Úskalí pohybové aktivity u osob s hypertenzí (obezitou)

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Obsah přednášky

- Předpis pohybové aktivity
- Úloha zátěžového vyšetření
- Hypertenze a sport
- Hypertenze, medikace a pohyb

Obsah přednášky

- Předpis pohybové aktivity

ESC European Society of Cardiology

European Journal of Preventive Cardiology (2022) 29, 205–215
doi:10.1093/eurjpc/zwaa141

CONSENSUS DOCUMENT
Blood pressure

Personalized exercise prescription in the prevention and treatment of arterial hypertension: a Consensus Document from the European Association of Preventive Cardiology (EAPC) and the ESC Council on Hypertension

Henner Hanssen [1]*, Henry Boardman [2], Arne Deiseroth [1], Trine Moholdt [3], Maria Simonenko [4], Nicolle Kränkel [5,6], Josef Niebauer [7,8], Monica Tiberi [9], Ana Abreu [10,11], Erik Ekker Solberg [12], Linda Pescatello [13], Jana Brguljan [14], Antonio Coca [15], and Paul Leeson [2]

2023 ESH Guidelines for the management of arterial hypertension

The Task Force for the management of arterial hypertension of the European Society of Hypertension

Endorsed by the International Society of Hypertension (ISH) and the European Renal Association (ERA)

4.4 Blood pressure during exercise

BP increases during dynamic and static exercise, and the increase is more pronounced for SBP than for DBP [99], althoug only exercise SBP can be measured reliably with noninvasive methods. The increase in SBP during exercise is related t preexercise resting BP, age, arterial stiffness and abdominal obesity, and is somewhat greater in men than in women [100 There is some evidence that an excessive rise in BP during exercise predicts the development of hypertensio independently from BP at rest [100]. There is currently no consensus on the normal BP elevation during exercise. Accordin to a consensus document of the European Association of Preventive Cardiology, a BP above 220 mmHg in male an 200 mmHg in female measured at peak exercise during cycle ergometry warrants further clinical evaluation including ABP [101]. Two interesting recent findings are that (i) the BP response to submaximal exercise may have a greater prognost significance than BP measured at peak [101] and (ii) exercise hypotension may also be a sign of an underlying CV diseas [100]. Nevertheless, exercise testing is not recommended as part of the routine evaluation of hypertension because of variou limitations, including lack of standardized methodology and definitions. The BP rise accompanying exercise should n discourage patients with treated or untreated hypertension from engaging in regular exercise, especially aerobic exercis except in the presence of very high BP values (grade 3 hypertension). Regular exercise represents an important lifesty intervention to chronically lower BP (see Section 7.5).

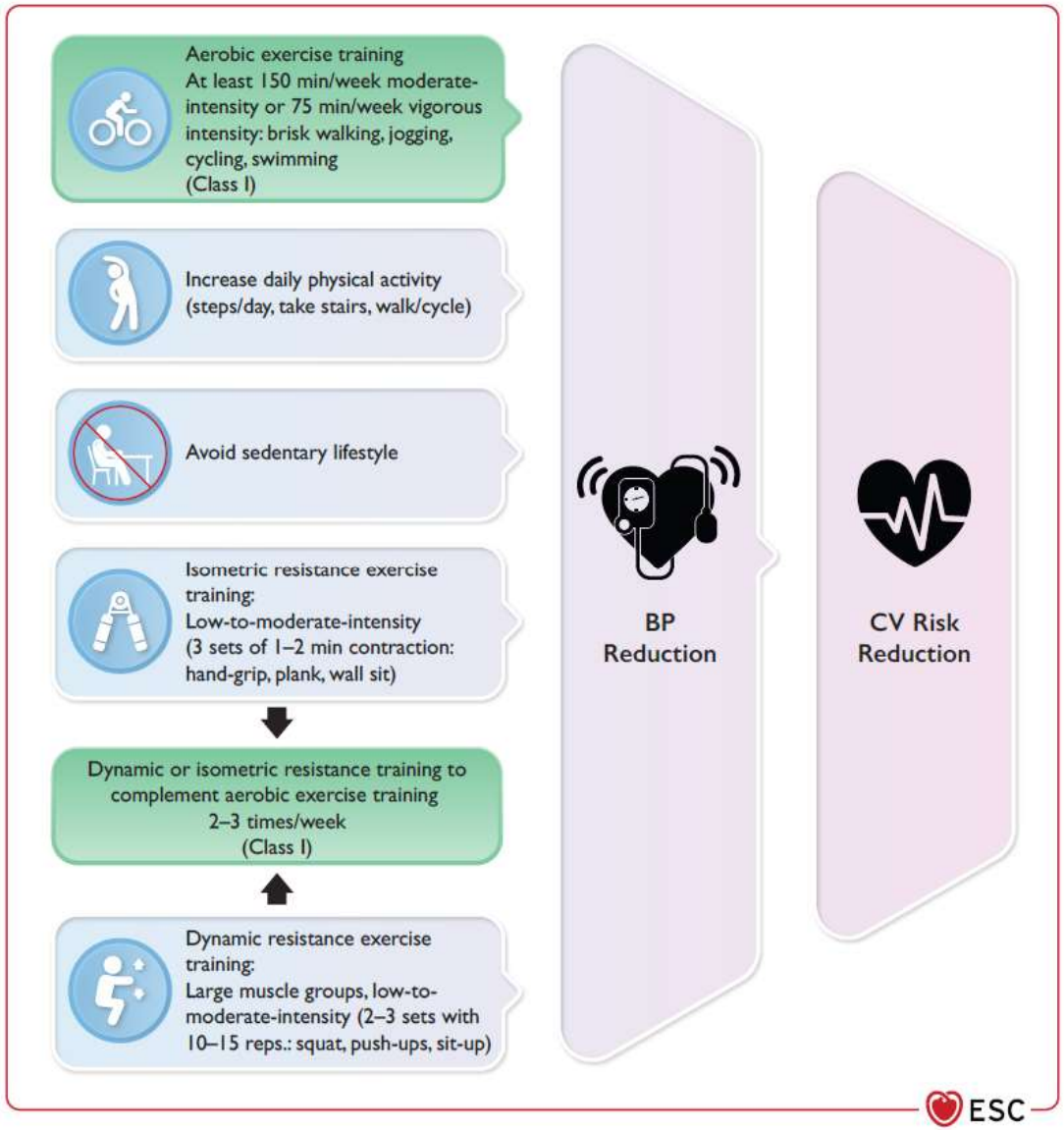
Daily physical activity and structured exercise is recommended for adults with elevated BP to reduce BP and improve cardiovascular risk profile. It is recommended to strive for at least 150-300 minutes of aerobic exercise a week of moderate intensity, or 75-150 minutes a week of aerobic exercise of vigorous intensity or an equivalent combination. Sedentary time should also be reduced and supplemented with dynamic resistance exercise (2-3 times per week).	I	B

Zvýšení PA o 10 MET týdně snižuje výskyt hypertenze o 6%
Platí pro obě pohlaví, věk i etnikum.
Nejlepší vliv u osob se sedavým chováním.

