HUR RESEARCH

IN THE WORLD

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1. Bone Formation

Effects of Resistance Training on Biomarkers of Bone Formation and Association with Red Blood Cell Variables (2011)

Min Hu, Taija Finni, Leiting Xu, Liangchou Zou and Sulin Cheng
Laboratory Center for Sport Science and Medicine, Guangzhou Institute of Physical Education, Guangzhou, China.

Equipment: Leg Extension Curl

Research Description: The author previously showed that resistance training significantly increased the red blood cell count (RBC) and hematocrit (Hct) and decreased the mean cell hemoglobin concentration (MCHC) in physically inactive men. The purpose of this study was to investigate further the effect of resistance training on serum bone-specific alkaline phosphatase activity (B-ALP), a biomarker of bone formation, and focus on the relationship between the change in B-ALP from baseline to 20-week follow-up and the corresponding changes in RBC, Hct and MCHC. This research concludes that resistance training increased biomarkers of bone formation, which had association with red blood cell turnover. Adaptive changes of bone metabolism induced by resistance training might facilitate erythropoiesis.

2. Corporate Fitness

Effectiveness of a Workplace Physical Intervention on the Functioning, Work Ability, and Subjective Well-being of Office Workers (2006)

Tuulikki Sjögren, MSc
Department of Health Sciences, Jyväskylä University, Finland

Equipment: Leg Extension Curl, Push Up Pull Down, Twist

Research Description: HUR LET concept (Light Equipment/Executive Training) is based on this research. According to this research, a better understanding of physical exercise intervention and connections between human functioning and contextual factors can be helpful in maintaining work ability and preventing impairment in work ability among persons in sedentary occupations, particularly at older ages.

3. Geriatrics: Cardiovascular Fitness

Improving Cardiovascular Fitness by Strength or Endurance Training in Women Aged 76-78 years (2002)

M. Kallinen, S. Sipilä,[1] M. Alen,[2] M. Kallinen,[2 3] and H. Suominen[3]

Department of Physical Medicine and Rehabilitation, Jyväskylä Central Hospital, Finland

[1] Berner Ltd, Helsinki, Finland, [2] Peurunka-Medical Rehabilitation and Physical Exercise Centre, Laukaa, Finland, [3] Department of Health Sciences, University of Jyväskylä, Finland

Equipment: Leg Extension Curl

Research Description: There have been few population-based, randomized controlled trials on the effects of strength or endurance training on cardiovascular fitness in older women. The objective is to study the effects of strength or endurance training on cardiovascular fitness in women aged 76-78 years. The research concluded that the effect of 18-week endurance or strength training on cardiovascular fitness among women aged 76-78 years is relatively small. Health problems can emerge during training programmes in medically-screened elderly subjects. More population-based, randomized controlled studies are needed to clarify the exact dose-response relationships and safety of physical exercise in elderly populations.

4. Geriatrics: Falls Prevention

Comparison of Balance and Some Other Physical Characteristics between Elderly Fallers and Non-Fallers (2008)

Frank Borg, Gerd Laxåback, Magnus Björkgren

University of Jyväskylä, Chydenius Institute, Kokkola, Finland

Equipment: Leg Extension Curl Rehab, Abduction Adduction Rehab, Performance Recorder

Research Description: Inadvertent falls to the ground or the floor during standing, rising or walking pose considerable risks to the elderly because of the considerable probability of bone

fractures and other traumas. It is therefore of interest to screen people which might have an elevated risk of falling in order to be able to provide preventive measures, such as balance, agility and muscle strength training, or making the living safer. This paper reports a retrospective study on differences between groups of elderly "fallers" (F) and "non-fallers" (NF). HUR Falls Prevention Concept is developed by this research group.

Does progressive resistance and balance exercise reduce falls in residential aged care? Randomized controlled trial protocol for the SUNBEAM program (2014)

Jennifer Hewitt[1], Kathryn M Refshauge[1], Stephen Goodall[2], Timothy Henwood[3], Lindy Clemson[1]

[1]Faculty of Health Sciences, University of Sydney, [2]Centre for Health Economic Research and Evaluation, University of Technology, Sydney, NSW, [3]University of Queensland/Blue Care Research and Practice Development Centre, The University of Queensland, Brisbane, QLD , Australia

Equipment: Leg Extension Curl Rehab, Abduction Adduction, Dip Shrug, Abdomen Back, Leg Press, Performance Recorder

Research Description: Among community dwelling older adults, exercise appears to be an effective countermeasure, but data are limited and inconsistent among studies in residents of aged care communities. This trial has been designed to evaluate whether the SUNBEAM program (Strength and Balance Exercise in Aged Care) reduces falls in residents of aged care facilities.

Strength-balance supplemented with computerized cognitive training to improve dual task gait and divided attention in older adults: a multicenter randomized-controlled trial

van het Reve E, de Bruin ED, BMC Geriatrics 2014, 14:134 (15 December 2014)

Equipment: Leg Press Rehab, Abduction/ Adduction Rehab, Optimal Rhomb, Abdomen/ Back Rehab, Leg extension/ Curl

Research Description: Exercise interventions often do not combine physical and cognitive

training. However, this combination is assumed to be more beneficial in improving walking and cognitive functioning compared to isolated cognitive or physical training. Combining strength-balance training with specific cognitive training has a positive additional effect on dual task costs of walking, gait initiation, and divided attention. The findings further confirm previous research showing that strength-balance training improves executive functions and reduces falls.

5. Geriatrics: Lower Extremities Strength

Effects of Strength and Endurance Training on Thigh and Leg Muscle Mass and Composition in Elderly Women (1995)

S. Sipilä, H. Suominen

Department of Health Sciences, University of Jyväskylä, Finland

Equipment: Leg Extension Curl

Research Description: The effects of 18 weeks of intensive strength and endurance training on knee extensor, knee flexor, and lower leg muscle mass and composition were studied in 76- to 78-yr-old women. Muscle cross-sectional area (CSA), lean tissue CSA, and relative proportion of fat were determined using computed tomography. The results show that intensive strength training can induce skeletal muscle hypertrophy in elderly women and thereby also reduce the relative amount of intramuscular fat, whereas the effects of endurance training are negligible.

