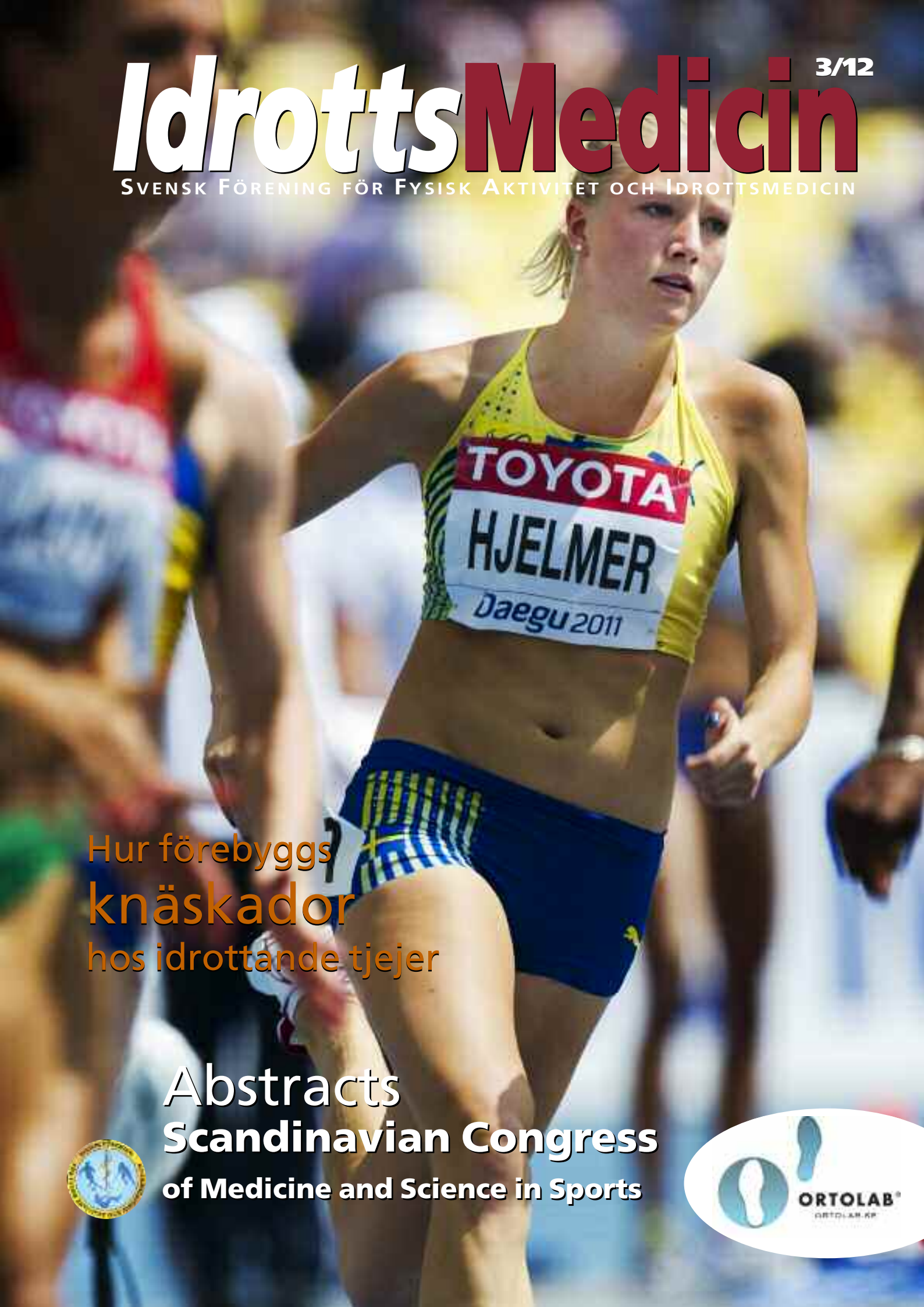
3/12

IdrottsMedicin

Svensk Förening för Fysisk Aktivitet och Idrottsmedicin



Hur förebyggs knäskador hos idrottande tjejer

Abstracts
Scandinavian Congress of Medicine and Science in Sports

Tomas Movin – ordforande@svenskidrottsmedicin.se

Tema ”Kvinnor och idrott” och nya hedersledamöter

Vårt skandinaviska möte genomförs vart annat år och vart åttonde år arrangeras mötet i Sverige. I år står Malmö som värd 19-22 september med ett mycket imponerande program med tre parallella sessioner. Titta in på hemsidan och studera det spännande och högklassiga innehållet. Jag hoppas att vi ses där.

Vår skandinaviska paraplyorganisation Scandinavian Foundation för medicin och vetenskap i idrott är vårt samarbetsorgan och är medarrangör vid de skandinaviska mötena och organisationen har vidare en styrande funktion av tidskriften Scandinavian Journal of Medicine and Science in Sports.

Den vetenskapliga tidskriften har under åren varit flitigt debatterad inom vår förening. Den har ett brett multidisciplinärt format och är också förenad med en kostnad för medlemmarna. Utvecklingen av den vetenskapliga kvaliteten och ryktbarheten för tidskriften är imponerande nu under tidskriftens tjugoandra årgång.

Kvalitetsranking

Vetenskapliga tidskrifters kvalitet rankas med sk impact factor. Scandinavian Journal of Medicine and Science in Sports har nu impact factor 2,867 och rankas som nummer 10 av 84 idrottsvetenskapliga tidskrifter. Det finns skäl att rikta tacksamhet mot de Editors- in- Chief som tillsammans med Section Editors positionerat tidskriften som en av de främsta inom vårt fält. Bengt Saltin, Henrik Galbo och senast Michael Kjaer har stått för detta fina ledarskap i funktionen Editor-in- Chief. Från i år har stafettpinnen lämnats vidare till Stephen Harridge, vid King’s College i London

Imponerande satsning

Vår andra medarrangör är World Village of Women Sports AB, med säte i Malmö, och vars vd är Malin Eggertz Forsmark. Organisationen drivs av en icke vinstdrivande stiftelse med syftet att skapa en bättre förståelse av förhållanden och villkor för kvinnor och idrott. Stiftelsens ordförande är Per Nilsson, som även är ordförande i Centrum för Idrottsforskning, och det finns ett vetenskapligt internationellt råd under ledning av Bengt Saltin. Satsningarna, profileringen och positioneringen i Malmö är imponerande och mycket vällovliga och årets mötestema ”Kvinnor och Idrott” kan inte ha en bättre geografisk hemvist än i Malmö. Jag vill redan nu rikta ett stort tack till hela organisationskommittén.

Jag vill dock särskilt lyfta fram Harald Roos, som är ordförande i organisationskommittén och ordförande i Scandinavian Foundation för medicin och vetenskap i idrott, därtill idrottstraumatologisk editor i Scandinavian Journal of Medicine and Science in Sports. Harald har en mycket stark idrottsmedicinsk gärning. Under mer än 30 år har han varit fotbollsläkare i Helsingborgs IF, under ett par decennier har han varit engagerad i SFAIMs styrelse och har hållit många idrottsmedicinska kurser. Harald var också initiativtagare och drivande i den mycket viktiga randomiserade främre korsbandsstudien som jämförde operativ behandling eller initial sjukgymnastisk behandling. Denna mycket välgjorda studie publicerades i den synnerligen välrenommerade kliniska tidskriften New England Journal of Medicine.

Styrelsen för SFAIM föreslår årsmötet i Malmö att utse Michael Kjaer och Harald Roos till nya hedersledamöter i vår förening.

Sommar-OS bättre än väntat

I dagarna avslutar, en av, eller kanske t.o.m. vår allra främsta kvinnliga idrottare, Carlolina Klüft sin karriär. Med ett färskt sommar-OS i minnet var det svenska resultaten i stort bättre än det som förväntades men det var ju sååå nära att vi kunde ha fått ytterligare två kvinnliga guldolympier i Sara Algotsson Ostholt och Lisa Nordén. Helt osannolikt, men mycket välförtjänt, var Lööf/Salminens avgörande segling, som gav spelens enda svenska OS-guld. Svensk idrott uppvisar en imponerande bredd och elitsatsande idrottare behöver adekvat och kompetent stöd för att nå toppen. Vår förenings medlemmar kan här bidra, men det måste ovillkorligen ske inom de etiska regler som föreningen har.

Tomas Movin

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Grafisk form
Sam Björk, Visby

Utgivningsplan

	manusstopp	utgivning
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Omslag: Moa Hjelmer
Foto: Ryno Quantz/Sv. Friidrott

Innehåll

Knäskador hos idrottande tjejer – hur kan de förebyggas?

Idrottande tjejer har en ökad risk att drabbas av akuta knäskador. Akuta knäskador, som främre korsbandsskador och andra ligamentskador, kan få stora negativa konsekvenser både på kort och lång sikt. Det är därför glädjande att det finns en växande evidens för att neuromuskulär träning förebygger skador i nedre extremiteten, inklusive främre korsbandsskador.

Av Martin Hägglund & Markus Waldén

Att delta i idrott och fysisk aktivitet är viktigt för fysisk, mental och social utveckling hos barn och ungdomar, och är även en viktig samhällelig hälsofrämjande åtgärd med tanke på den ökande prevalensen av övervikt och fetma hos barn och ungdomar de senaste decennierna. Skador i samband med idrottsaktivitet är dock ett problem och kan medföra stora negativa konsekvenser för den enskilda individen, men även stora samhällskostnader. I Sverige är ungefär var sjätte skada på akutmottagningar idrottsrelaterad, och i Skandinavien utgör idrottsskador var tredje skada som behandlas på sjukhus hos barn och ungdomar. Att förebygga skador i samband med idrott är därmed av uppenbart stor vikt.

Det ska emellertid först poängteras att barn och ungdomar som idrottar har en betydligt lägre skaderisk än vuxna, och en majoritet av skadorna är av mild natur. Det förekommer dock skador av mer allvarlig karaktär, där ligamentskador i knäet hör till de mest problematiska, och även hör till de vanligaste idrottsrelaterade skadorna som behandlas på våra akutmottagningar. Svåra ligamentskador i knäet, såsom främre korsbandsskador, kan utgöra ett hot mot fortsatt idrottande för den drabbade, och medför även en ökad risk för nya knäskador. Med skadan ses även en ökad risk för framtida artros, vilket kan förekomma så tidigt som 10 till 15 år efter skadan.

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Knäskador hos idrottstjejer

Det är väl känt att flickor har en ökad risk att drabbas av en främre korsbandsskada i samband med idrottsaktivitet jämfört med pojkar. Inom lagidrotter som till exempel fotboll, handboll och basket är risken ökad mellan två till fyra gånger hos kvinnor. Kvinnor drabbas dessutom av korsbandsskada i yngre åldrar än män och allra mest utsatta tycks flickor vara i slutet av eller precis efter puberteten. Däremot tycks det inte föreligga någon könsskillnad i risk hos prepubertala barn och ungdomar (<12 år).

Det är fortfarande väsentligen oklart varför flickor har en ökad risk att drabbas av en främre korsbandsskada jämfört med pojkar, men en ofta framförd teori bygger på att flickor har en sämre neuromuskulär kontroll av knäleden. Det har i olika studier visats att flickor uppvisar ett annorlunda rörelsemönster vid landning efter hopp, eller vid pivotering, med en ökad valgus i nedre

extremitet, lägre knä- och höftflexionsvinklar, ökad adduktion och inåtrotation i höften, ökad quadricepsaktivering i förhållande till hamstrings, samt en minskad muskelstyvhet över knäleden. Även inom lagidrotter inträffar främre korsbandsskador oftast utan kontakt med motspelare, exempelvis i samband med landning efter hopp, riktningsförändring eller kraftig deceleration. Uppkomstmekanismen är inte alltid helt entydig, men hos flickor inträffar skadan ofta i samband med en så kallad dynamisk valguskollaps av knäet, vilket vanligen definieras som ett mönster av inåtrotation och adduktion i höften, flexion och abduktion i knäleden, inåt- eller utåtrotation av tibia, och eversion av fotleden.

Riskökning hos flickor

Det är likväl oklart varför riskökningen hos flickor är som högst i slutet av puberteten (skaderisken förefaller vara som allra högst för 16-åriga flickor), men en tänkbar förklaring är att tillväxtspurten medför vissa för knäet ogynnsamma biomekaniska förändringar. En snabb tillväxt av femur och tibia ger längre hävarmar, en ökad längd förflyttar kroppens tyngdpunkt uppåt vilket ställer högre krav på bålkontroll, och med en samtidig viktökning kommer även ökade krafter. Hos flickor sker tillväxtspurten med en relativt sett (jämfört med pojkar) mindre samtidig ökning av muskelmassa, vilket kan göra dem extra utsatta för knäskador på grund av en minskad förmåga att dämpa och kontrollera krafter över knäleden. Detta är speciellt viktigt i samband med aktiviteter såsom landningar, sidledsförflyttningar och riktningsförändringar.

Varför neuromuskulär träning?

Utifrån teorin om bristande neuromuskulär kontroll och dynamisk valgus som skademekanism har olika träningsprogram utvecklats för att motverka dessa neuromuskulära och biomekaniska riskfaktorer. I dessa träningsprogram ingår oftast (ensamt eller i kombination) plyometriska hoppövningar, balansträning och komplexa övningar för att stärka upp muskulatur i höft och lår (framförallt hamstrings), samt bålmuskulatur. Programmen bygger även på en ökad medvetenhet om ett korrekt rörelsemönster och teknik, bland annat genom biofeedback. Det har visats att neuromuskulär träning kan förändra muskelaktiveringen vid landnings- och riktningsförändringar i gynnsam riktning, dämpa krafter vid landning och förbättra balansen. Vidare tycks program som kombinerar flera olika komponenter i träningen vara mer effektiva än att enskilt träna exempelvis benstyrka. Effektmekanismerna av den neuromuskulära träningen är inte fastställda men sannolikt är anpassning av motorisk kontroll en viktig komponent av träningen då man i studier observerat en förändring i rörelsemönster (central motoradaptation) efter en träningsperiod utan samtidig styrkeökning (perifer adaptation).

Är neuromuskulär träning skadeförebyggande?

Historiskt sett har ibland väldigt stora skadeförebyggande effekter setts i okontrollerade eller icke-randomiserade studier, men flera av dessa studier har haft tämligen allvarliga brister i sina upplägg och haft låg evidensnivå. Under 2000-talet har emellertid några väldesignade randomiserade kontrollerade studier påvisat god skadeförebyggande effekt av olika uppvärmningsprogram innehållande neuromuskulär träning. Bland annat visades i en norsk studie på ungdomshandboll med drygt 1800 deltagare (övervägande flickor) en signifikant reduktion av akuta knä- och fotledsskador med ca 50 procent efter införande av ett neuromuskulärt uppvärmningsprogram under en säsong. Liknande resultat har därefter visats i en finsk studie på drygt 450 kvinnliga innebandyspelare där man påvisade en signifikant reduktion av icke-kontaktskador i nedre extremitet med 66 procent under en sex månaders spelsäsong. I den senaste studien inkluderandes knappt 1900 norska flickfotbollsspelare under en spelsäsong och författarna fann en signifikant riskreduktion om 30-50 procent för skador generellt. Spelare med högst följsamhet till träningsprogrammet visade den största förebyggande effekten, vilket understryker vikten av att träningen genomförs i tillräcklig mängd.

Trots adekvat studiestorlek för att studera skador i nedre extremiteten har ingen av dessa studier varit designad

Sammanfattning av Knäkontrollstudien

Design: Klusterrandomiserad kontrollerad interventionsstudie.

Deltagare: 230 fotbollsklubbar (4564 spelare) från flickserier F13 till F17 i åtta fotbollsdistrikt i södra och mellersta Sverige.

Intervention: Träningsgruppen instruerades att använda träningsprogrammet ”Knäkontroll” (SISU Idrottsböcker©, 2005) som uppvärmning vid två träningspass i veckan under tävlingssäsongen 2009 (april till oktober). Programmet innehåller sex övningar som fokuserar på bål- och knäkontroll, balans, benstyrka och landningsteknik, och tar cirka 15 minuter att genomföra. Varje övning har fyra svårighetsgrader och en parövning.

Resultat: En minskad risk för främre korsbandsskada sågs i träningsgruppen med 64%, vilket var en statistiskt säkerställd skillnad. En mindre reducering av skaderisken sågs även för akuta knäskador (8%) och för svåra knäskador (30%), men dessa skillnader var ej statistiskt säkerställda. För de spelare i träningsgruppen som regelbundet genomfört uppvärmningsprogrammet (≥ 1 pass i veckan under säsongen) sågs en kraftigt minskad risk för alla akuta knäskador (47%), inklusive främre korsbandsskador (83%) och övriga svåra knäskador (82%). Spelare i träningsgruppen som endast utförde programmet sporadiskt drabbades dock av skador i liknande omfattning som kontrollgruppen.

Slutsats: Allvarliga knäskador, inklusive främre korsbandsskador, kan förebyggas genom neuromuskulär träning. Studien visar med tydlighet att regelbundenhet i träningen är nödvändig för att få den skadeförebyggande effekten.

Rekommendation: Neuromuskulär träning bör ingå som uppvärmning till idrottsaktivitet för barn och ungdomar. Träningen ska genomföras regelbundet under hela säsongen, helst 2 gånger i veckan.

specifikt för att undersöka en förebyggande effekt mot främre korsbandsskador, vilket kräver mycket stora studiematerial. Av denna anledning genomfördes den så kallade ”Knäkontrollstudien” under 2009 i svensk flickfotboll. Syftet var att undersöka om ett 15-minuters neuromuskulärt uppvärmningsprogram (Knäkontroll, SISU Idrottsböcker©, 2005) kan förebygga främre korsbandsskador och andra allvarliga knäskador (Box 1). Studien är världens hittills största skadeförebyggande randomiserade studie inom idrott.

Resultaten visar att Knäkontrollprogrammet var framgångsrikt i att förebygga akuta knäskador; specifikt sågs en stor minskning av risken för främre korsbandsskada med cirka två-tredjedelar. Neuromuskulär träning kan således ha stor inverkan på skadebördan i flickfotboll där knäskaderisken är väldokumenterat hög.

Det är osäkert huruvida resultaten från studien kan generaliseras till andra åldersgrupper, till pojkfotboll, eller till andra lagidrotter, men det förefaller rimligt att programmet kan ha en god skadeförebyggande effekt även i dessa sammanhang.

Sammanfattning

Det ska betonas att en främre korsbandsskada hos idrottande flickor trots allt är en ganska ovanlig skada, där ungefär 0,5-1 procent av fotbollsspelande tonårstjejer drabbas årligen. Med tanke på de mycket negativa konsekvenserna på kort och lång sikt är skadeprevention ändå en nödvändighet. Det är därför glädjande att det finns en växande evidens för att regelbunden neuromuskulär träning ger god skadeförebyggande effekt mot främre korsbandsskador, och andra skador i nedre extremitet, inom flera stora lagidrotter. Sådan träning bör därför ingå som rutin i uppvärmningen i samband med all idrott för barn och ungdomar. Vi idrottsmedicinare har här ett stort ansvar att föra ut budskapet på fältet till aktiva, föräldrar, och tränare. De skadeförebyggande programmen tar i regel inte mer än 15 minuter i anspråk av träningen, eller kan med fördel genomföras innan träningen för att utnyttja plan/halltider maximalt, vilket gör att det inte finns några godtagbara ursäkter att inte träna. Att som idrottsmedicinare och idrottsledare förmedla den skadeförebyggande träningen som en naturlig och rolig del av idrottandet är sannolikt en av de viktigaste punkterna och utmaningarna i den idrottsliga utbildningen av barn och ungdomar framöver.

Referenser

Hewett TE, Schultz SJ, Griffin LY (eds). Understanding and preventing noncontact ACL injuries. American Orthopaedic Society for Sports Medicine. Human Kinetics 2007. Champaign, USA. ISBN-10:0-7360-6535-0.

Olsen OE, Myklebust G, Engebretsen L, Holme I, Bahr R. Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial. BMJ 2005;330:449.

Pasanen K, Parkkari J, Pasanen M, Hiilloskorpi H, Mäkinen T, Järvinen M, et al. Neuromuscular training and the risk of leg injuries in female floorball players: cluster randomised controlled study. BMJ 2008;337:a295.

Soligard T, Myklebust G, Steffen K, Holme I, Silvers H, Bizzini M, et al. A comprehensive warm-up programme to prevent injuries in young female footballers: cluster randomised controlled trial. BMJ. 2008;337:a2469.

Waldén M, Atroshi I, Magnusson H, Wagner P, Hägglund M. Prevention of acute knee injuries in adolescent female football players: cluster randomised controlled trial. BMJ 2012;344:e3042.

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Long-Term Athlete Development

Träna som barn för framgång som vuxen

Till årets första temakväll hade Idrottsmedicin Väst bjudit in Istvan Balyi från Kanada som föreläsare. Balyi är en världsauktoritet vad gäller utveckling av idrottare och är en av grundarna till utvecklingsmodellen LTAD - Long-Term Athlete Development. Här följer ett referat från hans föreläsning och de diskussioner som fördes under hans vistelse i Göteborg.

Av Lennart Sugiardjo

Konceptet LTAD började utvecklas i Kanada på 90-talet och syftar till att utveckla idrottare optimalt. Modellen förklarar hur idrottare bör träna under barn- och ungdomsåren för att kunna få ut sin maximala kapacitet som vuxen. Den består av sju faser för långsiktig utveckling av idrottare och fokuserar mer på individens mognadsnivå än kronologiska ålder. Modellen syftar även till att minska risken för skador och ge barn ett livslångt intresse för idrott och motion.

Lennart Sugiardjo, ordförande Idrottsmedicin Väst, ortopedläkare Orthocenter IFK-kliniken, Göteborg. Förbundsläkare U23 damfotboll, ass. lagläkare IFK Göteborg.
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Allt fler idrottsförbund i olika länder har nu tagit fram egna LTAD-program, bland annat sim-, tennis- och judoförbunden i England, volleyboll-, gymnastik- och basebollförbunden i Sydafrika, ishockeyförbundet i USA och ett sextiotal idrottsförbund i Kanada. I Sverige har Svenska Innebandyförbundet nyligen skrivit om sin spelarutvecklingsplan så att den följer LTAD. Team Danmark, en organisation som verkar för främjande av elitidrott i Danmark, har utvecklat program, "Aldersrelaterede traeningskoncepter", som har starka influenser från LTAD.

Brister i nuvarande system

När Balyi analyserade barn- och ungdomsidrotten i Kanada fann man många brister man ville förbättra:

– Många barn tränade för lite och tävlade för mycket
– Tävlingssystemen var utformade för vuxna och inte för barnens bästa
– Träning och tävling utgick från individens kronologiska ålder istället för biologiska ålder/utvecklingsnivå
– De mest välutbildade tränarna verkade på elitnivå, aldrig på de nivåer där idrottaren utvecklas mest
– Tränarutbildningar berörde för lite om barns tillväxt och mognad
– Ingen föräldrautbildning förekom

Huvudbudskapen i LTAD är att idrottaren skall få optimal träning, tävling och återhämtning med hänsyn till utvecklingsålder och mognad. På två trettonåringar i samma lag kan det skilja fyra till fem år i utveckling. Dessa båda behöver därför olika sorts träning.

