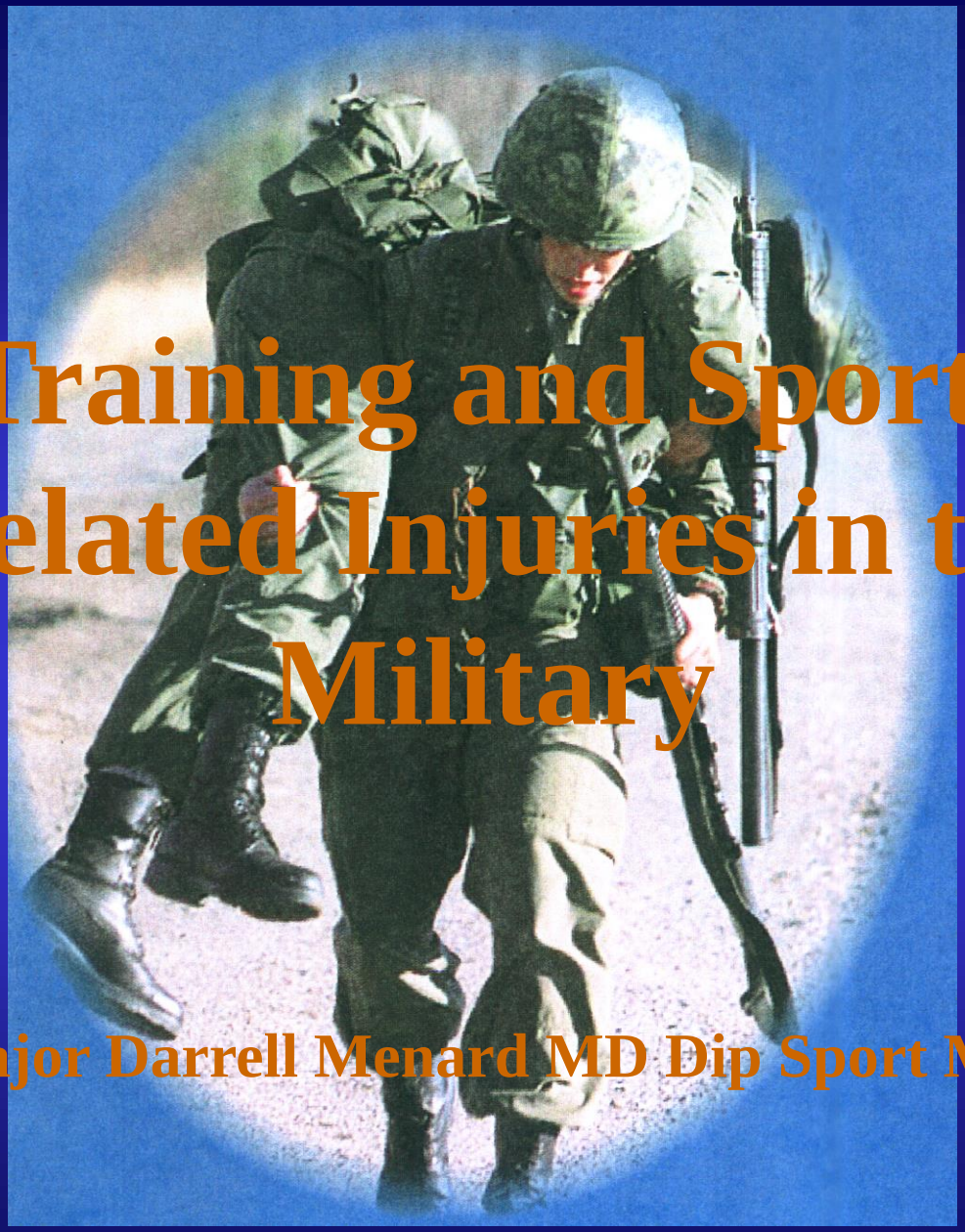

Training and Sports Related Injuries in the Military

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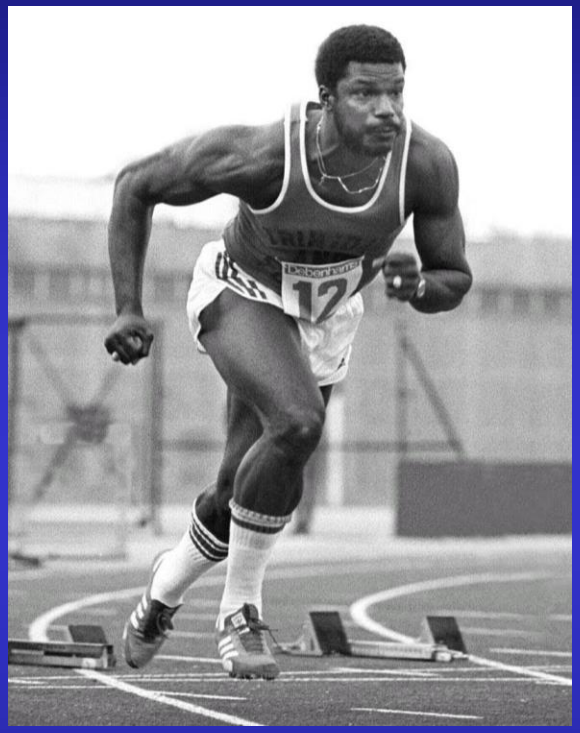
STRENGTHENING THE FORCES
ÉNERGISER LES FORCES

Basic Concept



Think of soldiers as

Athletes in Uniform

Introduction

Torn ACL

- Military MSK injuries do not differ significantly from civilian injuries
- The **culture** these injuries occur is unique - physicians dealing with military patients must understand this!
- Example: an ACL tear won't threaten a Nortel clerk's employment but could be a career ending injury for a military clerk

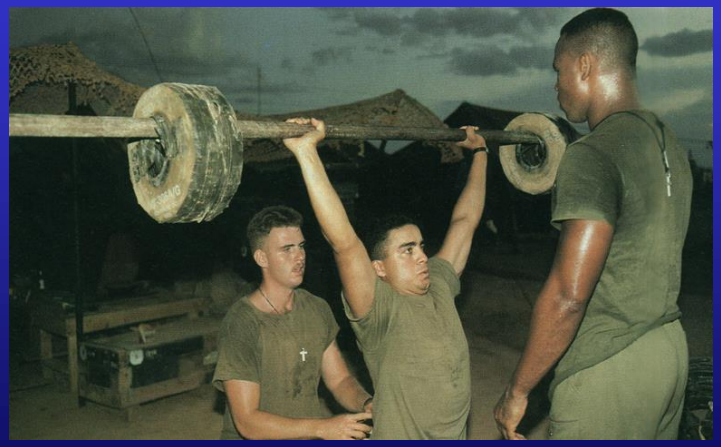
Cultural Issues

- Universality of Service
- Traditions – reluctant to change
- Machismo
- Running mentality
- Punish with exercise
- Training extremes – Pathfinders Course
- Train as a team verses individual needs
- Under educated unit physical training staff
- Lack of fitness leadership

	Elite Athlete	Soldier
Consequences of Failure	Disappointment	Death/disability
Consequences of Doping	Embarrassment/suspension	May ↑ chances of survival
Playing field	Intense	Hostile
Events	Very predictable	Highly unpredictable
Equipment	Best money can buy	One size fits all
Decision to compete	Individual choice	Tasked
Team Selection	Competitive process Years of dedicated training	Its your turn On team after 13wks
Failing to make team	Disappointment	May be positive – less risk, more family time