Effects of strength and endurance training on isometric muscle strength and walking speed in elderly women (1996)

S. Sipilä , J. Multanen, M. Kallinen, P. Era, H. Suominen

Department of Health Sciences, University of Jyväskylä, Finland

Equipment: Leg Extension Curl Rehab, Performance Recorder

Research Description: The separate effects of 18 weeks of intensive strength and endurance training on isometric knee extension (KE) and flexion (KF) strength and walking speed were studied in 76- to 78- year-old women. Maximal voluntary isometric force for both KE and KF

was measured in a sitting position on a custom-made dynamometer chair at a knee angle of 60 degrees from full extension. Maximal walking speed was measured over a distance of 10 m. This study indicates that in elderly women the effects of physical training on muscle strength and walking speed occur after endurance as well as strength training. The considerable interindividual variation in change of muscle performance is also worth noticing.

Quantitative ultrasonography of muscle: detection of adaptations to training in elderly women (1996)

S. Sipilä, H. Suominen

Department of Health Sciences, University of Jyväskylä, Finland

Equipment: Leg Extension Curl

Research Description: The research objective is to develop quantitative ultrasonography in studying the adaptation of quadriceps muscle mass and composition to short term physical training and rehabilitation in elderly women. The research concluded that the quantitative ultrasonography is a potentially useful tool for studying skeletal muscle in elderly women. The precision and accuracy of the method, however, should be improved to reveal the adaptation of aging muscles to short-term physical training and rehabilitation programs.

Effects of strength and endurance training on muscle fibre characteristics in elderly women (1997)

S. Sipilä, M. Elorinne[1], M. Alen[2], H. Suominen and V. Kovanen

Departments of Health Sciences and [1] Cell Biology, University of Jyväskylä, Jyväskylä, Finland; [2] Peurunka - medical Rehabilitation and Physical Exercise Centre, Laukaa, Finland

Equipment: Leg Extension Curl

Research Description: The effects of 18 weeks' intensive strength and endurance training on fibre characteristics of the vastus lateralis muscle were studied in 76- to 78-year-old women. The results indicate that intensive strength training induces type I fibre hypertrophy, whereas

the effects of endurance training are less evident. The considerable variation found in the change in muscle fibre cross-sectional areas is also noteworthy.

Asymmetrical Lower-Limb Muscle Strength Effects of Strength Deficit in Older People (2008)

Erja Portegijs

Department of Health Science, Jyväskylä University

Equipment: Leg Extension Curl, Leg Press, Adduction and Abduction

Research Description: The aim of this research is to study causes and consequences of asymmetrical strength deficit, i.e. difference in muscle strength between the lower-limbs, and the effects of progressive resistance training in clinical and non-clinical populations of older people. The study stresses the importance of regaining muscle strength after lower-limb injury such as hip fracture. In addition to poor strength, a considerable side-to-side strength difference compromises mobility and balance in older people. To prevent mobility limitation and falls, multi-component rehabilitation programs including progressive resistance training should be studied.

The Effects of Muscle Strength and Power Training on Mobility among Older Hip Fracture Patients (2008)

M. Mård[1], J. Vaha[1], A. Heinonen[1], E. Portegijs[1 2], R. Sakari-Rantala[1], M. Kallinen[3], M. Alen[1], I. Kiviranta[3] and S. Sipilä[1 2]

[1]*Department of Health Sciences,* [2]*the Finnish Centre of Interdisciplinary Gerontology, University of Jyväskylä,* [3]*Central Hospital, Central Finland*

Equipment: Leg Extension Curl, Leg Press, Adduction and Abduction

Research Description: Study shows that muscle strength and power training twice a week over a period of 3 months increases muscle strength, improves self-reported mobility and the ability to rise from a chair among 60-85-year-old hip fracture patients. Muscle strength and power

training should be considered as part of the rehabilitation process to improve or regain mobility, even several years after injury, in older hip fracture patients.

6. Geriatrics: Memory Disorders

Lifestyle guidance prevents memory disorders (2015)

Miia Kivipelto

Finnish Geriatric Intervention Study to Prevent Cognitive Impairment and Disability (FINGER) , National Institute for Health and Welfare, The University of Eastern Finland, the University of Helsinki, the University of Oulu and the Karolinska Institutet

Equipment: Leg Extension Curl, Twist

Research Description: A total of 1,260 Finnish elderly participants were randomly divided into two groups, one of which was given standard lifestyle advice and the other intensive guidance. Intensive guidance included dietary instruction and participation in exercise activities and memory training, as well as support in managing the risk factors of cardiovascular diseases. All of the study participants were deemed to be at risk of dementia, based on standardised test scores. After two years, study participants' mental function was scored using a standard test, the Neuropsychological Test Battery (NTB), where a higher score corresponds to better mental functioning.

7. Exercise Mode and Gender

Comparing Exercise Prescribed with Exercise Completed: Effects of Gender and Exercise Mode (2010)

King, Neil A., Byrne, Nuala M., Hunt, Andrew P., & Hills, Andrew P

Queensland University of Technology, Australia

Equipment: Chest Press, Leg Extension Curl, Body Extension, Biceps Triceps, Leg Press, Abdomen Back, Push Up Pull Down, Abduction Adduction

Research Description: The purpose of this study was to compare the amount of exercise

prescribed with the amount completed between two different modes of training intervention and gender. Study's data suggest that overweight and obese individuals participating in light-resistance circuit training completed more exercise than prescribed. Men and women do not differ in the extent to which they over- or undercomplete prescribed exercise.

8. Isometric Contraction, Strength and Endurance

Comparison of the IEMG Activity Elicited During an Isometric Contraction Using Manual Resistance and Mechanical Resistance (2011)

Shweta Shenoy*, Priyaranjan Mishra, Jaspal Singh Sandhu

Faculty of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, Punjab, India.

Equipment: Leg Extension Curl Rehab, Performance Recorder

Research Description: This study's aim was to observe, if greater activity is produced using mechanical instruments for torque measurements (since the resistance is adjusted to subject's maximum capacity) or if tests, position of MMT, and resistance offered by trained physiotherapist are effective. We compared the IEMG (Integrated electromyography) output between manual and mechanical testing during maximal voluntary isometric contraction. Study shows that HUR system has very good reliability in measuring muscle strength of the knee extensors and flexors as compared to the MMT, suggesting that it will be useful in clinical applications, especially for professional athletes or physically powerful populations.

