Creating a “So What” out of Performance Data

Amanda Carlson-Phillips, MS, RD, CSSD
Vice President
Collegiate and Professional Sports Dietitians Association
Creating a “So What” out of Performance Data

**PROFILE**
Evaluations & Testing
The grading and categorization of an individual's current state across Mindset, Nutrition, Movement, Recovery

**READINESS**
Cumulative Stress & Nervous System Response
The balance between fitness & fatigue acting on an individual.

**LOAD**
Physical & Physiological Load Monitoring
The cumulative stress an individual has incurred.

**PERFORMANCE**
Relevant Performance in Sport
Resulting outcomes derived from the relevant task an athlete, office professional, or operator is measured by.

**FOUNDATIONAL PROGRAM**

- QUALITATIVE BEHAVIORS
  - Blood nutrient
  - Microbiome
  - Genome
  - Anthropometric
- GOALS
  - Training Load

+ GPS
+ IMU
+ Heart Rate
+ Relative Training Loads
+ Cumulative Mass during strength training session

+ Goals Scored
+ Batting Average
+ Shooting Percentage
+ Pitching Speed/Accuracy
Funds and Staff to Support Data Insights

**Full Time NCAA Sports RDs**

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**Impact of Deregulation**

- 145% ↑ increase in budget
- 55% ↑ in athletes fed

- 2013 – 2014 = $534,130.43
- 2014- 2015 = $1,308,695.65
Safe Supplementation to Fill the Gaps

The NSF Certified For Sport Program on supplement manufacturing and sourcing process, provides key preventive measures to:

- Protect against adulteration of products
- Verify label claims against product contents
- Identify athletic banned substances in the finished product or ingredients

2001
NSF launches a testing and certification program for dietary supplements to certify what is on the label is in the bottle and that the product does not contain harmful contaminants.

2002
NSF launches a dietary supplement GMP (good manufacturing practices) registration program.

2003
NSF develops first American National Standard for dietary

2004
NSF launches an athletic banned substances certification program (NSF Certified for Sport®), which is recognized by major sports organizations (NFL, MLB, PGA, etc.)

2016
65+ companies and over 400 products certified (protein, recovery, ergogenic aids, hydration formulas, MVI, fish oil, etc.)
Harnessing the Potential: Completely Integrated Sports Nutrition Programs

- **NOURISH**: Nutritional strategy supports and propels health and performance of the body and brain.

- **RECOVER**: Resiliency created to better handle mental, physical, and metabolic stress.

- **PREPARE**: Being metabolically prepared for the upcoming task at hand.

- **ENGAGE**: The culture and environment perpetuates adoption of fueling concepts.

- **INSPIRE**: Fueling philosophy, intent and actions live beyond short term goals.

©Athletes’ Performance, 2016
What is Human Growth Hormone (hGH)?

- Protein hormone produced in the pituitary gland
  - Important role in the growth and proper functioning of the body.
  - Manages cell growth
    - Controls the size of the cells, their division, the way they release proteins, their absorption of fats and carbohydrates, and more.
    - Stimulates the liver, muscle and all other tissues.
- Recombinant HGH: made by genetically engineered bacteria, was first developed in 1981
Uses

Legal

- By prescription for clearly and narrowly defined indications.
  - In children – Treat poor growth
    - Turner's syndrome,
    - PraderWilli syndrome,
    - Chronic renal insufficiency,
    - hGH insufficiency/deficiency,
    - Children born small for gestational age, and
    - Idiopathic short stature
  - In adults:
    - Treatment of the wasting syndrome of AIDS and hGH deficiency

Illicit

- Anti-aging agent
  - Replenish declining hGH levels
- Bodybuilding
  - Reducing body fat and increasing skeletal muscle mass
- Improve athletic performance
  - Used with other PEDs like anabolic steroids
  - Recovery from injury
How is hGH taken?

