Triathlons & the Recreational Athlete:
What you Need to Know About Training, Injuries, and Equipment

EATA Annual Meeting, Buffalo, NY
January 5th, 2013

Christine Jenkins, MS, ATC - Hudson Valley Community College, Troy, NY
Todd Shatynski, MD, CAQSM – Capital Region Orthopaedics, Albany, NY
What do you Know?

- % of first timers at Ironman events?
- Most Common Triathlete Injury?
- How Many Deaths in last 2 years?
- At what Distance?
- During which Discipline?
Why This Matters

- Increased popularity
- If you haven’t already, you WILL see these athletes
- People are dying
- Opportunities for ATC’s

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**Triathlete Dies in NYC Ironman**
Aug 12, 2012 5:59 AM CDT

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**Athlete Dies Competing in Swim Leg of Triathlon**
By MARC SANTORA
Published: August 11, 2012

An athlete competing in New York City's first Ironman triathlon died Saturday morning during the 2.4-mile swim in the Hudson River, the first stage in the grueling 140-mile race, according to the police.

The swimmer, identified by the police only as a 42-year-old man, was taken to a hospital in New Jersey but did not survive. An autopsy was being performed, the police said.

A witness said she watched as emergency workers tried to revive the man after pulling him from the water, not far from the finish line at Ross Dock on the New Jersey side of the river.

“He still had his wet suit on,” said the witness, Nancy Hartwell, who was there to watch another competitor, her husband, race. “I had never seen anyone do chest compressions before.”

Last summer, two people died during the swimming portion of the Nautica New York City Triathlon. Another racer in a city triathlon died in 2008.

John Korff, one of the organizers for the Ironman United States Championship in New York and New Jersey, said every precaution had been taken to ensure the safety of the athletes.
Why Listen to Us?

- Me - triathlete since 2005 – 1 IM
  - Endurance101.com
  - Professor of Sports Nutrition, Kinesiology, A&P

- Todd Shatynski, MD – triathlete since 1997 - 3 IM
  - Sports Medicine Physician
  - Presented on triathlons
  - IMLP 9:38:44
The Basics

- **Sprint**
  (0.5m Swim, 12m Bike, 3.1m Run)

- **Olympic**
  (0.9m Swim, 25m Bike, 6.2m Run)

- **½ Ironman (70.3)**
  (1.2m Swim, 56m Bike, 13.1m Run)

- **Ironman (140.6)**
  (2.4m Swim, 112m Bike, 26.2m Run)
Growth/Participation
Growth in Ironman Brand Events

**Full Ironman Events Worldwide**
- 2004: 15
- 2012: 30

**70.3 Events Worldwide**
- 2006: 10
- 2012: 70
It’s More than the Ironman Corp.
Club Teams

Youth Movement

Capital District Triathlon Club

NHS TRI
NATIONAL HIGH SCHOOL TRIATHLON ASSOCIATION
NHSTRI.COM

Saratoga Triathlon Club

31 States

Northeast Collegiate Triathlon Conference

21 College/University Teams
Number of Triathletes According to Full Year USAT Memberships from 1993-2010

Source: USAtriathlon.org
USAT Adult Membership by State - 2011

Source: USAtriathlon.org
Triathlon & the Inevitable Injury
Difficult to Measure

- Inconsistencies in reporting
- Small sample sizes
- Limited population
- Multifactorial
Injury Epidemiology

- McHardy et al, 2006
- Analysis of studies (1966-2005)
- Running: 58-72%
- Cycling: 25-34%
- Swimming: 12-18%
Epidemiology of Injury

- *Burns J. et al., 2003*
- Study of 131 Australian triathletes (all levels, avg age 33.7)

**Preseason:**
- **2.5** injuries p/1,000 hours training
- 71% from running, 75% lower extremity

**In-season:**
- **4.6** injuries p/1,000 hours training
- 73% from running, 72% lower extremity
Epidemiology of Injury

- Korkia et al., 1994
- Study of 155 British triathletes (all levels, avg age 34) – followed for 8 weeks

