



50 GOOD REASONS FOR COMPRESSION IN SPORTS

A SUMMARY OF
SCIENTIFIC STUDIES
(2019)

The effects of compression in sports have become a strongly discussed topic and there are a multitude of scientific papers, articles, and commercial advertisements that show or don't show the various effects of compression garments in sports. In recent years we have seen an increase of scientifically based studies and a larger interest in compression technology for sport than ever before.

CEP took this opportunity to analyze the publicly available studies, and give you an overview of 50 positive studies, which we summarized by ourselves to our best knowledge and diligence. This brochure describes the studies in a very simple and intuitive way that allows you easily to understand the relevant elements of each study instantly. For those who want to deepen their understanding of single studies, we added the PubMed-ID so you can look up the study on your own and read the whole study (given the whole document is provided). For a better overview, we have grouped the studies into 4 main categories: performance, recovery, prevention and comfort.

We at CEP believe that innovation is a never-ending process, nurtured by new ideas, research and critical curiosity. We would like you to take part on that journey, learn, and grow together with us.








**Thank you for your attention
and enjoy the pressure**

the highlighted benefits from the scientific studies were derived by CEP and only represent an interpretation by CEP



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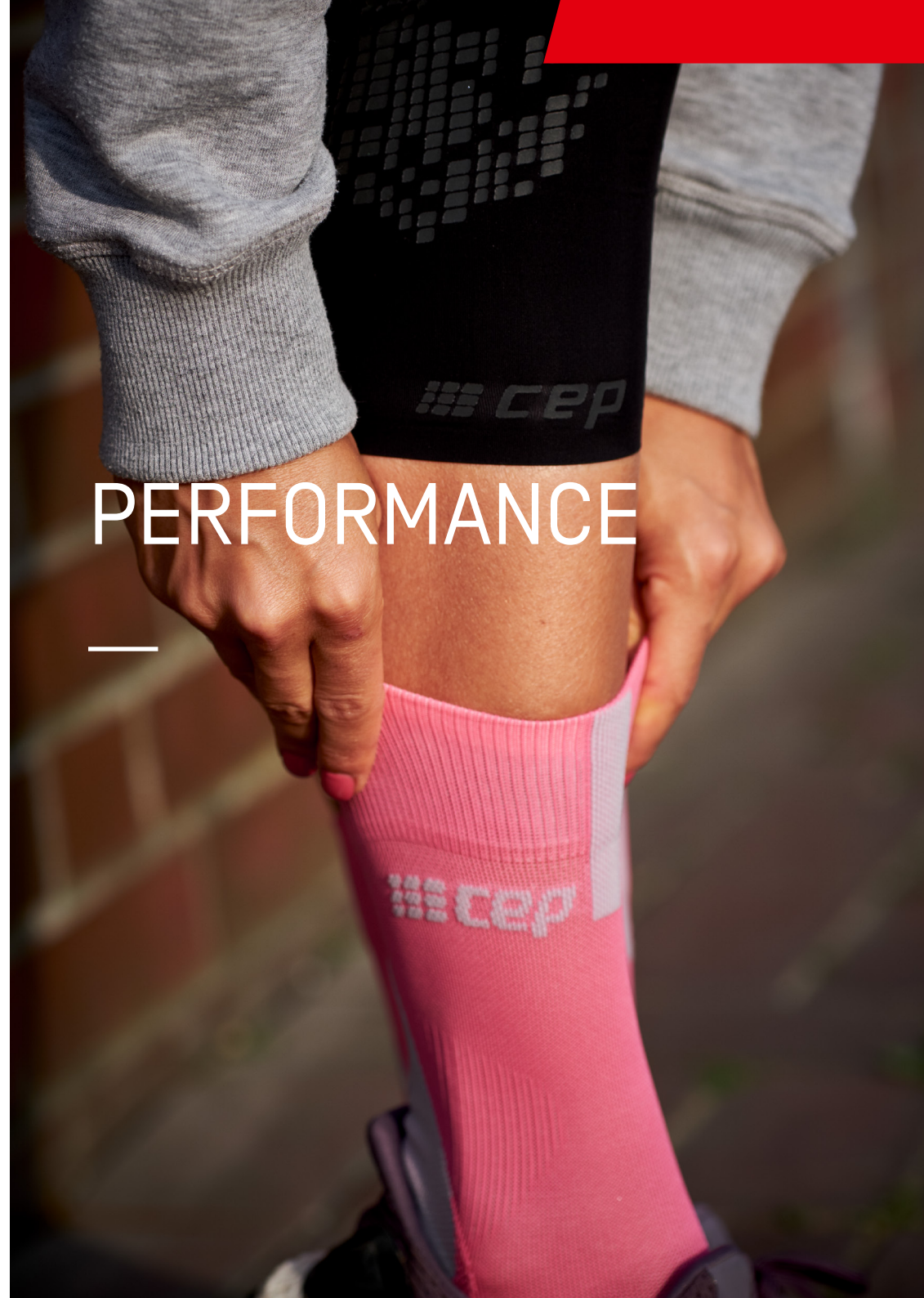
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LIST OF ABBREVIATIONS