- **Oral Sprays**
  - Ineffective: poor or no absorption

- **Injections**
  - About $2k per month for pharmaceutical grade
  - Online purchases – most from China - ~$150/month
    - Sold as “for research purpose only” GH releasing peptides

- **Releasers/Supplements**
  - Pills: claim to stimulate the pituitary gland into producing more hGH
  - Sold in health food stores
  - Very questionable effectiveness
Testing for hGH

- Very low positive test rate
- Blood test
- Isoform test has a limited window of detection
  - On the order of 24 hours
- Usually taken during the off season - athletes test negative when the tests are conducted during the season.
  - Only if the tests are introduced on no advance notice and out of competition strategy, they will be able to detect doping in athletes.
Usage Rates of Synthetic HGH

- Pro sports: Rumors of very high usage rates
- Youth:
  - 11% of high school students admit use
    - 12% of boys admit use
    - 9% of girls admit use
  - Breakdown by race
    - 15% of African American teens
    - 13% of Spanish Teens
    - 9% of Caucasian Teens
  - Almost 2 million high school kids!

Partnership for Drug Free Kids, 2014
The Concept of Physical Literacy
E. Paul Roetert, Ph.D.

• History
• A re-emerging concept
• Physical Literacy in the United States
The Concept of Physical Literacy

The ability to move with competence and confidence in a wide variety of physical activities in multiple environments that benefit the healthy development of the whole person (Mandigo, Francis, Lodewyk, & Lopez, 2012)
National Standards and Grade Level Outcomes for K-12 Physical Education

- Plan curricula to produce physically literate students
- Attain and maintain a lifetime of physical activity
- Assess and track student progress across grades
- Provide framework for what students should know and be able to do
Physical Literacy is the ability, confidence, and desire to be physical active for life

- The Aspen Institute – Project Play
- Response to declining rates of physical activity
A well-rounded curriculum

• Greater focus on importance of physical education as an academic subject
• Parallels terms used in other subject areas
• Skill acquisition & focus on deliberate practice of well-designed learning tasks
• Emphasis on lifetime activities for all (physical education, sport, recreation)
• Enriched quality of life for people themselves & those around them
• Potential decrease in sedentary behavior & obesity rates
Purpose of Inter-Association

- To assure availability and accessibility of appropriate mental health care for all student-athletes

- To create and maintain an environment within the athletics department that de-stigmatizes and promotes help seeking

- Developed with input from a range of stakeholder groups

- Final rounds of additional review and endorsements from medical and higher education associations.
Guideline #1

- Care should be provided by: clinical or counseling psychologist, psychiatrist, licensed clinical social worker, psychiatric mental health nurse, licensed professional counselor, primary care physicians with Certificates of Added Qualifications (CAQs) in Sports Medicine and/or competency-based training in mental health.

- Individual providing care should have both societal cultural competency and cultural competency working with collegiate athletics.
Guideline #2

• Ensure that athletic departments have clarified their procedures for referring athletes with potential mental health concerns to appropriate personnel.
  – Routine Mental Health Referrals.
Guideline #3

• Implement mental health screening as part of annual pre-participation exams
  – Determine screening approach in consultation with licensed mental health professional providing mental health care to student-athletes.
  – Specify when and to whom symptomatic or at-risk student-athletes identified through this screening process will be referred.
Guideline #4

• Create a health promoting environment that supports mental well-being and resilience.

• Coaches play a central role and should be:
  – educated on signs and symptoms of mental health disorders;
  – trained in empathic response;
  – encouraged to create a positive team culture;
  – advised of department referral protocols.
Making **Physical Activity** a Vital Sign

Joint Commission on Sports Medicine and Science
2016 Annual Meeting
February 12, 2016
Anaheim, California

**Children and Adolescents**

**Strong Evidence**
- Improved cardiorespiratory and muscular fitness
- Improved bone health
- Improved cardiovascular and metabolic health biomarkers
- Favorable body composition

**Adults & Older Adults**

**Strong Evidence**
- Lower risk of early death
- Lower risk of coronary artery disease
- Lower risk of stroke
- Lower risk of high blood pressure
- Lower adverse blood lipid profile
- Lower risk of type II diabetes
- Lower risk of metabolic syndrome
- Lower risk of colon cancer
- Lower risk of breast cancer
- Prevention of weight gain
- Weight loss (combined with diet)
- Improved fitness
- Prevention of falls
- Reduced depression
- Better cognitive function
Making Physical Activity a Vital Sign

- Temperature
- Pulse
- Blood pressure
- Weight
- Height
- Respiratory rate
- Oxygen saturation
- Pain
- Tobacco use
- Physical activity

HEALTHCARE STRATEGY 1
Make physical activity a patient “vital sign” that all healthcare providers assess and discuss with their patients.