Event duration	1-2 weeks	6-12 months
Preparation time	Years of dedicated training	Could be only days
Dietary Supplements	Risk of banned substances	Operational safety issues
Team roles	Only athletes compete	All team members expected on battlefield
Training Program	Highly individualized	Often done in groups
Facilities	Excellent	Excellent

What do we know?

- We currently know very little about the rate of training and sports-related injuries in the CF
- Completing a study on injuries in the CF that will allow us to categorize them, quantify them and identify trends
- The following provides us with some indication of the extent of the problem:



Injury trends during deployed operations

- Battlefield injuries are the most devastating but currently create a relatively small burden
- Physical training and sports related injuries are the leading cause of injuries in deployed personnel.
- Often due to the **“New Year’s Resolution”** attitude of personnel arriving in theatre in less than ideal physical condition

2004 HLIS Data

Repetitive Strain Injuries:

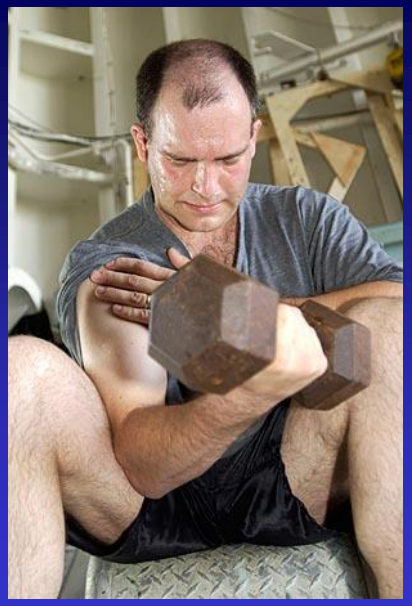
- 28% of CF sustained an RSI serious enough to limit normal activity in previous year (26% M, 30% F)
- Rate higher than general population
- Incidence↑ with 3 variables: ↑ age, female, army
- 58% occurred during sports, physical training or adventure training
- Only 6% were battle related