Utvecklingsfaser

LTAD delar in idrottarens karriär i sju olika utvecklingsfaser:
Active Start (upp till 6 års ålder)
FUNdamentals (flickor 6-8 år, pojkar 6-9 år)
Learning to Train (flickor 8-11, pojkar 9-12)
Training to Train (flickor 11-15, pojkar 12-16)
Training to Compete (15-17, 16-18)
Training to Win (flickor 17+, pojkar 18+)
Active for Life (flickor. 17+, pojkar 18+)

I åldern 6-9 år (FUNdamentals) bör man i första hand träna upp grundmotoriska rörelser eller "Kroppens ABC". I åldern 8-12 år (Learning to Train) tränas olika grundläggande idrottsrörelser in, "Idrottens ABC", och först vid 12-16 år blir träningen mer specifik för den aktuella idrotten. Ett centralt begrepp inom LTAD är Physical literacy; på samma sätt som alla barn får läs- och skrivkunnighet tidigt bör de även ha rätt till grundläggande

I Sverige har Svenska Innebandyförbundet nyligen skrivit om sin spelarutvecklingsplan så att den följer LTAD. Bilden är publicerad med tillstånd av Svenska Innebandyförbundet, fotograf: Lars Hjalmarsson

motorisk utveckling. "Kroppens ABC" och "Idrottens ABC" bör vara inträngade innan cirka tolv års ålder, senare i livet är det svårare att tillgodogöra sig en allsidig rörelsekompetens.

Vid några få idrotter med höga tekniska krav rekommenderas att man specialiserar sig tidigt, till dessa hör gymnastik, rytmisk gymnastik, konståkning och simhopp. Vid övriga idrotter bör man specialisera sig sent, för att lära in så bred motorisk kompetens som möjligt. Upp till 15-16 års ålder bör man hålla på med flera idrotter.

Utvecklingsålder

Balyi rekommenderar att man under puberteten mäter barnens tillväxt regelbundet, för att veta när de går in i tillväxtspurten (PHV = peak height velocity). Detta avgör nämligen hur man bör träna idrottarens olika egenskaper; teknik, snabbhet, styrka, rörlighet och uthållighet. Både kroppslängd, armspann och sittande längd bör mätas var tredje månad, för att påvisa när tillväxten är som störst i ben, armar respektive bål. Oftast sker tillväxtspurt först i benen, därefter i armarna och sist i bålen. För flickor inträffar tillväxtspurten oftast kring 10-14 års ålder, för pojkar omkring 12-16 års ålder.

Risker under tillväxtspurten

Under tillväxtspurten bör den aktuella kroppsdelen belastas mer försiktigt, då många vävnader kan vara extra känsliga under denna period. Bland åhörarna fanns docent Leif Swärd från Orthocenter IFK-kliniken. Hans forskning har tidigare visat att hög idrottsbelastning under tillväxtspurten ökar risken för skador på diskar och kotornas ändplattor. De senaste åren har det även blivit allt vanligare med femuroacetabulärt impingement i höftleden hos unga idrottare. En orsak skulle kunna vara att barn och ungdomar nu tränar mer och med högre belastning under tillväxten. Två tänkbara förklaringsmodeller finns. Dels misstänker man att subkliniska fyseolyser (glidning i tillväxtzonen mellan caput och collum) ger upphov till en formförändring, så kallad pistol grip-deformitet. Dels kan den ökande belastningen och hotande fyseolysen ge en ökad kärlinväxt ventralt på collum som ger benpålagringar, så kallade CAM-förändringar. Detta kan behöva åtgärdas operativt, med bortfräsning av förändringarna via höftledsartroskopi. Docent Swärd leder nu en forskargrupp i Göteborg som undersöker ett eventuellt samband mellan hård fysisk träning under tillväxtspurten och ökad risk för femuroacetabulärt impingement.

Mottaglighetsfönster

Idrottarens fysiska egenskaper tränas optimalt under olika perioder av barn- och ungdomen. Balyi hänvisade här till Atko Viru och dennes råd om mottaglighetsfönster. Enligt dessa tränas teknik bäst innan tolv års ålder och uthållighet bäst i början av tillväxtspurten. Träning av styrka har hos pojkar bäst effekt 12-18 månader efter tillväxtspurten och hos flickor direkt efter tillväxtspurten och även vid menstruationsdebut. Snabbhet har två "fönster" för accelererad träningsadaptation; hos pojkar 7-9 och 13-16 års ålder, hos flickor 6-8 och 11-13 års ålder. Både uthållighet, styrka och snabbhet går ändå att träna i alla åldrar, Balyi rekommenderade att snabbhetsövningar finns med i varje träningspass, helst direkt efter uppvärmningen.

Idrottsmedicinska aspekter

Balyi talade varmt om begreppet prehabilitering, viket innebär att man försöker undvika skador genom att via korrekt träning förbereda spelarna optimalt för sin idrott. Inom irländsk rugby är det vanligt med två olika sorters fysioterapeuter i lagen; en som ansvarar för prehabilitering och en som sköter mer traditionell rehabilitering. Hos oss har ju fysträänare en liknande roll, men kanske inte alltid lika stort fokus på skadeprevention.

Vidare belystes betydelsen av god sömn, ibland en bortglömd åtgärd för att förbättra prestationsförmågan hos idrottare. Balyi hänvisade till en studie av Cheri Mah, som visade att ökad sömntid hos collegespelare i basket förbättrade sprinthastigheten och precisionen vid straff- och trepoängskast.

Idrottens selektionssystem

Balyi berättade att han fick ett nytt favoritcitat då han gästade Barnidrottskonferensen i Malmö i höstas: ”We are searching for talent but finding age”. Uttrycket kommer från Tomas Peterson, professor i idrottsvetenskap i Malmö, vars forskning visat att fotbollens nuvarande selektionssystem till regionläger och ungdomslandslag främst väljer ut spelare som råkar vara födda under årets första kvartal. Den finns inga belägg för att dessa spelare egentligen är de som har mest talang för sin idrott. Balyi visade att samma bristfälliga urvalsprinciper även gäller i andra länder och andra idrotter.

Sammanfattning

LTAD verkar vara en omfattande, väl genomtänkt utvecklingsmodell som försöker följa vetenskapliga råd när detta är möjligt. Det som är tilltalande med modellen är att den försöker kombinera framgångsrik utveckling av elitidrottare med att samtidigt ge alla barn möjlighet att utvecklas optimalt efter sina förutsättningar. Målet är både att få fram så många toppidrottare som möjligt, och att ge alla ett livslångt intresse för idrott och motion. Om man tidigt i livet får en allsidig rörelsekompetens ökar chansen att man känner självförtroende och välbefinnande vid fysisk aktivitet, och fortsätter med detta som vuxen.

I Sverige är de flesta idrottslag indelade efter kronologisk ålder. Ett sätt att anamma LTAD kan vara att dela in sin träningsgrupp i tre delar: tidigt, normalt respektive sent utvecklade. Man kan då anpassa övningarna bättre till idrottarens utvecklingsnivå.

Balyi betonade att det behövs ett paradigmskifte inom idrotten för att förbättra barns och ungdomars idrottande. Det återstår att se när detta sker i Sverige...

Referenser

Balyi, Williams. Coaching the young developing performer. UK: The National Coaching Foundation. 2009.

Canadian Sport Centres. Long-Term Athlete Development, Canadian Sport for Life. 2010.

Persson, Bååth. Svensk Innebandys Utvecklingsmodell (SIU). 2011.

Viru et al. Critical periods in the development of performance capacity during childhood and adolescence. Physical Education and Sport Pedagogy, 1999; vol. 4:75-119.

Mah et al. The effects of sleep extension on the athletic performance of collegiate basketball players. Sleep, 2011;34(7):943-950.

Musculoskeletal Biomechanics in Cross-country Skiing

Biomekanisk simulering av längdskidåkning

- ett sätt att beräkna prestation

Varför ska man kopiera de som är bäst inom sin idrottsgren? När man väl har lärt sig deras teknik så har de antagligen redan gått vidare. Vore det inte bättre att öka sin förståelse så att man kan ligga i spets, istället för i svallvågorna? Med biomekaniska simuleringar som ett komplement till traditionella experimentella metoder finns möjligheten att få veta varför prestationen ökar, inte bara hur man ska göra för att öka sin prestation.

Av L. Joakim Holmberg

Syftet med avhandlingen har varit att utröna möjligheter och eventuella begränsningar med beräkningsbaserad biomekanik och simuleringsteknik inom längdskidåkning. Biomekanik används oftast inom idrott för att öka prestationen via teknik, utrustning eller träning, men ibland också för skadeprevention och rehabilitering (McGinnis 2005). Vanligtvis används endast experimentella metoder och slutsatser dras direkt ifrån mätdata. Ett annorlunda angreppssätt är att föra ett teoretiskt resonemang med hjälp av klassisk mekanik för att öka förståelsen inom en viss idrott (Baudouin & Hawkins 2002). En mer avancerad metod är att skapa en matematisk simuleringsmodell av idrottaren och eventuell utrustning. En stor fördel jämfört med traditionell testning med exempelvis elektromyografi är att inte bara ytligt liggande muskler är ”enkla” att mäta. En annan stor fördel är att i simuleringsmodellen kan förutsättningarna (exempelvis rörelsemönster, muskelstyrka eller utrustning) enkelt förändras vilket ger bra möjligheter till att svara på ”vad händer om”-frågor.

Metod

Längdskidåkning innehåller snabba och kraftfulla helkroppsrörelser och därför behövs en beräkningsmetod som kan hantera simuleringmodeller av en hel kropp. Metodiken i avhandlingen bygger på inversdynamik och statisk optimering. Denna metod tillåter helkroppsmodeller med hundratals muskler och stelkroppssegment av de flesta kroppsdelarna. Till största del har programvaran The AnyBody Modeling System (Damsgaard et al. 2006) använts. Inversdynamik kan ses som när en föreskriven rörelse driver kroppsmodellen och de interna krafter som behövs för att generera den föreskrivna rörelsen beräknas. Vid muskuloskelettär inversdynamik rekryteras muskler till arbete så att kroppen utför den föreskrivna rörelsen. Men för de flesta rörelser är den mänskliga kroppen ett redundant system, det vill säga det finns fler muskler än nödvändigt för att utföra

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rörelserna. För att finna lastfördelningen mellan musklerna krävs en strategi. Lastfördelningen mellan musklerna antas vara optimal i visst hänseende och fördelningen formuleras som ett matematiskt optimeringsproblem. The AnyBody Modeling System använder en min/max-formulering som ger ett utmattningskriterium i betydelsen att det ger minimal aktivitet av de maximalt aktiverade musklerna (Rasmussen et al. 2001).

Muskelrekrytering

Som en del i metodutvecklingen genomfördes en studie för att se hur muskel dekomposition och muskelrekryteringskriterium påverkar muskelkraftberäkningarna. Detta är viktigt för att skapa en så kallad "gold standard" vid muskelskelettär modellering. Problemet är att muskler oftast modelleras som linjeelement (från en punkt till en annan punkt), men muskler har ofta breda fästen eller ursprung (ex. deltamuskeln). Den gängse tekniken är då att dela upp (dekomposition) en muskel i flera. Detta får dock konsekvenser vid beräkningen av vilka muskler som ska arbeta vid en viss rörelse eftersom simuleringen kan generera fysiologiskt ologiska resultat. I Holmberg & Klarbring 2012 presenteras normaliseringsfaktorer för olika muskelrekryteringskriterium som rättar till problemet. Det visas också att rekryteringskriteriet min/max som använts i avhandlingen i övrigt inte påverkas. Tilläggas kan att det stora flertalet av publicerade studier inom muskelskelettär modellering använder sig av muskelrekryteringskriterium som skulle behövt använda de normaliseringsfaktorer som presenteras.

Snabba och explosiva rörelser

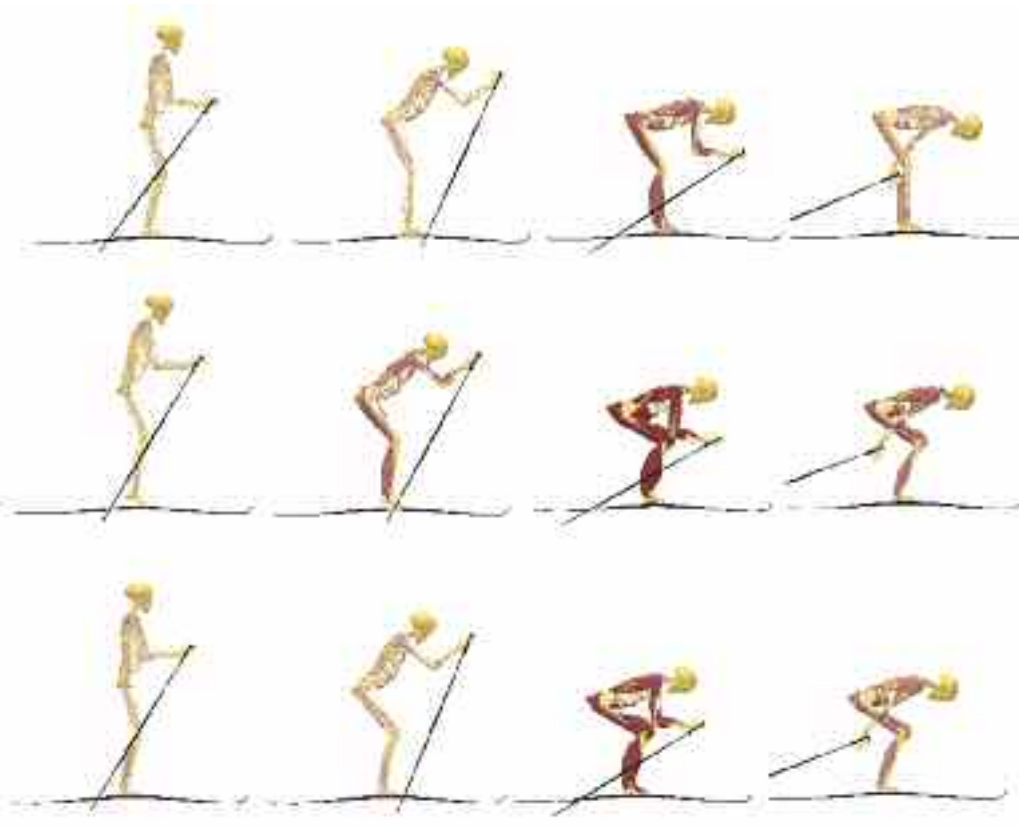
En intressant metodfråga är kontraktionsdynamikens betydelse för en muskuloskelettär modell av längdskidåkning. Att en muskelmodell har kontraktionsdynamik innebär att modellen tar hänsyn till musklernas fiberlängder, pennationsviklar, kontraktionshastighet, senans vilolängd etcetera. Den dominerande uppfattningen inom simuleringskretsar är att kontraktionsdynamik behövs vid modellering av ”snabba och explosiva” rörelser. Problemet är att det inte finns några publicerade studier som visar hur ”snabba” eller ”explosiva” rörelserna måste vara för att det ska ha betydelse. Det finns heller inga publicerade studier som visar vilka typer av simuleringsresultat som berörs och till vilken grad. Längdskidåkning i allmänhet och dubbelstakning i synnerhet bedöms vara en idrott med kraftfulla och snabba rörelser. Frågan är om krafterna och accelerationerna i dubbelstakning är så pass höga att simuleringsresultaten är beroende av att muskelmodellen innehåller kontraktionsdynamik? Det visar sig att kontraktionsdynamiken har betydelse vid simulering av dubbelstakning då beräkningarna av såväl muskelarbetet som energiåtgången påverkas (Holmberg, manuskript). För att estimera muskelfunktion vid rörelser med ledomfång och belastningar liknande de i dubbelstakning verkar det alltså som om kontraktionsdynamik behövs. Däremot verkar inte den inbördes rangordningen (energimässigt) vid snarlika rörelser påverkas.

Simuleringsmodell

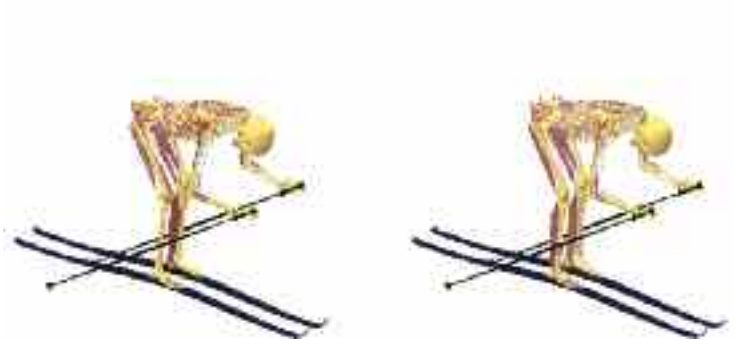
Hur pass individanpassad måste en simuleringsmodell vara för att kunna ge användbara och praktiska resultat för en enskild idrottare? I sammanhanget är det viktigt att hålla isär antropometrisk skalning och funktionell skalning (kraft-skalning) av muskuloskelettära simuleringsmodeller. En genomförd förstudie ger en indikation på vilka parametrar som är viktigast för att ”kraftskala” en muskelmodell som inkluderar kontraktionsdynamik. Dessa parametrar är: muskelns maximala kraft (vid optimala förhållanden), optimal fiberlängd samt senans vilolängd. Ett problem är att det är både tidskrävande och svårt (ibland kanske omöjligt) att på experimentell väg ta reda på dessa parametrar för en levande individ. Därav intresset att kunna skala en generell modell baserad på kadaverstudier. Den generiska modellen skalas både antropometriskt och funktionellt till individen bland annat med hjälp av ledmomentmätningar. I ett konferensbidrag har ett första simuleringsförsök publicerats (Pannetier et al. 2011).

Energiåtgång, verkningsgrad och prestation

Dubbelstakningen inom längdskidåkning har förändrats mycket det senaste decenniet. Huruvida verkningsgrad och



Figur 1.
Visuell överblick av simuleringskinematiken och muskelaktiviteten för tre olika stilar av dubbelstakning (överst: traditionell, mitten: modern, nederst: extrem knäböj).



Figur 2.
Visualisering av handikappad (vänster) och icke-handikappad (höger) åkare. Notera att större och mörkare muskler betyder att muskelkraften är större. Jämför exempelvis lårmusklerna på höger ben.

prestation har förändrats på grund av stilen i sig (och inte åkarens fysik) är oklart. Utifrån experiment genomförda på Nationellt vintersportcentrum i Östersund skapades olika simuleringsmodeller. För den intresserade så beskrivs implementationen i Holmberg & Lund 2008. Simuleringsmodellerna beskriver olika varianter (eller stilar) av dubbelstakning, alltifrån klassisk stil med relativt raka ben till en mer modern stil där åkaren går upp på tå och använder sig av en kraftig knäböj. Resultaten visar först och främst att ur verkningsgradssynpunkt är den klassiska stilen att föredra då den ger mest framåtdrivande arbete per utfört arbete, det vill säga den är energisnål. Verkningsgraden var 4,5 procent för den traditionella stilen jämfört med 4,1 procent för en mer modern stil. Men, ska en längdlöpare komma så fort fram som möjligt (utan att bry sig om spenderad energi) verkar det som en mer modern stil är att föredra (Holmberg et al. 2012).

Denna studie visar också att för att kunna jämföra kroppens energiåtgång för skelettmusklernas arbete mellan olika rörelser så krävs det en muskuloskelettär simuleringsmodell.

Ett annat mycket intressant resultat av denna studie är det kan med mycket stor säkerhet sägas att de på marknaden vanliga stakergometrar (träningsredskap för längdskidåkare) inte kan användas för att jämföra överkroppskapacitet mellan individer utan att hålla koll på underkroppens kinematik (som tyvärr vanligtvis görs i forskningslitteraturen) eftersom dubbelstakning (även m.h.a. ergometer) är ett helkroppsarbete (Rasmussen et al. 2012).

Klassificering inom handikappidrotten

Inom handikappidrotten klassificeras idrottare med avseende på funktionsnedsättning. Policyn är att klassningen ska utgå från respektive idrotts speciella karaktär, vilket är anledningen till att klassningen i stor utsträckning baseras på funktion snarare än handikappdiagnos - att exempelvis ha en amputerad arm innebär inte samma funktionsnedsättning i pistolskytte som i simning.

Bedömningen av funktionsnedsättningen har idag brister då det med experimentella metoder är svårt att bortse från psykologiska effekter och fysisk förmånga (lungkapacitet). I ett försök att öka förståelsen för olika handikapp och att få en rättvisare klassificering har en pilotstudie med muskuloskelettära modeller utförts (Holmberg et al. 2012).

Vid utförande av exakt samma rörelse och hastighet vid dubbelstakning i längdskidåkning var energiåtgången 80 procent för en icke-handikappad jämfört med en handikappad som saknar underbensmuskulatur i det ena benet *(se figur 2)*. Detta är ett teoretiskt första försök till att använda en ny metod för att kunna nå längre i rådgivningen till klassificeringssystemet.

Avhandling

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Referenser

Baudouin A & Hawkins D. A biomechanical review of factors affecting rowing performance. British Journal of Sports Medicine, 36:396-402, 2002.

Damsgaard M, Rasmussen J, Christensen ST, Surmaa E & de Zee M. Analysis of musculoskeletal systems in the AnyBody Modeling System, Simulation Modelling Practice and Theory, 14:1100_1111, 2006

Holmberg LJ. A simulation study on the necessity of muscle contraction dynamics in cross-country skiing. Submitted.

Holmberg LJ & Klarbring A. Muscle decomposition and recruitment criteria influence muscle force estimates. Multibody System Dynamics, 2012. To appear.

Holmberg LJ & Lund AM. A musculoskeletal full-body simulation of cross-country skiing. Proceedings of the Institution of Mechanical Engineers, Part P: Journal of Sports Engineering and Technology, 222:11-22, 2008.

Holmberg LJ, Lund Ohlsson M & Danvind J. Musculoskeletal simulations: A complementary tool for classification of athletes with physical impairments. Prosthetics and Orthotics International, 2012. To appear.

Holmberg LJ, Lund Ohlsson M, Supej M & Holmberg HC. Skiing efficiency versus performance in double-poling ergometry. Computer Methods in Biomechanics and Biomedical Engineering, 2012. To appear.

McGinnis PM. Biomechanics of sport and exercise, 2nd edition, 2005, (Human Kinetics, Champaign, IL)

Pannetier R, Robert T, Holmberg J & Wang X. Optimization-based muscle force scaling for subject specific maximum isometric torque estimation. In Proceedings of the XXIIIth Congress of the International Society of Biomechanics, Brussels, Belgium, July 3-7 2011.

Rasmussen J, Damsgaard M, Voigt M. Muscle recruitment by the min/max criterion – a comparative numerical study, Journal of Biomechanics, 34:409_415, 2001.

Rasmussen J, Holmberg LJ, Sørensen K, Kwan M, Andersen MS & de Zee M. Performance optimization by musculoskeletal simulation. Movement & Sport Sciences - Science & Motricité, 75:73-83, 2012.

Fjärde upplagan av Clinical Sports Medicine

Det närmaste ett uppslagsverk i idrottsmedicin

Clinical Sports Medicine
Brukner och Khan
1 300 sidor

Med tanke på tidigare utgåvor kändes det som en lätt uppgift att recensera fjärde utgåvan av Brukner och Khans ”Clinical Sports Medicine”. När jag hämtade paketet med ett exemplar insåg jag snabbt att det var en tung uppgift som väntade; viktmässigt i klass med Gray’s Anathomy! Efter en snabb bläddring insåg jag att utgåvan inte bara viktmässigt utan även innehållsmässigt är en riktig tungviktare!