Calling on all health care providers to assess and review every patient’s physical activity program at every visit.
Predictive Validity of an Adult Physical Activity "Vital Sign" Recorded in Electronic Health Records.

Bell TJ, Joy EA, Gren LH, Cunningham R, Shaw JM.
Reaction Time Field Test

Elizabeth Moos, Ben Jelinek, Cailin Timm, Grace Edgar, Tim Stark
Northwestern Health Sciences University, Bloomington, Minnesota USA.

Presented by Ted Forcum, DC, DACBSP on behalf of Ben Jelinek
Sports-related concussions have been gaining interest in the sports medicine community.

Consensus statement from the 4th International Conference on Concussion lists five clinical domains of a concussion, with reaction time (RT) included in the cognitive domain.

RT has been shown to be one of the most sensitive measures of neurocognitive change following injury (Erlanger et al 2001).

Deficits in RT have been shown to persist longer than symptoms (Makdissi et al 2010).

To date, a low-cost field test has been introduced but not yet fully developed and tested.
Ekner et al introduced a simple RT test with a meter stick. He shows the methods to be sensitive to the effects of concussion (79% sensitivity, 62% specificity)(2014), with test-retest reliability similar to those found with computer based testing (2011).

MacDonald et al subsequently found there to be marginal test-retest reliability and poor validity when compared to CBT (2015).

Moos, et.al. discovered a weakness to the MacDonald study (via their testing videos) that blinking at the wrong time resulted in significant delay in measurable reaction.

Moos et.al. suggests modifying methods include raising the hand to eye level, using a 12” ruler rather than meter stick, and inserting the cue “do not blink during the trial” before beginning.
### Demographic Data

<table>
<thead>
<tr>
<th>Participants (Male/Female)</th>
<th>Age Mean ± SD, y</th>
<th>Handedness (Right/Left)</th>
<th>Past TBI</th>
<th>Past Whiplash</th>
<th>Weight Mean ± SD, lbs</th>
<th>BMI ± SD</th>
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</thead>
<tbody>
<tr>
<td>175 (105/67) 3 missing</td>
<td>31.6o ± 12.14</td>
<td>163/10 2 missing</td>
<td>35/175</td>
<td>32/175</td>
<td>176.03±36.43</td>
<td>25.59±3.76</td>
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<tr>
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</tr>
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</table>

### Self Reported Data

<table>
<thead>
<tr>
<th>N</th>
<th>Hours of sleep</th>
<th>Restfulness (out of 10)</th>
<th>Stress (out of 10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>170</td>
<td>174</td>
<td>173</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Mean</td>
<td>6.50</td>
<td>5.46</td>
<td>6.05</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1.07</td>
<td>2.00</td>
<td>1.99</td>
</tr>
<tr>
<td>Minimum</td>
<td>3.5</td>
<td>.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.0</td>
<td>10.00</td>
<td>10.00</td>
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</tbody>
</table>
• The results indicate that Trial 1 Reaction Time is significantly slower than Trial 2, 3, and average RT ($p < .002$), suggesting a practice trial may be needed in order to reduce the inclusion of a learning effect.

• Regression analysis showed that when Age, Weight, BMI, Hours of Sleep, Restfulness, and Stress are considered, **Age** and **Stress** were found to be significantly affecting the Average RT ($p < .01$)
  
  • Higher age and higher stress level resulted in a higher reaction time (poorer performance on the test)

• After the initial performance of the study, the data collected will be used to help determine if the test-retest reliability of Eckner et al’s study can be improved using our methods

• **Tips For Best Practices**
  
  • Allow the Athlete a practice trial
  
  • Cue the athlete to “not blink” prior to the trial
  
  • Establish the athlete’s perceived level of stress
Doesn't make sense. Re-wrod please.