2004 HLIS Data

Acute Injuries:

- 26% of CF had an acute injury serious enough to limit normal activity in previous year (26% M, 23% F)
- Rate also higher than general population
- Incidence↑ with 3 variables: ↓ age, male, army
- 53% occurred during sports, physical training or adventure training
- Only 4% were battle related

2004 HLIS Data



Physical Activity:

- Only 40% of CF personnel are physically active
- 33% of CF personnel are physically inactive
- Since 2000, activity levels in CF ↓ while they ↑ in the general population
- Barriers to activity:

  86% have access to exercise facilities

  90% have showers available

  55% have exercise classes at work

  76% are given time off to exercise at work

2004 HLIS Data

Physical Inactivity:

- 81% of CF personnel work in jobs requiring little or no physical activity
- 40% have completely sedentary jobs
- Only 5% do heavy work
- Average CF member spends 24 hrs/wk watching TV, on internet, playing video games or reading

2004 HLIS Data

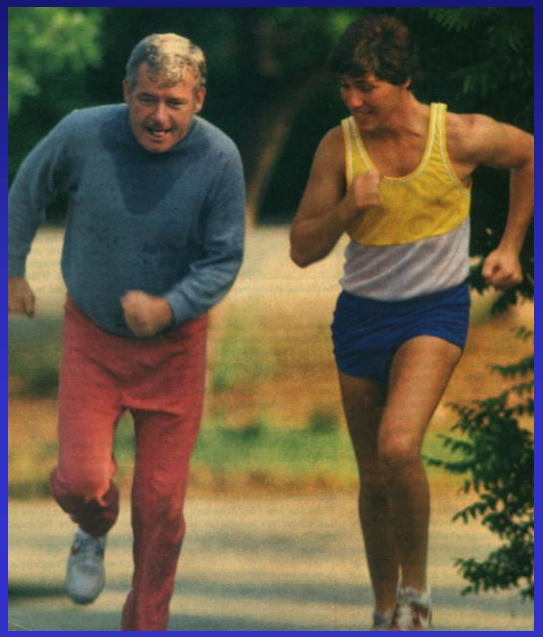
Body Mass Index:

	Underweight (BMI <18.5)		**Normal** (18.5-24.9)		**Overweight** (BMI 25-29.9)		**Obese** (BMI 30+)	
	M	F	M	F	M	F	M	F
HLIS 2000	**0**	**1**	**29**	**55**	**51**	**31**	**19**	**12**
HLIS 2004	**0**	**1**	**26**	**58**	**52**	**28**	**22**	**13**

2004 HLIS Thoughts:

- CF members sustain more acute and repetitive strain injuries than civilians
- Most of these injuries occur during sports or physical training
- Inactivity and obesity are major issues in what should be a operationally ready organization
- Many injuries occur when: **“The physically unprepared are required to perform”**

Common injury causes



- Lack of fitness – by far #1
- Failing to rest
- Participating while injured
- Lack of experience
- Lack of control over personal fitness program - RHIP
- Aggressiveness play – unit pride
- Failing to wear protective equipment – goggles, helmets, masks, elbow pads, etc.

Protective equipment may not have helped here!

Common Injury Causes

- Enormous operational performance demands:
  - Load carriage ≥138lbs
  - Minimal sleep
  - No food
  - Limited water
  - High altitude
  - Extreme temperatures
  - Environmental hazards – insects, snakes, scorpions, explosive devices, enemy forces

Common injury causes

- 2's Disease: too much, too fast, too heavy, too many times – too soon!
- Failing to bridge
- Old injuries returning to haunt you
- Athletic mind set – I'm invincible!
- Crash course preparing for fitness testing
- Returning too soon from being injured

Common injury causes

- Injury promoting practices:
  - Running with rucksacks
  - Running in combat boots
  - Running with bloused pants
  - Airborne push-ups
  - Water restrictions
  - Excessive load carriage
  - Australian repelling