2024 ESC Guidelines for the management of elevated blood pressure and hypertension

Developed by the task force on the management of elevated blood pressure and hypertension of the European Society of Cardiology (ESC) and *endorsed by the European Society of Endocrinology (ESE) and the European Stroke Organisation (ESO)*

Regular aerobic exercise (e.g. at least 30 min of moderate dynamic exercise on 5–7 days/week) is recommended.	I	A	Moderate intensity aerobic exercise of ≥150 min/week (≥30 min, 5–7 days/week) or alternatively 75 min of vigorous intensity aerobic exercise per week over 3 days are recommended and should be complemented with low- or moderate-intensity dynamic or isometric resistance training (2–3 times/week) to reduce BP and CVD risk.
Body-weight control is indicated to avoid obesity (BMI >30 kg/m^2 or waist circumference >102 cm in men and >88 cm in women), as is aiming at healthy BMI (about 20–25 kg/m^2) and waist circumference values (<94 cm in men and <80 cm in women) to reduce BP and CV risk.	I	A	It is recommended to aim for a stable and healthy BMI (20–25 kg/m^2) and waist circumference values (<94 cm in men and <80 cm in women) to reduce BP and CVD risk.


Aerobic exercise training
At least 150 min/week moderate-intensity or 75 min/week vigorous intensity: brisk walking, jogging, cycling, swimming
(Class I)
Increase daily physical activity (steps/day, take stairs, walk/cycle)
Avoid sedentary lifestyle
Isometric resistance exercise training:
Low-to-moderate-intensity
(3 sets of 1–2 min contraction: hand-grip, plank, wall sit)
Dynamic or isometric resistance training to complement aerobic exercise training
2–3 times/week
(Class I)
Dynamic resistance exercise training:
Large muscle groups, low-to-moderate-intensity (2–3 sets with 10–15 reps.: squat, push-ups, sit-up)
BP Reduction
CV Risk Reduction
ESC

Circulation

AHA SCIENTIFIC STATEMENT

Resistance Exercise Training in Individuals With and Without Cardiovascular Disease: 2023 Update: A Scientific Statement From the American Heart Association

RT snižuje celkovou mortalitu o 15%, CV mortalitu o 17%, výskyt DM o 17% (30-60 minut týdně)

Kombinace AT a RT snižuje celkovou mortalitu o 40-46%

Table 1. Associations of Resistance Training With Nontraditional Cardiovascular Risk Factors

Nontraditional risk factor	Association	Summary
Cardiorespiratory fitness	↑ or ↔	Small or moderate improvements in fitness in adults with and without CVD (+1 to 3 mL·kg^{-1}·min^{-1} in Vo_2max).[6,17] For people with coronary heart disease, similar improvements in Vo_2max shown with RT (17%) as with aerobic training (21%)[18]
Arterial stiffness	↔, ↑, or ↓	Low-intensity to moderate-intensity RT favorably associated with lower central (−0.7±1.4 m/s) and peripheral (−1.3±1.07 m/s) PWV.[20] Effects of high-intensity RT are inconsistent, identifying studies with positive and negative associations with PWV.[20]
Inflammation (CRP)	↓ or ↔	RT lowers CRP by -0.26 to -0.37 mg/L in adults overall.[6,19] RT lowers CRP in adults with elevated cardiometabolic risk by -2.47 mg/L.[6] Among 3 studies of adults with overweight or obesity, associations for CRP coincided with fat mass reduction.[21]
Fibrinolysis and coagulation	↑ fibrinolysis ↔ coagulation	Higher volume and intensity RT associated with a greater fibrinolytic response and platelet activity, although on the basis of limited evidence in only apparently healthy young adults.[22] Among patients with coronary artery disease, a single RT session was associated with improvements in the fibrinolytic response without elevating potential thrombotic markers.[22]
Endothelial function	↑	Improvements of ≈2%–3% (flow-mediated dilation) in adults with and without cardiometabolic conditions.[6,23]
Depression and anxiety	↓	Moderate-effect sizes in reduction in depressive symptoms (ES=0.66).[24] Small-to-moderate effect in reductions in anxiety (ES=0.33).[25]
Quality of life	↑	Positive effect on mental health–related QoL measures, including total Mental Component (ES=0.54), Mental health (ES=0.64), and Vitality (ES=0.39).[26] Positive effect on physical health–related QoL measures, including total Physical Component (ES=0.50), Bodily pain (ES=0.81), General health (ES=0.57), and Physical functioning (ES=0.40).[26]
Sleep	↑ sleep quality	Moderate-effect sizes in better sleep outcomes, with the strongest beneficial associations for sleep quality. Associations are less consistent for sleep duration.[27]

CRP indicates C-reactive protein; CVD, cardiovascular disease; ES, effect size; PWV, pulse wave velocity; QoL, quality of life; and RT, resistance training. ↑ represents direct association; ↓represents inverse association; ↔ represents no association.

Table 2. Associations of Resistance, Aerobic, and Combined Training With Traditional CVD Risk Factors

	Magnitude of benefit			Conclusion	Summary of evidence
					
Blood pressure	+	+	+	RT, AT, and CT have similar favorable, small to moderate effects on both systolic and diastolic BP	Systolic BP significantly reduced after RT (−1.8 mm Hg) and AT (−3.5 mm Hg), but insignificantly after CT (−1.4 mm Hg). Diastolic BP significantly reduced after RT (−3.2 mm Hg), AT (−2.5 mm Hg), and CT (−2.2 mm Hg).[32] No significant differences between training types.
Lipid profile	+	+	+	RT, AT, and CT have similar favorable small to moderate effects on lipids	RT, AT, and CT improve lipid profile (eg, triglyceride, HDL and LDL cholesterol) by 4%–5%. No significant differences between training types.[33,34]
Glycemic control	+	++	+++	All modes have benefits. CT may have the strongest associations followed by AT, then RT.	In patients with type 2 diabetes, CT lowered HbA1c by 0.17% more than AT, and AT lowered HbA1c by 0.20% more than RT.[35] In patients with prediabetes, CT and AT are superior to RT in reducing HbA1c and CT is most effective in controlling fasting blood glucose levels.[10]
Body weight: Weight loss	0	+	+	AT and CT have small to moderate effects on weight loss. CT may be most beneficial for weight maintenance.	Greater reductions in body weight in CT (−2.0 kg) and AT (−1.2 kg), compared with RT.[34]
Weight maintenance	0	+	++		When used in combination with AT, RT may help assist with weight loss or maintenance by increasing resting metabolic rate, fat oxidation, and lean mass.[36]
Body composition: Lean mass	++	+	+++	RT is more beneficial for lean mass gains than AT.	Lean body mass improves more in CT (+0.9 kg) and RT (+1.3 kg), compared with AT.[34]
Fat mass	0	++	+++	AT is more beneficial for fat mass loss than RT. CT provides the greatest benefits for both fat and lean mass.	Greater reductions in fat mass in CT (−1.9 kg) and AT (−1.2 kg), compared with RT.[34] CT is also superior to AT or RT for reducing subcutaneous abdominal fat.[37]

+ small to moderate benefit; ++ moderate benefit; +++ moderate to large benefit; 0 no effect.  = resistance training;  = aerobic training; and  = combined training. AT indicates aerobic training; BP, blood pressure; CT, combination training; HbA1c, hemoglobin A1c; HDL, high-density lipoprotein; LDL, low-density lipoprotein; and RT, resistance training.

