Endurance Running

Ultra and Extreme Weather Conditions

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Endurance Races

• Event exceeding 6 hours or >26.2 miles
• Extremes conditions
  – Temp (-30 to 56c)
  – Altitude
  – Terrain (isolation, desert, glacier…)
• Competitors are willing to overcome something that appears to be seemingly impossible (physically and mentally)
Toughest Ultra Runs

Jungle Marathon, Brazil 254km

Yukon Artic Ultra, Canada 700km
-12C/-25C

Dragon’s Back Race, Wales, 300km

Tor des Geants, Italy 336km

15,000 m

24,000 m
Ultra-Marathon

- Increased in popularity
- 70,000 people participate around the world
- Western States Endurance Run (100 miles)
  - Increased 289% last 10 years
  - Lottery system 10,000 participants
- Leadville 100 (sold out within 24h)

Women Ultra Running Personality

- 334 female ultra runners
- 75% had a full time job
- Average 12h week training
- **Overall motivation**
  1. Physical health
  2. Psychological motives (self esteem, life meaning, inner peace)
  3. Achievements
  4. Social recognition was the least motivation
- **Goal-oriented**
  - Task-oriented (time, age group place etc)

Safety Requirements

- Body cover for appropriate weather conditions
- Clothing: BE READY FOR TEMP CHANGES! – Layering (inner, middle and outer)
- Map, compass, whistle, emergency food
- FATALITIES

Two runners dead after storm overtakes extreme Zugspitze race.

Published: 14 Jul 2008 09:36 GMT+02:00
Updated: 14 Jul 2008 09:36 GMT+02:00
Hospitalizations during & after Ultra Competitive Event

• **Dehydration**
  – Heat exhaustion
  – Electrolyte disturbance (hyponatremia)
• Fractures or dislocations
• Skin Injuries
  – Blisters and wounds
• Concussions

Exercise-Associated Hyponatremia (EAH)

• Leading cause of preventable mortality in endurance activities
• Normally occurs during or 24h after prolonged physical activity
• Serum Na <135mEq/L
• High incidence of “asymptomatic hyponatremia”
  – 100 miles race- prevalence 30-51%
  – Marathons 13%
• Symptomatic Hyponatremia
  – Mental status changes resulting from cerebral edema (EAHE)
  – 23% of symptomatic athletes seeking medical care in Ironman

If 500,000 runners participate in 375 Marathons annually in the USA and the incidence of EAH is 13%, 50,000-60,000 runners are at risk of developing EAH in Marathons alone.
PRIMARY ETIOLOGY

Nausea-Vomit
Pain-Emotion
Hypoglycemia

Excessive water intake

Inappropriate AVP secretion

Exercise Associated Hyponatremia

Minor factors:
- Sweat sodium loss
- Inability to mobilize sodium stores
- ANP/BNP elevations
- Rapid absorption of water from GI tract
Athlete Related Risk Factors for EAH

- Excessive drinking
- Low body weight
- Females
- Slow running
- Event inexperience
- NSAIDs
EAH Signs and Symptoms

- Bloating
- Puffiness
- Headache
- Nausea/Vomiting
- Confusion
- Disorientation
- Coma
- Death
Treatment Symptomatic EAH

- Restrict fluid intake until the onset of urination
- Seek medical attention if symptoms worsen
- IV isotonic or hypertonic fluid administration
- Avoid hypotonic fluids
  - Fluid overload
Extreme Weather

Marathon Des Sables, the Toughest Footrace on Earth

- Athletes must be self-sufficient and carry everything but the water
- Multistage over a distance of 240km
- 30C degree temp day and 12C night
Exertional Heat Stroke (EHS)

- Temperature >40°C (105°F)
- Central Nervous System Dysfunction
- Multisystem organ failure often results if the hyperthermia is not treated immediately.

Symptoms:
- Heat cramps
- Diarrhea
- Headache
- Nausea, vomit
- Collapse and Coma

Treatment: COOL (reduce core temp)
- Ice water immersion
- Ice water soaked towels

Ultras in Artic Conditions

Hypothermia:

- Temperature <35°C (95°F)
  - Lean athletes
  - <11 y/o or >60 y/o
- Clinical symptoms
  - Shivering
  - High Blood Pressure
  - Apathy
  - Amnesia/Cardiac Irregularities
  - Ventricular Fibrillation
- Treatment
  - Remove clothes and rewarm the athlete
  - Heat trunk over the extremities

Frostbite:
- Tissue freeze
- Avoid Petroleum Jelly (increase risk of frostbite)

Symptoms
- Edema, redness, transient tingling or numbness
- Vesicles, anesthesia

Treatment
- Evaluate patient for hypothermia
- Rewarming should be performed only if it is certain that refreezing will not occur
- Clear the blisters
- Splint the limb and elevate
- Delay surgical debridement
Injuries

- ULTRA Study
  - Ultra running Longitudinal Tracking
  - Began in 2011
  - 3000 ultra runners
  - 64% reported exercise-related injury

Prevalence of Injuries:
- **Knee**
  - Patellofemoral/ ITB
- Calf Strain
- Ankle Sprain
- Plantar Fasciitis
- Stress Fractures (incidence 5% annually)
  - Less common than marathoners and shorter distance runners
  - **48% foot**

Risk Factors

- Less experienced
- Less focused on running
- High intensity (don’t do easy runs)

Stress Fractures
  - Woman
  - Longer distance
  - Less resistance training
  - High intensity training
  - Female Athlete Triad
    - Low energy availability
    - Menstrual irregularities
    - Osteoporosis

In runners, stress fractures tend to be more common than in all other sports.

Conclusion

• Ultra running is becoming more popular
• Preparation and safety measures are key to prevent fatalities
• Competitive Events
  – Foot injuries (blisters, wounds)
  – EAH
  – Heat Stroke
  – Hypothermia/Frostbite
• Overuse Injuries
  – Lower extremities (knee, calf, stress fractures)
Appreciation is born through struggle.