Ignoring Injuries

- Military personnel may hide injuries for several reasons:
- Career concerns: fears of
  - Medical category – T-Cat or P-Cat
  - Loss of career
  - Loss of deployment or posting or income
  - Course failure

- Real men don’t get injured – the Rambo Factor
- Lack of trust in CF leadership and medical team

Load Carriage

- Soldiers are battlefield beasts of burden
- Prior to 18th Century soldier loads rarely exceeded 15kg
- Horses, donkeys, carts and vehicles were used to ↓ loads
- Modern concept – "One soldier one kit"
- Technology has greatly ↑ soldier load:

Body armour	Food/water
Night vision goggles	Survival gear
Sleeping gear	GPS
Communications	Helmet
Weapons/ammunition	Boots

Load Carriage

- Some troops in Afghanistan are carrying loads ≥ 63kg
- Recommended limit is 30% body weight – that's 30kg for a 100kg soldier
- Carrying heavy loads creates enormous energy demands that can significantly ↓ a soldier's ability to fight and fire a weapon effectively
- These loads also place incredible strain on discs, articular cartilage, joints, muscles, tendons, etc

Load Carriage

- Excessive loads may explain why 53% medical evacuations from Iraq are for LBP
- Only 17% of medical evacuations are for battle-related injuries
- Back pain is a major problem in the CF
- Rucksack design, load distribution and load location – all affect how much one can safely carry
- Females are disadvantaged with smaller body sizes and the rucksacks were designed for men

Load Carriage

- “On the field of battle man is not only a thinking animal , he is a beast of burden. He is given great weights to carry. But unlike the mule, the jeep, or any other carrier, his chief function in war does not begin until the time he delivers that burden to the appointed ground…In fact we have always done better by a mule than by a man. We were careful not to load the mule more than a third of its weight.”

Colonel S.L.A. Marshall 1950

Female Issues

- **Equal opportunity** and **gender free** military training are major advances for women but they come with a price tag
- Women are at higher injury risk from the time they join the military
- This is a big issue when 11% of CF and 15% of the US Armed Forces are female

Female Issues

Factors contributing ↑ injury rate:

- Shorter stature – still have to carry full kit
- Lower upper body strength – urban warfare
- Shorter stride length – keeping up with males forces them to weight bear at the extremes of joint motion
- Poor fitting equipment – designed for men
- Group training – women often working closer to physiological maximum
- Urination in the field - no facilities no privacy! To avoid many women drink less even in very hot environments

Female Issues

Factors contributing ↑ injury rate:

- Marching at back of platoon
- More frequent running
- Inadequate energy intact
- Menstrual irregularities
- Smoking
- Physical activity level prior to basic training

Female Issues

- Stress fractures are common in the militaries of the world
- Very common during recruit training
- Females recruits at 2½ - 4 x greater risk
- Pelvis, femoral and tibial stress fractures are most common in females
- Very costly in terms of delayed training and medical release of personnel

Female issues

- Injury reduction solutions include:
  - Training women separately
  - Smallest female leads marching/running – ↓ stride length
  - Progress training more slowly
  - Lower impact activities to build aerobic fitness
  - Ensure adequate energy intake
  - Ensure females are fitter prior to recruit training

Poor Protoplasm

- Many militaries note ↓ in recruit fitness
- 5’ 0” 242lb female reported for recruit training – unable to do 1 push-up or sit-up and failed stage 2 of the 20 MSR
- March 2006, 19 year old died during a fitness test in the first week of recruit training
- Basic training is so streamlined, instructors lack the time to get someone who arrives unfit to be fit before graduation

“Nintendo to Commando in 13 weeks”

Predictors of Injury in US Recruits

- Low fitness on arrival – especially aerobic fitness
- Smoking and alcohol use
- Short stature
- Menstral disturbances
- ↑ body weight
- ↑ body fat
- ↓ Leg strength
- Female gender – ↑ risk x 2
- Slower running times
- Amount run during basic training – risk ↑ proportionally

Poor Protoplasm

- Many people show up for recruit training with body tissues that are unprepared for the physical stresses they will be subjected to

- These unprepared tissues include:

Bone	**Tendons**
Muscles	**Fascia**
Cartilage	**Ligaments**

Poor Protoplasm

- Recruits can be victims of their own physiology
- Body tissues do not respond to training stimuli in a uniform manner
- Heart and lungs improve their function much faster than MSK structures can adapt
- At ~ 4-6 weeks the heart and lungs are ready to go while MSK structures are at their weakest

Poor Protoplasm

- As a result of these differing rates of adaptation, militaries worldwide had a recruit training injury pattern with a peak in the 4th week of training

- By making the 3rd week of recruit training a **low impact** week, this peak has disappeared

Poor Protoplasm

Unfit recruits create many problems:

1. Often injured during recruit training
2. Often arrive at home unit injured
3. Frequently cannot handle unit training
4. Have poor exercise habits
5. Often lack basic sport skills
6. ↑ demands on fitness/medical staff

Running in combat boots!