AnT	anaerobic threshold	PPT	pressure pain threshold
BLa	blood lactate	PR	passive recovery
CG	compression garment	PT	protected thigh
CK	creatine kinase	RE	running economy
CMJ	counter movement jump	RER	respiratory exchange ratio
CMJH	counter movement jump height	RFD	rate of force development
C-RP	C-reactive protein	RJ	rebound jump
CS	compression stocking/sock	RPE	level of perceived perception
CT	control thigh	RSE	repeated sprint exercise
CWT	contrast water therapy	SFA	superficial femoral artery
DJ	drop jump	StO ₂	tissue oxygen saturation
DOMS	delayed onset muscle soreness	SV	cardiac stroke volume
EMG	electromyography	T	Trial
Ex	Experiment	T ₂	transverse relaxation time
GCS	graduated compression socks	TAT	thrombin-anti-thrombin
GRF	ground reaction force	TF	tissue factor
Hb	hemoglobin	TFPI	tissue factor pathway inhibitor
HHb	deoxyhemoglobin	TOI	tissue oxygenation index
HR	heart rate	t-PA	tissue plasminogen activator
IL-6	plasma interleukin-6	TT	time trial
MAP	mean arterial pressure	TT	time to
max	maximal	TTE	time to exhaustion
Mb	myoglobin	TTF	time to fatigue
MCAv	blood flow velocity	VC	vascular conductance
MS	muscle soreness	VO ₂	oxygen uptake
MVIC	maximal voluntary isometric contraction	WBCG	whole body compression garment
nTHI	regional blood flow	YoYoEI2	YoYo Intermittent Endurance Test level 2
nTHi	tissue hemoglobin index	MIES	maximum isokinetic hip/leg-extensor strength
PE	perceived exertion		
PMT	progressive maximal test		



#1

The effect of graduated compression stockings on running performance. [Ali, A et al.,2011]



NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	Trial: 4 x 10 km run on outdoor 400-m track Test: countermovement jump, Blood-lactate, heart rate and perception of stockings
EXAMINED CG	low (12-15 mmHg), medium (18-21 mmHg) and high (23-32 mmHg) stockings
EXAMINED PARAMETERS	Leg power, BLA, HR and perception
RESULTS	countermovement jump: low and med > control and high; BLA: no change; HR: no difference; low more comfortable than mid and high

BENEFIT: Maintain leg power and stay more comfortable during running with compression.

PubMed-ID: 21293307

#3

Lower Limb Sports Compression Garments Improve Muscle Blood Flow and Exercise Performance During Repeated-Sprint Cycling. [Broatch, J. R. et al., 2018]



NUMBER OF PARTICIPANTS	20
EXERCISE METHODS	2 cycling RSE sessions(repeated sprint exercise): 4 sets with 10x6 seconds maximal sprint [24 seconds recovery break during set and 120 seconds between sets]
EXAMINED CG	lower-limb compression garments
EXAMINED PARAMETERS	muscle oxygen consumption and blood flow(mBF), Cycling performance(power output), HR and blood samples(BLA, pH, bicarbonate and base excess)
RESULTS	difference: higher peak power and mBF plus lower HR with CG; Rest: no significant differences for other parameters.

BENEFIT: Improved performance for highly instense and short workouts.

PubMed-ID: 29252067

#2

Effects of a compression garment on sensory feedback transmission in the human upper limb. [Barss, T. et al., 2018]



NUMBER OF PARTICIPANTS	25
EXERCISE METHODS	Experiment 1: surface EMG at Rest Experiment 2: surface EMG during rest, arm-cycling and reaching task
EXAMINED CG	elbow sleeves
EXAMINED PARAMETERS	H-reflexes and M-H recruitment curves
RESULTS	significant better reaching accuracy, better precision and sensitivity around applied joint.

BENEFIT: Improve precision and sensitivity during exercise.

PubMed-ID: 29641310

#4

Effect of Compression Socks Worn Between Repeated Maximal Running Bouts. [Brophy-Williams, N. et al.,2018]



NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	TT1: warm-up + 5 km - 1 hour break - TT2: warm-up + 5 km
EXAMINED CG	compression socks
EXAMINED PARAMETERS	Time for TT
RESULTS	significant less time loss in TT2 compared to TT1 with CG, no significant differences in BLA, V02, perceived MS, fatigue and recovery

BENEFIT: Maintain your speed during high intensity running and intervall training.