Fösta utgåvan av Clinical Sports Medicine kom 1993. Ambitionen vara att ge läkare, sjukgymnaster, massörer och tränare ett verktyg för att hjälpa alla individer som är fysiskt aktiva, från motionärer till elit, att öka prestationsförmågan oavsett begränsande faktor: fysiologiska faktorer, överbelastningsskador eller akut trauma.

En atlas över skador

Denna fjärde utgåva är en uppföljning där tillägg gjorts med att tydliggöra evidensen i klinisk praxis, argument och medel att stötta patienter till ökad fysisk aktivitet med tanke på positiv effekt på medicinska tillstånd samt en del med akuta medicinska tillstånd. Fokus är lagd på grundläggande biomekaniska principer med förklaringsmodeller och vägledning till diagnos med behandlingsförslag; strukturerad genomgång av skador utifrån anatomisk lokalisation för att samla alla differentialdiagnosen i samma kapitel. Med de illustrationer som finns kan det jämföras med en atlas över skador. Även frågor om uthållighetsträning behandlas och elitidrottarens specifika krav.

Den fjärde utgåvan har nio redaktörer. Medförfattare är över 100 till antalet, ingen nämnd och ingen världsauktoritet glömd. Den är därmed det närmaste som går att komma ett uppslagsverk i idrottsmedicin med ett evidensbaserat förhållningssätt; där evidensen saknas är detta tydligt noterat.

Grundläggande idrottsmedicin

Boken är upplagd i färgkodade delar som inleds med en del om grundläggande idrottsmedicinska principer. Andra delen går igenom skador indelade efter anatomisk lokalisation. Den tredje delen riktar sig till speciella grupper som barn och ungdomar, kvinnor, äldre, militärer och idrottare med funktionshinder. Den fjärde delen handlar om medicinska problem och fysisk aktivitet, och den femte och sista delen riktar sig mer till den som praktiskt arbetar med idrottare ute på fältet.
Varje färgkodad del är indelade i kapitel som alla inleds med ett citat utifrån ett idrottsmedicinskt perspektiv. För att underlätta behandling av skador finns schematiska flödesdiagram och sammanfattande faktarutor där ”varningsflaggor” är noterade, det vill säga diagnoser eller symtom som inte bör missas.

Ofullständigt register

En begränsning är registret. Det är ofullständigt och den nomenklatur som används är utifrån dagens paradigm. Möjligheten att söka diagnos via registret kräver att läsaren är uppdaterad i dagens benämningar för att hitta rätt. Detta kompenseras dock av kapitelindelning som utgår från anatomisk lokalisation. Som alltid är det svårt att garantera att inte mindre fel smyger sig in. Det finns någon detalj som är felaktigt illustrerad men detta medför inget principiellt fel för den aktuella skadan.

Tillsammans med boken följer även tillgång till videos och ”podcasts”. Dessa lovar förlaget att uppdatera regelbundet och därmed ge ett dynamiskt komplement till den tryckta boken.

En fundering är hur länge sidorna håller för slitage. Boken lämpar sig inte för att flyttas runt utan passar bäst liggandes på ett bord i ett bibliotek som det uppslagsverk den är. I dagens digitala värld, med mindre/färre traditionella arbetsplatser med individuella skrivbord, kan det begränsa användningen.
Syftet med boken är att hjälpa kliniker att hjälpa patienter. Jag kan inte annat än att rekommendera alla kliniker och mottagningar att uppdatera sina bibliotek med denna drygt 1300 sidor tjocka tungviktare!

EVA ZEISIG, ortoped, Norrlands universitetssjukhus
Vetenskaplig sekreterare Svensk förening för fysisk aktivitet och idrottsmedicin.

Ingen dispens för Depo-Medrol vid hösnuva

Många idrottsläkare/distriktsläkare med flera behandlar hösnuva (allergisk rinit) med en engångsinjektion av Depo-Medrol (Metylprednisolon). Detta är dock inte Lege Artis behandling. Såväl i Läkemedelsboken 2011-2012 samt i en artikel i Läkartidningen har nyligen fastställts att detta inte är riktig behandling.

Dopingkommissionens Dispenskommitté kommer inte att ge dispens för Depo-Medrol vid hösnuva i fortsättningen.

Det är World Anti-Doping Agency (WADA) som definierar vad som är doping och utformar listan över förbjudna substanser och metoder. En del av dessa förbjudna substanser är läkemedel. För de idrottare som behöver använda sådan medicin har WADA utarbetat dispensregler (TUE = Therapeutic Use Exemption). Där möjliggörs för idrottaren att begära dispens för nödvändig medicinering och där alternativ, tillåten medicin inte är tillfylles.

Dispensansökan

Dispensansökan, som görs av idrottaren själv, måste också vara signerad av behandlande läkare med angivande av diagnos och varför medicinen är nödvändig. Varje lands anti-doping organisation (NADO = National Anti-Doping Organisation) liksom de Internationella Idrottsförbunden (ISF) måste sätta till en dispenskommitté att hantera dessa dispensansökningar. I Sverige har Dopingkommissionen en dispenskommitté ledd av undertecknad.

Vid värdering av dispensansökningarna uppstår sällan några stora problem. Har idrottaren Diabetes typ 1 och måste ha insulin är det självklart att ge vederbörande dispens för det. Samma är förhållandet med kortisonbehandling av inflammatorisk tarmsjukdom, reumatisk sjukdom, liksom amfetamin/Ritalina behandling vid ADHD och DAMP. Egentligen har Dispenskommittén endast avslagit dispensansökningar när det gäller hostmedicin innehållande Efedrin.

Ingen riktig behandling

Många idrottsläkare och distriktsläkare med flera behandlar hösnuva (allergisk rinit) med en engångsinjektion av Depo-Medrol (Metylprednisolon). Detta är dock inte Lege Artis behandling. Såväl i Läkemedelsboken 2011-2012 samt i en artikel i Läkartidningen har nyligen fastställts att detta inte är riktig behandling. Dessutom har WADA fastställt att dispens inte får ges om alternativ, tillåten medicinering finns. Av dessa två skäl kommer inte dispens att ges i framtiden för injektion av Depo-Medrol mot hösnuva.

Idrottare i klistret

Skulle nu den behandlande läkaren ändå ge idrottaren en sådan spruta sätter han idrottaren i klistret. Kortison är ju förbjudet i samband med tävling. Eftersom Metylprednisolon ligger kvar så länge innebär det att idrottaren måste göra ett tävlingsuppehåll på minst tre månader, eventuellt längre.

Så därför – idrottsläkare, ledare, tränare, idrottare, ge inte och acceptera inte användandet av Depo-Medrol mot hösnuva i fortsättningen.

Denna information har skickats till alla de idrottare som hittills har fått dispens för Depo-Medrol. Likaså har en skrivelse från Dispenskommittén gått ut till alla förbundsläkare. Det är därför vår förhoppning att idrottare i fortsättningen inte behandlas med Depo-Medrol mot hösnuva.

BENGT O ERIKSSON, professor
Ordf. i RF:s Dopingkommissions dispenskommitté

Spenatens gåta löst - därför gör den oss starka

Nitrat, som förekommer naturligt i till exempel spenat, har en kraftigt positiv effekt på muskelstyrka. Forskare vid Karolinska Institutet har lyckats förklara vad det beror på, genom att identifiera två relevanta proteiner som ökar i musklerna efter intag av nitrat. I studien fick möss nitrat via sitt dricksvatten, något som fick dem att uppvisa en kraftigt ökad muskelstyrka – och detta redan vid doser som går att få i sig genom vanlig kost.

SFAIM i samarbetsprojektet: Läkares samtal om levnadsvanor

Äntligen har Socialstyrelsen insett värdet av fysisk aktivitet i sjukdomsförebyggande syfte! Den vetenskapliga dokumentationen är övertygande. Vår förenings arbete, med att ta fram FYSS, bekräftas genom att det i Socialstyrelsen nationella riktlinjer föreslås skriftlig ordination av fysisk aktivitet vid ohälsosam levnadsvana i form av otillräcklig fysisk aktivitet.

Av Eva Zeisig

Förra året kom Socialstyrelsen ut med ”Nationella riktlinjer för sjukdomsförebyggande metoder 2011”. Ett lättläst häfte som vägledning för styrning och ledning för alla inom hälso- och sjukvården. Syftet är att hälso- och sjukvården ska stödja människor, friska och patienter, till förändring av ohälsosamma levnadsvanor.

De levnadsvanor som tas upp är tobaksbruk, riskbruk av alkohol, otillräcklig fysisk aktivitet och ohälsosamma matvanor.

Hur ska stödet ske? Tanken är att rådgivande samtal ska vara grunden för åtgärder. Dessa samtal delas in i tre nivåer; enkla råd, rådgivande samtal och kvalificerade rådgivande samtal. Allt utifrån vetenskapligt visade hälsoeffekter. Ju säkrare vetenskaplig dokumentation, desto högre nivå.

Den högsta nivån kvalificerade rådgivande samtal, och därmed mest tidskrävande, riktas mot rökning och ohälsosamma matvanor. Den lägre nivån rådgivande samtal föreslås vid riskbruk av alkohol och otillräcklig fysisk aktivitet.

Vår förening har på senare tid tagit tydligt ställning i hälsofrämjande arbetet, inte minst genom det namnbyte som har skett till ”Svensk förening för fysisk aktivitet och idrottsmedicin”. Redan tidigare, som ”Svensk Idrottsmedicinsk förening”, fanns ett definierat hälsoperspektiv. En röd tråd, diagnos och behandling av skador och sjukdomar som begränsar fysisk aktivitet/idrott, har knutit samman aktiviteter vid möten, kurser etc. Alla utbildningar genom föreningen har behandlat dopning och droger (tobaksbruk och riskbruk av alkohol) och nutrition (ohälsosamma matvanor) vid idrott. Med andra ord finns kunskapen om hälsofrämjande arbete inom föreningen. Som sektion inom Svenska läkaresällskapet (SLS) deltar vår förening i ett samarbetsprojekt, ”Läkares samtal om levnadsvanor”, med Socialstyrelsen för implementering av de nationella riktlinjerna för sjukdomsförebyggande metoder.

För att lyckas införa riktlinjerna krävs självklart kännedom att dessa finns! Målgruppen är den svenska läkarkåren (som sektion inom SLS). För att sprida kunskapen om riktlinjerna har förening fått ekonomiska resurser där uppdraget huvudsakligen ligger på YFA, delföreningen Yrkesföreningar för fysisk aktivitet.

För de som jobbar med vård vid sjukdomar i rörelseorganen har Socialstyrelsen i år gett ut rekommendationer kring osteoporos, artros i knä och höft, inflammatorisk ryggsjukdom och ankyloserande spondylit, psoriasisartrit och reumatoid artrit. I rekommendationerna framgår tydligt vikten av skriftlig ordination av fysisk aktivitet.

Mer läsning

www.sls.se/Levnadsvaneprojektet/
www.socialstyrelsen.se
www.enrokfrioperation.se
www.fhi.se
www.rf.se/RF-tycker/Alkohol-och-tobak/Riktlinjer-alkohol-och-tobak/

Brev till redaktionen

NSAID-behandling inte utan risker

Jag skulle vilja kommentera artikeln i Svensk Idrottsmedicin (aug 2012) av Frida Björkman och Mikael Mattson om överanvändning av NSAID bland idrottare. Författarna varnar med rätta för långvarigt regelbundet bruk, men rekommenderar kortvarigt bruk av NSAID efter skada.

Påståendet att kortvarigt bruk av NSAID är gynnsamt i den tidiga läkningsfasen är bara delvis riktigt. Minskad smärta och svullnad kan möjligöra tidigare återgång till träning, vilket kanske kan ge mekanisk stimulering av läkningen. Däremot kommer läkningsprocesserna i sig att hämmas av tidig NSAID-behandling.

När det gäller ben finns bra humanstudier som visar att NSAID ökar risken för läkningskomplikationer, och att den hämmande effekten på bennybildning uppstår redan efter en veckas behandling. När det gäller senor [1], ledband [2] och senfästen [3] har vi bara djurstudier, men dessa är entydiga: Det rör sig om stora negativa effekter. En relevant dos av NSAID under fem dagar efter skadan minskar hållfastheten i en läkande sena med en tredjedel i försök på råtta. Minskningen består en lång tid [1]. Däremot kan man, märkligt nog, se en svagt positiv effekt på materialegenskaperna om behandlingen börjar först efter den inflammatoriska fasen.

Utöver de funktioner av NSAID som författarna beskriver, är det viktigt att veta att de molekyler vars tillverkning NSAID förhindrar (främst PGE2), medverkar i de processer som gör kollagena vävnader starkare efter belastning. Detta är ovedersägligt för ben och mycket troligt för senor och ligament. Detta bör innebära att kronisk NSAID-behandling hindrar både vävnadernas anpassning till belastning och läkningen av småskador, som idrottaren kanske inte ens märker. Med andra ord: Ökar risken för ”slitskador”.

Själv tvekar jag inte att ta NSAID efter skada eftersom smärtlindringen är så bra. Men om jag vore idrottare skulle jag absolut låta bli.

Per Aspenberg
Professor i ortopedi
Linköping

[1] Virchenko O, Skoglund B, Aspenberg P. Parecoxib impairs early tendon repair but improves later remodeling. Am J Sports Med. 2004;32:1743-7.

[2] Elder CL, Dahners LE, Weinhold PS. A cyclooxygenase-2 inhibitor impairs ligament healing in the rat. Am J Sports Med. 2001;29:801-5.

[3] Dimmen S, Nordsletten L, Engebretsen L, Steen H, Madsen JE. The effect of parecoxib and indometacin on tendon-to-bone healing in a bone tunnel: an experimental study in rats. J Bone Joint Surg Br. 2009;91:259-63.

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Stockholm (söderort+norrort), Uppsala, Västernorrland (Tillf.)

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Stockholm (västerort + innerstan), Örebro, Jämtland (Tillf.)

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Mobil 0702-09 71 19
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Fokus på kvinnors idrott och hälsa

Kvinnor är satta på undantag inom idrottsforskningen. En femtedel av forskningsresultaten tros ha bäring på båda könen. Men ingen vet säkert och mer kunskap behövs. Därför har Scandinavian Congress of Medicine and Science in Sports som arrangeras i Malmö 19-22 september, ett särskilt fokus på kvinnors situation inom idrotten.

Malin Eggertz Forsmark, vd för WVWS och ansvarig för den konceptuella utvecklingen

Av Jenny Henrichson

Scandinavian Congress of Medicine and Science in Sports arrangeras av Svensk Förening för Fysisk Aktivitet och Idrottsmedicin, Skandinaviska stiftelsen för medicin och vetenskap i idrott, och World Village of Women Sports.

World Village of Women Sport (WVWS) är ett forsknings- och utvecklingscenter med fokus på kvinnors idrott och hälsa. WVWS utgör kärnan i ett arkitektritat kvarter på 100 000 kvadratmeter i centrala Malmö. Här ska finnas lokaler för träning, tester, rehabilitering, vård och utbildning sida vid sida med kommersiella lokaler och bostäder. Genom att samla idrott, akademi och näringsliv i samma miljö skapas bättre förutsättningar för nya samarbeten och innovationer. Fastigheten beräknas stå klar årsskiftet 2014/15.

– Vi behöver nytänkande och ökad kunskap för att bryta mönster och strukturer. Forskningen och utvecklingsarbetet handlar om såväl socioekonomiska förhållanden som träningsmetoder, tränarutbildning, skadeprevention och behandling. Det här är ett nytt sätt att arbeta med jämställdhetsfrågor, att fokusera på möjligheterna, säger Malin Eggertz Forsmark, vd för WVWS och ansvarig för den konceptuella utvecklingen.

Vetenskapligt råd

WVWS ambition är att vara komplett inom idrottsvetenskap och idrottsmedicin för att på så sätt kunna förebygga skador och utveckla träningsmetoder, produkter och tjänster.

– Närmast all kunskap om träning och dess effekter baseras på studier på män. Vi vet egentligen inte om kvinnor reagerar på träning på samma sätt som män, till exempel när det gäller påverkan på hjärtat eller musklernas anpassningsförmåga, säger Bengt Saltin ordförande i WVWS internationella vetenskapliga råd.

Rådet arbetar bland annat med en forskningsplan som sträcker sig fram till och med år 2014 och som omfattar inriktningen på forskningen vid WVWS.

Drivs i stiftelseform

World Village of Women Sports stiftelse har det övergripande ansvaret för utvecklingen och finansieringen av verksamheten. Syftet är att skapa en bättre förståelse av förhållanden och villkor för kvinnors idrott och hälsa.
WVWS stiftelse finansierar forskning och utveckling. I samråd med det internationella vetenskapliga rådet föreslår styrelsen forskningsinriktning inom WVWS. Det kan handla om allt från fysiologisk och mental utveckling till produktutveckling och ledarskapsutveckling.

Ordförande är Per Nilsson, som också är ordförande i Centrum för idrottsforskning. Han menar att det är inte bara WVWS inriktning som gör satsningen unik.

– Modellen för samverkan mellan idrotten, högskole- och universitetsvärlden och representanter för näringslivet är ovanlig och spännande. Att de tillsammans, med samma mål, kan skapa en organisation som genererar nya resurser, konstaterar han.

Scandinavian Congress of Medicine and Science in Sports

Free communications 15.30-16.30

Wednesday September 19th

(Session A: Rehabilitation and exercise)
Room A+B

Chairs: Anette von Porat & Joanna Kvist, Sweden

15.31-15.38 Hip-flexion strength training in the clinical setting: can elastic bands induce a strengthening effect? K. Thorborg, T. Bandholm, M. Zebis, L. Andersen, J. Jensen, P. Holmich (#1)

15.39-15.46 Electromyographic evaluation of frequently used hip-adduction exercises for soccer players: implications for strength training in the rehabilitation and prevention of adductor-related groin injuries. A. Serner, L.L. Andersen, M.D. Jakobsen, E. Sundstrup, K. Thorborg (#2)

15.47-15.54 Hop performance and leg muscle power in athletes – reliability of a test battery. B. Kockum, A. Hejne (#3)

15.55-16.04 Reliability of single leg squat test and vertical drop jump test in elite team handball players. V. Flosadottir, A. Pedersen, A. Vinther (#4)

16.05-16.12 Hop performance before and after fatiguing intermittent aerobic work. A Ros, S. Holm, C. Fridén, A. Hejne (#5)

16.13-16.20 Body composition perception in triathletes. S. Hecht, D. Vigil, J. Luftman, A. Vasco, I. Gardner, L. Huston, R. Contreras (#6)

16.21-16.28 A Three-Month Active Rehabilitation Program Improved Knee Function in Patients with Focal Cartilage Lesions. The Oslo CARE study. B. Wondrasch, A. Årøen, J.H. Røtterud, T. Høysveen, K. Bølstad, M.A. Risberg (#7)

16.29-16.30 Summary

Free communications 15.30-16.30

Thursday September 20th

(Session B: Physiology)
Room A+B

Chairs: Carl-Johan Sundberg & Eva Blomstrand, Sweden

15.31-15.38 Energy availability in female endurance athletes – impact on energy and bone metabolism as well as health and preliminary results from an on-going study. A. Melin, Å.B. Tornberg, S. Skouby, J. Sundgot Borgen, A. Sjödin (#8)

15.39-15.46 Stages of change towards physical activity among a Norwegian pregnant urban population. L. Haakstad, K. Bø (#9)

15.47-15.54 Intensive interval training is more efficient than moderate continuous training in heart transplant recipients with impaired chronotropic response. C. Dall, M. Snoer, M. Frederiksen, H. Langberg, F. Gustafsson, E. Prescott (#10)

15.55-16.04 Fatigue causes changes in brain activity during the preparation of a drop landing task. J. Baumeister, S. von Detten, S.J. van Niekerk, M. Schubert, E. Ageberg, Q.A. Louw (#11)

16.05-16.12 Cardiac effects of deconditioning and physical reconditioning using the anterior cruciate ligament injury as a model. K. Steding-Ehrenborg, B. Hedén, R. Herbertsson, H. Arheden (#12)

16.13-16.20 The effect of life-long endurance exercise on the fibril morphology of human patellar tendon. C. Couppé, R.B. Svensson, J.F. Grosset, A. Karlsen, R.H. Nielsen, D. Skovgaard, M. Hansen, M. Kjær, S.P. Magnusson (#13)

16.21-16.28 Oral contraceptives do not affect muscle strength and hop performance in active women. L. Ekenros, A. Lindén Hirschberg, A. Heijne, C. Fridén (#14)

16.29-16.30 Summary

Free communications 15.30-16.30

Thursday September 20th

(Session C: Traumatology)
Room Östra salen

Chairs: Ioannis Kostogiannis & Ola Olsson, Sweden

15.31-15.38 Copenhagen Hip and Groin Outcome Score (HAGOS) in male soccer: Reference-values for hip and groin injury-free players. K. Thorborg, F. Stensbirk, J. Jensen, P. Hölmich (#15)

15.39-15.46 Illiotibial band autograft versus Bone-patella-tendon-bone autograft for ACL-reconstruction: A 15-year follow-up of a prospective randomized controlled trial. F. Stensbirk, K. Thorborg, L. Konradsen, P. Hölmich (#16)

15.47-15.54 Is a knee arthroscopy of any benefit for the middle-aged patient with meniscal symptoms? - A prospective, randomized single-blinded study? H. Gauffin, J. Kvist, A. Meunier, S. Tagesson (#17)

15.55-16.04 ACL-injury incidence in female handball - 10 years after the Norwegian ACL prevention study: a success story? G. Myklebust, A. Skjølberg, R. Bahr (#18)

16.05-16.12 Injury situations in elite freesryle ski cross: A systematic video analysis of 33 cases. S. Randjelovic, S. Heir, L. Nordsletten, T. Bere, A. Grønvold, R. Bahr (#19)

16.13-16.20 Cartilage and bone markers and inflammatory cytokines are increased in synovial fluid in the acute phase of knee injury. P. Swärd, R. Frobell, M. Englund, H. Roos, A. Struglics (#20)

16.21-16.28 Low level mechanical stimulation improves tendon healing in rats. M. Hammerman, T. Andersson, P. Eliasson, O. Sandberg, P. Aspenberg (#21)

16.2916.30 Summary

Free communications 10.30-12.10

Friday September 21st

(Session D: Traumatology, Exercise & Physiology)
Room A+B

Chairs: Bengt Saltin, Denmark & Eva Zeisig, Sweden

10.31-10.38 The Swedish athletics study: Annual incidence of musculoskeletal injuries in elite athletics athletes. J. Jacobsson, T. Timpka, J. Kowalski, S. Nilsson, J. Ekberg, Ö. Dahlström, P. Renström (#22)

10.39-10.46 Is "football for all" safe for all? Disparities and determinants of 1-year injury prevalence in community-based youth football programs. Ö. Dahlström, S. Backe, J. Ekberg, S. Jansson, T. Timpka (#23)

10.47-10.54 Injury rates in European professional football depending on match result, match venue and type of competition. H. Bengtsson, J. Ekstrand, M. Waldén, M. Hägglund (#24)

10.55-11.02 Lower Injury Rates for Newcomers in Professional Football Clubs. K. Kristenson, M. Waldén, J. Ekstrand, M. Hägglund (#25)

11.03-11.10 Head and neck injuries in professional football. M. Nilsson, M. Hägglund, J. Ekstrand, M. Waldén (#26)

11.11-11.18 Metatarsal 5 fractures in male football. To operate or not to operate? J. Ekstrand, C.N. van Dijk (#27)

11.19-11.26 The Copenhagen groin pain-test: Giving the green light for soccer-play! K. Thorborg, B. Andersen, M.T. Langelund, M.M. Madsen, L.R. Lundquist, P. Hölmich (#28)

11.27-11.34 Pre- and post-injury running mechanics in a patient with an Achilles tendon rupture. K. Grävare-Silbernagel, R. Willy, I. Davis (#29)

11.35-11.42 Eccentric strengthening effect of hip adductor-training with elastic bands in soccer players. J. Jensen, P. Hölmich, T. Bandholm, M. Zebis, L. Andersen, K. Thorborg (#30)

11.43-11.50 Guided pelvic floor muscle training to prevent stress urinary incontinence in primiparous women. A randomized controlled trial. S. Åhlund, E.L. Wilander, B. Nordgren, C. Fridén (#31)

11.51-11.58 The nine test screening battery - Normative values on a group of recreational athletes. M.E. Batt, F. Flodström, A. Frohm, A. Heijne (#32)

11.59-12.06 Does training soccer at elite level suffice the demands put on women playing a domestic league game? A. Olsson, L. Berg, H. Ljungberg, K. Söderman, B-M. Stålnacke (#33)

12.07-12.10 Summary

1. HIP-FLEXION STRENGTH TRAINING IN THE CLINICAL SETTING: CAN ELASTIC BANDS INDUCE A STRENGTHENING EFFECT?

Thorborg K. 1; Bandholm T. 2; Zebis M. 3; Andersen L. 4; Jensen J. 1; Hölmich P 1.
1) Arthroscopic Centre Amager, Copenhagen University Hospital, Amager, Copenhagen, Denmark
2) Departments of Orthopaedic Surgery and Physical Therapy, Copenhagen University Hospital, Hvidovre, Copenhagen, Denmark.
3) Clinical Research Centre and Departments of Orthopaedic Surgery and Physical Therapy, Copenhagen University Hospital, Hvidovre, Copenhagen, Denmark.