Panel A Resistance Training Prescription Components

RT Intensity	Percent of 1-RM	Number of Reps	Frequency per week	Muscle Adaptation	Population
Low Intensity	<40% 1-RM	15-20 reps	≥ 2 days/week	Endurance	High risk patients
Moderate Intensity	40-60% 1-RM	8-12 reps	≥ 2 days/week	Strength and endurance	General Population
High Intensity	>80% 1-RM	1-6 reps	≥ 2 days/week	Strength	Healthy adults looking to optimize strength

Panel B Contraindications to Resistance Training

Absolute Contraindications

- Unstable coronary heart disease
- Decompensated heart failure
- Uncontrolled atrial and/or ventricular arrhythmias
- Severe pulmonary hypertension (mean pulmonary arterial pressure >55 mm Hg)
- Severe and symptomatic aortic stenosis
- Acute myocarditis, endocarditis, or pericarditis
- Uncontrolled hypertension (>180/110 mm Hg)
- Aortic dissection
- Marfan syndrome
- High Intensity RT in patients with active proliferative retinopathy or moderate or worse nonproliferative diabetic retinopathy

Relative Contraindications
(consult a physician before participation)

- Individuals with defibrillators or pacemakers
- Diabetes
- Controlled hypertension
- Musculoskeletal conditions or limitations
- History of stroke
- Low functional capacity (<4 METs)

Major Muscle Group, *accessory muscle group*	Example Exercises
Pectoralis, *anterior deltoids, triceps*	Chest press; Push-up
Deltoids	Shoulder press; Shoulder raise
Rhomboids, *latissimus dorsi, rear deltoids, biceps*	Seated row; Bent-over row
Triceps brachii	Triceps extension
Biceps brachii	Biceps curl
Quadriceps, Hamstrings, and Gluteals	Squat; Lunge
Gastrocnemius, *soleus*	Calf raise
Abdominals, *obliques*	Abdominal crunch
Quadratus lumborum	Back extension

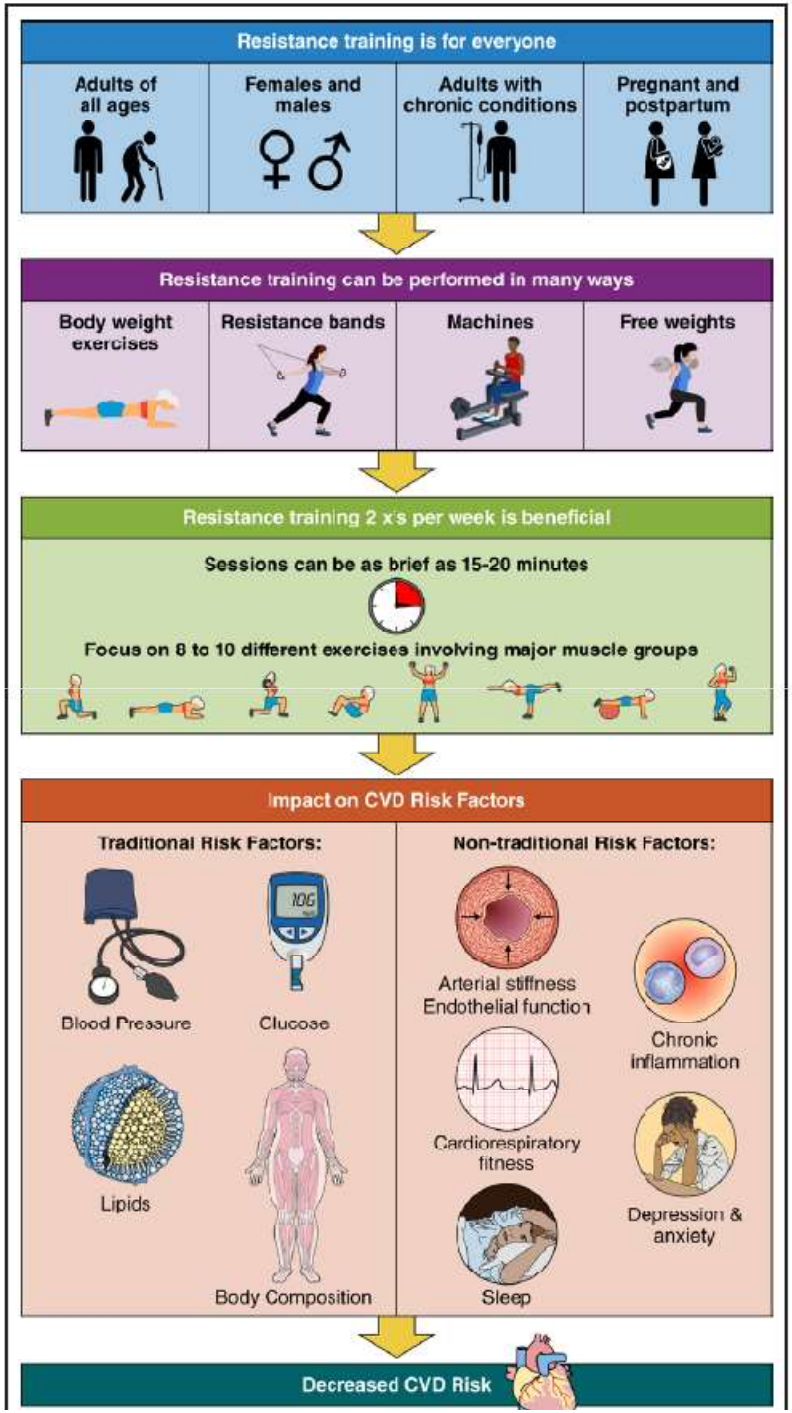


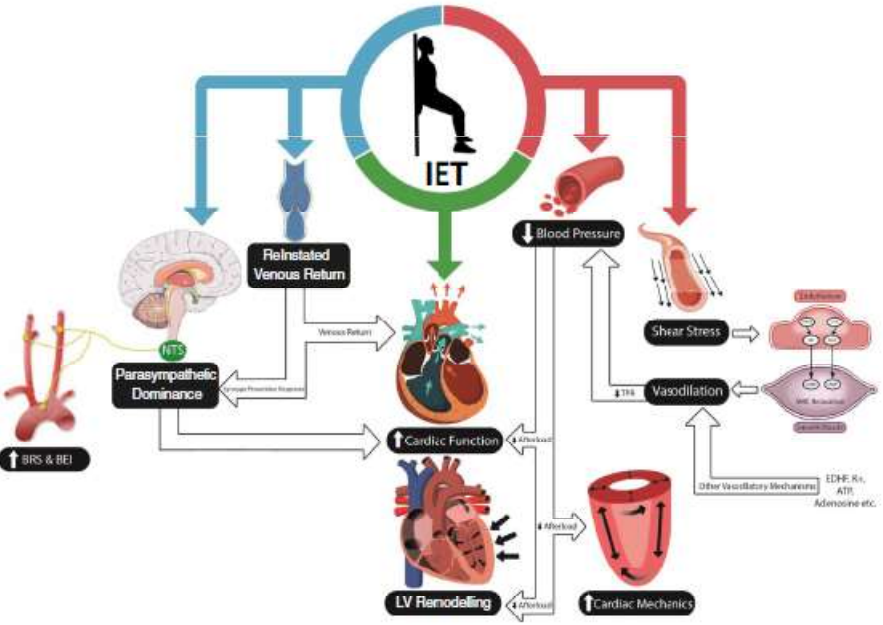
Figure 3. Summary of resis exercise training.
CVD indicates cardiovascular