The effect of different dosages of caffeine on isometric strength and isometric endurance (2008)

Sharma Archina, Sandhu S Jaspal

Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, India

Equipment: Leg Extension Curl Rehab, Performance Recorder

Research Description: The effect of different dosages of caffeine on isometric strength and

isometric endurance. Caffeine has performance enhancing effects, some of which have been observed during submaximal isometric contractions. The purpose of the study was to investigate effect of different dosages of caffeine (0, 5, 9, and 13 mg/kg body weight) on neuromuscular variables such as isometric strength and endurance. The results suggest that isometric endurance can be increased following low to moderate caffeine consumption whereas an increase in isometric endurance was observed following high caffeine consumption.

Effect of oral creatine supplementation and Pre-cooling on isometric strength and isometric endurance (2007)

Manocha Neha, Paul Maman, Sandhu S Jaspal

Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, India

Equipment: Leg Extension Curl Rehab

Research Description: Athletes use various Ergogenic aids to enhance performance capacity or the ability to perform work during various sporting events. The purpose of the study was to investigate the effect of oral creatine supplementation and pre-cooling on neuromuscular variables such as isometric strength and endurance. It is thus concluded that creatine supplement can act as an effective Ergogenic aid both in terms of isometric strength and endurance but pre-cooling effectively increases isometric endurance only within the investigated range.

The rehabilitation of a professional Rugby Union player following a C7/T1 posterior microdiscectomy (2005)

Kerry Peeka, Don Gathererb

17 Methuen Street, Fitzroy, SA 5082, Australia,

Tudor House Clinic, 225 Wendover Road, Aylesbury, Buckinghamshire HP21 9PB, UK

Equipment: Performance Recorder

Research Description:

Rugby Union is a popular international sport [Bathgate, A., Best, J., Craig, G., & Jamieson, M. (2002) with a high incidence of cervical injury. A prospective study of injuries to elite Australian rugby union players. British Journal of Sports Medicine 36, 265–269.] with a high incidence of cervical injury. The purpose of this case study was to explore the rehabilitation of a professional rugby union player following a cervical disc injury affecting the C8 nerve root and subsequent microdiscectomy. A 10-week rehabilitation programme was then commenced whereby the player performed periodised upper limb and Maximal Isometric Voluntary Muscle Contraction (IVMCmax) neck exercises with a graduated return to contact training and playing.The results show a dramatic improvement in the strength of the cervical musculature acting in the four directions of movement tested (cervical flexion, extension and left and right side flexion).

9. Muscle Function

Muscle fatigue in middle-distance running (2009)

A. Nummela, K. Heath, L. Paavolainen, M. Lambert, A.St Clair Gibson, H. Rusko, T. Noakes

Research Institute for Olympic Sports, Jyväskylä, Finland; University of Cape Town, Sports Science Institute of South Africa, Cape Town, South Africa; Department of Biology of Physical Activity, University of Jyväskylä, Finland.

Equipment: Leg Press Rehab, Performance Recorder

Research Description: This study investigated fatigue-induced changes in neuromuscular and stride characteristics during and immediately after a hard middle-distance running effort. Eighteen well-trained male distance runners performed a maximal 20m sprint test and maximal voluntary contractions (MVC) on a leg press machine before and immediately after a 5000m time trial. In all the tests the EMG of five lower limb muscles was measured. The authors conclude that the fatigue measured at maximal effort both pre- and post-time trial is more related to sprint performance than endurance performance and that the fatigue measured during the time trial is related to endurance performance and factors affecting pacing strategy.

The findings support the idea that pacing strategy is regulated in an anticipatory manner by a central governor, which ensures that physiological reserves are maintained.

Effect of Time-of-Day-Specific Strength Training on Muscular Hypertrophy in Men (2009)

S. Milan, T. Finni, S. Cheng, M. Lind Markus and K. Häkkinen

Department of Biology of Physical Activity, University of Jyväskylä, Finland

Equipment: Leg Extension Curl Research Line

Research Description: The purpose of the present study was to examine effects of time-of-day-specific strength training on muscle hypertrophy and maximal strength in men. Research indicated 10 weeks of strength training performed either in the morning or in the afternoon resulted in significant increases in Quadriceps femoris muscle size. The magnitude of muscular hypertrophy did not statistically differ between the morning and afternoon training times. From a practical point of view, strength training in the morning and afternoon hours can be similarly efficient when aiming for muscle hypertrophy over a shorter period of time.

Neuromuscular and Hormonal Adaptations to Resistance Training (2009)

Milan Sedliak

Department of Biology of Physical Activity, University of Jyväskylä, Finland

Equipment: Leg Extension Curl Research Line

Research Description: The majority of the processes in human physiology and behaviour exhibit daily variation. According to the research result, it can be suggested that time-of-day-specific strength training may be beneficial in sports where maximum strength performance needs to peak at a particular time of day, especially in the morning hours.

A Correlation Study between Plasma Myostatin and Peak Torque Strength Gains of Bilateral Knee Extensors and Flexors After Resistance Training in Healthy Asian Indians (2011)

Sandhu S Jaspal, Shiva Shankar Trivedi, Shweta Shenoy

Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, India

Equipment: Leg Extension Curl Rehab

Research Description: The research purpose is to accurately quantify percentage changes in strength gains and correlate it with percentage changes in plasma myostatin levels. Subject's maximal isometric voluntary contraction for both the limbs knee extensors and flexors were measured using HUR 5530 Leg Extension/curl computer controlled machine prior to the training and after the training.

Effects of Caffeine Ingestion on Strength and Endurance Performance of Normal Young Adults (2010)

Sharma Archna*, Sandhu S Jaspal*

** Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, India*

Equipment: Leg Extension Curl Rehab, Performance Recorder

Research Description: There are a number of studies evaluating the effects of various dosages of caffeine on performance variables viz. isometric strength & endurance performance, but the effects of caffeine on exercise performance are controversial. Research concludes that caffeine (5mg/kg BW) has an ergogenic effect on isometric muscular endurance and cardio/vascular endurance but not on maximal force generating capacity of the human quadriceps muscle.