#5

The effects of ionized and nonionized compression garments on sprint and endurance cycling.
[Burden, R. J. & Glaister, M., 2012]



NUMBER OF PARTICIPANTS	10
EXERCISE METHODS	3 sprint trials, 3 endurance trials
EXAMINED CG	compression tights
EXAMINED PARAMETERS	power output, BLa, VO2 and HR
RESULTS	No significant effect for peak- and mean power and fatigue. VO2, HR and TT did not differ relative to control. Significant effect on blood lactate in sprint and endurance trial.

BENEFIT: Less lactate development during your training.

PubMed-ID: 22124356

#7

Evaluation of a lower-body compression garment.
[Doan B. K. et al., 2003]



NUMBER OF PARTICIPANTS	20
EXERCISE METHODS	60 meter sprints, countermovement jump
EXAMINED CG	compression shorts
EXAMINED PARAMETERS	TT, hip torque angle, skin temperature, muscle oscillation, Counter-movement vertical jump height,
RESULTS	SPRINTS: reduced hip flexion, increased skin temperature and faster warming up; improved range of motion CMJ: less muscle oscillation, increased vertical jump height OVERALL: reduction of impact force by 27%

BENEFIT: Reduce impact force, increase range of motion and lower muscle oscillation for a better recovery and performance.

PubMed-ID: 12875311

#6

The effects of wearing undersized lower-body compression garments on endurance running performance.
[Dascombe, B. J. et al., 2003]



NUMBER OF PARTICIPANTS	11
EXERCISE METHODS	progressive maximal tests (PMT) & TTE-test at 90% VO2max
EXAMINED CG	compression tights, undersized and manufacturer-recommended
EXAMINED PARAMETERS	VO2, O2pulse, deoxyhemoglobin (HHb), running economy, oxyhemoglobin and TOI
RESULTS	PMT: significant improvement of VO2, O2-pulse and HHb similarly for recommended and undersized CG; decrease of running economy, decrease of oxyhemoglobin and TOI at low-intensity-speeds (8-10 km/h) and increase of nTHI and HHb plus lower HR and TOI at high-intensity-speeds TTE: growth of HHb for both CG, significantly positive effect on nTHI for undersized CG; no effect on performance

BENEFIT: Further improve your benefits for your cardiovascular system through compression.

PubMed-ID: 21725102

#8

Maximalist vs. minimalist shoes: dose-effect response of elastic compression on muscular oscillations.
[Gellaerts, J. et al., 2017]



NUMBER OF PARTICIPANTS	11
EXERCISE METHODS	16x1 min on treadmill
EXAMINED CG	compression garments
EXAMINED PARAMETERS	muscular oscillation
RESULTS	reduction of muscular oscillation

BENEFIT: Reduce muscle oscillation with compression.

PubMed-ID: 28085121

#9

Effects of Compression Tights on Recovery Parameters after Exercise Induced Muscle Damage: A Randomized Controlled Crossover Study
[Hettchen, M. et al., 2019]



NUMBER OF PARTICIPANTS	19
EXERCISE METHODS	lower extremity resistance and EMS- training
EXAMINED CG	compression tights
EXAMINED PARAMETERS	MIES, CMJ
RESULTS	significant lower decrease of MIES and significant better CMJ with compression

BENEFIT: Significant reduced effects of exercise induced muscle damage through compression.

#11

Efficacy of lower limb compression and combined treatment of manual massage and lower limb compression on symptoms of exercise-induced muscle damage in women.
[Jakeman J. R. et al.,2010]



NUMBER OF PARTICIPANTS	32
EXERCISE METHODS	100 plyometric drop jumps, examinations after 1, 24, 48, 72 and 96 hours
EXAMINED CG	compression tights
EXAMINED PARAMETERS	perceived MS, CK, isontonic muscle strength, squat jump and CMJH
RESULTS	significant smaller reduction of isotonic muscle strength, squat jump and CMJH; significant moderation of perceived MS through a combination of CG and massage

BENEFIT: Keep your muscle soreness in check through a combination of massage and compression garments.

PubMed-ID: 20940646

#10

The effects of compression garment pressure on recovery from strenuous exercise.
[Hill, J. et al., 2017]



NUMBER OF PARTICIPANTS	45
EXERCISE METHODS	100 drop jumps
EXAMINED CG	compression tights (low and high compression LOW/HI)
EXAMINED PARAMETERS	perceived MS, MVC, CMJH, CK, CRP and Mb
RESULTS	significantly better recovery of MVC and CMJ with HI; higher jump at 24 h post exercise; no significant effects for MS, CK, CRP and Mb

BENEFIT: Deliver better performance with a faster recovery thanks to compression garments.