-tstark
-  
  5/5/2016
SMART System: Industrial Injury Management; Sports Medicine Model

L/ATC w/ added certifications in:
- First aid/CPR/AED/BBP Instructor (ARC)
- Certified Ergonomic Assessment Spec
- NSCA CSCS

Under direction of AOASM, AMSSM primary care sports medicine physician
TIA, Inc. - Sports Medicine, Athletic Rehabilitation & Training (SMART)

Injury Management System

Pre-Injury Discomfort

ATC: E&M

Modified Duty: 2 wk. max

Supervisor

ATC: Tx

Return To Work

ATC: E&M

1st Response

Injury

ATC: FAR

OOSHA reportable, billable event, possible DART

Nothing billed if referred back in to ATC’s on-site

No billing workers comp or health insurance

Possible OSHA reportable event

Out-Patient Tx

Physician Clearance

Dx

Rehab/ Rx

Return To Work

ATC: Clearance

ATC: Tx

ATC: E&M

ATC: Tx

ATC: E&M

Modified Duty

ATC: E&M

Return To Work

ATC: Tx

Out-Patient Tx

Out-Patient Tx

ATC: E&M

ATC: E&M

ATC: E&M

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Research & Education

Milestones and Impact
Research & Education

DART Rates
Research & Education

Additional Information

• Return on Investment:
  - >2:1 based on on-site Tx cost vs. outside referral billed against their workers comp (direct W/C cost only)
  - >8:1 based on NSC formula for total comp-related costs (direct + indirect where indirect = 3x direct; Total W/C = direct x 4)

• Program Expansion:
  3 months into 1 yr. regional pilot with mobile L/ATC traveling between 10 stores; potential to expand to 8 more regions, reaching 2,500 store employees
## Population Specific Odds for Injury

<table>
<thead>
<tr>
<th>Metric</th>
<th>Cut Score Value</th>
<th>Mean</th>
<th>Odds Ratio</th>
<th>Lower 90% (CI)</th>
<th>Upper 90% (CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P 6-12 Week Minutes</td>
<td>6080</td>
<td>4361</td>
<td>6.5</td>
<td>1.6</td>
<td>26.7</td>
</tr>
<tr>
<td>P 6 Load</td>
<td>29091</td>
<td>21794</td>
<td>3.7</td>
<td>1.1</td>
<td>12.6</td>
</tr>
<tr>
<td>P 6-12 Load</td>
<td>39110</td>
<td>23521</td>
<td>6.6</td>
<td>1.0</td>
<td>42.5</td>
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<tr>
<td>Weekly Monotony</td>
<td>1.494</td>
<td>1.155</td>
<td>3.1</td>
<td>0.9</td>
<td>10.1</td>
</tr>
<tr>
<td>Weekly Load</td>
<td>4212</td>
<td>3763</td>
<td>3.6</td>
<td>0.9</td>
<td>13.9</td>
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<tr>
<td>P 6 Strain</td>
<td>25854</td>
<td>29065</td>
<td>4.7</td>
<td>0.8</td>
<td>27.8</td>
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<tr>
<td>Weekly Minutes</td>
<td>880</td>
<td>725</td>
<td>2.6</td>
<td>0.8</td>
<td>8.7</td>
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<tr>
<td>Weekly Strain</td>
<td>7518</td>
<td>5043</td>
<td>2.3</td>
<td>0.7</td>
<td>7.8</td>
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<tr>
<td>P 6 Monotony</td>
<td>1.110</td>
<td>1.138</td>
<td>3.8</td>
<td>0.7</td>
<td>22.5</td>
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<td>P 6 Minutes</td>
<td>5440</td>
<td>4148</td>
<td>2.0</td>
<td>0.5</td>
<td>7.9</td>
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<td>P 6-12 Monotony</td>
<td>1.420</td>
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<td>44554</td>
<td>30111</td>
<td>2.0</td>
<td>0.3</td>
<td>12.0</td>
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</table>
### Table 1: Time loss injury characteristics (location, type, cause) stratified by sport