Myoelectrical Manifestations of Quadriceps Fatigue during Dynamic exercise differ in Mono- and Bi-articular Muscles (2006)

M. Hu, T. Finni, M. Alén, J. Wang, L. Zou, W.Zhou, S. Cheng

Dept. of Sports and Health, Guangzhou Institute of Physical Education, Guangzhou, China; Depts. of Health Science, Biology of Physical Activity, University of Jyväskylä, Finland; School of Education,

Zhejiang University, China; School of Life Science, Sun Yatsen University, Guangzhou, China

Equipment: Leg Extension Curl

Research Description: The purpose of this study was to investigate different myoelectric manifestations of neuromuscular fatigue among individual quadriceps muscle during high load dynamic knee extension exercise. The results suggest that rectus femoris is more susceptible to fatigue than two vastii when making dynamic knee extension exercise against heavy load, and corresponding divergence of neuronal coding mechanisms might exist in the central nervous system.

Reliability of Knee Muscle Strength and Fatigue Measurements (2005)

J.Surakka[1], A. Virtanen[2], S. Aunola[1], K.Mäentaka[1], H. Pekkarinen[3]

[1]National Public Health Institute, Turku, Finland; [2]Social Insurance Institution, Research Department, Turku, Finland; [3]Dept. of Physiology, University of Kuopio, Finland

Equipment: Leg Extension Curl, Research Line

Research Description: The purpose of the research is to investigate the intra- and inter-rater reliability of maximal knee muscle strength and fatigue measurements in healthy subjects. The studies concluded that knee muscle strength and fatigability can objectively be measured by using a fixed dynamometer. The reliability of maximal voluntary isometric strength was high and all three fatigue indices, based on the calculation of Area Under Force vs. time Curve, were found reliable in assessing the test-retest fatigability of knee extensors and flexors during a sustained 30 s muscle contraction.

10. Obesity

Lifestyle Modification and Metformin as Long-term Treatment Options for Obese Adolescents: Study Protocol (2009)

A Justine Wilson*, Harry Prapavessis, Mary E Jung, Anita G Cramp, Joy Vascotto, Larissa

Lenhardt, J Kevin Shoemaker, Margaret Watson, Tracy Robinson and Cheril L Clarson

Department of Health Sciences, School of Kinesiology, The University of Western Ontario, London, Ontario, Canada; Faculty of Medicine, The University of Western Ontario, London, Ontario, Canada; Children's Hospital, London Health Sciences Centre, Ontario, Canada and Healthy Eating and Activity Program, Children's Hospital, London Health Sciences Centre, Ontario, Canada

Equipment: Leg Press, Lat Pull, Abduction Adduction, Tricpes/Biceps, Chest Press, Back extension, Push Up Pull Down and so on. Maximum Isometric Strength were measured with Leg Press and Chest Press.

Research Description: Childhood obesity is a serious health concern affecting over 155 million children in developed countries worldwide. Childhood obesity is associated with significantly increased risk for development of type 2 diabetes, cardiovascular disease and psychosocial functioning problems (i.e., depression and decreased quality of life). The two major strategies for management of obesity and associated metabolic abnormalities are lifestyle modification and pharmacologic therapy. This paper will provide the background rationale and methods of the REACH childhood obesity treatment programs are being recruited to participate in this randomized placebo controlled trial.

11. Physical Performance Capacity

Physical Performance Capacity during 12 Days Military Manoeuvre in Winter Conditions (2005)

Dr. Juha Oksa, Dr. Sirkka Rissanen, M.Sc. Tero Mäkinen, Prof. Heikki Kyröläinen, Dr. Ari Peitso, Prof. Hannu Rintamäki

Finnish Institute of Occupational Health, Oulu, Finland; University of Jyväskylä, Department of Biology of Physical Activity, Jyväskylä, Finland; Center for Military Medicine, Lahti, Finland; University of Oulu, Department of Biomedicine, Oulu, Finland

Equipment: Leg Extension Curl, Research Line

Research Description: This study was designed to evaluate the effect of 12 days military

manoeuvre in cold environment on physical performance capacity, physical strain, fatigue and recovery of participating soldiers. In addition, the aim was to find out how was the physical strain subjectively evaluated. The 12 twelve day military manoeuvre consisted of 5 day combat training and 6 day combat shooting training with one day (day 6) for transportation in between. This study was divided into laboratory and field measurements. Research concluded that the soldiers were predominantly able to maintain their physical performance capacity during a long-term military manoeuvre in the cold.

12. Rehabilitation for Cardiac Disease

Peak exercise capacity prediction from a submaximal exercise test in coronary artery disease patients (2013)

Arto J. Hautala*, Antti M. Kiviniemi, Jaana J. Karjalainen, Olli-Pekka Piira, Samuli Lepojärvi, Timo Mäkikallio, Heikki V. Huikuri and Mikko P. Tulppo
Department of Exercise and Medical Physiology, Verve Research, Finland; Institute of Clinical Medicine, Department of Internal Medicine, University of Oulu, Finland

Equipment: HUR SmartCard Software with Monark
Research Description: The purpose of this study was to determine whether a rating of perceived exertion scale (RPE) obtained during submaximal exercise could be used to predict peak exercise capacity (METpeak) in coronary artery disease (CAD) patients. In conclusion, the current study shows that Borg's RPE is a practical tool for assessing METpeak in secondary preventive medicine. RPE at submaximal exercise intensity is related to absolute METpeak in CAD patients. The data reveal that the relationships between RPE and exercise intensity together with easily measured variables at rest and during â€œwarm-up" exercise can reasonably predict METpeak in patients with CAD.

Individual Differences in the Responses to Endurance and Resistance (2005)

Arto J. Hautala, Antti M. Kiviniemi, Timo H. Makikallio, Hannu Kinnunen, Seppo Nissila, Heikki

V. Huikuri Mikko P. Tulppo

Department of Exercise and Medical Physiology, Merikoski Rehabilitation and Research Centre, Oulu, Finland; Division of Cardiology, Department of Medicine, University of Oulu, Finland; Lapland Central Hospital, Rovaniemi, Finland; Polar Electro, Kempele, Finland

Equipment: HUR strength equipment for Abdomen, Back, Legs and Arms.

Research Description: The individual responsiveness of VO2peak to exercise training is related to the mode of training. The purpose of this study was to test the hypothesis that resistance training may increase VO2peak in individuals whose responsiveness to endurance training is low. Resistance exercise training was established based on the recommendations of ACSM (Kraemer et al.2002). Resistance training consisted of 15 exercises involving the major muscle groups performed with one set of 8-12 repetitions to near fatigue (8-12 RM). Research concluded that the healthy males and females whose training response is low after endurance training seem to result in a marked improvement in their cardiorespiratory fitness by resistance training.