PubMed-ID: 28051341

#12

Effect of compression stockings on running performance in men runners.
[Kemmler, W. et al., 2009]



NUMBER OF PARTICIPANTS	21
EXERCISE METHODS	progressive treadmill test + retest within 10 days
EXAMINED CG	compression socks
EXAMINED PARAMETERS	running performance (time under load, work in kj and aerobic capacity), BLA and V02max
RESULTS	significantly better running performance (time under load and work); improved threshold(aerobic and anaerobic) performance with CG; no significant difference in V02max

BENEFIT: Better running performance at blood lactate thresholds and overall.

PubMed-ID: 19057400

#13

Influence of compression garments on vertical jump performance in NCAA division I volleyball players.
[Kraemer, W. J. et al., 1996]



NUMBER OF PARTICIPANTS	36
EXERCISE METHODS	Jump tests
EXAMINED CG	compression shorts (normal fit and undersized CS/UCS)
EXAMINED PARAMETERS	CMJ (CMJHmax, force and power production)
RESULTS	no effects on max force or power of CMJHmax; significant higher power and force production with CS

BENEFIT: Uphold your performance with compression garments.

#14

Effects of wearing lower leg compression sleeves on locomotion economy.
[Kurz, E. & Anders, C., 2018]



NUMBER OF PARTICIPANTS	22
EXERCISE METHODS	treadmill test at four different speeds
EXAMINED CG	calf sleeves
EXAMINED PARAMETERS	muscular activity through EMG
RESULTS	significant reduction of muscle activity per distance travelled.

BENEFIT: Save energy on your runs and go for longer distances with the same effort.

PubMed-ID: 29447545

#15

Compression sleeves increase tissue oxygen saturation but not running performance.
[Ménétrier, A. et al., 2011]



NUMBER OF PARTICIPANTS	14
EXERCISE METHODS	2 treadmill tests (15 min rest, 30 min 60%, 15 min passive recovery, running to exhaustion, 30 min passive recovery)
EXAMINED CG	calf sleeves
EXAMINED PARAMETERS	StO ₂ , TTE
RESULTS	significant StO ₂ increase at rest and during recovery. No significant difference for TTE.

BENEFIT: Increase your tissue oxygen saturation through compression sleeves.

PubMed-ID: 22052027

#16

Effects of three postexercise recovery treatments on femoral artery blood flow kinetics.
[Ménétrier, A. et al., 2013]



NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	3 x tiring exercise on cycle ergometer; 15 minutes recovery with either contrast water therapy(CWT), compression stockings(CS) or passive recovery(PR); 5 minutes performance test afterwards
EXAMINED CG	compression socks(CS)
EXAMINED PARAMETERS	mean power output
RESULTS	significant better performance with CS and CWT compared to PR; CWT significant effect compared to CS

BENEFIT: More power after short bouts of tiring exercise with compression recovery.

#17

Wearing Compression Garment after Endurance Exercise Promotes Recovery of Exercise Performance.
[Mizuno, S. et al., 2016]



NUMBER OF PARTICIPANTS	18
EXERCISE METHODS	Experiment 1: downhill running Experiment 2: level running, 30 minutes each
EXAMINED CG	compression tights
EXAMINED PARAMETERS	VO2max, subjective feelings, jump performance(CMJ,RJ and DJ), circumference of the leg and blood variables
RESULTS	significant increase of CMJ and RJ

BENEFIT: Better recovery for jump performance with compression tights.

PubMed-ID: 27454135

#19

Effect of an ankle compression garment on fatigue and performance.
[Šambaheer, N. et al., 2016]



NUMBER OF PARTICIPANTS	15
EXERCISE METHODS	drop jumps (30 cm)
EXAMINED CG	ankle compression garment
EXAMINED PARAMETERS	Skin temperature, MVC force, EMG, DJ (20,35,50 cm), TTF, continuous DJs, GRF, Bla
RESULTS	Significant reduction of half-relaxation time and increase of skin temperature at post- warm up and post-fatigue; significant lower GRF with ankle compression at post-fatigue; other parameter did not differ significantly.

BENEFIT: Higher skin temperature and better control during recovery.

PubMed-ID: 25992662

#18

Can compression stockings reduce the degree of soccer match-induced fatigue in females?
[Pavin, L. N. et al., 2018]



NUMBER OF PARTICIPANTS	20
EXERCISE METHODS	soccer match, agility test, standing heel-rise and YoYo Intermittent Endurance Test level 2 (YoYoIEI2)
EXAMINED CG	compression socks
EXAMINED PARAMETERS	Test scores, HR and perceived exertion
RESULTS	YoYoIEI2 and perceived exertion show no significant differences; agility test and heel-rise show significant better performance than control-group

BENEFIT: More agility and less exercise induced fatigue with your compression garments.