<table>
<thead>
<tr>
<th>Number of injuries</th>
<th>Athletics (n=17)</th>
<th>Boxing (n=4)</th>
<th>Basketball (n=4)</th>
<th>Gymnastics (n=4)</th>
<th>Rowing (n=4)</th>
<th>Rugby (n=24)</th>
<th>Swimming (n=8)</th>
<th>All (n=94)</th>
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<tbody>
<tr>
<td>Number of injuries</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
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<td>Injury location</td>
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<tr>
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<td>Foot/toe</td>
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<td>Knee</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>3</td>
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<tr>
<td>Lumbar spine/lower back</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
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<tr>
<td>Shoulder/clavicle</td>
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<td>Thigh</td>
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<td>Wrist</td>
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<td>1</td>
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<td>1</td>
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<tr>
<td>Injury cause</td>
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<tr>
<td>Contact</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Non-Contact acute</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Overuse</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Injury type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concussion</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Fracture (trauma, stress, other bone injuries)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Strain (muscle rupture)</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 3: Injury, Illness, and Number of Medical Encounters at Youth Olympic Level Mass Sporting Events

<table>
<thead>
<tr>
<th>Event</th>
<th>Injury (per 1000 athletes)</th>
<th>Illness (per 1000 athletes)</th>
<th>Medical Encounters (per athlete)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 Summer YOG Singapore [IOC][12]</td>
<td>-</td>
<td>-</td>
<td>0.29</td>
</tr>
<tr>
<td>2012 Winter YOG- Innsbruck [IOC][16]</td>
<td>108.7</td>
<td>84.2</td>
<td>-</td>
</tr>
<tr>
<td>2013 European Youth Olympic Festival [15]</td>
<td>91.1</td>
<td>20.2</td>
<td>-</td>
</tr>
<tr>
<td>2014 Summer YOG-Nanjing [IOC][13]</td>
<td>207.1</td>
<td>-</td>
<td>0.27</td>
</tr>
<tr>
<td>2014 Summer YOG-Nanjing (USA only)</td>
<td>425.5^</td>
<td>212.7</td>
<td>3.7</td>
</tr>
</tbody>
</table>

^ = combines Team USA injury and complaint data to be consistent with previous definitions of injury.
Previous studies by the USOC and USA Swimming have shown that elite swimmers have a high number of asymptomatic positive shoulder imaging findings. In fact, over several years of ultrasound screening of elite swimmers, 100% of elite swimmers have at least one “abnormal” finding.

Baseline imaging helps create a better understanding of what defines “normal” anatomy in an elite swimmer and allows for creation of future normative databases. When reviewing the data below, it is important to remember that none of the athletes screened had symptomatic shoulders at the time of screening and the results are not indicative of pathology.

<table>
<thead>
<tr>
<th>Anatomy</th>
<th>Number of Positive Findings/ Total # Shoulders</th>
<th>Percentage With Positive Imaging Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicep Tendon</td>
<td>32 out of 36</td>
<td>89%</td>
</tr>
<tr>
<td>Supraspinatus</td>
<td>36 out of 36</td>
<td>100%</td>
</tr>
<tr>
<td>Infraspinatus</td>
<td>29 out of 36</td>
<td>81%</td>
</tr>
<tr>
<td>Subscapularis</td>
<td>33 out of 36</td>
<td>92%</td>
</tr>
<tr>
<td>Bursal</td>
<td>17 out of 36</td>
<td>47%</td>
</tr>
<tr>
<td>AC Joint</td>
<td>29 out of 36</td>
<td>81%</td>
</tr>
<tr>
<td>Posterior Recess</td>
<td>21 out of 36</td>
<td>58%</td>
</tr>
<tr>
<td>Lateral Subacromial Impingement</td>
<td>15 out of 36</td>
<td>42%</td>
</tr>
<tr>
<td>Anterior Subcoracoid Impingement</td>
<td>4 out of 36</td>
<td>11%</td>
</tr>
</tbody>
</table>
Baseline SCAT 3 Scores

<table>
<thead>
<tr>
<th>SAC Score</th>
<th>Symptoms</th>
<th>Symptom Severity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.2 (95% CI 26.8-27.6)</td>
<td>2.0 (95% CI 1.5-2.6)</td>
<td>3.6 (95% CI 2.5-4.8)</td>
</tr>
</tbody>
</table>
OVERTRAINING SYNDROME

“RUNNING ON EMPTY” • OUTSIDE MAGAZINE • JULY 2015

A “sport-specific” decrease in performance together with disturbances in mood state. This underperformance persists despite a period of recovery lasting several weeks or months.