Individual Responses to Aerobic Exercises, the Role of the Autonomic Nervous System (2008)

Arto J. Hautala*, Antti M. Kiviniemi, Mikko P. Tulppo

Department of Exercise and Medical Physiology, Verve Research, Oulu, Finland

Acknowledgements: Academy of Finland, Ministry of Education, Finnish Funding Agency for Technology and Innovation, TEKES, Polar Electro Oy and HUR Oy

Research Description: It is well established that regular aerobic exercise training reduces all-cause mortality and improves a number of health outcomes. However, a marked heterogeneity in the training-induced changes, e.g. in terms of aerobic fitness, has been observed in healthy human subjects, even with highly standardized training programs. In summary, the research review in this paper provides an overview of the evidence of the role of ANS activity related to acute and chronic aerobic exercise, particularly human heterogeneity in response to aerobic training interventions, in terms of VO2max or VO2peak.

Recovery Pattern on Baroreflex Sensitivity (2007)

Teemu H. Niemela[12], Antti M. Kiviniemi[1], Arto J. Hautala[1], Jukka A. Salmi[2], Vesa Linnamo[2], Mikko P. Tulppo[1]

[1]*Department of Exercise and Medical Physiology, Verve, Oulu, FINLAND;*

[2]*Department of Biology of Physical Activity, University of Jyväskylä, FINLAND*

Equipment: Chest Curl, Leg Extension Curl, Biceps Triceps

Research Description: Baroreflex sensitivity after acute exercise is associated with exercise intensity, showing relatively rapid recovery after aerobic and light resistance exercise and delayed recovery after heavy resistance exercise. The delayed BRS pattern after heavy resistance exercise is regulated by delicate interplay between the withdrawal of vagal outflow and the probably increased sympathetic vasomotor tone documented by measurements of heart rate and blood pressure variability. During the research, 1RM and personal adjustments to machines were measured at least 2 days before first intervention.

Effects of exercise prescription on daily physical activity and maximal exercise capacity in coronary artery disease patients with and without type 2 diabetes (2012)

Jaana J. Karjalainen[12], Antti M. Kiviniemi[1], Arto J. Hautala[1], Jarkko Niva[2], Samuli Lepojarvi[2], Timo H. Makikallio[2], Olli-Pekka Piira[2], Heikki V. Huikuri[2] and Mikko P. Tulppo[12]

[1]*Department of Exercise and Medical Physiology, Verve Research, and* [2]*Department of Internal Medicine, Institute of Clinical Medicine, University of Oulu, Oulu, Finland*

Acknowledgements: Academy of Finland, Ministry of Education, Finnish Funding Agency for Technology and Innovation, TEKES, Polar Electro Oy and HUR Oy

Research Description: Research Description: Promotion of and adherence to increased physical activity (PA) is an important part of the prevention and treatment of coronary artery disease (CAD). We hypothesized that individually tailored home-based exercise prescriptions will increase long-term PA and maximal exercise capacity among CAD patients without and with type 2 diabetes (CAD+T2D). Research concluded that the patients with CAD with T2D

are physically less active than CAD patients without diabetes in their daily life. Individually tailored home-based exercise prescriptions are an effective way to promote more active lifestyles and improve fitness in both patient groups.

Determinants of heart rate recovery in coronary artery disease patients with and without type 2 diabetes (2012)

Jaana J. Karjalainen, Antti M. Kiviniemi, Arto J. Hautala, Olli-Pekka Piira, Samuli Lepojarvi[2], Timo H. Makikallio, Heikki V. Huikuri and Mikko P. Tulppo

Institute of Clinical Medicine, Department of Internal Medicine, University of Oulu, Finland; Department of Exercise and Medical Physiology, Verve Research, Oulu

Acknowledgements: Academy of Finland, Ministry of Education, Finnish Funding Agency for Technology and Innovation, TEKES, Polar Electro Oy and HUR Oy

Research Description: Cardiovascular autonomic dysfunction, which is a common complication of diabetes, is associated with increased mortality in patients with coronary artery disease(CAD). However, the reasons of autonomic dysfunction in CAD patients with or without diabetes are not well known. We examine the association between heart rate recovery (HRR) and other potential factors among CAD patients with and without type 2 diabetes (T2D). Research concluded that the blunted HRR is more common among CAD patients with T2D than in those without, and this is more closely related to physical activity and obesity than to the duration of T2D or associated co-morbidities.

Effects of emotional excitement on heart rate and blood pressure dynamics in patients with coronary artery disease (2010)

Victor R. Neves, Antti M. Kiviniemi, Arto J. Hautala, Jaana J. Karjalainen, Olli-Pekka Piira, Aparecida M. Catai, Timo H. Makikallio, Heikki V. Huikuri and Mikko P. Tulppo

Department of Exercise and Medical Physiology, Verve, Oulu, Finland; Department of Physiotherapy, Federal University of São Carlos, São Carlos, Brazil; Department of Internal Medicine, Institute of

Clinical Medicine, University of Oulu, Oulu, Finland

Acknowledgements: Academy of Finland, Ministry of Education, Finnish Funding Agency for Technology and Innovation, TEKES, Polar Electro Oy and HUR Oy

Research Description: The incidence of adverse cardiovascular events is higher among spectators of exciting sports events, but the mechanistic link between the events is not known. We assessed the heart rate (HR) and blood pressure (BP) dynamics of enthusiastic male ice hockey spectators (60±9 years) with coronary artery disease (CAD) during Finnish national league ice hockey play-off final matches. The results show that cardiac vagal outflow is attenuated and vasomotor sympathetic activity elevated during exciting sports events and BP dynamics differ from those occurring during physical exercise at equal HRs. The autonomic reactions may partly explain the vulnerability to cardiovascular events caused by this type of leisure-time emotional excitement.