dicine (2024) 54:1459–1497
i.org/10.1007/s40279-024-02036-x

W ARTICLE

etric Exercise Training and Arterial Hypertension: An Updated ew

. Edwards[1] · Damian A. Coleman[1] · Raphael M. Ritti-Dias[2] · Breno Q. Farah[3] · David J. Stensel[4,5,6,7] · E. Lucas[8] · Philip J. Millar[9] · Ben D. H. Gordon[10] · Véronique Cornelissen[11] · Neil A. Smart[12] · Debra J cGowan[14] · Ian Swaine[15] · Linda S. Pescatello[16] · Reuben Howden[17] · Stewart Bruce-Low[18] · pher K. T. Farmer[19] · Paul Leeson[20] · Rajan Sharma[21] · Jamie M. O'Driscoll[1,21]



ig. 3 Acute physiological responses post-isometric exercise. *ATP* denosine triphosphate, *BEI* baroreflex effectiveness index, *BRS* aroreflex sensitivity, *EDHF* endothelium-derived hyperpolarising factor, *IET* isometric exercise training, *K* potassium, *LV* left ventricular, *NTS* nucleus tractus solitarius, *TPR* total peripheral resistance

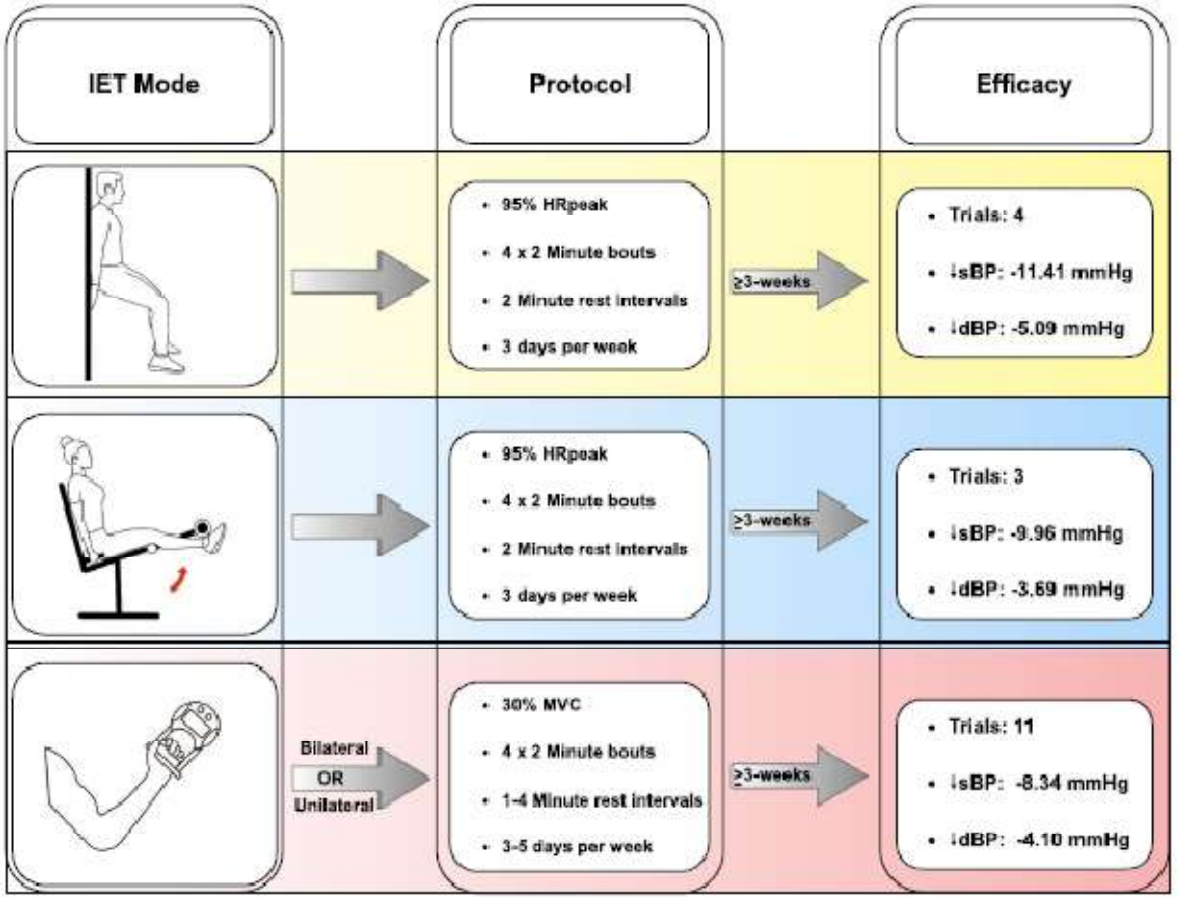
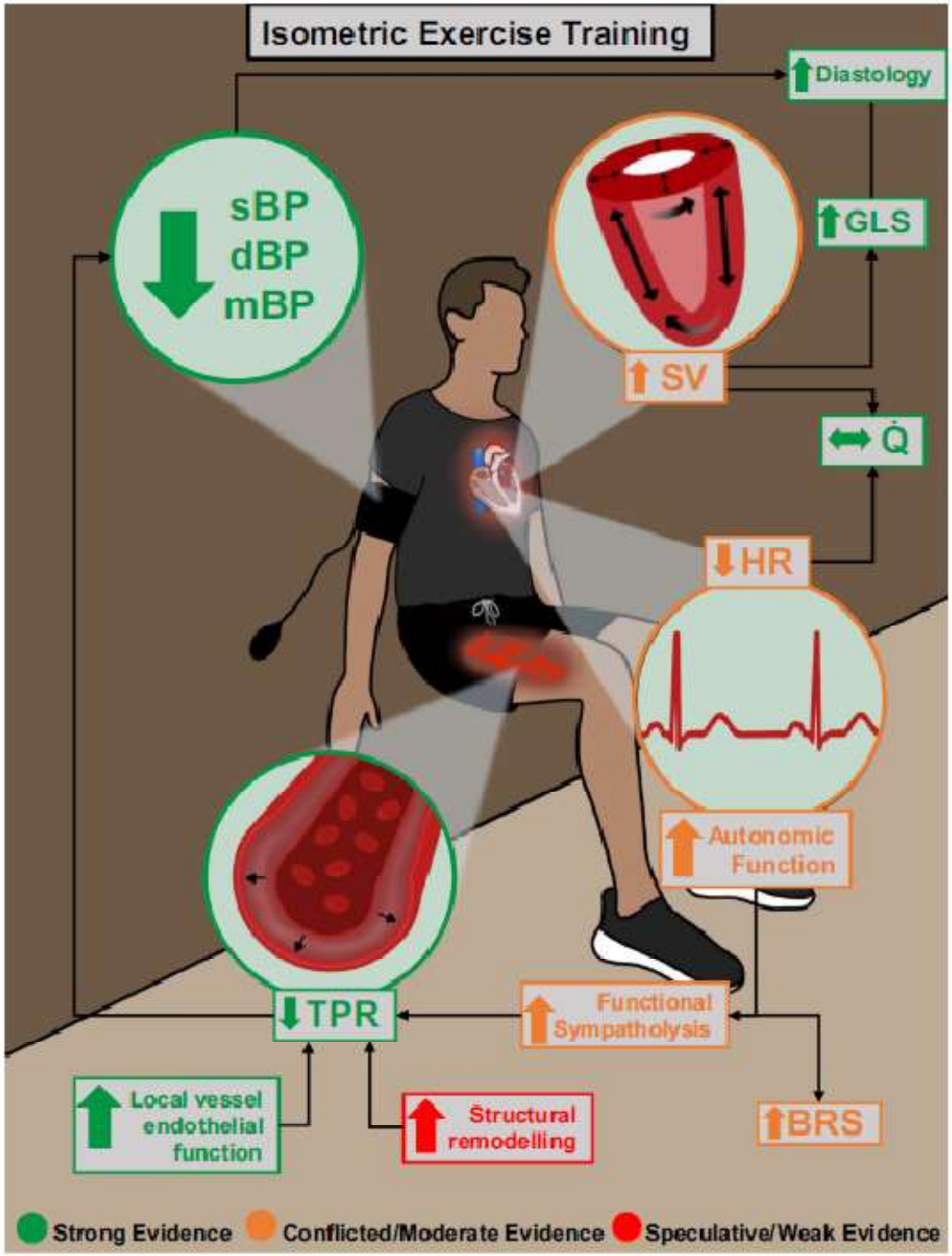