INTRODUCTION Heavy slow Strength Training (HST) is an effective treatment for tendinopathy, and is applied in different overuse conditions. Hip-flexor (ilopsoas-related) tendinopathy is a common problem, but so far HST has not been promoted for this condition.
PURPOSE To investigate the effect and feasibility of 6-weeks hip-flexion strength training on hip-flexion strength in healthy subjects, using a simple clinical set-up including elastic bands.
METHODS Thirty-three healthy subjects were included in a randomised controlled trial and allocated to HST or control (CON). HST of the hip-flexors was performed 3 times per week for 6 weeks, on the dominant leg. The HST-group progressed from 15 repetition maximum (RM) (week 1) to 10 RM (week 2-5) to 8 RM (week 6-7), using elastic bands for external resistance. Isometric hip-flexion strength was measured in both legs pre- and post-intervention by a blinded assessor, using a reliable test-procedure.
RESULTS There was a significant within-group change in isometric hip-flexion strength in the hip-flexion strength of the trained leg (dominant leg, training group) from 1,90 ±0.43 Nm/kg to 2.22 ± 0.54 Nm/kg, corresponding to a mean within-group change of 0.32 (95% CI 0.19-0.45) Nm/kg, $p<0.001$. No within-group differences were seen in the standing leg in the training group, and in the control group, $p>0.05$. Between-group comparison of hip-flexion strength change in the trained leg (dominant leg, training group) versus the non-trained leg (dominant leg, control group), showed a significant mean group difference of 0.34 (95% CI 0.17 -0.52) Nm/kg, $p<0.001$.
CONCLUSION Hip-flexor strength training using elastic bands is an effective and simple intervention, improving hip-flexor muscle strength to the same extent as could be expected when training in strength-training machines. Furthermore, the intervention seems to induce sufficient loading to stimulate muscle-tendon repair and thereby possibly improve clinical symptoms, in patients with hip-flexor tendinopathy.

2. ELECTROMYOGRAPHIC EVALUATION OF FREQUENTLY USED HIP-ADDUCTION EXERCISES FOR SOCCER PLAYERS: IMPLICATIONS FOR STRENGTH TRAINING IN THE REHABILITATION AND PREVENTION OF ADDUCTOR-RELATED GROIN INJURIES.

Serner. A 1; Andersen. L L 2; Jakobsen. M D 2; Sundstrup. E 2; Thorborg. K 1
1) Arthroscopic Centre Amager, Copenhagen University Hospital, Denmark; 2) National Research Centre for the Working Environment, Copenhagen, Denmark

INTRODUCTION: Strength training is considered important in the prevention and rehabilitation of adductorrelated groin injuries, however, there is a lack of knowledge concerning the intensity of frequently used strengthtraining exercises.
PURPOSE: To investigate the muscle activation of specific hip musculature during 8 frequently used hip-adduction strengthening exercises.
METHODS: 40 healthy elite soccer players, training >5 hours a week, age, mean (SD) 21.4 ± 3.3 years, were included in the study. Electromyographic (EMG) activity of adductor longus, gluteus medius, rectus abdominis and the external abdominal oblique muscles was measured bilaterally using surface electrodes during 8 frequently used hip-adduction strengthening exercises and normalized to peak EMG using an isometric maximal voluntary contraction (MVC) as reference for each muscle group.
RESULTS: There was a significant difference in normalized EMG (nEMG) of the adductor longus muscle between the 8 exercises with values ranging from 14-108% nEMG ($p<0.0001$). One exercise showed 14% nEMG, 2 showed 64-86% nEMG and 5 exercises showed 98-108% nEMG activity. Furthermore, there was a significant difference between legs of 35%-48% peak nEMG in 3 of the 8 exercises ($p<0.0001$). Peak muscle activation of the gluteus medius, rectus abdominis and the external abdominal oblique muscles showed relatively low values ranging from 5 to 48 percent of the respective reference contraction ($p<0.001$).
CONCLUSION: Specific hip-adduction exercises can be ranged by intensity. Seven out of the eight different hip adduction exercises qualify as strength training with an EMG activity of more than 60%. Three exercises display large asymmetric EMG-activity between legs. This information will allow a targeted and differentiated selection of exercises when considering strength training for prevention and rehabilitation of adductor-related groin injuries.

3. HOP PERFORMANCE AND LEG MUSCLE POWER IN ATHLETES – RELIABILITY OF A TEST BATTERY

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BACKGROUND: Functional performance after injury is difficult to measure and there is a need for objective criteria when establishing a safe return to sports. The aim of this study was to evaluate the absolute and relative reliability of a muscle power- and jump test battery for the lower extremity, including a new test, the single-legged squat jump, in a test-retest design.
METHODS: Fourteen athletes (7 women and 7 men) with a median age of 23.4 years (SD 20-27), performed a test battery on two occasions, 7-10 days apart. The battery consisted of three jump tests (counter movement jump (CMJ), one-leg hop for distance, side-hop test (for endurance) and three lower extremity muscle power tests (single-legged squat jump, knee-flexion and knee-extension muscle power test) for the right and the left leg. The single-legged squat jump was performed in a modified Smith machine, allowing for jumping motions. A linear transducer was used for measuring power.
RESULTS: The test battery showed excellent relative reliability (ICC=0.84-0.99). For the side-hop test (left leg), a significant difference between test 1-2 (p=0,01) was found. The methodological error within subjects varied, for the jump tests between 3%-11 %, and for the power tests between 8-12 %.
CONCLUSIONS: The absolute reliability of each test in this test battery can be considered high and since the test battery included a single-legged squat jump test, it can be used to measure healthy athletes' performance. Whether this test is reliable for injured athletes has to be studied further. However, these tests may contribute to the decision making process in rehabilitation and when to return to sports.
KEY WORDS: Athletic performance, Lower extremity function, Reliability, Return to sports, Single-legged squat jump

4. RELIABILITY OF SINGLE LEG SQUAT TEST AND VERTICAL DROP JUMP TEST IN ELITE TEAM HANDBALL PLAYERS

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PURPOSE: The single leg squat test (SLS) and the vertical drop jump test (VDJ) are simple tests that can be used to evaluate frontal plane knee control. It is clinically relevant to test their reliability to investigate their potential application as screening tools. The main aim of this study was to investigate the intra and inter rater reliability of the single leg squat test and the vertical drop jump test. A further aim was to assess the frontal plane knee control in Swedish elite team handball players and to assess for gender differences.
METHODS: Two raters observed 29 male and 32 female elite team handball players perform SLS and VDJ on two occasions. Absolute agreement (%) and weighted kappa (Kw) were calculated to investigate intra and inter rater reliability.
RESULTS: The inter rater reliability was found to be good to very good for both SLS and VDJ (Kw 0.64-0.80 and 0.79-0.84 respectively) corresponding to 90-93% SLS and 87-90 % VDJ absolute agreement. Both raters showed good intra rater agreement (Kw values 0.66 and 0.69) corresponding to 89 % and 92 % absolute agreement for SLS, while good and very good intra rater agreement (Kw values 0.80 and 0.83) and corresponding 87 % and 90 % absolute agreement were observed for VDJ. In the present study SLS identified 84 % of the female players and 86 % of the male players to have reduced/poor frontal plane knee control. The corresponding percentages for VDJ were 53 % for females and 21 % for males (p=0.01).
CONCLUSION: This study found good to very good inter and intra rater reliability of SLS and VDJ. Significant more females than males were found to have reduced/poor knee control by VDJ.

5. HOP PERFORMANCE BEFORE AND AFTER FATIGUING INTERMITTENT AEROBIC WORK

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INTRODUCTION: It has been suggested that injuries occur more frequently during fatigued conditions. Therefore it is of great importance to find clinically applicable, less time-consuming, practical methods of measuring whether an athlete, after fatiguing exercise, has recovered adequately for return to sport (e.g. the second half of a soccer or football match).
PURPOSE: The purpose of this study was to evaluate the responsiveness of the One-leg hop test and the Square hop test to fatiguing intermittent aerobic work and during recovery. A further aim was to study sex differences in trends.
METHODS: Members of four sub-elite-level soccer teams were invited to participate. Ten men, mean (SD) age 20.7 (3.4) and ten women 21.8 (4.8) accepted to participate in the study. Data was collected before and after fatiguing exercise. The Yo-Yo intermittent Endurance test Level 2, was used as a standardized sport-specific fatiguing protocol. The One-leg hop test and the Square hop test were performed before, immediately after, 15 and 30 minutes after fatiguing exercise. To quantify the level and progression of fatigue and recovery, blood lactate and heart rate were measured and general fatigue was estimated on Borg s RPE scale.
RESULTS: No significant difference in performance in either hop test was found immediately after intermittent aerobic fatiguing work. Performance in the One-leg hop test significantly decreased (p=0.002) while that in the Square hop test increased (p=0.001) between baseline and 15-30 minutes after fatiguing work. No significant difference in trends between sexes was found.
CONCLUSIONS: The One-leg hop test and the Square hop test did not immediately respond to fatiguing intermittent work. The motor learning effect in the Square hop test, as shown in other studies, was probably high since performance increased during the recovery phase despite objective and subjective parameters of fatigue. Performance in the One-leg hop test decreased during the recovery phase and had not reached nonfatigue values even after 30 minutes of recovery.

6. BODY COMPOSITION PERCEPTIONS IN TRIATHLETES

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Body image distortion has been shown to be a factor in the development of disordered eating. No information is available on triathletes' perceptions of body composition compared to actual measurements.
PURPOSE: 1. Compare perceived vs measured body composition in triathletes
2. Assess triathletes' perceptions of optimal body composition for triathlon performance
3. Compare body composition perceptions of male vs female triathletes Study Design: Cross-sectional
METHODS: Subjects: Triathletes registered to compete in the 2006 California Ironman Triathlon (1.2 mile ocean swim, 56 mile bike ride, 13.1 mile run).
INSTRUMENTS:**1 Pre-race Survey:** Triathletes filled out a questionnaire regarding demographics, triathlon history, training distances, perceived, optimal and previous body composition measurements. **2 Measurements**: Height & weight were measured using a calibrated scale. Body fat percentage was measured using a NIR spectrophotometric hand-held device (Futrex 6100 XL).
RESULTS: During registration, 2120 triathletes checked-in and 457 participated in the study (21,6 %). 74 % of the subjects were male and 26 % female. The mean age of males was 36.6 +/-19.0 years and females 35.8 +/- 8.9 years. The mean body fat for males was 17.2 +/- 4.6 % and for females 27.1 +/- 4.4 %. 56 percent of males and 61 percent of females had completed at least one half Ironman triathlon. 85 percent of female triathletes and 81.1 percent of male triathletes estimated their body composition to be lower than the actual measurement (mean estiamated body fat: males 13.1 +/- 5.7; females 20.6 +/- 6.1%). Female triathletes were as likely as male triathletes to underestimate their body fat percentage (p=0.41), although female triathletes underestimated their body fat percentage by a sidnificantly greater amount (p<0.0001) than their male counterparts. Female triathletes reported a mean optimal body fat for performance in a half-Ironman triathlon to be 16.2 +/- 3.4 % and males reported 9.7 +/- 3.5%.
CONCLUSIONS: Male and female triathletes underestimate their body fat percentage and may have unrealistic ideas about body composition for their sport.

7. A THREE-MONTH ACTIVE REHABILITATION PROGRAM IMPROVED KNEE FUNCTION IN PATIENTS WITH FOCAL CARTILAGE LESIONS. THE OSLO CARE STUDY

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PURPOSE: Aim of the study was to implement a preoperative rehabilitation program to improve knee function in patients with focal cartilage defects on the femoral condyle who were already scheduled for cartilage repair surgery.
MATERIAL & METHODS: This prospective cohort study included patients with a focal cartilage defect on the femoral condyle assessed by arthroscopy. Inclusion criteria were an age between 17 and 50, no ligamentary instability and a Lysholm score of less than 75. Exclusion criteria were resection of more than 50 % of the medial and/or lateral meniscus and osteoarthritis.

The active rehabilitation program consisted of neuromuscular and strength exercises and was performed over three month. To record compliance each patient received a questionnaire every second week through email. Patients were tested before and after the end of the rehabilitation program using the KOOS, the IKDC2000, isokinetic muscle strength and two single leg hop tests.

RESULTS: 48 patients (14 female, 34 male) with a mean age of 34.1 years (17-50) and mean defect size of 2.9 cm2 (±1.28) were tested at baseline. 44 patients (13 female, 31 male) completed the rehabilitation program and were tested post rehabilitation. The rehabilitation program was attended on an average twice a week during the 12 week program. The IKDC2000 and the KOOS QOL show significant improvement ($p < .01$) from baseline to post rehab test. Muscle strength at the injured side increased about 30 % for the quadriceps and about 31 % for the hamstrings. The low symmetry index (LSI) of the single leg hop test showed an increase of 2 %, whereas the LSI of the triple leg hop test decreased about 1%. 63 % of the patients did not want to undergo cartilage surgery and postponed surgery. 27% of the patients went through cartilage surgery.
CONCLUSION: This rehabilitation program significantly improved knee function to such a degree that 63 % of the patients postponed surgery in a short term.

8. ENERGY AVAILABILITY IN FEMALE ENDURANCE ATHLETES – IMPACT ON ENERGY AND BONE METABOLISM AS WELL AS HEALTH AND PERFORMANCE – PRELIMINARY RESULTS FROM AN ON-GOING STUDY

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OBJECTIVE: Energy availability in female athletes is a nutritional concern linked to reproductive function and bone health. The aim of this on-going study is to investigate if subjects with low/moderate energy availability differ in regards to energy- and bone metabolism, recovery, injuries and markers of vascular health compared to subjects with sufficient energy availability.
METHODS: Fifty female endurance athletes aged 18-39 years, exercising ≥ 5 times a week are being recruited from Danish and Swedish endurance sport federations and clubs (competitive level) . Study protocol includes gynaecological examination and analyses of sex hormones to clinically verify reproductive health; Bone health assessed by Dual energy X-ray absorptiometry and bone markers; Fasting blood samples for analyses of lipids, hormones, glucose, lactate, iron- and vitamin D status; RMR, VO2peak and work efficiency (modified from Rosenbaum et al) using respiratory calorimetry (Jaeger OxyconPro); Ability to recover from two progressive bicycle treadmill tests performed with a 4 hour interval (modified from Meeusen et al); Assessment of eating disorders using Eating Disorder Examination. In order to estimate energy expenditure, non exercise physical activity and exercise are monitored using accelerometers (Actigraph) and heart rate (Polar) measurements during 7 consecutive days simultaneously with assessment of energy intake (weighed food records). Energy availability is calculated according to Loucks et al.
PRELIMINARY RESULTS: The first 14 athletes, 28 ±1.5 yrs of age and with BMI 20.4 ±0.4 (kg/m2), exercising 11.2 ±1.1 hours/week were found to have a mean daily energy availability of 145±16 kJ/kg FFM. Mean weight fluctuation during data collection period was -0.5±0.2 kg. Ten subjects (71 %) had low/moderate energy availability (<189 kJ/kg FFM/day). Six (43 %) had hypothalamic amenorrhea, 7 (50 %) were diagnosed with osteopenia, 1 with osteoporosis and 4 with hypercholesterolemia due to increased LDL while 4 (29 %) were diagnosed with eating disorders (1 bulimia nervosa and 3 EDNOS).
CONCLUSION: Preliminary results indicate that despite the fact that subjects are within the normal BMI-range, insufficient energy availability and clinical disorders linked to impaired health such as menstrual dysfunctions, osteopenia/osteoporosis and hypercholesterolemia are commonly found in this type of female endurance athletes. Additional data will be continuously collected throughout 2012.

9. STAGES OF CHANGE TOWARDS PHYSICAL ACTIVITY AMONG A NORWEGIAN PREGNANT URBAN POPULATION

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BACKGROUND: Studies have suggested that most pregnant women do not exercise on regular basis, and that only 5-20% engages in optimal levels of physical activity according to guidelines. In several settings, the Transtheoretical Model (TTM) of change has been used successfully in promoting behavioral change. However, very little is known about physical activity levels across the five stages of change among pregnant women. Hence, the aims of the current study were: 1) to assess perceptions regarding readiness to be/stay physically active according to the TTM and 2) address background and health variables associated with being in a particular stage for physical activity.
METHODS: Healthy pregnant women were successively allocated to the study from the application form for birth at Rikshospitalet University Hospital, Oslo, Norway. The participants filled in a validated self-administered questionnaire called Physical Activity Pregnancy Questionnaire (PAPQ) in the 3rd trimester, at mean pregnancy week 36.4 (SD=1.7). The relationship between the TTM model and selected variables were assessed by one-way Anova, independent t-tests or X2 as appropriate.
RESULTS: Mean age of the 467 (84.4%) women was 31.6 years (range 20-49), mean pre-pregnancy BMI was 23.6 (SD 3.7) and mean parity was 1.3 (SD 0.5). According to the TTM almost 52%, 1%, 33%, 12% and 1% reported to be in stage 5, 4, 3, 2 and 1 respectively. Hence, more than half of the participants (53%) were in stage 4-5, defined as being currently involved in regular exercise. Only six specified that they had recently started an exercise program (stage 4), signifying that very few women tend to begin exercising during pregnancy. A large proportion (33%) reported to be in preparation (stage 3) and doing some physical activity, but not regularly. Preliminary analysis showed that being older, having children, suffer from pelvic girdle pain, unhealthy eating habits, pre-gravid BMI__25 and maternal weight gain above Institute of Medicine references (IOM 2009) were associated with stage 1-3.
CONCLUSION: The present results with most participants in stage 3-5, may indicate a high motivational readiness or intention to increase physical activity behaviour. More research to evaluate whether a TTM-based intervention is useful to promote physical activity during pregnancy is needed.

10. INTENSIVE INTERVAL TRAINING IS MORE EFFICIENT THAN MODERATE CONTINUOUS TRAINING IN HEART TRANSPLANT RECIPIENTS WITH IMPAIRED CHRONOTROPIC RESPONSE

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BACKGROUND: Evolving studies indicate effect of high intense exercise in regards to increase peak oxygen consumption in heart transplant recipients. New studies also indicate that high intense exercise can be an important part of the treatment of endothelial dysfunction. Endothelial dysfunction linked to progression of coronary allograft vasculopathy and a predicter of negative outcome in heart transplant recipients. The purpose of the study was to examine whether aerobic interval training (AIT) > 85 % of VO_2peak is safe and superior to the moderate continuous training (CON) as currently recommended (60 %).
METHODS: A randomized clinical cross-over trial. Twelve HTX recipients were randomized in two groups to either 12 weeks of AIT or CON training followed by a 5-month wash-out/no intervention period and finally followed by a cross-over to 12 weeks CON or AIT.
MAIN OUTCOME: flow mediated vasodilatation determined by automatized fingertip assessment (FMD, endoPAT) and exercise capacity (VO_2peak) performed as a maximal symptom limited bicycle ergometer test (Jaeger) was performed at baseline and after 12 weeks.
RESULTS: Baseline VO2peak was 21.8 (SD 6.5) ml/kg/min. VO_2peak increased significantly in both the AIT and the CON intervention: after AIT by 5.5 (SD 1.9, p<0.001) and after CON by 3.2 (SD 2.0, p<0.001) ml/kg/min. The improvement was significantly higher in the AIT intervention (p<0.0006). In the 5-month wash-out/no intervention period there was a significant decrease in VO2peak (from 25.8 to 22.2, p<0.001).

Baseline FMD was 2.26 (0.70). FMD improved in AIT by 0.30 (SD 0.51, p= 0.06) and in CON by 0.16 (SD 0.31, p=0.11) with no statistical difference between groups (p= 0.24).
CONCLUSION: Intensive aerobic interval training is safe and superior to moderate continued training in improving VO2peak in heart transplant recipients. Both training interventions resulted in a borderline significant improvement in endothelial function as assessed by endoPAT.

11. FATIGUE CAUSES CHANGES IN BRAIN ACTIVITY DURING THE PREPARATION OF A DROP LANDING TASK

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INTRODUCTION: Fatigue is multifactorial and seems to decrease lower limb sensorimotor function. Biomechanical studies on landing tasks provide inconsistent findings about the impact of fatigue. Landing from a jump is based on CNS related interaction of predictive (feedforward) and reactive (feedback) sensorimotor control. The fronto-parietal brain network is known to play a role in feedback control of movement and can be measured by EEG (Theta and Alpha frequencies). However, there is only limited knowledge about the brain activity in the fronto-parietal network during feedforward task preparation in general and due to fatigue.
PURPOSE: To elucidate wether (H1) frontal and parietal brain areas are activated in feedforward preparation of a drop landing task (DL) in athletes, and (H2) if induced fatigue affects brain activity. After resting (M0) 14 healthy athletes performed a series of DL s. Subjects were asked
METHODS: To concentrate on the landing preparation for ten seconds before an auditory signal requires the subjects to drop off a 30cm plattform before (M1) and after (M2) a standardized fatigue protocol. EEG data was obtained during DL preparation in frontal and parietal brain areas and spectral power (Theta and Alpha) was calculated. To analyze 3D kinematics for the motor output at initial ground impact eight T-series Vicon cameras were used to describe lower limb angular positions. For statistical analysis paired t-tests and Pearsons r for effect sizes were used.
RESULTS: Frontal Theta power was increased in the preparation period compared to the resting state (Fz: p=.008, r=.083) (H1). Parietal Alpha-2 power increased in the preparation period after the fatigue protocol (P3: p=.01, r=0.94; Pz: p=.037, r=0.91) (H2) while the lower limb angular positions remained unchanged.
CONCLUSION: The frontal and parietal brain areas play a role in feedforward preparation of drop landings. Frontal Theta power demonstrate activation connected to higher attentional control compared to the resting state. After the fatigue protocol the parietal Alpha-2 power values increase which might be related to the inhibition of incoming peripheral sensory information due to the gating theory. ACL patients should be analyzed in this paradigm to see if conflicting sensory information due to damaged receptors after the injury affect brain activity in feedforward task preparation.