Heart rate dynamics after exercise in cardiac patients with and without type 2 diabetes (2011)

Olli-Pekka Piira, Heikki V. Huikuri Mikko P. Tulppo

Institute of Clinical Medicine, Department of Internal Medicine, University of Oulu, Finland; Department of Exercise and Medical Physiology, Verve Research, Oulu

Acknowledgements: Academy of Finland, Ministry of Education, Finnish Funding Agency for Technology and Innovation, TEKES, Polar Electro Oy and HUR Oy

Research Description: The incidence of cardiovascular events is higher in coronary artery disease patients with type 2 diabetes (CAD+T2D) than in CAD patients without T2D. There is increasing evidence that the recovery phase after exercise is a vulnerable phase for various cardiovascular events. We hypothesized that autonomic regulation differs in CAD patients with and without T2D during post-exercise condition. The research concluded HR recovery is delayed in CAD+T2D patients, suggesting impairment of vagal activity and/or augmented

sympathetic activity after exercise. Blunted HR recovery after exercise in diabetic patients compared with non-diabetic patients is more closely related to low exercise capacity and obesity than toT2D itself.

13. Rehabilitation for Cerebral Palsy

Individualized, Home-based Interactive Training of Cerebral Palsy Children Delivered through the Internet (2011)

Peder E Bilde, Mette Kliim-Due, Betina Rasmussen, Line Z Petersen, Tue H Petersen, Jens B Nielsen

The Helene Elsass Center, Denmark; Department of Neuroscience and Pharmacology, Panum Institute, University of Copenhagen, Denmark; Department of Exercise and Sport Sciences, University of Copenhagen, Denmark

Equipment: Leg Extension Curl, HUR Research Line

Research Description: According to the research, the children and their families reported great enthusiasm with the training system and all experienced subjective improvements in motor abilities and self-esteem. The children on average trained for 74 hours during a 20 week period equaling just over 30 minutes per day. Significant improvements in functional muscle strength measured as the frontal and lateral step-up and sit-to-stand tests were observed. Assessment of Motor and processing skills also showed significant increases. Endurance measured as the Bruce test showed a significant improvement, whereas there was no significant change in the 6 min walking test. Balance (Romberg) was unchanged. Visual perceptual abilities increased significantly.

14. Rehabilitation for Diabetics

The Effects of 12 weeks Progressive Resistance Training on Glycemic Control with Type 2 Tablet-Treated NIDDM Patients (2010)

Ursula Pajula, Sini Valtanen

Satakunta kiitoUniversity of Applied Sciences

Equipment: Lat Pull, Leg Extension Curl, Twist, Chest Press, Leg Press, Optimal Rhomb

Research Description: The purpose of this thesis was to investigate how 12 weeks progressive resistance training three times per week with HUR pneumatic machines affect on glycemic control, blood pressure, body mass index, waist circumference and muscle mass in tablet-treated non-insulin dependent (NIDDM), type 2 diabetic patients. The most changes occurred in subjects' muscle mass. Men improved their results in repetition maximum tests with 12-25 percent. Women improved their results with 6-24 percent in four of the five repetition maximum tests. On average, the subjects felt the resistance training had affected positively on their health status and physical fitness.

Effects of progressive resistance training and aerobic exercise on type 2 diabetics in Indian population (2009)

Shweta Shenoy, Ekta Arora, Sandhu Jaspal

Department of Sports Medicine and Physiotherapy, Guru Nanak Dev University, Amritsar, Punjab, India

Equipment: Leg Extension Curl, Research Line

Research Description: The Indian population faces a high risk for diabetes because of a high genetic predisposition and susceptibility to environmental insults. The objective of this study was to evaluate the effects of 16 weeks of Progressive resistance training (PRT) and Aerobic exercise (AE) on glycemic control, blood pressure, heart rate, muscle strength and control of type 2 diabetics. The study results show that PRT is a more effective form of exercise training than AE for improving glycemic control, blood pressure and heart rate in type 2 diabetics.

15. Rehabilitation for Kidney Disease

The Efficacy of supervised 6-month Aerobic and Resistance Exercise Program in Patients with Chronic Kidney Disease (2013)

Kengi Higuchi, Akira Kubo, Daisuke Shimon, Hiroshi Tsuda, Yasunori Utsunomiya, Masahiro Abo

Department of Rehabilitation, The Jikei Kashiwa Hospital; Department of Physical Therapy, School of Health Science, International Univ of Health and Welfare;Department of Rehab,The Jikei University Hospital; Physio Center, Inter Reha*; Division of Kidney and Hypertension, Department of Internal Medicine, The Jikei University of School of Medicine; Department of Rehabilitation Medicine, The Jikei University School of Medicine*

Equipment: Leg Extension Curl, Lat Pull, Leg Press

Research Description: The aim of this study was to evaluate the safety and efficacy of aerobic and resistance exercise for patients with chronic kidney disease (CKD). Three patients with CKD stage 2, 3, and 4 performed aerobic exercise for 30 minutes on a bicycle ergometer with a workload within the anaerobic threshold and performed resistance exercise for a maximum of 10 repetitions. Consequently, body function, physical activity performance, and lipid profiles were also improved. Therefore, our aerobic and resistance exercise program can be performed safely and may be considered useful for patients with CKD, although the efficacy of the protocol needs to be confirmed in a large number of patients.

16. Rehabilitation for Knee Arthroplasty

The Effect of a Prehabilitation Exercise Program on Quadriceps Strength for Patients Undergoing Total Knee Arthroplasty: A Randomized Controlled Pilot Study (2012)

Carly McKay, PhD, Harry Prapavessis, PhD, Timothy Doherty, PhD

Exercise and Health Psychology Laboratory, School of Kinesiology, Faculty of Health Sciences, University of Western Ontario, London, Ontario, Canada; Sport Injury Prevention Research Centre, University of Calgary, Canada

Equipment: Leg Extension Curl

Research Description: The purpose of this research is to examine the effect of a 6-week prehabilitation exercise training program on presurgical quadriceps strength for patients undergoing total knee arthroplasty (TKA). The intervention elicited clinically meaningful increases in quadriceps strength, walking speed, and mental health immediately before TKA. It did not impart lasting benefits to patients in the 12 weeks after surgery. Analysis of the results suggests that quadriceps strength may not drive functional improvements after surgery. These findings need to be replicated in larger trials before clinical recommendations are made about including strength training prehabilitation in everyday practice.