- **Injury Location**: Ankle/foot, thigh, knee, lower leg, back, hip *(in order of occurrence)*
- **Injury Type**: Strain, inflammation, sprain, tendinitis, bruise, blister *(in order of occurrence)*
- **Training**: 5.4 injuries p/1,000 hours training
- **Competition**: 17.4 injuries p/1,000 hours training
Injury Location

Korkia et al., 1994
Injury Type

Korkia et al., 1994
# Extrinsic Risk Factors

<table>
<thead>
<tr>
<th>Extrinsic</th>
<th>Causal Relationship Found?</th>
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</thead>
<tbody>
<tr>
<td>Triathlon Experience</td>
<td>YES</td>
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<tr>
<td>Excessive Running</td>
<td>YES</td>
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<tr>
<td>Total Training Time</td>
<td>No</td>
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<tr>
<td>Previous Injuries</td>
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<tr>
<td>Warm-up/Cool-down</td>
<td>No</td>
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<tr>
<td>Age</td>
<td>No</td>
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<tr>
<td>Weight</td>
<td>No</td>
</tr>
<tr>
<td>Gender</td>
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</tbody>
</table>

*Burns et al.*
Running Injuries

- *Stress Fractures (hip, foot, shin)
- *Iliotibial Band Syndrome
- Achilles tendinitis
- Plantar Fasciitis
- Metatarsalgia
- Patellofemoral Pain Syndrome
Running Injuries

- **Contributing Factors:**
  - Lean body mass
  - Come from running background - too much running!
  - Running only on hard surfaces
  - Do not train properly (too many long runs, no intervals)
  - Stubborn athletes – do not heed warning signs
  - Accumulation of training on lower body – failure occurs at weakest point (ankle, shin, foot)
  - Run occurs during last leg – body is most fatigued:
    - Form worsens
    - Muscles fatigued, joints take on more, more prone to injury
    - Run occurs during hottest part of day
    - Accumulated effects of environment/nutrition affect run
Equipment - Running

- **Shoes**
  - Midfoot/Forefoot Shoes
  - “Barefoot” style Shoes

- **Compression Socks**
  - Pressure of 15 mmHg used in medical grade
  - Helpful in recovery?
Biking Injuries

- 2 load points – Hip & Foot
- Knee pain usually a symptom of dysfunction/improper fit elsewhere
- Bike takes up ~50% of total race time

Overuse Injuries
- Improper knee tracking (PFPS)
- Foot (plantar fasciitis)
- Low Back
- Shoulder/Neck
- C’ spine (↑ hyperextension in aero position)
  (saddle sores, chafing)

Crash Injuries
Bike Fit

- #1 priority!
- Fit to each individual (flexibility, core strength)
- Fit & aero position have BIGGER impact than aerodynamic bikes/helmets
- Medial post commonly used to prevent over-pronation
- NOT one-size-fits-all
- Look at tibial tracking! (not always the same as patellar)
Tri Versus Road Bikes

Road Bike
- Better handling, more comfort
- Less aerodynamic
- BEST for beginners, draft legal races

Tri-Specific Bike
- More forward seat position (↑ Hip flexion)
- Narrower frame, aerodynamic positioning
- Stiffer, poorer handling
- No access to brakes in riding position

* ↑ Activation of hamstrings & Gluteals – reduces Quadricep fatigue, better run performance
Cycling Technique

- Relaxed Shoulders
- Head in down position between shoulders
- As close to flat back as possible

Cycle Stroke:

- Power phase – 10 o’clock – 2 (“punching” motion)
- Pull back
- Use momentum to help lift up
Swim

- Rotator Cuff Strain
- Multidirectional Instability
- Shoulder Impingement “Swimmer’s Shoulder”