13. THE EFFECT OF LIFE-LONG ENDURANCE EXERCISE ON THE FIBRIL MORPHOLOGY OF HUMAN PATELLAR TENDON.

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Muscle and tendon function together as a unit and it has previously been shown that training can give rise to tendon adaptation in the form of increased cross-sectional area. However it remains unknown if adaptation also occurs at the micro-structural level of tendon collagen fibrils.
PURPOSE: To examine the effect of aging and lifelong habitual endurance exercise on the fibril morphology of the human patellar tendon, ex vivo. We hypothesized that lifelong habitual endurance exercise would increase fibril density, size and volume fraction.
MATERIAL AND METHODS: We recruited 15 healthy injury free master athletes (old trained men, OT; age 59-75 years, running distance of 44±17 km/wk over 28±9 yrs (mean±SD)), 12 old untrained controls (OC; matched to OT for BMI and age) and 10 young men matched for current running distance (young trained,YT; age 21-34, 48±12 km/week) and 12 young untrained controls (YC; matched to YT for BMI and age). Tendon biopsy samples were analyzed by transmission electron microscopy for fibril density, volume fraction, and mean fibril area. A 2-way ANOVA was used for statistical analyses.
RESULTS: There was a tendency for age to have an effect on tendon fibril density (P = 0.084, Fibril density: OT, 81.4±11.9; OC, 74.2±16.0; YT, 92.8±33.3 and YC, 85.6±18.7 fibrils/mm2). For volume fraction, a significant interaction between age and training was observed (P<0.05), such that master athletes had a greater fibril volume fraction than OC that also was lower than YC (P<0.05) . Volume Fraction (%): OT, 56±6; OC, 49±7; YT, 53±7 and YC, 57±7. No other differences were observed
CONCLUSION: To our knowledge, these are the first data that demonstrate a higher tendon volume fraction in male master athletes compared to old untrained controls. The data also indicate that life-long habitual endurance exercise results in collagen material in the tendon that matched that of young untrained controls.

14. ORAL CONTRACEPTIVES DO NOT AFFECT MUSCLE STRENGTH AND HOP PERFORMANCE IN ACTIVE WOMEN.

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INTRODUCTION: Literature has suggested that female sex hormones may have an impact on physical performance and the risk of sustaining musculoskeletal injury. During the menstrual cycle significant variations in knee joint laxity, neuromuscular coordination and postural control has been demonstrated. Furthermore, an association between musculoskeletal knee injuries and the menstrual cycle has been reported, whereas oral contraceptive (OC) use may prevent from such injuries. Oral Contraceptives (OCs) contain synthetic female sex hormones and are used by numerous women all over the world for contraception. In the sports world, there are concerns that OCs may have a negative impact on physical performance, eg due to the eventual side effect of weight gain. The scientific data published on the effect of OC use on muscle strength and anaerobic performance has shown contradictory results.
PURPOSE: The primary aim was to compare muscle strength as well as hop performance during (OC) use with non-OC use (normal menstrual cycle) in the same woman. The secondary aim was to compare muscle strength and hop performance within three specific phases of an OC cycle, as well as during a menstrual cycle of the corresponding cycle days (Non-OC cycle).
METHODS: Seventeen moderate to highly recreationally active women participated in the study. Maximal isokinetic muscle strength of knee extensors, isometric handgrip strength and one-leg hop test for distance were measured during one OC cycle and one Non-OC cycle at three specific phases respectively, using a cross-over design.
RESULTS: No significant differences were found in terms of muscle strength and hop performance between the OC cycle and the Non-OC cycle. Furthermore, no significant difference in muscle strength and hop performance could be demonstrated within the OC cycle or within the phases of the menstrual cycle except from maximal isokinetic muscle strength in the knee extensors.
CONCLUSION: Overall we found no support for any significant influence of OC use on muscle strength and hop performance. This is important information since it is known that elite female athletes, similar to a non athlete population are using OCs. Further studies focusing on the hormonal effects on more specific neuromuscular performance and on the risk for sustaining injuries, particularly in female athletes on elite level, are however needed.

15. COPENHAGEN HIP AND GROIN OUTCOME SCORE (HAGOS) IN MALE SOCCER: REFERENCE-VALUES FOR HIP AND GROIN INJURY-FREE PLAYERS – CROSS-SECTIONAL STUDY

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INTRODUCTION: Reference data are needed to be able to interpret The Copenhagen Hip And Groin Outcome Score (HAGOS) in male soccer-players with hip- and groin-related injury.
PURPOSE: To describe the variation of self-reported hip and groin disability and to establish reference data for HAGOS in hip and groin injury-free male soccer-players.
MATERIAL AND METHODS: We included 444 male soccer-players out of 700 from 40 clubs (Division 1-5), in Eastern Denmark, mean age (SD) 23.4(4), training soccer 3.4(1) times per week. All players were hip and groin injury-free at the time of inclusion (beginning of new season). All players answered the HAGOS following valid and reliable procedures within the first 6 weeks after resuming training for the new season (July/August 2011).
RESULTS: Of the 444 hip and groin injury-free players at the beginning of the season, 143 had experienced hip and/or groin pain in the previous season. Age and playing level was not related to HAGOS scores.In soccer-players with no hip and/or groin pain in the present season, but in the previous season, Median and mean (CI 95%) HAGOS scores were; Pain: 95, 92.8 (91.5-94.1), Symptoms: 82, 82.1 (80.2-84), ADL: 100, 95.0 (93.6-96.4), Sport/Rec: 91, 86.5 (84.0-89.0), PA: 100, 90.9 (88.5-93.3), QOL: 90, 86.9 (84.9-88.9).

In soccer-players with no hip and/or groin pain in either present or previous season (n=301), Median and Mean (CI 95%) HAGOS scores were; Pain:100, 96.9 (96.1-97.7), Symptoms:89, 87.8 (86.6-89.0), ADL: 100, 97.3 (96.5-98.1), Sport/rec:100, 94.0 (92.9-95.1), PA:100, 94.6 (93.0-96.2), QOL:100, 95.5 (94.5-96.5).

All HAGOS subscale-scores were significantly different ($p<0.0001$) between soccer-players with no hip and/or groin pain in present or previous season (n=301), compared to soccer players who had no hip and/or groin pain in present season, but had in the previous season(n=143).
CONCLUSION: The HAGOS profile in hip and groin injury-free soccer-players is near the maximum score of a 100, for all subscales except for symptoms. Differences are seen between hip and groin injury-free players, who had hip and/or groin pain in the previous season, and those who did not. These differences were all less than 10 points for the different subscales, representing a small potentially relevant difference.

16. ILIOTIBIAL BAND AUTOGRAFT VERSUS BONE-PATELLA-TENDON-BONE AUTOGRAFT FOR ACL-RECONSTRUCTION: A 15-YEAR FOLLOW-UP OF A PROSPECTIVE RANDOMIZED CONTROLLED TRIAL.

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PURPOSE: Bone-patella-tendon-bone (BPTB) and hamstring tendons are the most frequently used autografts for reconstruction of the anterior cruciate ligament (ACL). The long term result after using the iliotibial band autograft (ITB) are not fully known. If equal in quality the ITB graft could be a useful alternative as a primary graft, in revision surgery or multiligament reconstruction. The hypothesis was that the ITB reconstructed knees would show similar re-rupture rates as those reconstructed with the BPTB autograft.
METHODS: From 1995-1996 sixty subjects scheduled for primary ACL-reconstruction were included in a prospective randomized controlled trial. Three senior knee-surgeons, experienced in both types of ACL-surgery, performed all the operations. A standardized and supervised rehabilitation program was used for both groups for 6 months. 30 patients received the ITB-reconstruction, and 30 received the BPTB-reconstruction. 49 participated at follow-up in 2010 (82%). Primary outcome was the failure-rate. Secondary outcomes were KOOS (pain, symptoms, Sport/Rec, QOL, ADL), Tegner Activity Scale, AKP-score, Lysholm Score, Rolimeter laxity, extension deficit, single-hop and crossover-hop for distance.
RESULTS: At 15-year follow-up no differences existed between the groups. Graft failure occurred in 3 BPTB-subjects (12.5%) and 4 ITB-subjects (16%) (P=0.53).KOOS Sport/Rec score for the BPTB-group was 73, and 75 for the ITB-group (P=0.82). The KOOS QOL score was 68 and 72 for the BPTB-group and ITB-group, respectively (P=0.58).
CONCLUSION: We found similar graft-failure-rates and KOOS-scores when comparing BPTB- and ITB-operated individuals, at 15-year follow-up. The ITB graft had equal long-term results compared to the BPTB graft and is recommended as a reliable alternative autograft for ACL-reconstruction.

17. IS A KNEE ARTHROSCOPY OF ANY BENEFIT FOR THE MIDDLE-AGED PATIENT WITH MENISCAL SYMPTOMS? - A PROSPECTIVE, RANDOMIZED, SINGLE-BLINDED STUDY

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Meniscal lesions are frequent incidental findings in middle-aged patients on knee MRI. There are no studies proving a significant positive effect of a knee arthroscopy in middle-aged patients with meniscal symptoms in excess of a structured rehabilitation program. The purpose of this study was to demonstrate any possible benefit by an arthroscopic intervention and also to assess some predefined predictive factors.
PRIMARY PURPOSE: Does an arthroskopic operation lead to an functional improvement for the middle-aged patient with meniscal symptoms compared to a control group?
METHOD: The study started in march 2010. After a power-analysis 150 patients were planned for inclusion. All patients aged 45 to 64 referred to the orthopedic department in Linköping for a possible knee arthroscopy brought by a suspected meniscal injury were included if they fullfilled the inclusion criteria (duration of knee pain > 3 month, carried out physiotherapy, no arthritis on standing x-rays and could understand swedish). Exclusion citeria were reumatic disorders, neurological disorders, replacements of hip- or knee joints, a locked knee or lockings for more than 2 seconds more than once a week. A majority of the patients had not accomplished a MRI. The last patient was included in april 2012.

The patients were randomized at the orthopedic clinic to one out of two interventions: In 2 weeks instructions by a physiotherapist, functional tests, start of a trainingdiary and another functional test after 3 month or the same interventions as above and a knee arthroscopy in 4 weeks. Any meniscal injury was resected. At inclusionen KOOS, Tegners activity score, EQ5D, duration of pain, and previous training were registred, as well as the possible predictive factors: Sudden onset of pain, locking for more than 2 seconds the last month, daily catchings and age under 55.

One orthopedic surgeon assessed all referrals and examined 146 out of 150 patients at the orthopedic clinic. The examiner was blinded for the intervention group. All operations were performed by one out of two experienced arthroscopists at an independent clinic. The primary outcome measure was the pain subscale in KOOS. Follow up by patient-administered instruments after 3 and 12 month. The intention to treat principle will be used.
RESULT: Only 5 patients denied inclusion in the trial. 135 out of 150 patients had in the end of april 2012 answered the 3-month questionnaires. These 135 patients will be reported here. 15 patients dropped out of the training group for an operation, but four patients allocated to the training+operation group did not have an operation.

The traing group decreased their pain according to the pain subscale in KOOS from 59 (SD 18) by inclusion to 69 (SD 19) by 3 month, while the operation+traininggroup changed from 57 (SD 16) to 76 (SD 17). The operation+ training group had according to the pain subscale in KOOS less pain at 3 month compared to the traininggroup ($p<0.03$). KOOS (quality of life) was also significantly better ($p<0.03$) at 3 month for the operation+training group. There were no significant differences at inclusion.
CONCLUSION: 135 out of 150 patienter have been analyzed at 3 month. The primary outcome measure, the subscale pain in KOOS, was statistically sigificantly better ($p<0.03$) for the group randomized to an arthroscopic operation. The one year results and the analysis of the predictive factors are not yet accomplished.

18. ACL INJURY INCIDENCE IN FEMALE HANDBALL-10 YEARS AFTER THE NORWEGIAN ACL PREVENTION STUDY: A SUCCESS STORY?

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INTRODUCTION: From 1998 to 2001 an ACL injury prevention program was introduced in female handball (Myklebust et al., 2003). The intervention consisted of a neuromuscular training program with exercises on a wobble board, a balance mat and handball specific exercises, and a gradual reduction in injury rate was observed during the study period. Our first follow/up period during the 2001/2005 seasons showed a doubled risk of ACL injury compared to the results from the intervention.

Seasons (# teams)	Elite division	1. div.	2. div.	Total
1998-99 (n=60)	1.08	0.25	0.36	0.48
1999-00 (n=58)	0.50	0.46	0.33	0.40
2000-01 (n=52)	0.42	0.36	0.28	0.33
2001-02 (n=60)	0.83	0.15	0.26	0.35
2002-03 (n=69)	0.71	0.42	0.42	0.48
2004-05 (n=70)	0.42	0.64	0.57	0.56
2005-06 (n=88)	0.25	0.21	0.18	0.19
2006-07 (n=90)	0.75	0.43	0.16	0.28
2007-08 (n=91)	0.17	0.33	0.28	0.27
2008-09 (n=88)	0.67	0.31	0.16	0.25
2009-10 (n=89)	0.42	0.21	0.19	0.22
2010-11 (n=93)	0.42	0.62	0.16	0.26

PURPOSE: To survey the ACL injury incidence after the 2004/2005 season to reveal if a national information campaign, including coach education and a new DVD introduced during the 2005/06 pre-season and a new website (www.skadefri.no, launched in May 2008) have influenced injury frequency. Participants: Norwegian female handball players, top three divisions.
METHODS: ACL injuries were recorded prospectively from 1998 until 2011 (except the 2003-04 season).
RESULTS: During the ACL intervention study period, the injury rate fell gradually from 0.48 ACL injuries per team (1998-99) through 0.40 injuries per team (1999-2000) to 0.33 injuries per team (2000-01).

19. INJURY SITUATIONS IN ELITE FREESTYLE SKI CROSS: A SYSTEMATIC VIDEO ANALYSIS OF 33 CASES

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INTRODUCTION: Freestyle Ski Cross (SX) became an official Olympic event in 2010. The discipline includes maneuvering at high speed through several obstacles while competing head to head in heats. The sport is spectacular, but recent studies have shown a high injury risk. Little is known about the situations leading up to the injuries.
PURPOSE: To qualitatively describe the situations leading up to time-loss injuries in World Cup and Olympic Freestyle Ski Cross.
METHODS: Thirtythree video recordings of Ski Cross injuries reported through the Internatinal Ski Federation Injury Surveillance System for four World Cup seasons (2006/07 through 2010) were obtained. Five experts in the fields of sport medicine and SX performed analyses of each case to describe in detail the situation leading up to the injury (racing situation and skier behaviour).
RESULTS: The injuries (N=33) occurred in four different skiing situations: Jumping (N=16), Turning (N=8), Jumping & Turning (N=7) and Rollers (N=2). The most frequently implicated obstacle was a single jump (kicker). All injured skiers lost control before time of injury, resulting in fall (N=29) and consequently injury. The main causes of loss of control were skier-opponent contact (N=13 of 33), technical error (N=8 of 33) and inappropriate strategy (N=8 of 33). Contact with an opponent occurred in in 21 of 33 cases, mostly at landing and take-off in jumping situations (N=13). The contact was mainly unintentional, but influenced on skier control in 16 of 21 cases, and contributed to the injury in 12 of these. Contact was usually caused by the opponent (N=11 of 21) or injured skier (N=8 of 21), mainly from behind (N=13). Of the 8 technical error cases, 6 were due to bad jumping technique (4 at take-off, 2 before take-off), while the 2 turning cases both involved too much inside lean. The inappropriate strategy cases (N=8) were dominated by strategic errors at take-off (N=7 of 8), such as inappropriate course line and bad timing.
CONCLUSION: In all Ski Cross injuries the skier lost control and got out of balance prior to the injury. In most cases loss of control was due to interference with opponent and personal fault (technical error and inappropriate strategy) at take-off, resulting in injury at landing or fall following a previous jump or turn.

20. CARTILAGE AND BONE MARKERS AND INFLAMMATORY CYTOKINES ARE INCREASED IN SYNOVIAL FLUID IN THE ACUTE PHASE OF KNEE INJURY (HEMARTHROSIS) – A CROSS-SECTIONAL ANALYSIS

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PURPOSE: To in a cross-sectional study population investigate concentrations of cartilage and bone markers, and pro-inflammatory cytokines in synovial fluid (SF) collected at different time points from acutely injured knees with hemarthrosis and to compare these with SF concentrations of knees of age and gender-matched healthy reference subjects.
METHODS: SF was aspirated from the acutely injured knee of 111 individuals (mean age 27 years, span 13-64 years, 22% women). Concentrations of sulphated glycosaminoglycan (sGAG) were measured by Alcian blue precipitation whereas cartilage ARGS, bone biomarkers (osteocalcin [OCL], secreted protein acidic and rich in cysteine [SPARC] and osteopontin [OPN]) and pro-inflammatory cytokines (IL-1_, IL-6, IL-8 and TNF-_) were analyzed using electrochemiluminescence. Samples were also analyzed with regard to time between injury and aspiration (same day [n=29], 1 day [n=31], 2-3 days [n = 19], 4-7 days [n = 20] and 8-23 days [n = 12]).
RESULTS: SF concentrations of ARGS ($p<0.001$), SPARC ($p<0.001$), OPN ($p<0.001$), and all cytokines ($p<0.001$), but not sGAG ($p=0.06$) or OCL ($p=0.992$), were significantly higher in injured knees compared to knees of reference subjects. The cartilage markers sGAG and ARGS were significantly higher in knees aspirated later than one day after injury, whereas concentrations of SPARC and OPN and all cytokines were higher in knees aspirated the same day as the injury and at all time-points thereafter.
CONCLUSIONS: Our results suggest that an acute knee injury is associated with an instant local biochemical response to the trauma, which may affect cartilage and bone as well as the inflammatory activity.

21. LOW LEVEL MECHANICAL STIMULATION IMPROVES TENDON HEALING IN RATS

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INTRODUCTION: Healing of tendon injuries can be stimulated by mechanical loading. Treatment of injuries often involves immobilization, but this might not prevent weak involuntary isometric muscle contraction. It is therefore of clinical interest to study the effect of weak forces on tendon healing. Unloading by tail suspension or Botox-induced paralysis of the calf muscles reduces the strength of the healing tendon compared to voluntarily loaded controls; this reduction amounts to between half and two thirds. In these models, unloading was not complete, and the healing tendon was still exposed to weak mechanical stimulation. To reduce mechanical loading even further, the two unloading methods were combined. This allows us to study the effects of also weak forces in vivo.
PURPOSE: To study effects of weak forces on tendon healing.
Methods: The right Achilles tendon of Sprague-Dawley female rats was transected and allowed to heal spontaneously under 4 different loading conditions: 1) normal cage activity, 2) calf muscle paralysis induced by Botox, 3) tail suspension, 4) Botox and tail suspension combined. 10 rats in each group were used. 8 days after surgery the healing tendons were evaluated by mechanical testing and histology.
RESULTS: Callus transverse area and thereby peak force was impaired by Botox and tail suspension alone compared to normal cage activity. There were no changes in peak force or transverse area between Botox alone and tail suspension alone. The combination of Botox and tail suspension did not reduce callus transverse area compared to Botox or tail suspension alone, but it still reduced peak force, stiffness, peak stress and e-modulus by about half ($p < 0.006$). The tendon strength with the combined unloading methods was only a fifth of voluntarily loaded controls.
CONCLUSION: Weak mechanical loading stimulates healing, and there seems to be different thresholds for mechanical stimulation of tissue quality versus volume. Patients with Achilles tendon ruptures, immobilized in a cast during early healing, have large variation in the stiffness of the healing tissue. If weak mechanical forces have strong effects on tendon healing, moderate differences in patient behavior could explain the surprisingly large variation in stiffness. Perhaps some patients perform weak unintentional isometric training in the cast, whereas other relax completely.

22. THE SWEDISH ATHLETICS STUDY: ANNUAL INCIDENCE OF MUSCULOSKELETAL INJURIES IN ÉLITE ATHLETICS ATHLETES

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BACKGROUND: Athletics is one of the most popular global sports, but also one of the most demanding with regard to human physical capacities. There are few prospective epidemiological studies available on athletic injury in populations of elite athletes.
PURPOSE: To describe annual injury incidence rates among adult and youth elite athletics athletes.
Participants: 293 youth and adult athletics athletes (97%) responded regularly between March 2009 and March 2010 to web-based questionnaires. Annual incidence rates of musculoskeletal injuries causing partial or complete absence from practice and competition were computed.
RESULTS: 199 (68 %) of the participating athletes (73% of 166 adults and 61% of 126 youths) reported at least one injury. 123 (42 %) athletes reported more than one injury and 70 (24 %) athletes reported more than two injuries. There were little differences between the event groups. All together, 482 injuries were reported during the study year. The total injury incidence was 3,57 injuries per 1000 hours of exposure to athletics. The lower extremity accounted for 77 % of all injuries reported (76 % among adults and 78 % among youths). The most commonly injured body area was the Achilles tendon, ankle, foot, and toe (28 %), followed by the hip, groin, and thigh (24 %), and the knee and lower leg (24 %). As much as 96 % of all injuries reported were classified as non-traumatic; 55 % with a gradual onset and 41 % with a sudden onset. For adults, the most common diagnosis categories were Achilles bursitis and tendinitis (17 %) and sprain, strains of hip or thigh (13%). Youths reported most injuries in the category sprains and strains of hip and thigh (16 %), sprains of ankle or foot (14 %), and shin splints (13 %). The majority of reported injuries (51 %) were severe, i.e. causing absence exceeding three weeks from normal training. The most frequent combination of location and type for severe injuries were the thigh/groin with a slow onset 45 (9 %), posterior thigh with a sudden onset 45 (9%), followed by Achilles tendinitis 39 (8%), and calf/shin splints 36 (7%).
CONCLUSIONS: Only one out of four Swedish elite athletic athletes are able to complete a season without sustaining at least one performance-limiting injury. The majority of these injuries are severe. There is an urgent need for prospective studies of risk factors related to practices regimes that can be used to inform injury prevention programs in athletics.