17. Rehabilitation for Knee functions after ACL reconstruction surgery

The Effectiveness of HUR integration exercise machine on the Knee Rehabilitation after ACL reconstruction surgery(2015)

M.D Bui Hong Thuy, M.D PHD. Professor Nguyen Trong Luu

108 Military Central Hospital , Deputy Chairman of Vietnam National Rehabilitation Association

Equipment: Leg press, Leg press Incline, Leg Extension Curl

Research Description: HUR integration machines bring high effectiveness for the rehabilitation of thigh perimeter (atrophy scale) and the range of motion of the knee joints after the surgical reconstruction of anterior cruciate ligament. Research shows that the improved function of knee joins is much better in the group treated with Hur integration machines than that without this treatment. In details, the good and very good results get over 90% for the treatment Hur

with integration machines compared with lower than 50% for other therapy. Specially, the ability for the group trained with the Hur integration machines to be back their jobs is very high (94.8%) and the difference has the statistic meaning compared to the group without this treatment with P<0.05.

18. Rehabilitation for Multiple Sclerosis

Effects of a 6-month Exercise Program on Patients with Multiple Sclerosis (2004)

A. Romberg, PT; A. Virtanen, MSocSc; J. Ruutiainen, MD; S. Aunola, PhD; S.-L. Karppi, MSc; M. Vaara, MSc; J. Surakka, MSc; T. Pohjolainen, MD; and A. Seppänen, MD

Masku Neurological Rehabilitation Centre, Masku; Research Department, Social Insurance Institution, Turku; Laboratory of Population Research, Department of Health and Functional Capacity, Public Health Institute, Turku; Rehabilitation Unit of Orton, the Invalid Foundation, Helsinki; and Health and Income Security Department, Social Insurance Institution, Helsinki, Finland

Equipment: Leg Extension Curl, Research Line

Research Description: The purpose of this study was to evaluate the effects of a progressive 6-month exercise program (3weeks during inpatient rehabilitation followed by 23weeks at home) on walking and other aspects of physical function in MS patients with mild to moderate disability. Maximal isometric torque of knee extensor and flexor muscles was measured using a dynamometer (HUR, Kokkola, Finland). This is a reliable method of measuring lower extremity strength in MS patients. The results of this randomized study show that long-term exercise led to significant and clinically meaningful changes in the walking speed of patients with mild to moderate MS. This was accompanied by significant improvements in upper extremity endurance.

Assessment of muscle strength and motor fatigue with a knee dynamometer in subjects with multiple sclerosis: a new fatigue index (2004)

Jukka Surakka, Anders Romberg, Juhani Ruutiainen, Arja Virtanen, Sirkka Aunola and Kari Mäentaka

National Public Health Institute, Turku; Masku Neurological Rehabilitation Centre, Social Insurance Institution, Research Department, Turku and National Public Health Institute, Turku, Finland

Equipment: Leg Extension Curl, Performance recorder

Research Description: The research purpose is to measure muscle strength and motor fatigue with a knee dynamometer and to assess the intra-rater reliability of measurements for maximal isometric extensor and flexor torques the reliability of a new fatigue index (FI) in patients with mild to moderate multiple sclerosis (MS). The research concluded that Maximal isometric torque and motor fatigue of knee flexor and extensor muscles can be reliably measured using a knee dynamometer in MS patients. The new Fatigue Index proved to be a reliable model for MS patients.

Effects of aerobic and strength exercise on motor fatigue in men and women with multiple sclerosis: a randomized controlled trial (2004)

Jukka Surakka, Anders Romberg, Juhani Ruutiainen, Sirkka Aunola, Arja Virtanen, Sirkka-Liisa Karppi and Kari Mäentaka

National Public Health Institute, Turku; Masku Neurological Rehabilitation Centre, Social Insurance Institution, Research Department, Turku and National Public Health Institute, Turku, Finland

Equipment: Leg Extension Curl

Research Description: The research purpose is to investigate the effects of aerobic and strength exercise on motor fatigue of knee flexor and extensor muscles in subjects with multiple sclerosis (MS). Motor fatigue of knee flexor and extensor muscles was measured during a static 30-s maximal sustained muscle contraction. According to the research, Motor fatigue was reduced in knee flexion (p =0.0014) and extension (ns) among female but not in male exercisers after six months of exercise. The exercise activity of women was 25% higher than that of the men.

19. Rehabilitation for Polio

Reliability of Knee extensor and Flexor Muscle Strength Measurements in persons with Late Effects of Polio (2010)

Ulla-Britt Flansbjer, PT, PhD and Jan Lexell MD, PhD

Department of Rehabilitation Medicine, Skåne University Hospital; Department of Clinical Sciences, Division of Rehabilitation Medicine, Lund University, Lund; Department of Health Sciences, Luleå University of Technology, Luleå, Sweden

Equipment: Leg Extension Curl Rehab

Research Description: The research objective is to assess the reliability of knee extensor and flexor muscle strength measurements in persons with late effects of Polio. Research concluded that the knee muscle strength can be measured reliably and can be used to detect real changes after an intervention for a group of persons with late effects of polio, whereas the values may be too high for single individuals or to detect smaller short-term changes over time for a group of individuals.

20. Rehabilitation for Respiratory Disease

The effect of Thixotropy conditioning and pneumatic machine exercise (Thixo-Ex) to the mobility of thorax, respiratory function, and exercise capacity of COPD patient

Kazunori Takahashi (Medical laboratory technician)

Akita City Hospital

Equipment: Pec Deck, Optimal Rhomb, SmartCard Software, Performance Recorder

Research Description: The research purpose is to study the effect of Thixotropy conditioning and pneumatic machine exercise (Thixo-Ex) to the mobility of thorax, respiratory function, and exercise capacity of COPD patients. 12 stable COPD patients have participated in the research. The research result is, for Thixo-Ex, the result of ensiform chest expansion variability (Before and after the exercise) and breathing difficulties while walking were positively correlated

with %FRC. The effect of Thixo-Ex differed depending on the pulmonary hyperinflation.

