

# SportsMed Update

## Volume 8 (9) 1: 2008

### Contents:

1. In adolescents (14-18 years), the general risk for a cruciate ligament injury of the knee is low (61 per 100 000 person years) but more frequent sports participation (> 4/week) increases that risk, particularly in females
2. In response to neuromuscular fatigue, changes in single-leg landing biomechanics occur that may affect risk of ACL injury, particularly in females
3. Biomechanical testing in the laboratory show that neck collars that restrict range of motion can reduce loads on the cervical spine – collars reduced loads if worn with shoulder pads in the raised configuration
4. In a sample of adolescents, decreased fitness was related to both low levels of physical activity and being overweight - the association between physical activity and fitness was however stronger than that between overweight and fitness
5. In a case series of over 500 elite athletes, routine screening for haematological and iron-related abnormalities generally resulted in a low yield – the most common abnormality was a low serum ferritin (<30ng/ml) (males=0,3%, females=19%)

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.

**In adolescents (14-18 years), the general risk for a cruciate ligament injury of the knee is low (61 per 100 000 person years) but more frequent sports participation (> 4/week) increases that risk, particularly in females**

**Title:** The risk for a cruciate ligament injury of the knee in adolescents and young adults: a population-based cohort study of 46 500 people with a 9 year follow-up

**Authors:** Parkkari J, Pasanen K, Mattila VM, Kannus P, Rimpela A

**Reference:** Br J Sports Med 2008; 42: 422-426

**Type of study:** Prospective cohort study

**Keywords:** injury, knee, cruciate ligaments, risk, adolescent

**EB Rating:** 8/10

**CI Rating:** 8/10

**Background:** Although knee injuries are common in adolescents, the incidence and risk factors for knee injuries – in particular severe injuries to the cruciate ligaments – are not well documented

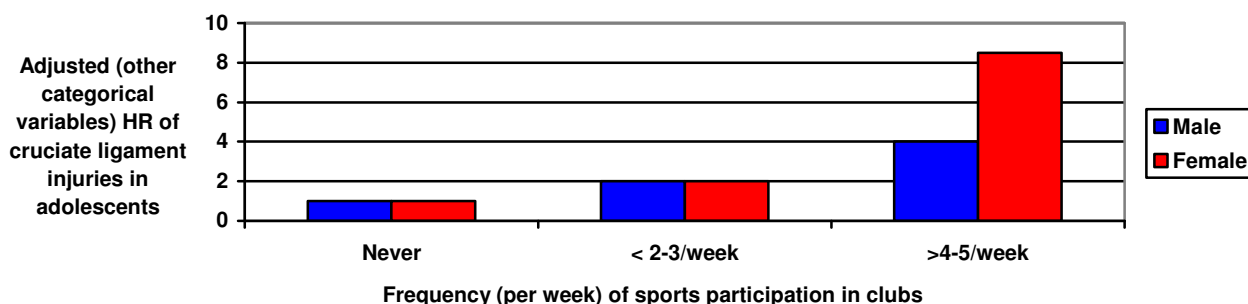
**Research question/s:** What is the incidence and what are the risk factors for major knee ligament injuries in an adolescent population?

**Methodology:**

- Subjects: 46 472 adolescents (female=25 099, age 14-18 yrs) (part of the Adolescent Health and Lifestyle Survey study in Finland)
- Experimental procedure: Baseline data using a questionnaire (78% response rate) were collected and subjects were then followed for an average of 9 yrs. Physical activity variables (including participation  $\leq 3$  times per week or  $\geq 4$ -5 times per week) and other categorical variables were recorded. All the subjects requiring hospitalization with the diagnosis of anterior or posterior cruciate ligament injury (CL= ACL or PCL) were included - 265 (0.6%) subjects (male=194, female=71) were treated for CL injury during the follow-up
- Measures of outcome: Incidence (per 100 000 person yrs) of CL injuries, risk factors for CL injuries

**Main finding/s:**

- Incidence of CL injuries: The overall incidence of CL injury was 60.9/100 000 yrs (95% CI 53.6-68.2) (males=96.6, female=30.0)



**Conclusion/s:**

- In adolescents (14-18 years), the general risk for a cruciate ligament injury of the knee is low (61 per 100 000 person years) but more frequent sports participation (> 4/week) increases that risk, particularly in females

**Methodological considerations:**

Well conducted study, generally good response rate, injuries treated as outpatients were not included, other intrinsic risk factors were not assessed

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.