Fig. 2 Modes of isometric exercise training. *dBP* diastolic blood pressure, HR_{peak} peak heart rate, *IET* isometric exercise training, *MVC* maximal voluntary contraction, *sBP* systolic blood pressure


Isometric Exercise Training
Diastology
GLS
sBP
dBP
mBP
SV
Q̇
HR
Autonomic Function
TPR
Functional Sympatholysis
Local vessel endothelial function
Structural remodelling
BRS
Strong Evidence
Conflicted/Moderate Evidence
Speculative/Weak Evidence

hybová aktivita u pacientů s hypertenzí

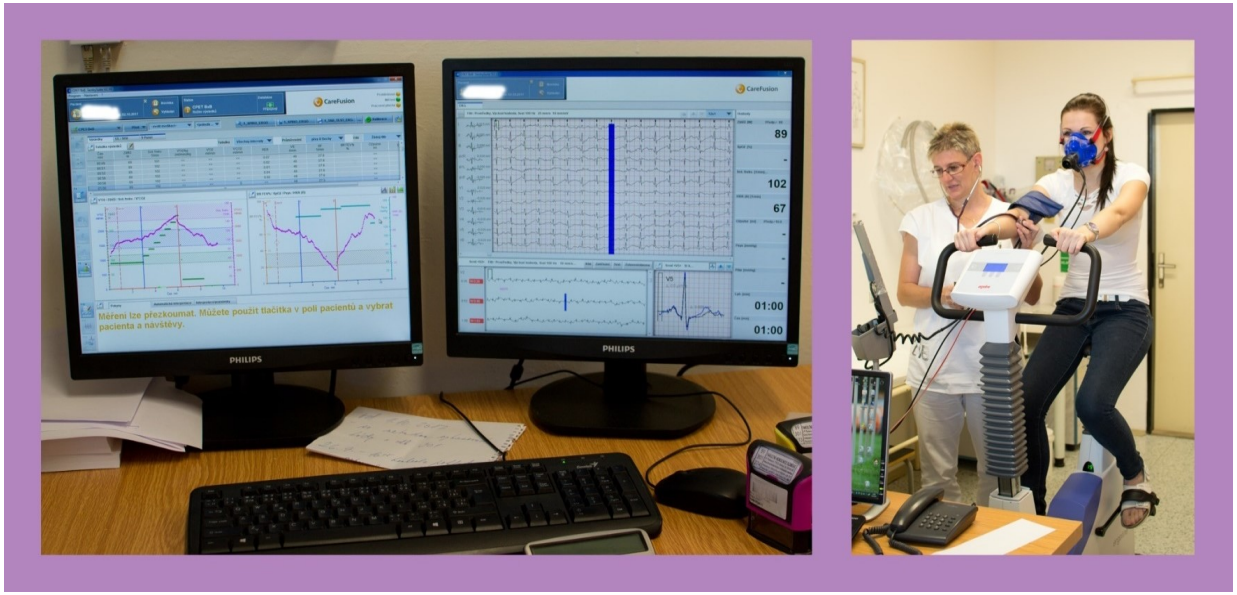
Frekvence	**Nejlépe denně /3-5x týdně**	
Intenzita	Střední intenzita 3-5,9 MET 64-76% maximální tepové frekvence Rychlá chůze, pomalá cyklistika, sekání trávníku, golf, čtyřhra tenis	Vysoká intenzita >6 MET 77-93% maximální tepové frekvence Jogging, běh, cyklistika nad 15 km/hod, tenis dvouhra, volejbal…
	1000 MET/min/týden	
Trvání	150 (300) min/týden	75 (150) min/týden
	Možno rozdělit do 10 minutových cvičení	
Typ pohybové aktivity	Aerobní (5 dní)	
	Odporový trénink (posilování) (2dny) **Dynamický** 2-3 serie /8-12 opakování/60-80% opakovacího maxima Starší a v dekondici 10-15 opakování na 60-70% opakovacího maxima **Isometrický**	
	Trénink flexibility, balance (součást cvičební jednotky)	

Mezery v poznání

- Poměry složek PA
- Individuální nastavení PA
- Jak zlepšit adherenci

Obsah přednášky

- Úloha zátěžového vyšetření



Zátěžové vyšetření

- Není doporučováno rutinně o osob s hypertenzí

- Ale na druhé straně VO2max je nejlepší prediktor rizika (Ross et. al)


AHA SCIENTIFIC STATEMENT

Importance of Assessing Cardiorespiratory Fitness in Clinical Practice: A Case for Fitness as a Clinical Vital Sign

A Scientific Statement From the American Heart Association

Zátěžová vyšetření

- Provádět rutinně pro zhodnocení funkční kapacity
- Nejlepším parametrem zhodnocení kardiorespirační zdatnosti – VO_{2max}/kg/min
- Monitorace EKG během zátěže
- Reakce TK na zátěž
- Znalost hodnoty VT1, VT2- nastavení parametrů tréninku