A mysterious training condition that “afflicts endurance athletes training at the outer edges of human performance”

“It was like my body was just shut down” – Mike Wolfe, ultrarunner

Presented by Kelly Lange DC CCSP / President – ACA Sports Council / JCSMS • Anaheim • February 2016
OTS - SYMPTOMS

“OTS is one of the scariest things I've ever seen in my 30 plus years of working with athletes,” says David Nieman, former vice president of the American College of Sports Medicine. “To watch someone go from that degree of proficiency to a shell of their former self is unbelievably painful and frustrating.”

• Anemia
• Generalized fatigue
• Hypothyroidism
• Hyperthyroidism
• Loss of appetite
• Heart arrhythmia
• Headaches
• Chronic dehydration
• Hypoglycemia
• Sudden weight loss
• Listlessness
• Lymphedema
• Muscle pains

• Decrease libido
• Brain fog
• Numbness
• Stale legs
• Insomnia
• Anxiety
• Respiratory illness
• Depression
* lack of ability

* “sudden, almost overnight disappearance of runners elite endurance talent”
• Multi-factorial
• High percentage (85%) starts with infection
• Glycogen depletion
• Overactive parasympathetic response

• Testing includes
  • Blood work
  • Brain scans
  • Heart screenings
  • Cortisol checks
  • Etc.

DIAGNOSIS OF EXCLUSION
**RESEARCH**

- Earliest mention in 1909 book *Exercise in Education and Medicine*
- Timothy Noakes wrote about it in *The Lore of Running*, 1985
- 2012 in *Sports Health*
- Dr. Tracy Hoeg, physiotherapist & ultrarunner, working on original research at this time with poster due out in Feb 2016
- Most of the available data is *anecdotal*
OTS – WHY ULTRARUNNERS?

• Many athletes experience overtraining – but they RECOVER with downtime & emerging ultrarunning world leaves little time for recovery

• No coaches or teams – lack of infrastructure

• No governing body

• Not much science

• No SOP – for how to train or how to treat them

• Tough to research – evidence is mostly anectodal

• They may look “normal” with testing/examination

• No consensus on the defining markers

• Psychological & physical stress of endurance sports
Alex Kor, DPM, MS
Johns Hopkins Department of Orthopaedic Surgery
Johns Hopkins Bayview Medical Center
President, American Academy of Podiatric Sports Med.
Diplomate, American Board of Podiatric Surgery

JCSMS Lightning Round: 5 Minutes/ 5 Slides
Anaheim, CA

“Tennis Injuries of the Lower Extremity: Changes in the Game”
“Tennis Injuries of the Lower Extremity: Changes in the Game”

2. According to a May 2014 article in Clin J Sports Med, the most commonly injured body regions were the lower extremities (42.2%) and upper extremities (26.7%). Sprains or strains (44.1%) were the most common type of injury. The number of tennis-related injuries decreased by 41.4% during the years 1990 to 2011, and the tennis-related injury rates decreased by more than 45% during the study period.
These injuries to Serena Williams, Kim Clijsters and David Nalbandian are even less common.

As a tennis playing podiatrist, I have noticed changes to the game of tennis in the last 5 – 10 years that may affect these statistics.

2. “..The strategy of the game has changed. Less serve and volley play and longer rallies involving more side-side movement of players.” from personal communication with Allan Grossman, DPM, USTA Sports Science Committee.
3. According to Grossman, 70 – 80 % of the baseline strokes are forehands and fewer than 30 % are backhands.

4. Perhaps, the biggest change in the last 5 – 10 years is the use of sliding on a hard court. Traditionally, sliding on clay courts has been commonplace. But as the game has become more athletic, faster, quicker, the tennis player has less reaction time to get to the ball and hit the shot. Thus, the use of sliding on hard courts is now a necessary skill at the elite level.
Question for discussion/research: Will these recent changes to the game affect the incidence and variety of lower extremity injuries?

One can hypothesize that:

#1. The trend in less injuries will likely change.
#2. Due the increased emphasis on side to side play, there will be an increase in more soft tissue overuse conditions.
#3. The effect of sliding on a hard court will likely cause more acute injuries and may be dependent on the advances of shoegear technology (which has not been as innovative as the running shoegear technology).
Most people first noticed colored kinesiology tape during the 2008 Olympics.