21. Rehabilitation for Stroke

Progressive Resistance Training After Stroke (2008)

Ulla-Britt Flansbjer, PT, PhD, Michael Miller, PT, PhD, David Downham, PhD and Jan Lexell MD, PhD

Department of Rehabilitation, Lund University Hospital, Lund; Department of Health Sciences, Division of Geriatric Medicine, Lund University, Malmö; Department of Health Sciences, Division of Physiotherapy, Lund University, Lund, Sweden; Department of Mathematical Sciences, University of Liverpool, Liverpool, UK; Department of Clinical Sciences, Division of Rehabilitation Medicine, Lund University, Lund and Department of Health Sciences, Luleå University of Technology, Luleå, Sweden

Equipment: Leg Extension Curl Rehab

Research Description: The research objective is to evaluate the effects of progressive resistance training on muscle strength, muscle tone, gait performance and perceived participation after stroke. The research concluded that progressive resistance training is an effective intervention to improve muscle strength in chronic stroke. There appear to be long-term benefits, but further studies are needed to clarify the effects, specifically of progressive resistance training on gait performance and participation.

22. Torque- Velocity Relationship

The Effect of Measuring Device and Method of Calculation on the Leg Extension Torque-Velocity Relationship (2002)

F Borg, S Jarsen, S Cheng, M Manderbacka, T Finni

University of Jyväskylä, Chydenius Institute, Kokkola, Finland; Neuromuscular Research Center, Dept.

Biology of Physical Activity, University of Jyväskylä; Dept. Health Sciences, University of Jyväskylä; HUR Co., Ltd

Equipment: Leg Extension Curl

Research Description: The aim of this study is to compare the computational methods for extracting force/torque velocity data, and the results using an isokinetic device and pneumatic device. According to the research, the data depends on a number of factors such as the dynamics of the device, the measurement protocol, the level of training of the participant, how the participant was strapped to the device, fatigue, and whether the performance was successful or not (e.g. submaximal)

The Force-Velocity Relation Studied with a Pneumatic Leg Extension Curl Device (2002)

Frank Borg & Mika Herrala

Jyväskylä University, Chydenius Institute, Finland.

Equipment: Leg Extension Curl

Research Description: The purpose of the present study was to find out whether a simple Hill-model for the muscle could be useful for understanding the results obtained using an off-the-shelf pneumatic leg extension / curl exercise machine (non-isokinetic).The study shows that the simple Hill-model (1) can help explain some important features of the data obtained with the pneumatic leg extension machine and thus suggests future comparisons with more detailed models. That the Hillmodel is relevant for leg-extension has been suggested e.g. by the work of Tihanyi et al. (1982) who used an ingenious but somewhat complicated measurement apparatus. With an improved protocol and a more sophisticated data analysis the present pneumatic device might provide a convenient measurement setup for assessing some gross muscle characteristics.

23. Studies in the sports science field

The force-velocity relation studied with a pneumatic leg-extension/curl device

Frank Borg & Mika Herrala

Jyväskylä University, Chydenius Institute, Finland.

Equipment: Leg Extension Curl

Research Description: The purpose of the present study was to find out whether a simple Hill-model for the muscle could be useful for understanding the results obtained using an off-the-shelf pneumatic leg extension / curl exercise machine (non-isokinetic).The study shows that the simple Hill-model (1) can help explain some important features of the data obtained with the pneumatic leg extension machine and thus suggests future comparisons with more detailed models. That the Hillmodel is relevant for leg-extension has been suggested e.g. by the work of Tihanyi et al. (1982) who used an ingenious but somewhat complicated measurement apparatus. With an improved protocol and a more sophisticated data analysis the present pneumatic device might provide a convenient measurement setup for assessing some gross muscle characteristics.

The effect of measuring device and method of calculation on the leg extension torque-velocity relationship

F Borg, S Jarsen, S Cheng, M Manderbacka, T Finni

University of Jyväskylä, Chydenius Institute, Kokkola, Finland; Neuromuscular Research Center, Dept. Biology of Physical Activity, University of Jyväskylä; Dept. Health Sciences, University of Jyväskylä; HUR Co., Ltd

Equipment: Leg Extension Curl

Research Description: The aim of this study is to compare the computational methods for extracting force/torque velocity data, and the results using an isokinetic device and pneumatic device. According to the research, the data depends on a number of factors such as the dynamics of the device, the measurement protocol, the level of training of the participant, how the participant was strapped to the device, fatigue, and whether the performance was

successful or not (e.g. submaximal)

Age dependency of neuromuscular function and dynamic balance control

J. M. Piirainen, J. Avela, N. Sippola, & V. Linnamo

Equipment: BT4 balance platform

Research Description: The purpose of the present study was to examine whether static and dynamic balance control are related to neuromuscular function and ageing. For this purpose, we constructed a new dynamic balance measurement system that simulates natural falling. Ten young (age 21 31 years) and 20 elderly (age 60 70 years) men participated in the experiment. Maximal isometric torque (MVC) and activation level were measured from the quadriceps and plantar flexor muscles. The H-reflex, V-wave, and maximal M-wave were measured from the soleus muscle. In dynamic balance control, anterior-posterior centre-of-pressure swaying was 74 9 8.1 mm in the young men and 91.5 9 19.4 mm in the elderly men (P B 0.05), whereas in the static condition there were no significant differences between the two groups. Knee extension MVC (young: 181 9 42 N × m; elderly: 135 9 39 N × m; P B 0.01), torque after 500 ms (young: 147 9 36 N × m; elderly: 108 9 39 N × m; P B 0.05), and activation level (young: 96.2 9 0.8%; elderly: 93.8 9 2.1%; P B 0.01) were higher in the young than the elderly men; no differences were observed in plantar flexion. The amount of re-stabilization after a sudden disturbance seems to be an age-related phenomenon, which is seen as a connection between balance control and rapid force production.

Isometric Knee-Extensor Torque Development and Jump Height in Volleyball Players

C. J. De Ruiter, G. Vermeulen, H. M. Toussaint, A. De Haan

Equipment:

Research Description:

HUR Labs References

24 Others

Measurement of EMG activity with textile electrodes embedded into clothing (2007)

T Finni, M Hu, P Kettunen, T Vilavuo, S Cheng

Neuromuscular Research Center, Dept. Biology of Physical Activity, University of Jyväskylä; Dept. Health Sciences, University of Jyväskylä; Guangzhou Institute of Physical Education, China

Equipment: Leg Extension Curl, Research Line

Research Description: Novel textile electrodes that can be embedded into sports clothing to measure averaged rectified EMG have been developed for an easy use in the field tests and in clinical settings. The purpose of this study is to evaluate the validity, reliability and feasibility of this new product to measure averaged rectified EMG. This study indicated that the textile electrodes embedded into shorts is a valid and feasible method for assessing the average rectified value of EMG.