## In response to neuromuscular fatigue, changes in single-leg landing biomechanics occur that may affect risk of ACL injury, particularly in females

**Title:** Gender differences in lower extremity landing mechanics caused by neuromuscular fatigue

**Authors:** Kernozek TW, Torry MR, Iwasaki M

**Reference:** Am J Sports Med 2008; 36(3): 554-565

**Type of study:** Case control study with intervention component (laboratory)

**Keywords:** gender, landing, fatigue, biomechanics, knee injury, ACL, neuromuscular fatigue

**EB Rating:** 7.5/10

**CI Rating:** 7/10

**Background:** It has been suggested the development of neuromuscular fatigue could alter lower limb biomechanics during landing thus increasing the risk of ACL injury – this may also differ between males and females

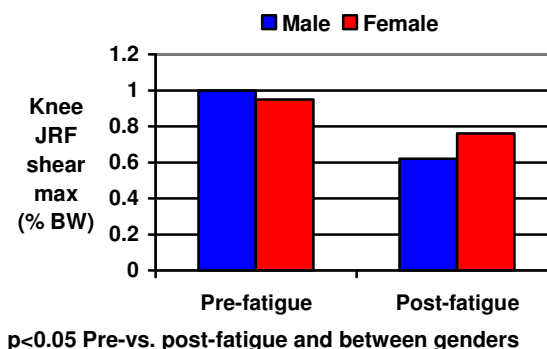
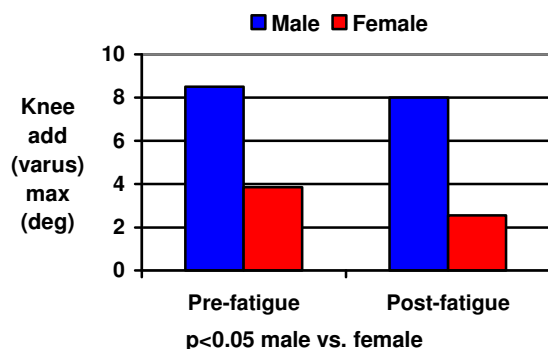
**Research question/s:** Are there changes in lower extremity kinematic and kinetic differences during drop landings after neuromuscular fatigue, and does this differ in males compared with females?

### Methodology:

- Subjects: 14 female (23.0±0.9 yrs) and 16 male (23.8±0.4 yrs) non-injured, recreational athletes
- Experimental procedure: All the subjects were assessed in a laboratory and performing single-legged 50-cm drop landings pre-fatigue and post-fatigue (fatigue induced by a parallel squat exercise - 60% of 1RM) repetition maximum) until failure. Inverse dynamic solutions estimated lower extremity (hip, knee, ankle) flexion-extension and varus-valgus (knee) kinematics and kinetics
- Measures of outcome: Differences (pre-.vs. post-fatigue) (males vs. females) in lower limb biomechanics (hip knee ankle) (mixed-model, repeated-measures analysis of variance)

### Main finding/s:

- Hip: There was increased hip flexion post-fatigue in males and this was greater in females (main effect fatigue,  $p=0.012$ ; main effect gender,  $p=0.001$ )
- Knee: Fatigue caused greater peak knee flexion in males (not females), greater knee anterior shear force in females (not males) and lower knee extension moments and knee abduction moments in males and females



### Conclusion/s:

- In response to neuromuscular fatigue, changes in single-leg landing biomechanics occur that may affect risk of ACL injury, particularly in females

### Methodological considerations:

Measurements do not necessarily reflect forces in the ACL, recreational athletes were used

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.

## Biomechanical testing in the laboratory show that neck collars that restrict range of motion can reduce loads on the cervical spine – collars reduced loads if worn with shoulder pads in the raised configuration

**Title:** Biomechanical analysis of football neck collars

**Authors:** Rowson S, McNeely DE, Brolinson PG, Duma SM

**Reference:** Clin J Sport Med 2008; 18(4): 316-321

**Type of study:** Controlled laboratory study

**Keywords:** injury, neck, collar, biomechanical testing, stinger, football, brachial plexus

**EB Rating:** 7.5/10

**CI Rating:** 7/10

**Background:** Neck collars are frequently worn by American football players to prevent neck injuries – yet these collars have not been tested in a laboratory setting to determine their effectiveness to protect the cervical spine

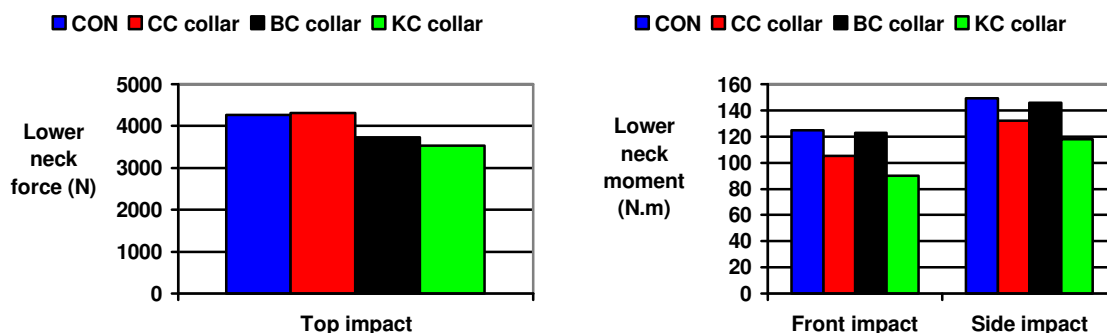
**Research question/s:** What are the load-limiting capabilities of protective neck collars that are used in American football through dynamic impact testing?