PubMed-ID: 30318916

#20

The effects of wearing lower-body compression garments (LBCG) during endurance cycling.
[Scanlan, A. T. et al., 2008]



NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	60 minutes cycling test
EXAMINED CG	compression tights
EXAMINED PARAMETERS	power output, BLA, HR, VO2 and muscle oxygenation
RESULTS	significant increase of power output at anaerobic threshold(AnT) and significant muscle oxygenation economy.

BENEFIT: More power at anaerobic threshold and a better oxygenation economy during exercise.

PubMed-ID: 19223669

#21

The effects of whole-body compression garments on prolonged high-intensity intermittent exercise.
[Sear, J. A. et al., 2010]



NUMBER OF PARTICIPANTS	8
EXERCISE METHODS	45 minutes high intensity exercise programm (treadmill)
EXAMINED CG	whole body compression garment (WBCG)
EXAMINED PARAMETERS	performance indicators (distance, v-specific distance, running speed), HR, BLA, TOI and nThi
RESULTS	increase of total distance covered and low-intensity acitivity distance compared to control; also higher average TOI in WBCG.

BENEFIT: Better performance through compression.

PubMed-ID: 20555284

#22

Compression socks and the effects on coagulation and fibrinolytic activation during marathon running.
[Zadow, E. et al., 2018]



NUMBER OF PARTICIPANTS	67
EXERCISE METHODS	Marathon
EXAMINED CG	compression socks
EXAMINED PARAMETERS	TAT, TF, TFPI and D-Dimer
RESULTS	significant lower increase of D-Dimer; increase of TF for all runners and no significant differences in TAT and TFPI.

BENEFIT: Less exercise induced hemostasis with compression garments.

PubMed-ID: 30043183



#23

Graduated compression stocking: Physiological and perceptual response during and after exercise [Ali, A et al., 2007]



NUMBER OF PARTICIPANTS	14 T1 14 T2
EXERCISE METHODS	Trial 1: 2 multi-stage intermittent shuttle running test Trial 2: 10k run
EXAMINED CG	graduated compression stockings (free available)
EXAMINED PARAMETERS	delayed-onset-muscle soreness (DOMS)
RESULTS	T1: no differences T2: reduction of delayed-onset muscle soreness(DOMS)

BENEFIT: Reduced muscle soreness after mediocre endurance training with compression socks

PubMed-ID: 17365528

#25

Compression socks and functional recovery following marathon running: a randomized controlled trial. [Armstrong, S. A. et al., 2015]



NUMBER OF PARTICIPANTS	33
EXERCISE METHODS	Grade treadmill test to exhaustion 2 weeks before and 2 weeks after marathon
EXAMINED CG	compression socks
EXAMINED PARAMETERS	TTE, average and maximum HR
RESULTS	significant increase of TTE.

BENEFIT: Improve your recovery after marathon running with compression socks.

PubMed-ID: 25627452

#24

The effects of 4 different recovery strategies on repeat sprint-cycling performance. [Argus, C. K. et al., 2013]



NUMBER OF PARTICIPANTS	11
EXERCISE METHODS	Trial: 4 x 30 seconds sprints on a cycle ergometer, 20 minutes recovery in between; mean power output, perceived recovery and blood lactate
EXAMINED CG	leg sleeves
EXAMINED PARAMETERS	Mean power output (Watt), perceived recovery and blood lactate
RESULTS	higher mean power output between trials compared to Control group

BENEFIT: Effective recovery between intensive exercises with compression clothing.

PubMed-ID: 23412547

#26

Effects of graduated compression stockings on blood lactate following an exhaustive bout of exercise. [Berry, M. J. & McMurray, R. G., 1986]




NUMBER OF PARTICIPANTS	T1: 6 T2: 6
EXERCISE METHODS	Trial 1: two VO2 max - tests on a treadmill (no GCS/GCS) Trial 2: 3x3 minutes bicycle ergometer of 110% VO2 max
EXAMINED CG	compression socks
EXAMINED PARAMETERS	VO2, BLa and hematokrit
RESULTS	Experiment 1: no significant change in VO2 and VO2-recovery, lower lactate-values at 15 minutes. Experiment 2: significant post-exercise BLa for GCS

BENEFIT: Lower your lactate concentration with graduated compression stockings, during and after your exercise.

PubMed-ID: 3605315

#27 Effect of a Compressive Garment on Kinematics of Jump-Landing Tasks. (Britto, M. A. et al., 2017)




NUMBER OF PARTICIPANTS	27
EXERCISE METHODS	4 different jump landing tests
EXAMINED CG	compression shorts
EXAMINED PARAMETERS	knee flexion, valgus angle and maximum jump height
RESULTS	no significant increase in max jump height; decrease of knee flexion and valgus range of motion

BENEFIT: Prevent potential knee injury with less dynamic valgus motion through compression.