23. IS "FOOTBALL FOR ALL" SAFE FOR ALL? DISPARITIES AND DETERMINANTS OF 1-YEAR INJURY PREVALENCE IN COMMUNITY-BASED YOUTH FOOTBALL PROGRAMS

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INTRODUCTION: Football (soccer) is endorsed as a health-promoting physical activity worldwide. When football programs are introduced as part of general health promotion programs, limitation of pre-participation disparities with regard to injury risk is important.
PURPOSE: The purpose was to explore if pre-participation disparity with regard to family socioeconomic status, player body composition, or self-reported health are determinants of football injury in community-based football programs, separately or in interaction with age or gender.
METHODS: Four community football clubs with 1230 youth players agreed to participate in the cross-sectional study during the 2006 season. The study constructs (family socioeconomic status, player body composition, and self-reported health) were operationalized into questionnaire items. The 1-year prevalence of football injury was defined as the primary outcome measure. Data were collected via a postal survey and analyzed using a series of hierarchical statistical computations investigating associations with the primary outcome measure and interactions between the study variables.
RESULTS: The survey was returned by 827 (67.2%) youth players. The 1-year injury prevalence increased with age. For youths of high socioeconomic status, boys reported injuries to a higher degree and girls reported injuries to a lower degree than expected (x2(1, N=474)=9.99, P=.002, Cramer's V=.15, Rothman's synergy index=4.62); for youths of low socioeconomic status there was a small tendency towards the opposite pattern (x2(1, N=203)=1.07, P=.30, Rothman's synergy index=0.98). Youths reporting injuries had higher standardized body mass index compared with youths not reporting injuries (t(577)=2.66, P=.008, r=.11). Children not reporting full health were slightly overrepresented among those reporting injuries and underrepresented for those reporting no injury (x2(1, N=688)=8.80, P=.003, Cramer's V=.11, Rothman's synergy index=0.24).
CONCLUSION: Pre-participation disparities in terms of socioeconomic status through interaction with gender, body composition, and self-reported general health, were found to be associated with increased injury risk in community-based youth football. When introduced as a general health promotion, youth football programs must be supplemented with individual and sport-specific adjustments for children and adolescents with increased pre-participation injury risk.

24. INJURY RATES IN EUROPEAN PROFESSIONAL FOOTBALL DEPENDING ON MATCH RESULT, MATCH VENUE AND TYPE OF COMPETITION

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INTRODUCTION: Previous studies have shown that player activities in a football match are influenced by the match result as well as if the match is played at home or away. It is not known if the injury rate is influenced by these match factors.
PURPOSE: To investigate if there is an association between injury rates and the result of the match, if the match is played on the home field or away, and the type of competition, in professional male football.
METHODS: 26 professional football clubs from 10 countries were followed prospectively during nine seasons (2001/02 to2009/10). All first team matches, and injuries that occurred during these matches, were registered by the team's medical staff and reported to the study group on a monthly basis. An injury was registered if it resulted in subsequent absence from training or match (i.e. time loss injury). Information about match result, match venue and type of competition for all reported matches were gathered by the authors from online databases, primarily the clubs' official homepages. Injury rates in matches with varying match characteristics were compared using multiple logistic regression. Odds ratios (OR) with 95% confidence intervals (95% CI) were calculated.
RESULTS: The study included 6,272 competitive matches. During these matches a total of 2,739 injuries were registered representing an injury incidence of 0.44 injuries per match. Injury rates were significantly higher in matches lost (OR 1.21, 95 % CI 1.05–1.39) or drawn (OR 1.15, 95 % CI 1.01–1.31) compared to matches won, and in matches played at home compared to matches played away (OR 1.19, 95 % CI 1.07-1.33). Finally, the injury rate in UEFA Champions League matches was significantly higher than in domestic league matches (OR 1.20, 95 % CI 1.03–1.39) while a lower injury rate was shown in other cup matches (OR 0.83, 95 % CI 0.69-0.98).
CONCLUSION: The injury rate was significantly higher in matches lost or drawn compared to matches won, in home matches compared to away matches, and in UEFA Champions League matches compared to domestic league matches. This indicates that the injury rate increases with the importance of the match. The underlying factors that contribute to the observed associations should be studied further.

25. LOWER INJURY RATES FOR NEWCOMERS IN PROFESSIONAL FOOTBALL CLUBS

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INTRODUCTION. No study has previously investigated if newcomers in professional football have a different injury rate compared to established players. In addition, there are conflicting results regarding injury rates depending on playing position and age.
PURPOSE. To investigate whether being a newcomer in a club, playing position and player age influence injury rates in male professional football players.
METHODS. 26 professional football clubs, with 1401 players, were followed prospectively during 9 consecutive seasons between 2001 and 2010. Club medical teams recorded time loss injuries and football exposure on individual level. A Cox regression model was used to study potential risk factors for injury. Covariates in simple and multiple analyses were: newcomer/established player (player defined as newcomer during the first season witha club), playing position, age category (≤ 20, 21-22, 23-24, 25-26, 27-28, 29-30, and ≥31 years), and match ratio (match exposure/total exposure). Results are expressed as rate ratio (RR) with 95% confidence interval (CI).
RESULTS. In total, 6140 injuries and 797 389 hours exposure were registered. Newcomers were younger and had higher training/match exposure compared to established players ($P < 0.001$). Decreased injury rates were observed for newcomers, goalkeepers, and in the youngest age group. Univariate newcomer vs. established player RR was 0.88 (95% CI 0.80 – 0.97). Using goalkeepers as reference, univariate RR for outfield playing positions were: defenders 1.77 (1.49-2.10); midfielders 1.64 (1.38-1.94) and forwards 1.57 (1.31-1.89). Using players ≤ 20 years as a reference, a peak injury rate was found in players 29-30 years old (RR 1.48, 1.25-1.74). Multiple Cox regression yielded almost identical results.
CONCLUSION. Newcomers played fewer matches and had a lower injury rate than established players. Moderate match exposure for newcomers could possibly be a successful injury preventive strategy in professional football. Goalkeepers had lower injury rates compared to outfield players, and this remained when adjusting for age and match exposure. Player age influences injury rates in professional football.

26. HEAD AND NECK INJURIES IN PROFESSIONAL FOOTBALL.

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INTRODUCTION: Head injuries account for 4-22% of all injuries in football, but little is known about risk factors for head and neck injuries.
PURPOSE: To study head and neck injury rates in male professional football in Europe over nine consecutive seasons and to evaluate the influence of various player- and match-related risk factors on injury occurrence.
METHODS: This was a sub-study of a long-term injury surveillance study in men's professional football in Europe. A total of 26 clubs and 1401 players were followed over a varying number of seasons from 2001/02 to 2009/10. Injury rates, calculated as the number of injuries per 1000 hours, were compared using z-statistics. Simple and multiple risk factor analyses were evaluated using a Cox regression for player-related variables and a logistic regression for match-related variables. Injury rates and player-related variables were analysed using a rate ratio (RR) and match-related variables using an odds ratio (OR) with 95% confidence interval (CI).
RESULTS: A total of 136 head and neck time-loss injuries were recorded (2.2% of all injuries). The most frequent injury was concussion (n=48) followed by nose fracture (n=21). The head and neck injury rate was 0.17 injuries per 1000 hours and the concussion rate was 0.06 injuries per 1000 hours. Substantially higher injury rates were seen during match play compared to training for head and neck injuries (RR 20.2; 95% CI, 13.3-30.6) and concussions (RR 78.5; 95% CI, 24.4-252.5). Injury rates were stable over the study period with no trend of injury reduction over time. The mean lay-off for concussion was 10.5 ± 12.6 days, but 27% of the concussed players returned to play within 4 days after the event. Defender was the only significant player-related risk factor (RR 1.8; 95% CI 1.0-3.1, compared to goalkeepers), and away match was the only significant match-related risk factor (OR 1.6; 95% CI 1.0-2.5, compared to home matches) for head and neck injuries. No significant risk factors were identified for concussions.
CONCLUSIONS: Head and neck injuries were relatively uncommon compared to other injuries in professional football, and no trend of injury reduction was seen over the study period. Almost one third of the concussed players returned to play prior to what is recommended in the consensus statements by the major international sports governing bodies. Defender was the playing position most at risk.

27. METATARSAL 5 FRACTURES IN MALE FOOTBALL. TO OPERATE OR NOT TO OPERATE?

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PURPOSE: To study incidence, lay off times and healing problems of MT5 fractures in male football players.
METHODS: 67 professional football clubs from 18 countries were followed prospectively during the years 2001-2011. X-rays from 41 of the 46 primary MT 5 fractures were collected, and classified according to Torg by the same independent radiologist.
RESULTS: 66 (0.4 %) of a total of 14 830 injuries were MT5 fractures. The incidence was 0.02 injuries/1000 hours of exposure. A team of 25 players can expect an MT 5 fracture every seventh season. 80 % of the fractures were primary and 20 % re-fractures. One of the 41 primary fractures was an avulsion fracture of the tuberosity; the other 40 (98 %) located to the proximal part. 38 % of the players with MT 5 fracture were younger than 21 years. 38 % occurred during the preseason. 46% of the players sustaining MT 5 fractures had prodromal symptoms (pain before the fracture occurred). 53% of the initial x-rays of the primary MT 5 fractures were classified as Torg type II (stress fractures), and 47 % were classified as Torg type I (acute type). 30 of the 40 base fractures (75 %) were treated surgically. 23 of these healed (healing rate 77 %) and returned to full team training at an average of 84 (range 43-143) days. 13/15 (87 %) patients with Torg type I fracture healed while the two that re-fractured both had prodromal symptoms. 10 fractures (25 %) were treated conservatively. Four of these healed (healing rate 40 %) and returned to full football in 87 (59-117) days. The non-healing rate of conservative treatment was 60 % (5 re-fractures and 1 non-union).The healing rate after surgery was significantly higher than after conservative treatment ($p<0.03$).
CONCLUSION: The majority of fractures are stress fractures and mainly occur to young players during the preseason high intensity training period. The stress nature of the injury might explain the high frequency of healing problems. Less healing problems are seen after surgery compared to after conservative treatment. Patients with Torg I type of fractures and not having had prodromal symptoms seems to heal without complications while conservative treatment of fractures with stress reactions leads to healing problems in two patients out of three.

28. THE COPENHAGEN GROIN-PAIN TEST: GIVING THE GREEN LIGHT FOR SOCCER-PLAY! – CROSS-SECTIONAL STUDY

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INTRODUCTION: Groin pain is the most frequent complaint in soccer, leading to reduced sporting function and frustration among players. Complex clinical presentation and multiple symptoms related to groin pain, often makes it difficult for sports-practitioners to establish severity, and provide specific guidelines for cessation or continuance of sporting activity.
PURPOSE: To investigate whether a simple groin-pain testis related to self-reported hip- and groin-related sporting function in soccer players. A priori it was hypothesized that a strong correlation of ≥ -0.5, would exist.
MATERIAL AND METHODS: 668 male soccer players,from 40 clubs (Division 1-5), in Eastern Denmark, mean age (SD) 23.4(4), training soccer 3.4(1) per week, were included in the study. All players answered the HAGOS, and underwent the Copenhagen groin-pain test, a bilateral maximal 5-second isometric hip adduction contraction with extended legs in the supine position. The players were asked to rate groin-pain intensity associated with this procedure on a numerical rating scale (NRS) ranging from 0-10. HAGOS and the groin-pain test were conducted following valid and reliable procedures. Testing was performed within the first 6 weeks after resuming training for the new season (July/August 2011).
RESULTS: Increased groin-pain intensity during maximal hip-adduction contraction correlated significantly with lesser HAGOS score (Sports-scale) (Spearman rho= -0.61, $P<0.01$). Age and playing level was not related to sporting function. The other HAGOS subscales (symptoms, pain, activities of daily living, physical activity and quality of life) also correlated significantly, ranging from (Spearman rho= -0.51 to -0.60, $P<0.01$). Furthermore, large clinically-relevant between-group differences (≥ 20 points) existed for HAGOS (Sport-scale) scores presented as median (25th & 75th percentiles), for players reporting groin-pain intensity at the three different pain-levels proposed by Thomee (1997): NRS(0-2), HAGOS (Sports-scale) 97(86-100), compared to players reporting NRS (3-5), HAGOS (Sports-scale) 69(56-84), again compared to players reporting NRS(6-10), HAGOS (Sport-scale), median 47(31-61) ($p < 0.0001$).
CONCLUSION: The Copenhagen groin-pain test is strongly related to hip- and groin-related sporting function. When minimal groin-pain intensity is experienced by a soccer-players during this test (NRS= 0-2), optimal hip- and groin-related sporting function exists, and the green light for soccer play can be given.

29. PRE- AND POST-INJURY RUNNING MECHANICS IN A PATIENT WITH AN ACHILLES TENDON RUPTURE

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BACKGROUND: The Achilles tendon is the most frequently ruptured tendon, with the incidence increasing in the last decades. The rupture generally occurs without any preceding warning signs and therefore pre-injury data are seldom available. This case represents a unique opportunity to compare pre-injury running mechanics with post-injury evaluation in a patient with an Achilles tendon rupture.
CASE DESCRIPTION: A 23-year-old female sustained a right total Achilles tendon rupture while playing soccer. Running mechanics data were collected pre-injury, as she was a healthy participant in a study on running analysis. In addition, patient reported symptoms, physical activity level, strength, ankle range of motion, heel-rise ability, Achilles tendon length, and running kinetics were evaluated 1 year after surgical repair.
OUTCOMES: Prior to injury the involved side had approximately 8° greater rearfoot abduction during running compared to the uninjured side. Greater ankle dorsiflexion, eversion and rearfoot abduction were noted on the involved side post injury when compared to pre-injury data. In addition, post-injury, the magnitude of all kinetics data were lower on the involved limb when compared to the uninvolved limb. The involved side displayed deficit in strength and heel rise, increased Achilles tendon length and differences in ankle range of motion when compared to the uninvolved side 1 year after injury.
DISCUSSION: Despite a return to normal running routine and reports of only minor limitations with running, considerable changes were noted in running biomechanics 1 year after injury. Calf muscle weakness and Achilles tendon elongation were also found when comparing the involved and uninvolved side.

30. ECCENTRIC STRENGTHENING EFFECT OF HIP ADDUCTOR-TRAINING WITH ELASTIC BANDS IN SOCCER PLAYERS

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INTRODUCTION: Soccer players with weak hip-adductor muscles are at increased risk of sustaining groin injuries. Therefore, a simple hip-adductor strengthening program for prevention of groin injuries is needed.
PURPOSE: We aimed to investigate the effect of an 8-week hip-adductor strengthening program, including one hip-adduction exercise, on eccentric and isometric hip-adduction strength, using elastic bands as external load.
METHODS: 34 healthy, sub-elite soccer players, mean (±SD) age of 22.1 (±3.3) years, were randomized to either training or control. During the mid-season break, the training-group performed 8 weeks of supervised, progressive hip-adduction strength training using elastic bands. The participants performed 2 training sessions per week (week 1-2) with 3x15 repetition maximum loading (RM), 3 training sessions per week (week 3-6) with 3x10 RM, and 3 training sessions per week (week 7-8) with 3x8 RM. Eccentric hip-adduction (EHAD), isometric hip-adduction (IHAD) and isometric hip-abduction (IHAB) strength, and the IHAD/IHAB-ratio, were measured assessor-blinded pre- and post-intervention, using reliable hand-held dynamometry procedures.
RESULTS: In the training-group, EHAD strength increased by 30 % ($p<0.001$). In the control-group, EHAD strength increased by 17% ($p=0.003$), but the increase was significantly larger in the training-group compared with the control-group ($p=0.044$). No other significant between-group differences in IHAD, IHAB or the IHAD/IHAB-ratio existed ($p>0.05$).
CONCLUSION: 8 weeks of hip-adduction strength training, using elastic bands, induce a relevant increase in eccentric hip-adduction strength in soccer players and thus may have implications as a promising approach towards prevention of groin injuries in soccer.

31. GUIDED PELVIC FLOOR MUSCLE TRAINING TO PREVENT STRESS URINARY INCONTINENCE IN PRIMIPAROUS WOMEN. A RANDOMIZED CONTROLLED TRIAL.

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INTRODUCTION: Urinary incontinence (UI) is a major health problem affecting both men and women, but women in particular. In the age group 35-64 years, 16.4 % of all women reported having problems with UI, and with age prevalence increases significantly. UI causes severe impacts on the quality of life and the problems are often underreported. Parity is one of the top risk factors for developing stress urinary incontinence (SUI).
PURPOSE: The purpose of this study was to assess the effect of guided pelvic floor training on muscle strength and SUI in primiparous women who underwent a training program between three and nine months after delivery.
METHODS: A randomized controlled trial (n=50) with 25 participants in the study group and 25 in the control group. Subjects were primiparous women, mean (SD) age 33 (4) Body Mass Index (BMI) 22.5 (3.2) and with higher education (96 %) who had undergone a normal term singleton vaginal delivery. The intervention group received guided pelvic floor training during a six-month period with follow-up meetings every six weeks. The control group received standard clinical treatment (medical examination and written instructions only). Muscle strength assessment was done by vaginal squeeze pressure (perineometer) and vaginal palpation (Ox ford scale 0-5). SUI assessment was done by ICIQ FLUTS questionnaire.
RESULTS: Women who received guided pelvic floor training showed a significant ($p<0.05$) increase in peak muscle strength (mmHg) and muscle function (assessed with Oxford scale) compared to the control group. However, no significant improvement concerning self reported SUI could be established. No correlation was found between muscle strength and self reported SUI.
CONCLUSION: The results indicate that guided pelvic floor training is likely to be an effective way of increasing pelvic floor muscle strength in primiparous women with low BMI and high education. However, no correlation was found between muscle strength and self reported SUI.

32. THE NINE TEST SCREENING BATTERY - NORMATIVE VALUES ON A GROUP OF RECREATIONAL ATHLETES

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PURPOSE. To establish normative values for 'The nine test screening battery' in a group of recreational athletes. A secondary aim was to study gender variability and differences between those who reporting previous injuries and those who did not report previous injury. A third aim was to explore the internal consistency of the 'The nine test screening battery'.
METHODS. Eigthy healthy recreational athletes, (40 men and 40 women) between 22 and 58 years, were included. The subjects were tested in nine functional movement exercises, graded from 0-3, at one occasion.
RESULTS. The median score for the whole group was 18 (Range 12 – 24). No significant sex difference ($p = 0.16$) or between the group that reported previous injuries and the group that did not ($p = 0.65$), was found. The internal consistency estimated with the Cronbach's alpha and was, 0.41.
CONCLUSION. This research is the first to provide reference data for the 'The nine test screening battery' on a cohort of recreational athletes. The use of 'The nine test screening battery' in a population of recreational athletes shows a normal distribution with no floor-ceiling effect. No differences in total score were found between men and women. Minor injuries, with no subjective symptoms for six weeks prior to screening, do not seem to affect performance.

33. DOES TRAINING SOCCER AT ELITE LEVEL SUFFICE THE DEMANDS PUT ON WOMEN PLAYING A DOMESTIC LEAGUE GAME?

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INTRODUCTION: Soccer changes character as a game progress. During the last fifteen minutes of play, most injuries occur, most goals are scored while players show less ability to run at high intensities. Considering these factors, and that the injury rate during game time is five-fold for women compared to during practice, makes it interesting to study if and how practice resembles game action.
PURPOSE: The aim was to study and compare the heart rate (HR) distribution among elite female soccer players during in-season training sessions and a game.
Method: Fiftytwo Swedish elite female soccer players were observed during three regular, but randomly chosen in season training sessions, and a domestic league game using Polar Team2 HR monitors. For technical and tactical reasons, continuous HR monitoring was completed for 15 players during all four sessions. HR was then categorized into different HR zones to compare intensities of each activity observed.
RESULTS: Mean and peak HR during the game were 168 and 189 beats per minute (bpm) respectively, where the HR-mean corresponded to 89 % of HRpeak. The HR values during the game were significantly higher than during training where a mean and peak HR of 134 and 183 bpm, corresponding to 71 and 97 % of HRpeak, respectively were shown. ($p<0.001$) There was a strong positive correlation between game and training regarding the percentage of time players spent at high-intensity (HR >90 % of HRpeak) during training ($r=0.89$, $p<0.001$).
CONCLUSION: The cardiovascular strain during the game is significantly higher than during training. To be able to perform for ≥90 minutes at game intensity, this needs to be taken into consideration when planning the internal load on an in-season training week. The time spent at high-intensity in training might enhance the ability to spend more time at high-intensity in games.

P1. MYOCARDIAL PEAK VELOCITIES IN FEMALE ATHLETES

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PURPOSE: To compare myocardial peak velocities in female endurance athletes (EA) and age- and gender matched sedentary controls (SC) in order to study the effect of training upon the heart in females.
METHODS: In a controlled cross-sectional design, 52 female athletes from a variety of high-dynamic endurance sports (VO_2max 52±5 ml _ kg-1 _ min-1) and 51 age- and gender matched sedentary controls (VO_2max 39±5 ml _ kg-1 _ min-1) where examined with color tissue Doppler echocardiography at rest. The left and right ventricular (LV and RV) free walls and septum were examined, at the base and mid-ventricular level, in a total of 14 measurement points. Systolic (s'), early (e') and late, atrial, diastolic (a') peak myocardial velocities were collected. Data are presented as percent difference with 95% confidence interval.
RESULTS: Acquisition of data was possible in 98.5 % of variables in EA and 95.0 % in SC. Systolic velocities were generally higher in EA than in SC, with the largest difference in the LV mid-ventricular septum, +24 % (14-35 %). Basally, RV s' was 6.0 % (2-16 %) higher in EA. In two points in the LV free wall, s' were larger in SC than in EA. No difference in RV diastolic velocities was seen between groups, while the mid-ventricular LV wall showed higher diastolic peak velocities both in the septum (a' +30%, 11-49 %) and the LV free wall (e' +12 %, 3-21 %).
CONCLUSIONS: We found the myocardium of the female athletes to exhibit functional adaptations, measured as myocardial velocities, when compared to sedentary females. Systolic as well as diastolic peak velocities were different between the groups, indicating that training affects both emptying and filling of the heart chambers. Besides from adding to the knowledge of cardiac adaptation in female athletes, these results are useful as reference data when evaluating young athletes with suspected cardiac disease.

P2. A PHYSICAL ACTIVITY PROGRAM AMONG PHYSICAL INACTIVE SWEDISH HIGH SCHOOL FEMALES. AN INTERVENTION CONTROLLED STUDY

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BACKGROUND. Physical activity level, engagement in physical activity and sport participations often decline during adolescence whereas sedentary behaviours often increase. In comparison to adolescent males, physical activity and sport participation are in general less frequent among adolescent females. The aim of this study was to investigate if a 6-month physical activity intervention could influence general health, physical activity, level of physical activity and physical fitness among physical inactive high school female students.
METHODS. The study was designed as a prospective quasi-randomized controlled physical activity intervention study. Four hundred and ninety four high female students completed a screening questionnaire and 262 females answered that they were physical inactive. One hundred and four inactive female students were included in the study, 60 in the intervention group and 44 in the control group. The intervention group exercised at least once per week (after school) at a sport centre. All students answered some questionnaires and carried out a number of physical performance tests prior to the start of the study and after 6 months.
RESULTS. There were no significant group differences at baseline regarding general health (p= 0.236). There was a significant group difference in the change from baseline to follow up (p= 0.012). When the intervention group was divided into two groups the regular training group (n=27) reported a significantly improved general health compared to the control group, while the irregular training group (n=33) did not differ from either the regular training group or the control group. Maximal oxygen consumption (VO_2 max), measured with "one-mile walk test", was significantly improved in the intervention groups (regular training group and irregular training group) as compared to the control group (p< 0.001). The female students of the intervention groups walked faster than those of the control group (p= 0.002). In the analyses of muscular strength and muscular endurance none of the analyses yielded a significant difference. An improved performance in all groups was observed in both "sit-ups" and "one-leg hop" (p< 0.001).
CONCLUSION. Regular physical activity at least once a week during six months influenced and improved general health, physical activity, physical activity level and physical fitness among physical inactive high school female students.