### Methodology:

- Material: Three neck collars (Cowboy Collar-CC, Bullock Collar-BC, and Kerr Collar-KC)
- Experimental procedure: 48 dynamic impact tests were conducted in a laboratory setting using a dummy (50<sup>th</sup>-percentile male Hybrid III dummy). Each of the three collars and a control (CON) test were conducted at 2 velocities (5 m/s and 7 m/s), 3 impact locations (front, top, side of the helmet), and 2 shoulder pad positions (normal, raised). Biomechanical variables including head acceleration, force transmission and neck moments (upper and lower neck) were determined
- Measures of outcome: head acceleration, force transmission, moments in response to 3 impact locations

### Main finding/s:

- Overall collars performed better when shoulder pads were in the raised configuration
- The KC collar restricted range of motion in all planes which resulted in load reductions in all impact directions
- Results by impact location: 1) Top - compared with the CON, the KC and BC reduced head accelerations and force transmission through the neck, 2) Front - all 3 collars reduced lower neck moment, and the KC reduced lower neck force and upper neck moment, 3) Side - lower neck moment was reduced by the KC



### Conclusion/s:

- Biomechanical testing in the laboratory show that neck collars that restrict range of motion can reduce loads on the cervical spine – collars reduced loads if worn with shoulder pads in the raised configuration

### Methodological considerations:

Well conducted study, laboratory study

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.

## In a sample of adolescents, decreased fitness was related to both low levels of physical activity and being overweight - the association between physical activity and fitness was however stronger than that between overweight and fitness

**Title:** Physical fitness in adolescents with normal weight and overweight

**Authors:** Fogelholm M, Stigman S, Huisman T, Metsamuuronen J

**Reference:** Scand J Med Sci Sports 2008; 18: 162-170

**Type of study:** Cross sectional study

**Keywords:** adolescents, fitness, physical activity, overweight, BMI

**EB Rating:** 6.5/10

**CI Rating:** 7/10

**Background:** Childhood obesity is an increasing public health concern and the relationship between physical fitness, overweight and low levels of physical activity in adolescents deserves attention

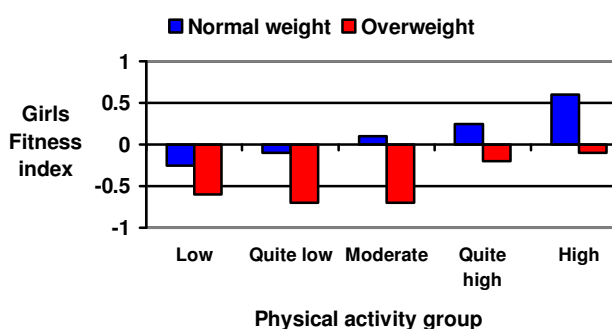
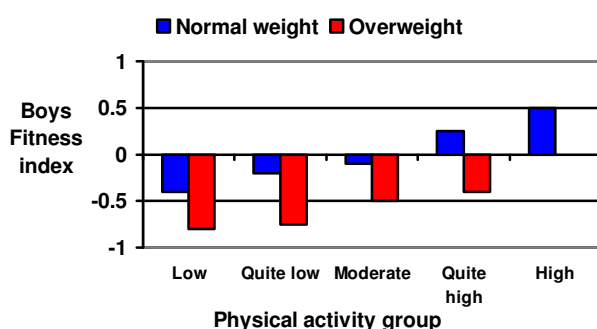
**Research question/s:** What is the association between physical fitness and 1) being overweight (BMI  $\geq$  85<sup>th</sup> percentile) and 2) physical inactivity in adolescents?