PubMed-ID: 27552212

#28 Elastic stockings, performance and leg pain recovery in 63-year-old sportsmen. (Chatard, J. C. et al., 2004)




NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	2 x 5 min maximal exercise, 80 min rest, twice a week for 2 weeks
EXAMINED CG	compression socks
EXAMINED PARAMETERS	perceived leg pain, Bla, blood plasma and hematocrit
RESULTS	higher leg power in second test with CS (2,1%). Significant decrease of Bla and hematocrit through CS. no significant increase in plasma volume.

BENEFIT: Wear your compression garments for better recovery and a better performance afterwards.

PubMed-ID: 15455235

#29 Positive effect of lower body compression garments on subsequent 40-kM cycling time trial performance. (Glanville, K. M. de & Hamlin, M. J., 2012)




NUMBER OF PARTICIPANTS	14
EXERCISE METHODS	40-km ride 24 hours compression, 40-km ride, repeated one week later
EXAMINED CG	compression tights
EXAMINED PARAMETERS	TT-marathon, power output, oxygen cost and perceived exertion
RESULTS	substantial improvement of performance TTm time through CG and higher average power output in second trial; no significant effects for oxygen cost or perceived exertion

BENEFIT: Optimize your recovery with compression garments.

PubMed-ID: 22240553

#30 Influence of compression garments on recovery after marathon running. (Hill, J. et al., 2014)



NUMBER OF PARTICIPANTS	24
EXERCISE METHODS	CG for 72 hours after completed marathon run
EXAMINED CG	compression tights
EXAMINED PARAMETERS	perceived MS, MVIC, CK and C-RP
RESULTS	significantly lower perceived MS and improved perception of recovery; no significant effects on MVIC, CK or C-RP and no significant rise of muscular strength or decrease of markers concerning exercise-induced muscle damage

BENEFIT: Feel less muscle soreness and a faster recovery with compression.

PubMed-ID: 24714530

#31

Do compression garments enhance the active recovery process after high-intensity running?
(Lovell, D. I. et al., 2011)



NUMBER OF PARTICIPANTS	25
EXERCISE METHODS	30-minute treadmill test with 2 different speed settings (6 blocks á 5 minutes)
EXAMINED CG	compression tights
EXAMINED PARAMETERS	BLa, HR and expiratory gases (RER, VO2)
RESULTS	lower HR and BLa and higher RER with CGs

BENEFIT: Compression helps you to keep a lower level of lactate and heart rate for a better active recovery, especially during HIIT and likewise.

PubMed-ID: 22082795

#33

Wearing Compression Tights on the Thigh during Prolonged Running Attenuated Exercise-Induced Increase in Muscle Damage Marker in Blood.
(Mizuno, S. et al., 2017)



NUMBER OF PARTICIPANTS	30
EXERCISE METHODS	120 minutes uphill running (55% gradient)
EXAMINED CG	compression tights(CT), compression socks(CS)
EXAMINED PARAMETERS	HR, RPE, VO2[running economy], MVC of knee extension and plantar flexion, CMJ, DJ and perceived MS/fatigue, blood parameter (BLa, glucose, FFA, Mb, C-reactive protein and IL-6)
RESULTS	no significant differences in HR, RPE, VO2, CMJ and DJ between the groups. Significant lower Mb in CT.

BENEFIT: Compression garments can help you to reduce muscle damage from your workout.

PubMed-ID: 29123488

#32

The Effects of Compression Socks on Arterial Blood Flow and Arterial Reserves in Amateur Sportsmen
(Mann, S. et al., 2016)



NUMBER OF PARTICIPANTS	30
EXERCISE METHODS	two treadmill tests with a 1-week rest (9 km/h, 12%)
EXAMINED CG	compression socks
EXAMINED PARAMETERS	BLa, arterial blood flow and arterial reserve
RESULTS	bigger arterial reserve after run with CG and increase of arterial blood flow

BENEFIT: Improve your blood circulation with compression garments

#34

Effects of graduated compression stockings on skin temperature after running.
(Priego Quesada, J. I. et al., 2015)



NUMBER OF PARTICIPANTS	44
EXERCISE METHODS	2x 10 minutes warm up + 20 minutes run at 75%
EXAMINED CG	compression socks
EXAMINED PARAMETERS	skin temperature, HR and perceived fatigue
RESULTS	greater increase of skin temperature with involved muscle tissue, no difference for HR and perceived fatigue.

BENEFIT: Stay warm with compression stockings.