P3. OUTCOMES OF TRAINING COURSES ON PHYSICAL ACTIVITY ON PRESCRIPTION FOR VIETNAMESE HEALTH CARE PROFESSIONALS

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INTRODUCTION: Vietnamese health care professionals are being trained based on the book Physical Activity in the prevention and treatment of diseases (FYSS) and the Physical Activity on Prescription (PAP) concept. Here we provide results on outcomes of two courses in Sweden, but around 200 health care workers have been trained in Vietnam.
PURPOSE: To investigate the impact of PAP training courses on behaviors and attitudes of participants.
METHODS: Training courses were 5 days long and took place in late 2011 and early 2012. 13 health care professionals (11 medical doctors, 1 nurse, 1 medical ethicist) took part in either of the courses. All participants were given a questionnaire at: the end of the course; 2 or 4 months after the course ended; and 8 months after the course ended for participants who took part in the first course. The questionnaire mainly contained questions on what the participants hoped to achieve in their work relating to physical activity (PA) and in the follow-up questionnaires they were astked about the outcomes. Both open and closed-ended questions (ratings 1-5 with 1 representing "not at all" and 5 "to a high" degree") were used.
RESULTS: 12/13 participants provided answers. Common goals included applying PAP for patients (n=9), transfer knowledge (n=4) and plan patient studies (n=4). Other major goals included starting up a cardiac rehabilitation clinic (n=1). The usefulness of the course was rated at 3,83 (±0,51) 2-4 months after the course ending.

Patients and supportive work environment were mentioned as facilitating factors for reaching the goals. Lack of time, money, human resources and facilities were highlighted as barriers.

One participant got inspired to conduct a study on the effect of PA after coronary artery stenting and one has begun planning a training study for diabetes patients.
CONCLUSIONS: The participants thought the courses provided a good basis for them to perform work related to PA in NCD prevention and the courses had a very positive influence on attitudes to PA among the participants. The next step in the evaluation process (after analyzing all data from the questionnaires) is to look at objective parameters such as patient outcomes and adherence to PA.

P4. IMPACT OF RESISTANCE TRAINING ON REGIONAL FAT REDUCTION AND SOME OF THE HEART RISK FACTORS IN HEALTHY FEMALES

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INTRODUCTION: The loss of muscle mass with age (sarcopenia) is associated with a decline in strength. Sarcopenia is associated with a rise in body fat and being obese. Obesity and its metabolic consequences are major risk factors for cardiovascular morbidity and mortality. Besides, exercise training is known as a best means to reduce the risks of such diseases.
PURPOSE: The aim of this study was to examine the effect of resistance training on regional fat reduction, abdominal and some of the heart risk factors among 30 to 45 years old healthy females.
METHODS: 20 inactive healthy female, with a mean age of 37 yrs, height 164 cm, and a body mass index of 26.68 (kg/m2), participated in the study in two groups [Control group-(n=10) and resistance training group-(n=10)], randomized design. The protocol included resistance training with 40%-60% 1RM, 3day/week for 8 weeks. Blood samples for measuring of lipoproteins concentrations plus abdominal, sacroiliac and thigh fat were measured by caliper, BMI and peripheral of abdomen from all subjects 24 hours before starting the program and after the last session of the program. Differences between post-test and pre-test were evaluated using a Students t test for paired samples. A p-value < 0.05 was considered to statistically significant.
RESULTS: Data analysis revealed significant differences in levels of plasma lipoproteins concentrations and a significant decrease in abdominal, sacroiliac and thigh fat of resistance group.
CONCLUSION: Although physical activity is associated with reduction in abdominal and visceral fat, there is insufficient evidence to determine a dose-response relationship. Nevertheless, the effects of resistance training on regional and abdominal fat reduction and some of the cardiovascular risk factors is some deal known, and based on other and our finding, resistance training has been shown to be beneficial in improving many factors associated with good health.

P5. EFFECTS OF ORAL CONTRACEPTIVE USE ON EXERCISE CAPACITY IN FEMALE ELITE SOCCER PLAYERS

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The purpose of this project was to assess the effects of oral contraceptives (OC) on exercise capacity and body composition in female elite soccer players.
METHOD: Fourteen elite female soccer players (N=7 oral contraceptives users (OCU) + 7 non-OCU (N-OCU)) with age 24 (18-32) years participated in two laboratory visits within a cross-sectional study design. At the first visit, were anthropometric measurements, a history including use of OC and menstrual cycle taken, a venous blood sample as to evaluate sex hormones and an incremental exercise test were performed. The second visit occurred within one to three days after the first visit and a full body dual energy X-ray absorbtiomtry (DXA) scan was performed for determination of body composition. The incremental test was performed to assess VO_2, VCO_2, blood glucose and blood lactate levels during exercise. The exercise test started with a warm-up consisting of jogging at 8 km/h for two minutes, where after the speed increased to 10 km/h for another two minutes and to 11 km/h for 1 minute and finally to 12 km/h. At 12 km/h the initial slope of 0º was increased by 1º per minute until exhaustion. Respiratory gases exchange and pulmonary ventilation were measured telemetrically using breath-by-breath (Oxycon Mobile, Jeager, Germany). Mann-Whitey's U-test was used when comparing variation. Spearman's correlation coefficient (rho) was used to analyse interrelationships between variables.
RESULTS: There were no significant differences between groups in age, height, weight, body mass index, and muscle mass or fat mass. In contrast there were significant group differences in endogenous estrogen concentrations, but not between days of cycle. VO_2 peak was significantly lower in OCU than in N-OCU, irrespective if VO_2 peak was normalized to body weight or muscle mass. During sub-maximal exercise there were significant differences between groups in respiratory exchange ratio at 12 km 0º slope, 12 km 1º slope and 12 km 2º slope. There were also significant differences in capillary blood glucose concentrations after exercise both at two and five minutes. There were no significant differences in capillary blood lactate concentrations after exercise.
CONCLUSION: This study indicates that use of OC in female elite soccer players may reduce their aerobic capacity, possibly due to altered substrate utilization in skeletal muscle. Female elite athletes should be aware of this possibility when deciding on contraceptive use.

P6. THE PREVALENCE OF THE FEMALE TRIAD IN DANCERS – A SYSTEMATIC REVIEW

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INTRODUCTION: Low energy availability, menstrual disturbances and low bone mineral density (BMD), alone or in combination may cause health risks to dancers. These three components of the female athlete triad are especially common in sports in which leanness and aesthetic demands are considered important. The consequences for the dancer may be eating disorders, functional hypothalamic amenorrhea and osteoporosis.
PURPOSE: To investigate the prevalence of the female athlete triad in dancers.
METHODS: A systematic review. From 2005-2012, 25 unique studies were critically reviewed relating to prevalence for eating disorder or energy availability, menstrual disturbances and low bone mineral density in dancers.
RESULT: Prevalence for eating disorder varied from 0 %-83%. Five studies investigated low energy availability and all five showed that dancers have low energy availability. Prevalence for menstrual disturbances ranged between 0 % and 69% in dancers. Ten studies investigated low BMD, six studies showed that dancers had high BMD two studies showed normal BMD and two showed that dancers had low BMD.
CONCLUSION: Dancers seems to be at higher risk for the female athlete triad compared to control groups. Low energy availability appears to be the factor that leads to menstrual disturbances and low BMD. Balanced energy availability will on the other hand have a positive effect on dancers BMD. Most of the studies were cross sectional, future research should focus on prospective and longitudinal design for better understanding the female athlete triad in dancers.

P7. WHAT IS A SPORTS INJURY - REALLY?

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PURPOSE. Present sports injury reporting systems are not founded on a common conceptual basis. We set out to define unambiguous concepts for reporting sports injuries.
METHODS. Definitions used in the scientific literature on sports injury, concepts used in international models and classifications of injury, disease and functioning, and action-theoretical notions used describe disability were assessed followed by development of an integrated conceptual framework. The resulting framework was used to examine the definitions of reportable events in consensus statements about injury reporting in specific sports (n=6) and epidemiological studies of athletics injuries (n=12) published at PubMed until August 2011.
RESULTS. Sports impairment was introduced as the unifying concept based on the corresponding WHO notion. A three-paradigm recording system was derived from the viewpoints of clinical and preventive medicine, the athletes themselves, and sports institutions. The duration of the causative event was used as the norm for separating conditions into those sustained in isolated events and those having developed from overuse. Regarding sports impairment sustained in isolated events, sports injury is used to denote observations during clinical examinations, sports trauma to denote self-reported impairment, and sports incapacity to denote the sidelining of an athlete (time loss). Correspondingly, sports impairment caused by overuse recorded from clinical examinations is denoted sports disease (overuse syndrome), from athlete self-evaluations sports illness, and from sports authorities sports sickness. The appraisal showed that the sports institution paradigm ('time loss from sports') dominated (10/18 studies) the definitions of reportable events. Data from athlete self-evaluation of sports impairment was only included in five of the 18 definitions.
CONCLUSIONS. Sports epidemiology is ready to begin moving its conceptual framework towards a 'components of health' set of concepts. It is in the first step necessary to support planning of prevention programs by focusing on sports impairment concepts and to structure these by etiology and causal mechanisms and in particular to differentiate between discrete and enduring causal processes. In order to be able to plan for early prevention of overuse disorders, the athlete's subjective perspective needs to be included as an integral part of a framework.

P8. INJURY RATE AND INJURY PATTERN IN DANCERS - A SYSTEMATIC REVIEW

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INTRODUCTION. Dancers are performers but also athletes with high physical demands in extreme positions of joints and muscles which puts them at high risk of musculoskeletal injuries and pain.
PURPOSE The aim of the study was to describe musculoskeletal pain and injury patterns in dancers.
METHODS. A systematic review of 23 unique studies from 2005-2012 was accepted. Data was abstracted and critically reviewed relating to incidence, prevalence and incidence rate; type, site and most common site of injury in dancers.
RESULTS. Most studies were of retrospective design. Incidence of injury varied from 7 % - 89 %, prevalence from 6,5 % - 100 % and incidence rate from 0,009 - 4,4/1000 dance hours. Overuse injuries are the most common type in all dance-styles. Foot and ankle injuries are the most common sites in all dancers but breakdancers which are mostly exposed to injuries in the wrist.Modern dancers and breakdancers seem to have the highest incidence
rate. Incidence of ACL-injury appears to be low in dancers.
CONCLUSIONS. Studies of dance medicine is not yet reported in a uniformed way. This complicates analysis of results. Future research needs to focus on prospective cohort study design, using incidence rate and standardized injury definitions to better compare studies.

P9. INJURY SURVEILLANCE DURING A NATIONAL FEMALE YOUTH FOOTBALL TOURNAMENT IN KENYA

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BACKGROUND: Football in Kenya is not only a leisure activity, but also a tool for community and individual development. Studies on injury risk in female youth football players in Africa are limited.
OBJECTIVE: To analyze the incidence, characteristics and circumstances of injuries during a female youth football tournament in Kenya.
DESIGN: Prospective cohort study.
SETTING: A two-day national youth football tournament in Kenya.
PARTICIPANTS: A total of 938 female players from 69 teams, divided into 3 age groups (Under 13 [U13], Under 16 [U16], Over 16 [O16]).
METHODS AND MAIN OUTCOME MEASUREMENTS: Any physical complaint, sustained by a player during a match, irrespective of the need for medical attention or time-loss from football was registered by Kenyan injury reporters. The injury reporters were supported by four physiotherapists and two doctors.
RESULTS: A total of 123 injuries were reported from 106 matches. The incidence of all injuries was 93.3 injuries/1000h [95% CI 76.8-109.8]. Most injuries allowed the players to continue to play (n=98; 81%). Players in the U13 (RR=2.16; 95 % CI 1.34-3.47; p=0.002) and U16 (RR=2.17; 95 % CI 1.35-3.50; p=0.002) age groups had an increased risk of injury compared to the O16 group. A total of 8 injuries (7 %; 6.1 injuries/1000h; 95 % CI 1.9-10.3) were expected to result in absence from play for 1-7 days. The injuries most commonly involved the lower limb (n=100; 82 %). A contusion to the ankle (n=15; 12%) and foot/toe (n=15; 12%) were the most common specific injury types. Most acute injuries (89 of 113, 79 %) were caused by player contact.
CONCLUSION: The incidence of injuries among female youth football players in a national tournament in Kenya was high, with players participating in the U13 and U16 age groups being at greatest risk. However, most injuries were minor and did not prevent continued playing in the tournament. This can be seen as positive, as football plays a vital role in individual and community development in Kenya.

P10. EXPERIENCES OF RETURNING TO ELITE ALPINE SKIING AFTERACL INJURY AND ACL RECONSTRUCTION

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Anterior cruciate ligament (ACL) injury is one of the most common traumatic injuries in alpine skiing (Prodromos, Han, Rogowski, Joyce, & Shi, 2007). Also (Flörenes, Bere, Nordsletten, Heir, & Bahr, 2009) have reported that the injury risk among World Cup athletes in alpine skiing is even greater than has been described earlier.Thomee, Wahrborg, Borjesson, Thomee, Eriksson & Karlsson (2006) indicate that self-reported symptoms/functions and "internal locus of control" are the most important determinants of self-efficacy in patients with ACL injuries. In order to strengthen self-efficacy, these determinants should be considered by the clinicians involved in the rehabilitation.
OBJECTIVES: To explore the experiences of alpine skiing at elite level after anterior cruciate ligament (ACL) injury and reconstruction.
METHODS: Semi-structured interviews covering questions about five Ski High school students, two male and three female skiers experience of returning to elite alpine skiing after an ACL injury and reconstruction, were conducted through Skype (video communication). A manifest qualitative content analysis was carried out to describe the explicit substance in the transcribed text (Downe-Wambolt, 1992). The analysis was performed in five steps (Graneheim & Lundman, 2004).
RESULTS: Seven categories were identified. The participants described their perceived opportunities with regard to return to alpine skiing after ACL injury and reconstruction as something positive to do with self-belief, being mentally and physically prepared, regaining confidence in their own ability, being given time, and using active strategies. On the other hand, perceived barriers to a return to elite alpine skiing gave rise to negative feelings, for example fear, disheartenment, a total lack of or ambivalent confidence in their own ability and the use of passive strategies.
CONCLUSION: The two male skiers returned to alpine skiing. They reported confidence in their own ability, active strategies, and support on all levels as well as enhanced physical ability. The female skiers did not return to their pre-injury level of competitive alpine skiing. They stated lack of support on all levels, deterioration in their physical ability and two out of three reported passive strategies and no or ambivalent confidence in their own ability. The most important factors were family support, support on all levels, access to a physiotherapist and to be given time.

P11. COHERENCE BETWEEN POWER DRIVEN FROM COUNTER MOVEMENT JUMP IN A SMITH MACHINE AND FREE STANDING WITH EXTERNAL LOAD IN FEMALE ATHLETES

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The purpose of this pilot study was to evaluate the coherence of Power driven from a counter movement jump (CMJ) performed in a Smith Machine (SM) and frees standing (FS).
METHOD: Two female athletes performed 10 test sessions with three days in between. Each test session included two-legged CMJ performed in a SM and FS with external loads. Variables assessed with a linear encoder (MuscleLab 4010, Norway), were average power (AP), average force (AF) and average velocity (AV). Each subject performed three jumps on both legs at every load 20, 30 and 40kg. The loads were chosen in coherence with those used in Malmö Sports Academy's lab during testing of female elite athletes. A three-minute rest followed the three jumps on each load.

To assessing test-retest reliability was the coefficient of variance (CV) calculated as the standard deviation of the difference scores between test and retest divided by the rot square of ten divided by the mean of all test results. To assess coherence between SM CMJ and FS CMJ were methods compared in a Bland-Altman analysis to find any systematic variance (bias) in the indices AP, AF and AV and Limits of Agreement (LOA) was calculated from the Bland-Altman plots to show upper and lower LOA.

The relation between the results from CMJ performed in a SM and FS was high (rp= 0.87-1.0, p<0.001).
RESULT. The results showed a good test-retest reliability for all indices, for both CMJ performed in a SM and FS with coefficient of variance (CV) for AP (CVSM = 3.1-3.5 %; CVFS = 2.9-4.8 %), AF (CVSM = 1.6-1.9 %; CVFS = 1.6-2.1 %), and AV (CVSM = 1.7-2.7 %; CVFS = 1.8-2.9 %). Significantly higher values was seen during FS CMJ analysed by Bland-Altman plots with AP (Bias: 13.7 W; LOA -19.1 to 46.5 W), AF (Bias: 2.7 N; LOA -7.0 to 12.4 N) and AV (Bias: 0.03 m/s; LOA -0.05 to 0.11 m/s).
CONCLUSIONS: Even though FS CMJ was a test in an instable position the highest values were recorded during FS CMJ. The positive effects on stability from the SM, may alter the motion during CMJ. During FS CMJ tilting of the upper body is allowed which gives a favorable position for the extensor muscles of the back to participate in force production during FS CMJ compared to SM CMJ. Not just a higher AF was seen during FS CMJ but also a higher AV. This may be explained both by the position of the motion and that it may be due to friction in the SM. Athletes and coaches should be aware about the differences between SM and FS CMJ when evaluate training progress.

P12. POWER DRIVEN FROM ONE-LEGGED AND TWO-LEGGED COUNTER MOVEMENT JUMP WITH EXTERNAL LOAD

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The purpose of this study was to evaluate the test-retest reliability of one-legged and two-legged counter movement jump (CMJ) performed in a Smith-machine with external loads.
METHOD: Twenty-eight individuals were recruited into this study, 16 male and 12 female elite athletes. The Participants consisted of athletes from football, basketball, volleyball, ice hockey, handball and track and field sports. Test-retest CMJ one-legged and two-legged with external load was performed in a Smith machine with a three-day interval between tests for evaluation of test-retest reliability. Variables assessed with a linear encoder (MuscleLab 4010, Ergotest Innovation Norway), were average power (AP), average force (AF) and average velocity (AV). The Participants performed the same test at two different occasions, separated by three days. After three jumps of familiarisation the test procedure started. Each subject performed three jumps on both legs at every load. Each subject also performed three jumps on one legs at a time on every load. The loads were chosen in coherence with those used in the Malmö Sports Academy's lab during testing of elite-athletes. A three-minute rest followed the three jumps on each load. Analyses were performed at 20 and 40 kg for twolegged CMJ and 25 and 35 kg for the one-legged CMJ. Various methods of assessing test-retest reliability were used. Pearson's correlation (rp) was used to analyse interaction between day 1 and day 2. The coefficient of variance (CV) was calculated as ME divided by the mean of al test results.
RESULTS: The correlation between the results from one-legged and two-leg CMJ was high (rp= 0.85-0.95, p<0.001). The results showed a good test-retest reliability for all indices, for one-legged AP (rp= 0.90-0.94, p<0.001; CV = 5.0-6.2 %), AF (rp = 0.97-0.98, p<0.001 CV = 1.3-1.9 %) and AV (rp = 0.84-0.92, p<0.001; CV = 3.8-4.5 %), and twolegged AP (rp= 0.95-0.96, p<0.001; CV = 3.3-4.3%), AF (rp = 0.99, p<0.001; CV = 1.2-1.6 %) and AV (rp = 0.93-0.98, p<0.001; CV = 2.8-3.0 %).
CONCLUSIONS: For athletes and coaches to be able to follow the process in training it is important to know that both one-legged and two-legged CMJ are reliable. One-legged CMJ may add an important index to be tested in sports as soccer, volleyball and handball where one-legged jumping is common. In conclusion, athletes and coaches are able to use both one-legged and two-legged CMJ to evaluate training progress.

P13. POWER DRIVEN FROM COUNTER MOVEMENT JUMPS WITH EXTERNAL LOAD – COHERENCE AND TEST-RETEST RELIABILITY OF THREE ASSESSMENT METHODS

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The purpose of this study was to evaluate the coherence of the power driven from a counter movement jump (CMJ) assessed with three different methods; the Powertimer 300-series (300-serie, Newtest, Oulu, Finland) contact mat (C-mat), the MuscleLab 4010 infrared mat (IR-mat) (Ergotest Innovation, Langensund, Norway) and the MuscleLab 4010 linear encoder (M-encoder) (Ergotest Innovation, Langensund, Norway), and to evaluate the test-retest reliability of the M-encoder.
METHOD: Fifty-one individuals were recruited into this study, 22 male and 29 female elite athletes. The Participants consisted of athletes from soccer, basketball, volleyball, ice hockey, handball and track and field sports. Test-retest CMJ with external load was performed in a Smith machine with a three-day interval between. All three assessment methods were used simultaneously. Jump height and flight time were assessed with C-mat and IR-mat, and power was additionally assessed with C-mat. Variables assessed with M-encoder, were average power (AP), average force (AF), average velocity (AV) and distance (D). The Participants performed the same test at two different occasions, separated by three days. After three jumps of familiarisation the test procedure started. Each subject performed three jumps on both legs at every load. The loads were chosen in coherence with those used in the Malmö Sports Academy's lab during testing of elite-athletes. A three-minute rest followed the three jumps on each load. Analyses were performed at 40 kg CMJ. Methods used assessing the coherence between M-encoder, IR-mat, and C-mat were 1) mean difference and standard deviation; 2) Pearson's correlations (rp). Methods used assessing test-retest reliability were 1) Pearson's correlation (rp); 2) the coefficient of variance (CV).
RESULTS: The results from the C-mat were systematically higher than the ones obtained from the M-encoder and IR-mat. The correlation between the C-mat, M-encoder and the IR-mat was strong (rp= 0.95-0.98). The results showed high test-retest reliability for all indices assessed with the C-mat and the M-encoder. Results from the Mencoder were AP (rp = 0.97, p<0.001; CV = 3.9 %), AF (rp= 0.99, p<0.001; CV = 1.4%). Furthermore, the AV had high values (rp = 0.94, p<0.001; CV = 2.9 %) as well as D (rp = 0.87, p<0.001; CV = 5.4 %).
CONCLUSIONS: It is important to use the same assessment method in both pre- and post-testing when coaches and trainers monitor the training progress.

P14. TEST-RETEST RELIABILITY OF ISOKINETIC KNEE STRENGTH MEASUREMENTS IN CHILDREN AGED 8-10 YEARS

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BACKGROUND AND AIM: Strength training for children has previously been controversial but is now an accepted method for promoting health and fitness in children. Several studies describe benefits of strength training and how the training should be designed. However, there is a lack of reliable methods to assess strength in children.

The purpose of this study was to examine test-retest reliability of knee flexor and extensor isokinetic strength measurements in healthy children aged 8-10 years.
METHODS: A total of 22 healthy boys and girls aged 8-10 years performed five maximal isokinetic (Biodex 4.0) knee flexor and extensor concentric contractions at 60 °/s and 180 °/s, and five maximal isokinetic eccentric contractions at 60 °/s, on two occasions one week apart. Warm up on a bicycle ergometer, familiarization with the equipment using submaximal contractions and instructions to exert maximal voluntary effort preceded the test. The relative test-retest reliability of peak torque (PT) measurements was evaluated by the intraclass correlation coefficient (ICC2.1), and absolute reliability was assessed by the standard error of the measurements (SEM) and SEM%. Any systematic bias was examined by ANOVA. The study was approved by the Medical Ethichal Committee, Lund University
RESULTS: The concentric strength measurements of the knee extensors and flexors had good to excellent testretest reliability (ICC = 0.44-0.79) and low measurement errors (SEM = 3.4-5.5 Nm, SEM % <16.5 %). There were significantly higher values at test 2. The higher velocity at 180 °/s had a lower reliability. The reliability was lower in concentric knee flexor strength measurements (ICC = 0.44-0.61) compared to knee extensors (ICC = 0.64-0.79).