Reakce tlaku na zátěž

Hypotenzní reakce	• **Pokles STK o 10 mm Hg pod počáteční TK i přes rostoucí zátěž** • **Pokles STK pod 20 mm Hg pod nejvyšší hodnotu při zátěži** • **Neschopnost zvýšit STK během zátěže**	**Příčiny: těžká dysfunkce levé srdeční komory, obstrukce výtokového traktu levé komory, těžká ischemie myokardu. Abnormální sympatická kontrola, plicní hypertenze, centrální venózní obstrukce, medikace betablokátory**
Hypertenzní reakce	• Maximální TK v zátěži ≥210 mm Hg u mužů nebo ≥ 190 mm Hg u žen • Maximální DTK ≥110 mm Hg • STK v submaximání zátěži ≥150 mm Hg	Preexistující hypertenze, maskovaná hypertenze,

Doporučení	hodnota
AHA	Muži ≥210 mm Hg Ženy ≥190 mm Hg
ESC	Muži ≥220 m Hg Ženy ≥200 mm Hg
ACSM	Všichni ≥225mm Hg

Hypertenzní reakce na zátěž- STK

circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association

linical Recommendations for Cardiopulmonary Exercise Testing Data Assessment in Specific Patient Populations

Marco Guazzi, Volker Adams, Viviane Conraads, Martin Halle, Alessandro Mezzani, Luc Vanhees, Ross Arena, Gerald F. Fletcher, Daniel E. Forman, Dalane W. Kitzman, Carl J. Lavie and Jonathan Myers

Circulation. 2012;126:2261-2274; originally published online September 5, 2012; doi: 10.1161/CIR.0b013e31826fb946

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

nding on genetic

system to exer-

be heard down to 0 mm Hg in some normal subjects. A normal systolic blood pressure response to progressive exercise is dependent on both sex (higher in males) and age (higher with advancing age).[5] The average rise in systolic blood pressure during a progressive exercise test is about 10 mm Hg/MET.

Exercise BP (mm Hg)	• Provides insight into CV response to exercise and left ventricular afterload	• SBP increase ~10 mm Hg per 3.5 mL $O_2 \cdot kg^{-1} \cdot min^{-1}$ increase in Vo_2 • Upper range of normal maximal SBP is ~210 mm Hg for males, ~190 mm Hg for females • DBP remains the same or slightly decreases

zdíl M klid- peak 50-60 mm

zdíl Ž klid- peak 40-50 mm Hg

Journal of
Cardiovascular
Development and Disease

MDPI

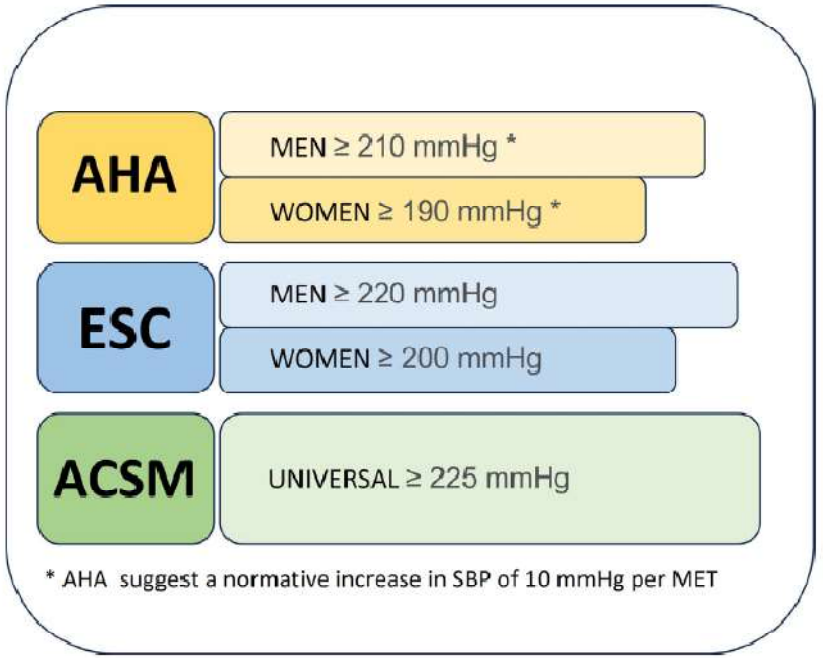
Review

Exercise-Induced Blood Pressure Dynamics: Insights from the General Population and the Athletic Cohort

Petra Pesova [1,2], Bogna Jiravska Godula [1,2], Otakar Jiravsky [2,3,*], Libor Jelinek [1], Marketa Sovova [1], Katarina Moravcova [1], Jaromir Ozana [1], Libor Gajdusek [2,4], Roman Miklik [2,3], Libor Sknouril [2], Radek Neuwirth [2,3] and Eliska Sovova [1]

Stanovení TK v zátěži výpočtem:
„Radvanského rovnice: hranice TKs v zátěži= TKs v klidu+ (30xW/kg)

