Acute and Chronic Musculoskeletal Injury

Dr. Kyle Steineman DC, ATC, CCSP, ICCSP

- B.S. Athletic Training at Manchester College, North Manchester, IN
- Doctor of Chiropractic at National University of Health Science FL
- Sports Nutrition Fellowship in the Human Performance Center at NWHSU
  - Sponsored by Nutri Dyn
Disclosure

I am an employee of Northwestern Health Sciences University and a sports nutrition fellow that is being funded by Nutri Dyn.

Any discussion involving clinical nutrition practice involving supplementation may be perceived as a conflict of interest.

Objectives

1. Define acute and chronic injuries
2. Discuss what is happening at the cellular level
3. Find strategies to help the body heal following an injury
Who?

Healing Process

Tissue Involved?

Bone
Muscle
Tendon
Neuro

What can you do?
Overtraining Biochemistry


Tissue Healing Timeline

1. PHASE 1: Acute phase: (1 to 7 days)
2. PHASE 2: Subacute phase: (Day 3 to < 3 weeks)
3. PHASE 3: Remodeling phase: (1 to 6 weeks)
4. PHASE 4: Functional phase: (2 weeks to 6 months)
5. PHASE 5: Return to competition phase: (3 weeks to 6 months)


Immobilization

- Wolff's Law - anatomical structures will adapt to stressed placed on it

Injury and Body Composition


Chronic Injury
Chronic Injury Intervention

Model of overtraining: Training load followed by insufficient recovery results in decreased performance.

Pro-Inflammatory Diet and Chronic MSK Dysfunction

Table 2
Pro-inflammatory chemistry of the metabolic syndrome

<table>
<thead>
<tr>
<th>Condition</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperglycemia</td>
<td>↑ NF-κB</td>
</tr>
<tr>
<td>Hyperinsulinemia</td>
<td>↑ CRP</td>
</tr>
<tr>
<td>Hypertriglyceridemia</td>
<td>↑ TNF</td>
</tr>
<tr>
<td>Hyperuricemia</td>
<td>↑ IL-6</td>
</tr>
<tr>
<td>↓ HDL</td>
<td>↑ Increased white blood cell count</td>
</tr>
<tr>
<td>↓ protein synthesis</td>
<td>↑ plasminogen activator inhibitor</td>
</tr>
<tr>
<td>↓ protein catabolism</td>
<td>↑ Fibrinogen</td>
</tr>
<tr>
<td>↓ gluconeogenesis</td>
<td>↑ Leptin</td>
</tr>
<tr>
<td>↓ serum amyloid A</td>
<td>↑ Resistin</td>
</tr>
<tr>
<td>↓ angiotensinogen</td>
<td>↓ adiponectin</td>
</tr>
</tbody>
</table>


Inflammation and Pain

[Graphs and images]

Treatment

Recommendations

- Low Glycemic Index, Reduce Meat
- Minimize Processed Foods
- Multi Vitamin
- Fish Oil - 1-3g
- Vitamin D3 - 3,000-5,000 IU

- Adequate Sleep
- Hydration
- No Alcohol
- Protein Intake 1.2-1.8 g/kg body weight

*patients are individuals
In summary...

Modulate inflammation to remove the barriers for tissue healing.
Questions/Comments?