PubMed-ID: 26267507

#35

The effect of graduated compression tights, compared with running shorts, on counter movement jump performance before and after submaximal running.
[Rugg, S. et al., 2013]



NUMBER OF PARTICIPANTS	14
EXERCISE METHODS	15 minutes treadmill running
EXAMINED CG	compression tights
EXAMINED PARAMETERS	CMJ, RPE, comfort level
RESULTS	significant greater CMJ post run, lower level of RPE and greater comfort

BENEFIT: Maintain your muscle power after a long and challenging endurance trial with compression garments.

PubMed-ID: 22692109

#37

Enhanced muscle blood flow with intermittent pneumatic compression of the lower leg during plantar flexion exercise and recovery.
[Zuj, K. A. et al., 2018]



NUMBER OF PARTICIPANTS	12
EXERCISE METHODS	3 minutes standing plantar flexion
EXAMINED CG	compression socks
EXAMINED PARAMETERS	SFA, MAP, SV, VC
RESULTS	greater increase in SFA flow with CG, greater VC directly after exercise

BENEFIT: Increased limb blood flow and potentially improving recovery and performance.

PubMed-ID: 29122964

#36

Effect of Compression Garments on Physiological Responses After Uphill Running.
[Struhár, I. et al., 2018]



NUMBER OF PARTICIPANTS	10
EXERCISE METHODS	3x 8 km at 6% elevation
EXAMINED CG	calf sleeves (low grade, medium grade and high reverse grade)
EXAMINED PARAMETERS	CK, MS, ankle strength, plantar/dorsal flexor, performance time
RESULTS	best performance time for medium grade compression; increased peak torque of plantar flexion with medium grade CSs and highest pain tolerance shift.

BENEFIT: Apparent enhancement of running performance and lower muscle soreness with compression garments.

PubMed-ID: 29599865



PREVENTION

#38 Changes in tissue oxygen saturation with calf compression sleeve: before, during and after a cycling exercise. (Boucourt, B. et al., 2015)



NUMBER OF PARTICIPANTS	11
EXERCISE METHODS	15 minutes cycling exercise with increasing intensity
EXAMINED CG	calf sleeves
EXAMINED PARAMETERS	StO2
RESULTS	significantly higher StO2 level before trial, 40W and 80W. No significant increase at 120-200W

BENEFIT: Improve your tissue oxygen saturation for recovery during mild exercises.

PubMed-ID: 25286891

#39 Perceived influence of a compression, posture-cueing shirt on cyclists' ride experience and post-ride recovery. (Cipriani, D. J. et al., 2014)



NUMBER OF PARTICIPANTS	20
EXERCISE METHODS	53 cycling rides (average 95.48 km)
EXAMINED CG	compression shirts
EXAMINED PARAMETERS	perceived influence
RESULTS	athletes reported perceived benefit for the rides and their recovery perception. Higher approved through female athletes.

BENEFIT: Embrace compression, experience less discomfort and faster recovery for your training.

PubMed-ID: 24711781

#40 Können Kompressionstextilien die propriozeptive Leistung verbessern - ist das Verletzungsprävention?/Are compression garments able to improve proprioception as an effective method to prevent injury?*

[Edtinger, S. et al., 2015]

NUMBER OF PARTICIPANTS	24
EXERCISE METHODS	standardised provocation protocol (one leg stand)
EXAMINED CG	compression socks (and knee bandage)
EXAMINED PARAMETERS	statistic data from the one leg stand through computer measurement.
RESULTS	significant increase of proprioceptive performance with CG and knee bandage.

BENEFIT: Better proprioceptive performance with compression garments.

#41 The influence of below-knee compression garments on knee-joint proprioception.

[Ghai, S. et al., 2018]

NUMBER OF PARTICIPANTS	44
EXERCISE METHODS	active joint repositioning test
EXAMINED CG	compression socks
EXAMINED PARAMETERS	proprioception
RESULTS	highly significant and positive effect on proprioception with CG

BENEFIT: Better proprioception through compression.

PubMed-ID: 27523397

#42 Benefits of Compression Garments Worn During Handball-Specific Circuit on Short-Term Fatigue in Professional Players.

[Ravier, G. et al., 2018]

NUMBER OF PARTICIPANTS	18
EXERCISE METHODS	3x 12 minutes sprints, jumps and agility exercises
EXAMINED CG	compression tights
EXAMINED PARAMETERS	MVC, RFD, MS and PPT
RESULTS	no difference during specific exercises in performance; MVC, RFD and PPT significantly lower without CGs or regular gym short after exercise; highly significant smaller decrease of MVC with CGs; full recovery after 24 hours.

BENEFIT: Lose less power in an intense game or exercise with compression.

PubMed-ID: 26840438

#43 Effect of compression stockings on physiological responses and running performance in division III collegiate cross-country runners during a maximal treadmill test.