Diastola: stejná nebo klesá, do 100 mm Hg norma



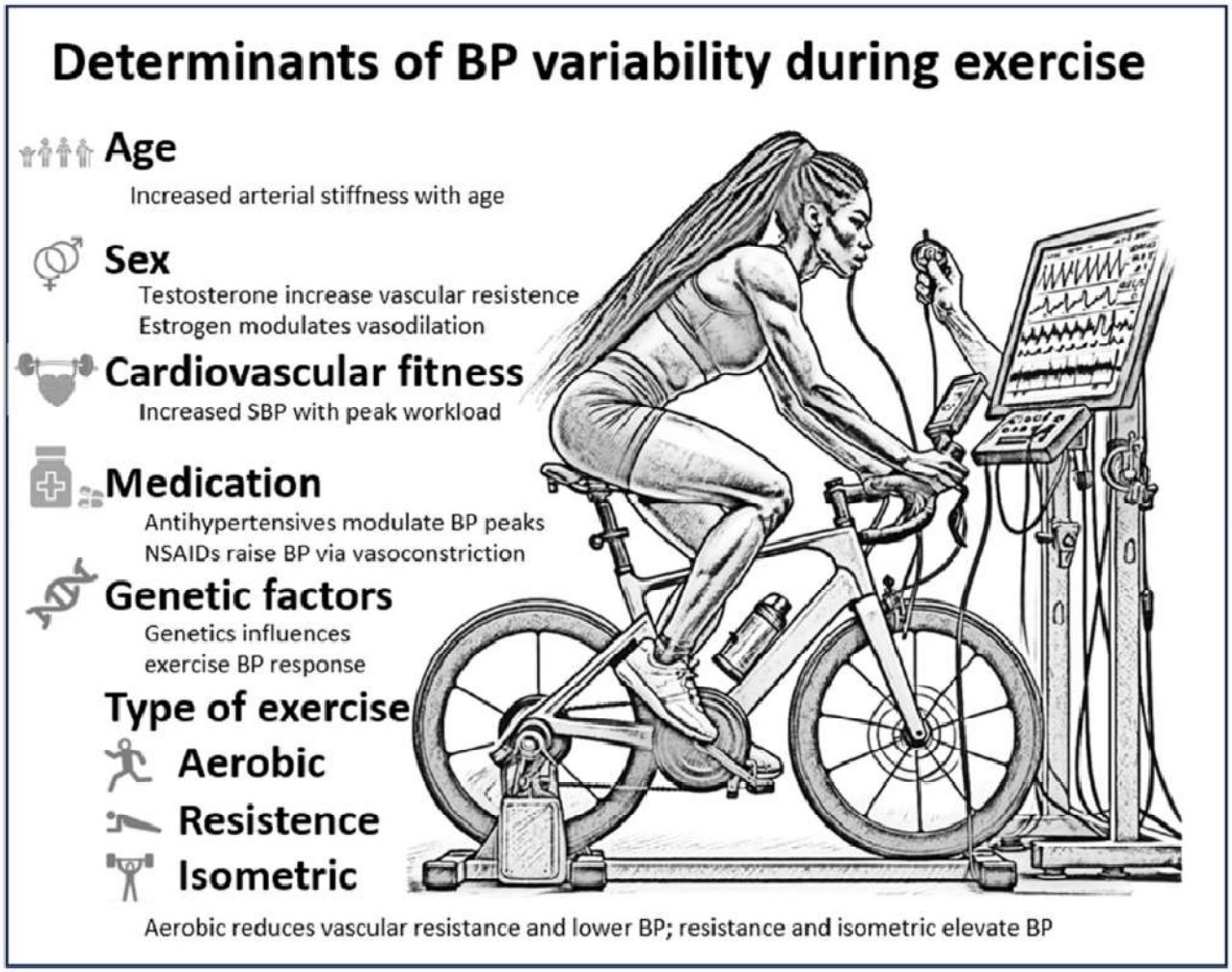


Figure 2. Determinants of BP variability during exercise. This schematic illustrates the factors that influence the response of blood pressure (BP) to exercise. Age affects vascular compliance by increasing arterial stiffness and affecting BP. Hormones such as testosterone and estrogen influence vascular resistance and vasodilation, respectively, and alter BP. Cardiovascular fitness correlates

Journal of the American Heart Association

ORIGINAL RESEARCH

Association of Blood Pressure Responses to Submaximal Exercise in Midlife With the Incidence of Cardiovascular Outcomes and All-Cause Mortality: The Framingham Heart Study

Joowon Lee, PhD; Ramachandran S. Vasan, MD; Vanessa Xanthakis, PhD

J Am Heart Assoc. 2020;9:e015554. DOI: 10.1161/JAHA.119.015554

CLINICAL PERSPECTIVE

What Is New?

- We observed significant associations of higher exercise blood pressure and delayed blood pressure recovery after submaximal exercise with a higher risk of hypertension, subclinical and clinical CVD, and all-cause mortality in middle-aged to older adults.

What Are the Clinical Implications?

- Submaximal exercise blood pressure and blood pressure recovery after submaximal exercise in midlife may provide important prognostic information on the risk classification of new-onset of hypertension, cardiovascular disease, and mortality in later life.

Mezery v poznání

- Který TK v zátěži lépe předpovídá prognózu pacienta
- Jak nastavit PA u osob s vysokým TK při nízké intenzitě zátěže

Obsah přednášky

- Hypertenze a sport

Hypertenze a způsobilost ke sportu

ESC European Society of Cardiology

European Heart Journal (2020) **00**, 1–80
doi:10.1093/eurheartj/ehaa605

ESC GUIDELINES

2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease

The Task Force on sports cardiology and exerc
cardiovascular disease of the European Society

Doporučení pro... | Guidelines

Doporučené postupy ESC pro sportovní kardiologii a pohybovou aktivitu pacientů s kardiovaskulárním onemocněním, 2020.

Souhrn dokumentu připravený Českou kardiologickou společností

(2020 ESC Guidelines on sports cardiology and exercise in patients with cardiovascular disease. Summary of the document prepared by the Czech Society of Cardiology)

Vladimír Tuka[a], Otakar Jiravský[b,c], Peter Kubuš[d], Eliška Sovová[e]

	Doporučení sportovní aktivity	Vyšetření	Frekvence kontrol
Dobře kompenzovaný TK RF: 0 Postižení cílových orgánů: 0 Komplikující onemocnění: 0	Všechny sporty	Anamnéza, fyzikální vyšetření, EKG, echokardio, zátěžové vyšetření	ročně
Dobře kompenzovaný TK RF: kontrolované Postižení cílových orgánů: 0 Komplikující onemocnění: 0	Všechny sporty	Anamnéza, fyzikální vyšetření, EKG, echokardio, zátěžové vyšetření	6-12 měsíců
Dobře kompenzovaný TK RF: kontrolované Postižení cílových orgánů: ano Komplikující onemocnění: ano	Všechny sporty kromě silových sportů zvyšujících TK	Anamnéza, fyzikální vyšetření, EKG, echokardio, zátěžové vyšetření	6 měsíců

Mezery v poznání

- Které léky na hypertenzi jsou nejvhodnější pro sportovce
- Jak snížit výskyt hypertenze u sportovců (úprava tréninku?)
- Jak jednotlivé sporty ovlivňují výskyt arteriální hypertenze ve vyšším věku

Obsah přednášky

- Hypertenze, medikace a pohyb

DOPING

Absolutně zakázané látky	
S0	Neschválené látky
S1	Anabolické látky
S2	Peptidové hormony, růstové faktory a související látky
S3	Beta-2-agonisté (s výjimkou inhalovaného podání)
S4	Hormonové a metabolické modulátory
S5	Diuretika a další maskovací látky
Metody zakázané vždy	
M1	Zvýšení přenosu kyslíku
M2	Chemická a fyzikální manipulace
M3	Genový doping
Látky a metody zakázané při soutěži	
S6	Stimulační látky
S7	Narkotika
S8	Kanabinoidy (Kanabinoidy jsou zakázány s výjimkou kanabidiolu (CBD). Doplňky obsahující CBD mohou být kontaminovány THC, což je na seznamu zakázaných látek a metod WADA
S9	Glukokortikosteroidy (Lokální aplikace (bez oznamování): Masti, krémy, oční/ušní kapky, inhalační spreje pro ORL, inhalační léky pro respirační obtíže, nitrokloubní aplikace, cílené injekce do šlachových pochev a okolí nervů. Celkové podání (vyžaduje terapeutickou výjimku): Tablety, i.v. injekce, intramuskulární injekce, rektální aplikace).
Látky zakázané v určitých typech sportů	
P1	Beta-blokátory (např. ve sportovních bobech, lyžování, snowboardingu, zápasu, střelbě atd.)

Betablokátory a pohyb

› Curr Res Physiol. 2021 Oct 28:4:235-242. doi: 10.1016/j.crphys.2021.10.002. eCollection 2021.