The eccentric strength measurements showed good test-retest reliability (ICC = 0.60-0.72), but SEM% values were high (18-21%). There were significantly lower values at test 2. No injuries or discomfort as a result of the testing was found.
CONCLUSION: Isokinetic dynamometry has the potential to be a reliable tool for knee strength measurements in healthy children aged 8-10 years; however, standardized verbal instructions adapted to children and more practice before testing are needed to reduce the systematic (repeated) measurement errors.

P15. MUSCULAR ACTIVATION PATTERNS AND POSTURAL ORIENTATION IN INDIVIDUALS WITH ANTERIOR CRUCIATE LIGAMENT INJURY – A QUANTITATIVE PILOTSTUDY

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PURPOSE: Anterior cruciate ligament (ACL) injury affects knee stability, neuromuscular function and, in the long term, there is an increased risk of osteoarthritis. The patients often demonstrate alterations in muscle-activation patterns as well as altered postural orientation - an affected ability to adequately stabilize body segments in relation to each other and to the environment, resulting in so called substitution patterns. The substitution patterns can be quantified with an observational test called Test for Substitution Patterns, TSP. The purpose of this study was to introduce a method to characterize relationships between deviant muscular activation patterns and substitution patterns and present preliminary findings from patients and un-injured subjects.
METHODS: Two ACL-injured patients and four un-injured subjects participated. Subjects performed the following test movements from the TSP; body-weight altering, mini-squat, knee flexion-extension on one leg, tiptoe standing knee-flexion-extension on one leg and forward lunge. Movements were recorded on video, and surface EMG was recorded (Mega Win ME6000) for muscles gluteus medius, biceps femoris, quad. femoris vastus lateralis, tibialis anterior, med. gastrocnemius and peroneus longus in the right and the left legs. A metronome was used for speed setting, and knee electrogoniometers were used to define start and end of movements. EMG activity during test movements was divided into 10 time bins for each muscle, with an 11th 'pre-bin' for anticipatory activity. Average amplitudes for each bin were plotted in a diagram. The correlation coefficient, the intercept and the slope of the regression line were calculated and used to compare activity in corresponding muscles.
RESULTS: In the two ACL-injured patients, muscles in the injured lower leg had a high activity also before and after movements were performed, picked up by our method, and yielded characteristic and quantifiable correlations with TSP scores. In the four un-injured subjects, the method allowed a quantification of intra-subject consistency and inter-subject variation when performing a given movement.
CONCLUSION: We present a method for EMG-analysis focused on comparing muscle activation patterns in ACL-injured patients with and without substitution patterns. Preliminary results indicate that the method allows a quantitative characterization between deviating muscle activation patterns and substitution patterns as measured by the TSP.

P16. CLINICAL SCREENING TESTS FOR ASSESSING MOVEMENT CONTROL IN NON-SPECIFIC LOW-BACK PAIN. A SYSTEMATIC REVIEW OF INTRA- AND INTER-OBSERVER RELIABILITY STUDIES

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BACKGROUND: Most people experience back pain at some point during their lives. Reports suggest that core stability interventions in subjects with non-specific low- back pain may increase function, thus decreasing pain. Reliable and validated clinical tests are required for implementing adequate rehabilitation and for evaluating such interventions.
OBJECTIVE: This systematic literature overview sought to assess the quality and summarize the results of original articles assessing the inter- and intra-observer reliability of clinical screening tests for movement control in subjects with non-specific low-back pain.
METHOD: A search was conducted in electronic search engines up until October 2011. The terms "low-back pain", "test", "movement control", "motor control" and "physical examination" were defined and used. An appraisal tool (QAREL) was used to assess methodological quality. Results of the studies were summarized.
RESULTS: Eight studies were included and assessed covering in total 26 screening tests for movement control. All examined inter-observer reliability and three also examined intra-observer reliability. The grading of the studies varied from five to nine positive items out of eleven possible. Inter-observer reliability ranged between poor and very good agreement. Intra-observer reliability ranged between moderate and very good agreement.
CONCLUSION: Few studies were conducted with a low risk of bias although tests showed moderate to good inter-observer reliability. However, since the studies reviewed used differing methods, tests and numbers of observers, it is difficult to conclude whether clinical tests for movement control may be considered reliable or not.

P17. MOTOR CONTROL EXERCISE REDUCES PAIN AND DISABILITY IN CHRONIC AND RECURRENT LOW BACK PAIN – A META-ANALYSIS

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OBJECTIVE. To determine the short-term, intermediate, and long-term effectiveness of motor control exercise, with regard to pain and disability, in patients with chronic and recurrent low-back pain.
SUMMARY OF BACKGROUND DATA. Previous meta-analyses have shown no difference between the effects of motor control exercise and general exercise in the treatment of low back pain. Several high quality studies on this topic have been published lately, warranting a new meta-analysis.
METHODS. We searched electronic databases up to October 2011 for RCTs clearly distinguishing motor control exercise from other treatments. We extracted pain and disability outcomes and converted them to a 0–100 scale. We employed the RevMan5 software to carry out pooled analyses to determine the weighted mean differences between motor control exercise and five different control interventions.
RESULTS. Sixteen studies were included. The pooled results favored motor control exercise over general exercise with regard to disability over all time periods (improvement in weighted mean differences ranged from -4.65 to -4.86), and with regard to pain in the short and intermediate term (weighted mean differences were -7.80 and -6.06, respectively). Compared to spinal manual therapy, motor control exercise was superior with regard to disability over all time periods (the weighted mean differences ranged between -5.27 and -6.12), but not with regard to pain. Furthermore, motor control exercise was superior to minimal intervention over all time periods with regard to both pain (the weighted mean differences ranged between -10.18 and -13.32) and disability (the weighted mean differences ranged between -5.62 and -9.00).
CONCLUSIONS. In patients with chronic and recurrent low back pain, motor control exercises seem to be superior to several other treatments, but further research is needed to explore the underlying mechanisms to clarify the impact of these exercises on pain and functional limitations.

P18.. STRENGTH TRAINING IN PARTIAL RANGE OF MOTION - EFFECTS ON STRENGTH IN FULL RANGE OF MOTION AND ON FUNCTIONAL PERFORMANCE.

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INTRODUCTION: During rehabilitation some patients are not able or allowed to perform resistance training in the full range of motion (ROM).
PURPOSE: To investigate 1) whether strength training in different partial ROM can affect strength in full ROM and 2) if strength training in different partial ROM:s affect functional performance differently.
METHODS: 27 female football-players were randomly divided into three different squat-training groups; Full range (FU, n=9), Shallow partial squat (SH, n=9) and Deep partial squat (DE, n=9), and trained twice weekly for 8 weeks. Outcome measures: 1 RM (one repetition maximum) squat from squat-depths of 60 and 90 degrees (1RM60 and 1RM90) and functional tests countermovement jump (CMJ), repeated CMJ (rCMJ) and a sprint test (Sprint). A linear Mixed Effect Model was used to evaluate differences between training groups.
RESULTS: 1RM60: FU - pretraining: 112.9 ± 21.3 kg, posttraining: 147.6 ± 21.0 kg, SH - pre: 116.0 ± 18.9 kg, post: 138.2 ± 25.5 kg, DE - pre: 109.6 ± 22.2 kg, post: 141.9 ± 17.0 kg. 1RM90: FU - pre: 68.5 ± 12.9 kg, post: 91.6 ± 10.6 kg, SH - pre: 63.0 ± 7.8 kg, post: 69.5 ± 10.3 kg, DE - pre: 63.5 ± 7.2 kg, post: 78.0 ± 7.2 kg. FU and DE groups increased 1 RM more than group SH both in 1RM60 and 1RM90 ($p < 0.05$). CMJ: FU - pre: 28.4 ± 4.3 cm, post: 29.7 ± 6.4 cm, SH - pre: 26.4 ± 3.1 cm, post: 25.9 ± 3.9 cm, DE - pre: 27.2 ± 3.2 cm, post: 30.3 ± 4.1 cm. DE-group increased CMJ more than the other groups ($p < 0.05$). rCMJ: FU - pre: 20.5 ± 4.8 cm, post: 25.6 ± 4.9 cm, SH - pre: 22.9 ± 2.2 cm, post: 22.4 ± 3.0 cm, DE - pre: 22.8 ± 1.4 cm, post: 24.2 ± 2.3 cm. FU-group increased rCMJ more than the other groups ($p < 0.05$). Sprint: No changes in Sprint were observed in any of the training groups.
CONCLUSION: ROM-specific strength training can affect strength in the full ROM, primarily when muscles are exercised in a lengthened state. The concept of movement specificity is indirectly supported, since there are improvements in outcome measures involving movement in the vertical plane only.

P19. NON-OPERATIVE TREATMENT OF PATELLOFEMORAL PAIN WITH NEUROMUSCULAR ELECTRICAL STIMULATION

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INTRODUCTION: Although the aetiology of the patellofemoral pain (PFP) remains unclear, it is believed that subgroups of patients may respond to specific non-operative treatment interventions. An asymmetric muscle mass of the quadriceps group and decreased neuromuscular stability are believed to contribute to PFP, but the relationship between these phenomena is still controversial. Neuromuscular electrical stimulation (NMES) can be used with a view of improving the timing and increase muscular contractions while performing functional activities.
PURPOSE: The objectives of this study were to investigate the effect of NMES while performing a rehabilitation program for PFP and compare the results of VISA-P-DK, Kujala score, passive range of motion (PROM), isometric strength and functional test scores pre & post intervention.
METHODS: One professional female athlete with unilateral PFP and one female patient with bilateral PFP (N=2) volunteered to take part. Both of the patients completed the VISA-P-DK and Kujala initially, at 4 weeks and at the end of the study at 10 weeks. The following outcome measurements were recorded, circumference of mid thigh and mid patella, PROM of hip internal/external rotation, knee flexion/extension and ankle plantar/dorsi flexion. In addition Isometric strength of hip flexion, abduction, extension, knee flexion and extension, single leg hop, step test, drop down vertical jump test, squat, single leg squat and single leg stance with eyes closed, were recorded. Each patient was provided with a FDA approved NMES (Compex Mi-Sport) to use while performing their home exercise program (HEP). Daily the patient was advised to use the Compex program Active Recovery and ice. Each week the patients received a 30 min follow-up session.
RESULTS: The most important changes in the outcomes following 10 weeks of rehabilitation with NMES were: Visa-P-DK: improved in Pts by 120 %; Pt2 by 102 %. Kujala scores improved in Pt1 by 15 %; Pt2 by 50 %. Hip flexion strength improved by 38 % in Pt1; Pt2 by 65 %. Single leg hop improved by 13 % in Pt1; Pt2 by 68 %. Squat improved by 33 % in Pt1; Pt2 by 71 %.
CONCLUSION: NMES can play a significant role during rehabilitation of PFP and can provide an easily assessed strength training method where the patient can train independently and regain their previous level of functional activity. Interestingly in both these cases subjective and functional outcomes improved more than objective measures such as strength and PROM

P20. DONOR-SITE-RELATED FUNCTIONAL PROBLEMS FOLLOWING ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: DEVELOPMENT OF A SELF-ADMINISTERED QUESTIONNAIRE

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INTRODUCTION: Donor-site-related problems following anterior cruciate ligament (ACL) reconstruction are ususally evaluated with questionnaires and tests validated for patients with patellar tendon grafts. There are no instruments in the literature designed to evaluate donor-site morbidity in patients who have undergone ACL reconstruction with hamstring tendon graft.
PURPOSE: To develop a self-administered questionnaire for the evaluation of donor-site-related functional problems after ACL reconstruction with autograft harvested from the hamstring tendon or patellar tendon and to determine the content validity, reliability and preliminary factor structure of this new instrument.
METHODS: Seven physiotherapists with long clinical experience of rehabilitation after ACL reconstruction and 60 patients from the target population participated as experts in the developmental stages of the questionnaire. Content validity was determined and quantified with the content validity index (CVI). Test–retest reliability, internal consistency and factor structure were evaluated in another 64 patients reconstructed with an autograft.
RESULTS: The final questionnaire included 16 items on symptoms and function during activities of daily living and exercise. Excellent content validity on both item level (I-CVI __ 0.83, range 0.83–1.00) and scale level (S-CVI = 0.93) was found. The test–retest reliability was good, ICC = 0.94. Internal consistency was high, and Cronbach's __ was 0.92 and 0.94 at each test occasion. The principal components analysis yielded a four-component structure.
CONCLUSIONS: The questionnaire "Donor-site-related Functional Problems following Anterior Cruciate Ligament (ACL) Reconstruction" is a patient-reported questionnaire with high content validity and reliability for the evaluation of donor-site-related functional problems after ACL reconstruction, with autograft harvested from the hamstring tendon or patellar tendon. The results of this study support the use of this questionnaire as a standardized outcome measure for both research purposes and in clinical settings.

P21. SELF-REPORTED QUALITY OF LIFE, KNEE FUNCTION AND ACTIVITY LEVEL IN PERSONS WITH BILATERAL ANTERIOR CRUCIATE LIGAMENT INJURY

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INTRODUCTION: An ACL injury is a severe knee injury that affects quality of life and activity level. The incidence of a subsequent ACL injury is higher than for a first time ACL injury.
PURPOSE: To investigate self-reported quality of life, knee function and activity level in persons with bilateral ACL injury.
METHODS: From 2004 – 2009, 147 subjects, 18-45 years, with bilateral ACL injury were identified through search of hospital records. 83 met the inclusion criteria for the study, having had their first ACL after 1997 and with no other major injuries in the knee joint. 66 subjects (80%), of whom 31 (47%) were women, answered. The mean age was 29.1 (SD 7.2) years. Six questionnaires were used for data collection; Quality of Life assessment in ACL deficiency (ACL-QOL) (1-10 scale), Knee Injury and Osteoarthritis Outcome Score (KOOS)(0-100), Lysholm knee score (0-100), EuroQol (EQ-5D) (0-1 and 0-100), Tegner activity scale (0-10), and a project specific questionnaire with questions about the level of activity and return to sport.
RESULTS: 20% had to change their work or education plans and 92% had changed their training habits due to their ACL injuries. 23% were back to their previous activity and 12% were at the same level as before the ACL injuries. The most common reasons for not returning to the previous activity were reduced function of the knee/knees (38%), a sense of not trusting the knees (24%), and fear of re-injury (18%). The median activity level according to Tegner was 9 (range1-9) before any of the injuries, 7 (range 1-9) after one ACL injury, and 4 (range 1-9) at the time of the study. The median Lysholm score was 82 (range 34-100), 46% had good/excellent results, 38% fair, and 16% poor. EQ-5D index of the overall health status was 0.77 (SD 0.22) and EQ-5D VAS 75.5 (SD 17.6). KOOS sub-scores were: pain 81 (SD 15.9), symptoms 74 (SD 18.8), ADL 91 (SD 9.9), function in sports and recreation 58 (SD 26.6) and knee-related quality of life 53 (SD 21.5). Mean of the ACL-QOL was 5.7 (SD 1.9). There were no differences in the questionnaires between sexes or between subjects who were reconstructed or not.
CONCLUSIONS: Subjects with bilateral ACL injury had changed their activities and activity level considerably because of their knee injuries. They presented worse self-reported quality of life and knee function compared to previously published results for healthy populations and patients with unilateral ACL injury.

P22. THE CLINICAL OUTCOME OF SUBACROMIAL IMPINGEMENT SYNDROME 2-3 YEARS AFTER ARTHROSCOPIC SURGERY, OPEN SURGERY OR NON-OPERATIVE TREATMENT

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INTRODUCTION: The ideal treatment of subacromial impingement syndrome is still controversial.
PURPOSE: To analyze the clinical outcome 2-3 years after arthroscopic, open surgical or conservative treatment.
METHODS: 89 patients with minimum 6 months of subacromial pain and no total rotatorcuff ruptures (ultrasonography verified) were prospectively randomized. During the follow up period, 2 patients died, 8 were lost because of wrong of other diagnosis and 24 declined to participate. Leaving 55 patients attending the examination after median 2.5 years. The arthroscopic group (AG), 19 (7 male/12 female; median age 51 years), the open surgical group (OSG), 15 (7 male/8 female; median age 53 years) and the physiotherapy group (PTG), 21 (13 male/8 female; median age 50 years).
RESULTS: At intervention the groups were comparable in terms of gender, age or duration of symptoms. Both before and 2.5 years after the intervention no significant differences found between the study groups in terms of the Constant score, Watson & Sonnabend score, range of motion and strength measurements. Both surgical groups improved their Constant score significantly ($p<0.001$) at follow-up compared with the pre-operative findings, the corresponding was not found in the PT group. Seven out of 14 questions in the Watson & Sonnabend score improved in the AG, 13/14 in OSG and 5/14 in PTG ($p<0.001$).
CONCLUSION: At 2.5 years after arthroscopic and open treatment, the Constant score improve significantly in contrary to the PT group. However, the study probably suffers a type 2 error because no significant differences were found between the study groups.

P23. NERVE AFFECTION AFTER HIP ARTHROSCOPY - AN UNDERREPORTED COMPLICATION?

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INTRODUCTION: In patients undergoing hip arthroscopy, symptoms of nerve affection is reported in 1-10% of patients after hip arthroscopy, but there is a lack of valid data regarding rate, localization and serverity.
PURPOSE: The primary purpose of this retrospective cohort study was to analyze the rate, localization and severity of nerve affection after hip arthroscopy. The secondary purpose was to study whether nerve affection was related to increased traction time.
METHODS: From March to October 2010 52 consecutive patients (27 males, mean age 40 (21-63) and 25 females, mean age 37(15-60)) underwent hip arthroscopy with labral repair, rim trimming and cheilectomy (osteoplasty). The patients received standardised follow-up questionnaire concerning symptoms of nerve affection one year after hip arthroscopy, regarding sensory disturbance within the last year, possible localisation and erectile dysfunction (males). 50 patients agreed to participate, and returned fully completed questionnaires. Patients reporting symptoms of nerve affection 1 year after hip arthroscopy were all clinically re-examined, including sensory assessment.
RESULTS: 23 out of 50 patients (46%) reported nerve affection symptoms within the first 6 weeks after hip arthroscopy, which was reduced to 12 patients (24 %) at 6 months and 9 patients (18 %) after 1 year. The 9 patients still suffering from nerve affection symptoms after a year, 8 had their symptoms located at the lateral thigh, and 1 had symptoms located at the foot. Re-examinations showed that the area of symptoms at the lateral thigh was mainly located around the portals. One patient experienced temporary erectile dysfunction.
Traction time between patients with nerve affection symptoms (n=16) and patients without (n=27) after hip arthroscopy did not differ (103min vs. 105min).
CONCLUSIONS: 6 weeks after hip arthroscopy symptoms of nerve affection is a common finding, involving up to 46% of patients. Long lasting symptoms (>1 year) of nerve affection can be seen in up to 18% of patients after hip arthroscopy, but these symptoms are primarily reduced sensation around the portals, comparable to those seen with other arthroscopic procedures. Symptoms of nerve affection following hip arthroscopy may be more common than previously reported.

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www.fhi.se/ettfriskaresverige

17-20: LONDON, ENGLAND
6th World Sports Trauma Congress and 7th EFOST Congress
www.wstc2012.com

26: STOCKHOLM
Utbildningsdag Handikappidrottsmedicin: Att träna och tävla med funktionsnedsättning
Mer info om utbildningsdagen finns på www.svenskidrottsmedicin.se under utbildning. Anmälan: kerstin.brodin@shif.rf.se, frågor: jan.lexell@skane.se

NOVEMBER
9-11: TRYSIL, NORGE
Norsk Idrottsmedicinsk höstkongress
www.imkongress.com

12-16: LUND
Steg 2-kurs i idrottsmedicin
www.svenskidrottsmedicin.se

NOVEMBER
16: STOCKHOLM
Kurs Hamstringsmuskulaturen på GIH
Info: Ansvarig: Carl Askling, E-post: caputbrevis@yahoo.se, Mobil: 0703331090

22-23: BURTON-ON-TRENT, ENGLAND
BASEM Annual
www.ba-sem.co.uk/

DECEMBER
10-12: ISTANBUL, TURKIET
17th FINA World Sports Congress
www.finasportsmedcongress2012.com

JANUARI 2013
31-2: KOLDING, DANMARK
Dansk Idrottsmedicinsk årskongress 2013
www.sportkongres.dk

APRIL
20-22: LONDON, ENGLAND
22th International Conference on Sports Rehabilitation and Traumatology
"Football Medicine Strategies for Muscle and Tendon Injuries
www.isokinetic.com
http://www.footballmedicinestrategies.com/

MAJ
12-16: TORONTO, CANADA
ISAKOS Congress 2013
www.isakos.com

Online tillgång till Scandinavian Journal of Medicine & Science in Sports

Visste du att i ditt medlemskap ingår prenumeration på Scandinavian Journal of Medicine & Science in Sports inkluderar tillgång till Internet?

Om du vill aktivera denna tjänst, vänligen kontakta Ann Kristin på Svensk Förening för Fysisk Aktivitet och Idrottsmedicin per e-post:
kansli@svenskidrottsmedicin.se
Skriv på ämnesraden Scandinavian Journal of Medicine & Science in Sports.

CONCEPT
TRÄNINGSREDSKAP AB

concept 2 ROWING

Concept 2 modell E
- Världens bästa roddmaskin!

”Ska du ha en roddmaskin finns inget alternativ, Concept 2 är överlägsen. Själv har jag 2 stycken ...

Lassi Karonen, OS-roddare

SkiErg from concept 2

Concept 2 SkiErg

”Vid Nationellt Vintersportcentrum i Östersund tränar och testar sig Sveriges bästa längdskidåkare och skidskyttar. I vårt styrkelabb är Concept 2 SkiErg en skidergometer som de aktiva anser efterliknar riktiga stakrörelser. Den ger bra feedback på effektutveckling och är mycket lämplig att använda vid olika belastningsnivåer.”

H-C Holmberg, professor och forskningschef
Nationellt Vintersportcentrum

Concept Tester
Concept Utbildningar
Concept Föreläsningar

Vid vårt huvudkontor i Jönköping har vi utbildnings- och testcenter med ett fysiologiskt laboratorium. Där kör vi certifierade utbildningar och professionella tester.
Läs mer på www.concept.se/utbildning

Exempel på tester:
-Kondition
(maximal syreupptagning med ”breath by breath” mätning, mjölksyra tröskel eller submaximala tester
- Viloämnesomsättning, kroppskomposition
- Styrka, rörlighet
Exempel på utbildningar:
-Träningslära för sjukvårdspersonal
-Testledarutbildning
-Bas- och fortsättningskurs i konditionsträning

CONCEPT TRÄNINGSREDSKAP AB

Vi har de senaste träningsprodukterna för hemmet, företaget och gymmet. Vi jobbar med de främsta varumärkena, och de bästa produkterna. Concept erbjuder allt från boxhandskar till kompletta gym av högsta kvalitet. Eriksdalshallen, Sturebadet, SATS och Sportlife är några anläggningar vi är stolta leverantörer till. Besök vår hemsida för komplett sortiment och handla i vår webbshop.

www.concept.se

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