- More likely to encounter acute problems...
Swim Equipment

- Wetsuits (Partial, Full body)
- Legal when water temp is < 78 deg. F
- Between 78-84 deg. F, can be worn at own discretion
- Prohibited when >84 deg. F

- False sense of ability & security!
Swim Like Your Life Depends on It

- **Swim deaths**
  - 14 deaths between 2006-2008 (13 from swimming)
  - In 2012:
    - 1 death in VT (Olympic nat’l Championships)
    - 1 death IM NYC

- **Why?**
  - Emotional
  - Chemical
  - Physical

- **Fatal Combination**
  - Hypoxia $\rightarrow$ compression from wetsuit $\rightarrow$ ↑cortisol $\rightarrow$ arrhythmia $\rightarrow$ difficulty of rescue
Risk of Sudden Death

Marathon: 0.8 deaths p/100,000

Triathlon: 1.5 deaths p/100,000

*Klein JZ., 2011
It’s Not Just the Swim…

- 85% of non-swim Ironman related problems occur during Run and at Finish Line*
- Dehydration
- Hyponatremia
- Hyperthermia
  - Core temp during bike is just as high as running
- Hypothermia
- Electrolyte Imbalance

*Laird et al.
How to Fix?

*Shared Responsibility

- Practice swimming – able to breathe bilaterally
- Use Swim as a way to rest legs during training
- Practice in open water
- Practice “sighting”
- Position yourself appropriately on race day
- More time for warm-up, initial start not “all out”

- More buoys, more staff
- Smaller heats
- Swim test requirement?
Course Management

- **USAT Recommendations:**
  - Minimum 1 lifeguard for every 50 athletes (non-ocean)
  - Minimum 1 lifeguard every 35 athletes (ocean)
  - 1 Physician p/200 athletes
  - 1 Nurse p/100 athletes
  - Others as needed (massage therapists)

- **NO specific guidelines on aid stations**
  - Typically 1 every 10 miles for bike course, every 1-2 miles on run
<table>
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<th>Sunday</th>
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<th>Tuesday</th>
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Training
Training Principles

- Gradual progression
- Intensity over Volume
- Limit traditional Bricks
- Split sessions if needed
- Recovery time a must
- Be flexible!
How to Set-up

- Build/maintain **BASE** training in off-season

- In-season:
  - Build/recovery cycles
  - Mix up sessions: speed, tempo, long
  - Progress slowly
  - At least 1 day off each week

- Swim/Bike/Run sessions spread out

- Peak 2-3 weeks before event (run 1\textsuperscript{st}, bike 2\textsuperscript{nd}, swim 3\textsuperscript{rd}) – DON’T need to do full distances

- Taper
Training Programs

Length of Training?
- Sprint: 10-16 weeks
- Olympic: 12 – 20 weeks
- ½ IM: 16-20 weeks
- Full IM: 20-36 weeks

• Dependent upon level, ability, time able to commit, goals

Race Times?
- Sprint: 1-2 hrs
- Olympic: 2-4 hrs
- ½ IM: 4-8 hrs
- Full IM: 10-17 hours
# Sample ½ IM Training Program - Intermediate