Ted Forcum, DC, DACBSP on behalf of KT Tape

This year you will proudly see KT Tape on our 2016 Olympians
HOW IS KT TAPE DIFFERENT THEN OTHER KINESIOLOGY TAPES

10” pre-cut and Edema Pre-cut
•  time is money
•  easy

Synthetic vs Cotton
•  Lasts longer
•  Reduced drag in water
•  Reduced weight with sweat
•  Reduced drag with clothing
•  Reflective safety

KT TAPE’s unique Matrix Mesh also allows for moisture release which is critical for comfort and wear-ability. The more porous the tape’s weave, the better it releases moisture caused by sweating or being worn in the water. The design provides more breathability and release of moisture so that it is comfortable to wear for up to five days at a time without itching, irritation or reactions with the skin.

KT TAPE is made up of reinforced 100% cotton sheathes (ORIGINAL) or specially engineered, ultra-durable synthetic fabric (PRO) designed to provide durability and increased strength. These materials provide uni-directional elasticity- allowing the tape to stretch in length but preventing the tape from stretching in width. These fibers are made to provide stable support without restricting motion.
Tape applied to quadriceps of healthy blindfolded subjects

Healthy subjects are not going to be made more healthy unless that are placed in unhealthy or fatigued situation.

NSAIDS will not make a pain free person feel less pain.
HOW DO IT WORK?

• Designed to provide stable support without restricting motion.

• Greater than 90% of nerve endings in Superficial Fascia Layer.
  • Sensory and mechanoreception
    • Siegfried Mense, MD

• Theoretically, increasing input to gamma motor neurons could reverse sensory or pain inhibited this weakness. Sensory input to these neurons from the skin could indirectly increase afferent feedback.

MRI analyses show that kinesio taping affects much more than just the targeted superficial tissues and causes heterogeneous deformations within the whole limb. Pamuk U¹, Yucesoy CA².

MRI images show deformations (up to 51.5% length change) in other directions. Non-targeted tissues also show sizable heterogeneous deformations, but in smaller amplitudes. Inter-subject variability is notable.
• Improves time to failure of the lumbar extensor muscles.
• Improved balance after applied for 48 hrs.
• Improvements retained even after the tape had been removed for 72 hours
• Improved hamstring length over static stretch and PNF peaking at 2.76 days.
• Improving proprioception and thus improving joint stability.
• Better tolerated than an NSAIDs.
• Improve the dynamic balance.
• Preservation of runner stride length in a fatigued state.
• Decreases fatigue-induced joint repositioning error.
• RA Hand muscle strength increased significantly.
• Improved clinical measures in PFPS

NO NEGATIVE OUTCOMES!
Improving Special Olympics’ athletes fitness and health
SO Athlete Wellness Statistics

Globally, on average, on a team of 10 Special Olympics athletes:

- 5 have significant problems with flexibility
- 4 have significant problems with balance, placing them at risk for injuries

Obese and Overweight (adults) by Region

<table>
<thead>
<tr>
<th>Region</th>
<th>Obese and Overweight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>60%</td>
</tr>
<tr>
<td>Africa</td>
<td>26%</td>
</tr>
<tr>
<td>Asia Pacific</td>
<td>39%</td>
</tr>
<tr>
<td>East Asia</td>
<td>36%</td>
</tr>
<tr>
<td>Europe/Eurasia</td>
<td>54%</td>
</tr>
<tr>
<td>Latin America</td>
<td>48%</td>
</tr>
<tr>
<td>MENA</td>
<td>40%</td>
</tr>
<tr>
<td>North America</td>
<td>73%</td>
</tr>
</tbody>
</table>

healthdata@specialolympics.org
Wellness

Physical Activity

Healthy Eating

Special Olympics
Next Steps

Engage Coaches
Engage Families
Work with Young Athletes (ages 2-8 years old)
Develop Wellness App
Establish partnerships with sport and fitness organizations
Call to Action

Special Olympics and JCSMS Jointly
Tackling Athlete Health and Fitness