The Impact of beta blockade on the cardio-respiratory system and symptoms during exercise

Eldar Priel [1 2], Mustafaa Wahab [1], Tapas Mondal [1], Andy Freitag [1], Paul M O'Byrne [1 2], Kieran J Killian [1], Imran Satia [1 2]

Affiliations + expand

PMID: 34988470 PMCID: PMC8710988 DOI: 10.1016/j.crphys.2021.10.002

Results: 42,771 subjects were included 7,787 were receiving beta-blocker [mean age 61 yrs, BMI 28.40 kg/m^2, 9% airflow obstruction (FEV1/FVC<0.7)] and 34,984 were not [mean age 51yrs, BMI 27.40 kg/m^2, 11% airflow obstruction]. Heart rate was lower by 18.2% (95% C.I. 18.15-18.38) (p<0.0001) while Oxygen pulse (VO_2/HR) was higher by 19.5% (95% C.I. 19.3-19.7) in those receiving beta blockers. Maximum power output (MPO) was 3.3% lower in those taking beta-blockers. The perceived effort required to cycle and breathe (mBorg) was 8% lower in those taking beta-blockers.

Kazuistika- muž 23 let- zátěžové vyšetření s betablokátorem a s ACE inhibitorem

	Vstupně	Po změně medikace
VO2 max/kg (ml/kg/min)	30,6	39,9
W max/kg	2,7	4
TK max (mm Hg)	250/80	210/90
TF max	152	187
TF při anaerobním prahu	132	155

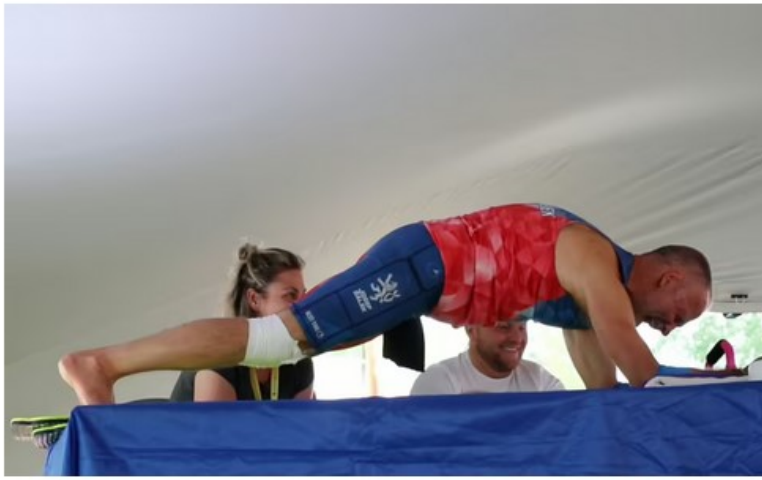
Mezery v poznání

- Který betablokátor nejméně ovlivňuje kardiorespirační zdatnost?
- Jak ovlivňuje kardiorespirační zdatnost verogalid?
- Který lék je nejvhodnější při výskytu hypertenzní reakce na zátěž?
- Jaký je vliv potravních doplňků na vznik hypertenze u sportovců?

DELŠÍ VÝDRŽ V PLANKU

lných 9:38:47 h. v planku je novým světovým rekordem!

ek z Písku vydržel ve cvičební pozici zvané plank (tzv. prkno) nepřetržitě po dobu 9 hodin 38 minut a 47
nk je izometrické cvičení zpevňující povrchové i vnitřní svaly všech částí těla, zejména břicha. Jeho správné
spočívá v opírání o lokty a špičky u nohou, přičemž tělo je vypnuté v jedné rovině. Dotek jiné části těla
ou není povolen.



rekordu bylo dosaženo v sobotu 20. května 2023 v rámci programu 4. kongresu vědomého života AVATAR,
onal v plzeňském Parkhotelu.

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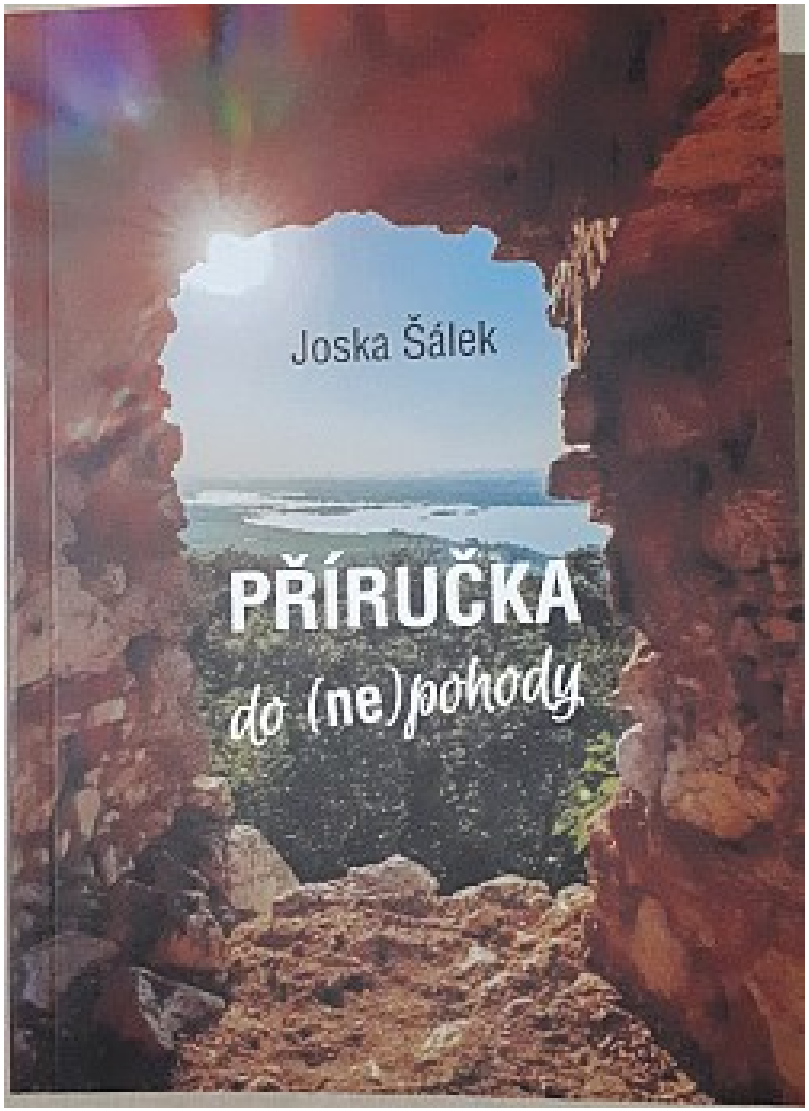
dů najdete na stránkách České knihy rekordů a v Muzeu rekordů Pelhřimov.
NEJ… a dejte nám o tom vědět!


Joska Šálek
PŘÍRUČKA
do (ne)pohody

2025
DY V POHYBU!

NIKA TĚLOVÝCHOVNÉHO LÉKAŘSTVÍ
ARDIOVASKULÁRNÍ REHABILITACE FN OLOMOUC

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