	50.2	1.71	10:20	22:06	46.9	1.62	11:08	S
90	22:30	47.5	1.63	10:59	20:34	44.7	1.56	11:43	
85	21:00	45.3	1.57	11:34	19:03	42.5	1.50	12:23	
80	20:04	44.0	1.54	11:56	18:00	41.0	1.45	12:53	E
75	19:42	43.4	1.52	12:07	17:30	40.3	1.43	13:08	
70	18:06	41.1	1.46	12:51	16:30	38.8	1.39	13:41	
65	17:45	40.6	1.44	13:01	16:00	38.1	1.37	13.58	
60	17:00	39.5	1.41	13:25	15:02	36.7	1.33	14:33	G
55	16:00	38.1	1.37	13:58	15:00	36.7	1.33	14:33	
50	15:30	37.4	1.35	14:15	14:00	35.2	1.29	15:14	
45	15:00	36.7	1.33	14:33	13:30	34.5	1.27	15:35	
40	14:11	35.5	1.30	15:05	13:00	33.8	1.25	15:56	F
35	13:36	34.6	1.27	15:32	12:03	32.4	1.21	16:43	
30	13:00	33.8	1.25	15:56	12:00	32.3	1.21	16:46	
25	12:04	32.4	1.22	16:43	11:00	30.9	1.17	17:38	
20	11:30	31.6	1.19	17:11	10:20	29.9	1.15	18:18	P
15	10:42	30.5	1.16	17:53	9:39	28.9	1.12	19:01	
10	10:00	29.4	1.13	18:39	8:36	27.4	1.08	20:13	
5	7:54	26.4	1.05	21:05	7:16	25.5	1.02	21:57	
1	5:14	22.6	0.94	25:17	5:20	22.7	0.94	25:10	VP
		n = 1,350				n = 4,394			

Total n = 5,744

S, Superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER (*Continued*)

FEMALES

	AGE 40–49				AGE 50–59				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	25:00	51.1	1.74	10:09	21:00	45.3	1.57	11:34	
95	20:56	45.2	1.57	11:35	17:16	39.9	1.42	13:16	S
90	19:00	42.4	1.49	12:25	16:00	38.1	1.37	13:58	
85	17:20	40.0	1.43	13:14	15:00	36.7	1.33	14:33	
80	16:34	38.9	1.40	13:38	14:00	35.2	1.29	15:14	E
75	16:00	38.1	1.37	13:58	13:15	34.1	1.26	15:47	
70	15:00	36.7	1.33	14:33	12:23	32.9	1.23	16:26	
65	14:14	35.6	1.30	15:03	12:00	32.3	1.21	16:46	
60	13:56	35.1	1.29	15:17	11:23	31.4	1.19	17:19	G
55	13:02	33.8	1.25	15:56	11:00	30.9	1.17	17:38	
50	12:39	33.3	1.24	16:13	10:30	30.2	1.15	18:05	
45	12:00	32.3	1.21	16:46	10:00	29.4	1.13	18:39	
40	11:30	31.6	1.19	17:11	9:30	28.7	1.11	19:10	F
35	11:00	30.9	1.17	17:38	9:00	28.0	1.09	19:43	
30	10:10	29.7	1.14	18:26	8:30	27.3	1.07	20:17	
25	10:00	29.4	1.13	18:39	8:00	26.6	1.05	20:55	
20	9:00	28.0	1.09	19:43	7:15	25.5	1.02	21:57	P
15	8:07	26.7	1.06	20:49	6:40	24.6	1.00	22:53	
10	7:21	25.6	1.03	21:52	6:00	23.7	0.97	23:55	
5	6:17	24.1	0.98	23:27	4:48	21.9	0.92	26:15	
1	4:00	20.8	0.89	27:55	3:00	19.3	0.85	30:34	VP
		n = 4,834				n = 3,103			

Total n = 7,937

S, Superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.

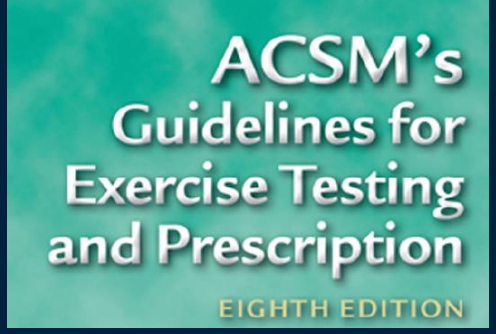

TABLE 4.8. PERCENTILE VALUES FOR MAXIMAL AEROBIC POWER (*Continued*)

FEMALES

	AGE 60–69				AGE 70–79				
%	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	Balke Treadmill (time)	Max $\dot{V}O_2$ (mL/kg/min)	12 min Run (miles)	1.5 Mile Run (time)	
99	19:00	42.4	1.49	12:25	19:00	42.4	1.49	12:25	
95	15:09	36.9	1.34	14:28	15:00	36.7	1.33	14:33	S
90	13:33	34.6	1.27	15:32	12:50	33.5	1.25	16:06	
85	12:28	33.0	1.23	16:22	11:46	32.0	1.20	16:57	
80	12:00	32.3	1.21	16:46	10:30	30.2	1.15	18:05	E
75	11:04	31.0	1.18	17:34	10:00	29.4	1.13	18:39	
70	10:30	30.2	1.15	18:05	9:15	28.4	1.10	19:24	
65	10:00	29.4	1.13	18:39	8:43	27.6	1.08	20:02	
60	9:44	29.1	1.12	18:52	8:00	26.6	1.05	20:54	G
55	9:11	28.3	1.10	19:29	7:37	26.0	1.04	21:45	
50	8:40	27.5	1.08	20:08	7:00	25.1	1.01	22:22	
45	8:15	26.9	1.06	20:38	6:39	24.6	1.00	22:54	
40	8:00	26.6	1.05	20:55	6:05	23.8	0.98	23:47	F
35	7:14	25.4	1.02	22:03	5:28	22.9	0.95	24:54	
30	6:52	24.9	1.01	22:34	5:00	22.2	0.93	25:49	
25	6:21	24.2	0.99	23:20	4:45	21.9	0.92	26:15	
20	6:00	23.7	0.97	23:55	4:16	21.2	0.90	27:17	P
15	5:25	22.8	0.95	25:02	4:00	20.8	0.89	27:55	
10	4:40	21.7	0.92	26:32	3:00	19.3	0.85	30:34	
5	3:30	20.1	0.87	29:06	2:00	17.9	0.81	33:32	
1	2:10	18.1	0.82	33:05	1:00	16.4	0.77	37:26	VP
		n = 1,088				n = 209			

Total n = 1,297

S, superior; E, excellent; G, good; F, fair; P, poor; VP, very poor.