### Methodology:

- Subjects: 2266 adolescents (15-16 yrs) (male=1120, female=1146)
- Experimental procedure: all the subjects completed questionnaires and underwent fitness assessments (sit-ups, sit-and-reach, five-jump, back-and-forth jumping, ball skills, co-ordination and endurance shuttle run tests) from which a fitness index (FI) was calculated. Overweight was defined by BMI (BMI  $\geq$  85<sup>th</sup> percentile using self-reported height and weight) while physical activity (PA) was assessed using self-reported frequency and duration of exercise resulting in sweating during organized and non-organized activity (low, quite low, moderate, quite high, high).
- Measures of outcome: Prevalence (%) of overweight, relationship between FI and OW and FI and PA

### Main finding/s:

- Prevalence of overweight: 17.3% males and 11.8% females were OW
- Physical activity (PA) was related to all fitness tests ( $p \leq 0.005$ ), and OW was related to all fitness tests ( $p < 0.002$ ), except for the sit-and-reach test – however, the association between PA and fitness was stronger than that between OW and fitness (linear regression models)
- The strongest association between fitness variables and PA were for sit-ups, endurance shuttle-run and fitness index



### Conclusion/s:

- In a sample of adolescents, decreased fitness was related to both low levels of physical activity and being overweight - the association between physical activity and fitness was however stronger than that between overweight and fitness

### Methodological considerations:

Well conducted descriptive study, narrow age range, self-reported data

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.

**In a case series of over 500 elite athletes, routine screening for haematological and iron-related abnormalities generally resulted in a low yield – the most common abnormality was a low serum ferritin (<30ng/ml) (males=0,3%, females=19%)**

**Title:** Screening for haematological and iron-related abnormalities in elite athletes – Analysis of 576 cases

**Authors:** Fallon KE

**Reference:** J Sci Med Sport 2008; 11: 329-336

**Type of study:** Case series

**Keywords:** elite athletes, blood tests, screening, haematology, iron

**EB Rating:** 6/10

**CI Rating:** 7.5/10

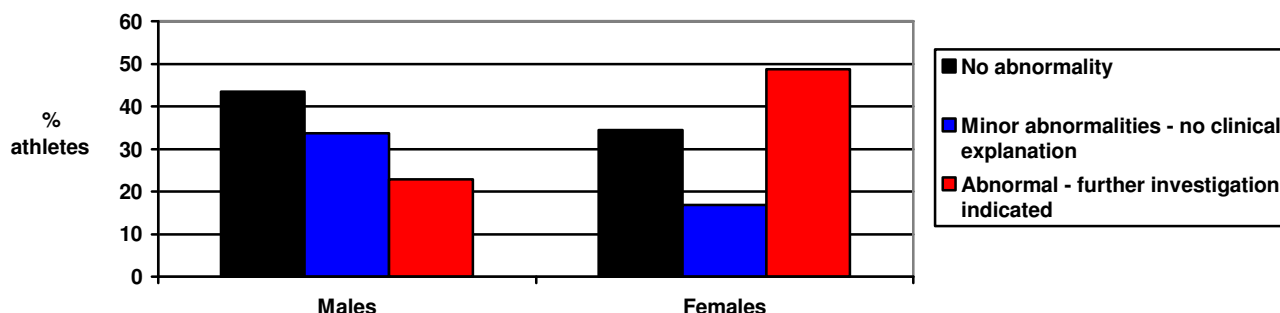
**Background:** Elite athletes undergoing regular medical assessments routinely have blood tests for haematological variables – however, the value of performing these tests in detecting abnormalities has not been well documented

**Research question/s:** What is the clinical and performance related utility of performing haematological and iron-related screening in elite athletes?

**Methodology:**

- Subjects: 576 elite athletes (male=303, female=273)
- Experimental procedure: Over a 3 yr period, all the athletes underwent routine medical screening which included a standard medical consultation and blood tests (full blood count and iron-related variables). Criteria used for iron supplementation was a serum ferritin < 30 ng/ml. Athletes were divided into 3 groups: all results normal, results abnormal with no clinical explanation and results abnormal with an explanation on the basis of clinical findings.
- Measures of outcome: Red blood cell abnormalities, white cell and platelet abnormalities, iron-related abnormal variables

**Main finding/s:**



- Iron supplementation (serum ferritin < 30 ng/ml): males=3%, females=19%)
- Disorders identified which were not expected following the clinical assessment: males=0.3%, females=0%
- Clinically non-significant abnormalities in males and females were generally minor - isolated reductions in haemoglobin and/or haematocrit, and alterations in red cell parameters or single measures of iron status

**Conclusion/s:**

- In a case series of over 500 elite athletes, routine screening for haematological and iron-related abnormalities generally resulted in a low yield – the most common abnormality was a low serum ferritin (<30ng/ml) (males=0,3%, females=19%)

**Methodological considerations:**

Descriptive study, parameters not linked to performance

**Produced and distributed by MPAH Medical cc, Copyright 2008**

The statements and opinions contained in the summaries of *SportsMed Update* are solely those of the individual authors and contributors and not of any organization or MPAH Medical cc. The information contained in summaries should never be used as a substitute for clinical judgment. The appearance of any promotional material in *SportsMed Update* is not a warranty, endorsement or approval of the products or services advertised or of their effectiveness, quality or safety. SportsMed Update, and the publisher, MPAH Medical cc, disclaims responsibility for any injury or illness to persons or damage to property resulting from any ideas or products referred to in the summaries or advertisements.