- CF personnel have traditionally run in combat boots
- The US and Israeli Armed Forces recognize this as dangerous and prohibit it
- US Army Regulation 350-41 states that **“The preferred shoe for running is a running shoe.”**

Running in combat boots!

- Combat boots are designed for marching and as such are a good piece of kit
- Running in combat boots↑ the potential for injury in an activity with a high injury potential
- Designing a combat boot that is better for running – will produce a boot that isn't good for marching or running

Running in combat boots!

Combat boots ↑ injury rates because of:

- Poor shock absorbing properties
- Poor flexibility
- Provide no biomechanical corrections
- Compress lower leg tendons
- ↓ traction on icy surfaces

Running in combat boots!

Arguments for running in combat boots:

- You wear them in battle - you should do all your training in them – fine for short sprints to safety but soldiers don't run 10K into battle
- Combat boots are heavy and so provide a greater training stimulus – true but this gain is substantially outweighed by the ↑ injury rate due to:
    - reduced shock absorption
    - altered running biomechanics

Running in combat boots!

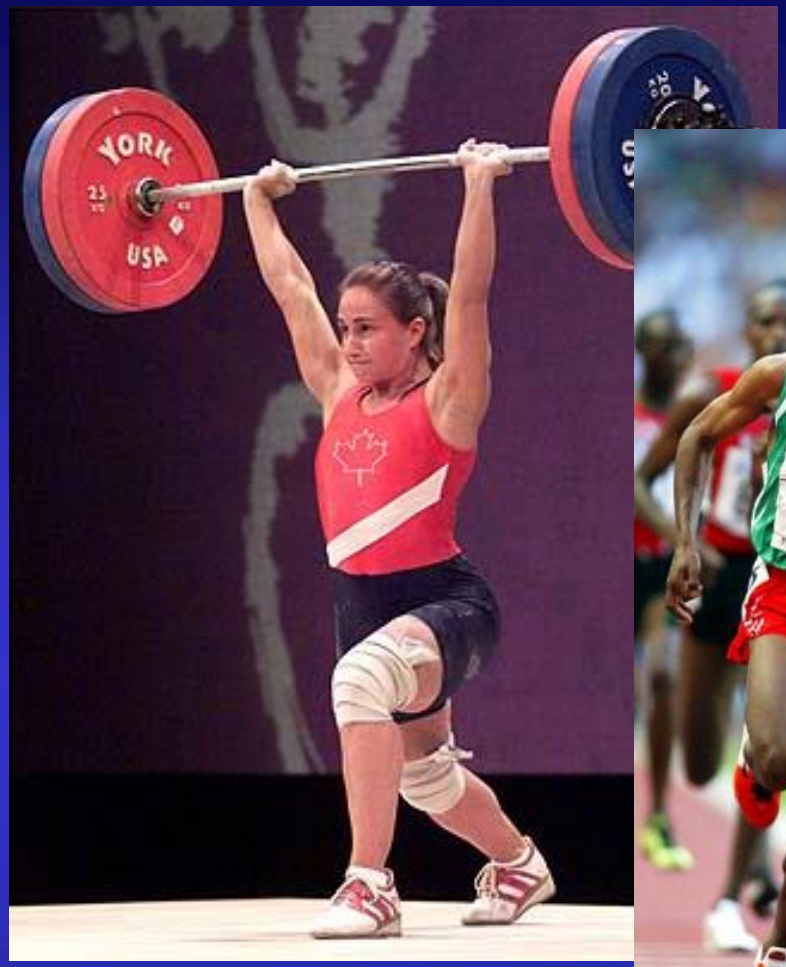
Bottom Line:

- Running in combat boots provides no operationally significant training benefit while exposing participants to an ↑ risk of injury
- Based on the above: the General of the Army banning the practice of running in combat boots.
- Despite the above some units still do this dangerous activity

Kabul 2003

Conclusion

- Training and sports-related injuries are very common in the military
- Important to understand military culture
- Unfit personnel get injured – especially recruits
- Females are at higher risk of injury
- Load carriage needs to be reduced
- No running in combat boots
- Think of soldiers as athletes in uniform!



Exercise is Medicine!