## Month 3

<table>
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<tr>
<th>Week 1 (Build)</th>
<th>Mon</th>
<th>Tue</th>
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<th>Thu</th>
<th>Fri</th>
<th>Sat</th>
<th>Sun</th>
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<tbody>
<tr>
<td>Swim 1k meters (speed)</td>
<td>Swim 2200 meters (long)</td>
<td>Run 5 mi (tempo)</td>
<td>Bike 30 mi (tempo)</td>
<td>Off</td>
<td>Bike 45 mi (long)</td>
<td>Run 11 mi (long)</td>
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<td>Bike 20mi (speed)</td>
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<td>Swim 1k meters (speed)</td>
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<td>Bike 50 mi (long)</td>
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<tbody>
<tr>
<td>Swim 1k meters (speed)</td>
<td>Swim 2200 meters (long)</td>
<td>Run 6 mi (tempo)</td>
<td>Bike 30 mi (tempo)</td>
<td>Off</td>
<td>Bike 50 mi (long)</td>
<td>Run 12 mi (long)</td>
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<tr>
<td>Bike 25mi (speed)</td>
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<td>Swim 1k meters (speed)</td>
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<td>Bike 50 mi (long)</td>
<td>Run 12 mi (long)</td>
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<td>Run 6 mi (tempo)</td>
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<td>Bike 30mi (speed)</td>
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<td>Swim 1k meters (speed)</td>
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<td>Bike 50 mi (long)</td>
<td>Run 13 mi (long)</td>
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<tr>
<th>Week 4 (Restore)</th>
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<td>Swim 2000 meters (long)</td>
<td>Run 5 mi (tempo)</td>
<td>Bike 25 mi (tempo)</td>
<td>Off</td>
<td>Bike 45 mi (long)</td>
<td>Run 10 mi (long)</td>
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<tr>
<td>Bike 20mi (speed)</td>
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<td></td>
<td>Swim 1k meters (speed)</td>
<td></td>
<td>Bike 50 mi (long)</td>
<td>Run 10 mi (long)</td>
<td></td>
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Training Tools

- Heart Rate zones
- Power output on Bike
- GPS watch – running pace

*Get rid of the ipod!
Overtraining

- ~ 80% of IM athletes arrive over-trained
- More is not always better
- **WILL** diminish performance
- Rest is when muscles re-build
- Recognize Signs/Symptoms
The Proof - Need for Recovery

- Leg muscle fatigue correlated with blood markers of muscle damage (blood myoglobin, creatine kinase concentration) (Coso et al.)

- Chemical Profile*:
  - **Immed. post-race**: ↑ in leukocytes, cortisol, creatine kinase, ↓ testosterone
  - **1 day post-race**: all persisted except cortisol
  - **5 days post-race**: creatine kinase, myoglobin remained higher than pre-race
  - **19 days post-race**: most returned to pre-race values (myoglobin still slightly ↑)

*Neubauer, et al.*
Personality Traits

- Individual sport
- **Common personality traits**
  - Perfectionistic
  - Driven
  - Goal-oriented
  - Stubborn

- **Demographics**
  - >$100,000 avg yearly income
  - Highly educated
  - Fastest age groups 40+

- **How to Tailor Treatment**
  - Set incremental goals
  - Explain injury in detail, tell them WHY
  - Must shock them – what happens if you DON’T follow rx plan
  - Be confident
  - Gain credibility – show knowledge of sport
Life Balance

- Something always has to give... prioritize (family, job, hobby)
- Can become part-time job – IM training avg. 20 hours p/wk
- Avoid life takeover ("Ironman Widow")
- Keep FUN in the sport
- Be efficient – more isn’t always better
- Balance will enhance recovery
ATC Involvement

- If you haven’t already, you WILL see these athletes
  - HS, College
  - Clinic
  - Coaches/Coworkers/Friends

- Opportunity to expand our scope
- Opportunity to market ourselves

- *Know your State’s Practice Act
latest posts

The 4-1-1 on Salt & Electrolytes – Part 2
Fresh salt swiped off the skin after a race...now we understand why Fido welcomes us home with so much licking! In the first installment of this post, we got down and dirty with the science of electrolytes. Now, we apply this science to training and give you practical tips (what you probably wanted from [...] Read More...

The 4-1-1 on Salt & Electrolytes – Part 1
Electrolytes are the sex of Nutrition. Everyone says they know what they're talking about...but few actually do. This phenomenon extends far beyond the world of endurance athletes. Not only can Gatorade be found at aid stations and in recovery tents, we now see it in children's hands at tee ball games [...] Read More...

About this site
Finally, a website devoted to the real science of endurance sports!
Endurance101 combines the best of both worlds - practical information on training, equipment, and nutrition AND the science behind it.

About the Prof
Learn more about the Prof here

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References