[Rider, B. C. et al., 2014]

NUMBER OF PARTICIPANTS	10
EXERCISE METHODS	maximal treadmill test
EXAMINED CG	compression socks
EXAMINED PARAMETERS	HR, BLA, BLA-threshold, VO2max, respiratory exchange rate, perceived exertion and TTF
RESULTS	no significant differences before and during trial; lower BLA with CS during recovery; Longer time to fatigue with CS.

BENEFIT: Better recovery through lower lactate concentration and less fatigue with compression garments.

PubMed-ID: 24172725

#44

Compression garments and cerebral blood flow: Influence on cognitive and exercise performance. [Smale, B. A. et al., 2018]



NUMBER OF PARTICIPANTS	15
EXERCISE METHODS	4x 8 minute cycling + 4km time trial
EXAMINED CG	compression tights
EXAMINED PARAMETERS	middle cerebral artery blood flow velocity(MCAv) in relation to cognitive and exercise performance
RESULTS	Significant effect on cognitive accuracy during trial.

BENEFIT: Improved cognitive accuracy with compression during high-intensity workouts.

PubMed-ID: 29239696

#46

Effects of gradual-elastic compression stockings on running economy, kinematics, and performance in runners. [Varela-Sanz, A. et al., 2011]



NUMBER OF PARTICIPANTS	T1: 16, T2: 12
EXERCISE METHODS	4x 6 minutes at recent half marathon pace on treadmill; time limit test at 105% recent 10-km pace
EXAMINED CG	compression socks
EXAMINED PARAMETERS	physiological responses[VO2max, HR], running economy(RE), running kinematics and time limit test (T(lim), TTF)
RESULTS	no significant differences for RE; significant lower HR for CG compared to control; no significant differences in kinematic during T(lim); trend to lower TTF and lower VO2max with CG during T(lim).

BENEFIT: Lower heart rate during your competition with compression garments.

PubMed-ID: 21912341

#45

Compression garments to prevent delayed onset muscle soreness in soccer players. [Valle, X. et al., 2013]



NUMBER OF PARTICIPANTS	15
EXERCISE METHODS	40 minutes treadmill with negative slope (10%)
EXAMINED CG	compression shorts
EXAMINED PARAMETERS	intracellular injury marker in protected tigh(PT) and control tigh(CT) through biopsy
RESULTS	26,7 percent lessinjury in PT compared to CT.

BENEFIT: Less muscle soreness and injury through compression garments.

PubMed-ID: 24596693

#47

The effect of compression socks worn during a marathon on hemostatic balance. [Zaleski, A. L. et al., 2015]



NUMBER OF PARTICIPANTS	20
EXERCISE METHODS	Marathon
EXAMINED CG	compression socks
EXAMINED PARAMETERS	caogulatory and fibrinolytic factors (TAT, D-Dimer, t-PA)
RESULTS	baseline: no significant differences; time trial: no significant time differences between the groups for the time trial, lower average t-PA with CG as well as average TAT

BENEFIT: Lower hemostatic activation with compression garments for endurance athletes.

PubMed-ID: 26212719

COMFORT

#48 Physiological effects of wearing graduated compression stockings during running. [Ali, A et al., 2010]



NUMBER OF PARTICIPANTS	10
EXERCISE METHODS	3x 40 minutes treadmill-runs at 80% V0max
EXAMINED CG	low pressure (12-15 mmHg) and high pressure (23-32 mmHg) stockings
EXAMINED PARAMETERS	VO2, HR and BLA
RESULTS	compression stockings with high pressure(23-32 mmHg) were considered more tight and pain inducing than those with low pressure (12-15 mmHg). Creatine kinase, myoglobin, jump height and pressure sensitivity improved only directly after the exercise. Athletes rated the compression garments as more comfortable in comparison.

BENEFIT: More comfort during running with compression garments and better performance directly after.

PubMed-ID: 20354717

#49 Effect of wearing compression stockings on recovery after mild exercise-induced muscle damage. [Bieuzen, F. et al., 2014]



NUMBER OF PARTICIPANTS	11
EXERCISE METHODS	3 trail races
EXAMINED CG	compression socks
EXAMINED PARAMETERS	perceived MS, CK, CMJ and IL-6
RESULTS	perceived MS lower with CS, better isometric torque at 60 minutes and 24 hours post run, plus better CMJ-recovery

BENEFIT: Experience less muscle soreness and recover faster from trail runs.

PubMed-ID: 23751727

#50

Graduated compression stockings for runners: friend, foe, or fake?
(Bovenschen, H.J. et al., 2013)



NUMBER OF PARTICIPANTS	13
EXERCISE METHODS	T1: 10- km run T2: maximum exercise test
EXAMINED CG	compression socks
EXAMINED PARAMETERS	lower leg volume
RESULTS	reduction of leg volume through GCS after running

BENEFIT: Keep your legs slim after your run with compression garments.

PubMed-ID: 23672387

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