

Acute and Chronic Musculoskeletal Injury

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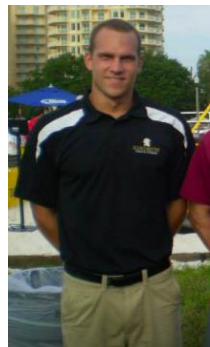
- B.S. Athletic Training at Manchester College, North Manchester, IN
- Doctor of Chiropractic at National University of Health Science FL
- Sports Nutrition Fellowship in the Human Performance Center at NWHSU
 - Sponsored by Nutri Dyn



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Human Performance Center



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.

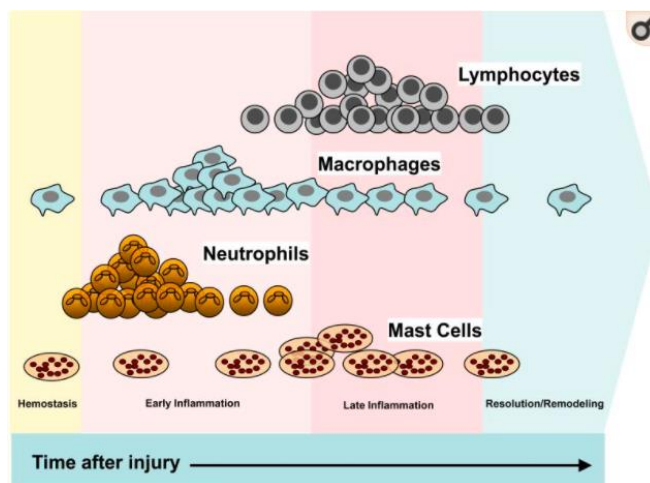
Objectives

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



Koh, T. J., & DiPietro, L. A. (2011). Inflammation and wound healing: the role of the macrophage. *Expert reviews in molecular medicine*, 13.

Tissue Involved?

Bone

Muscle

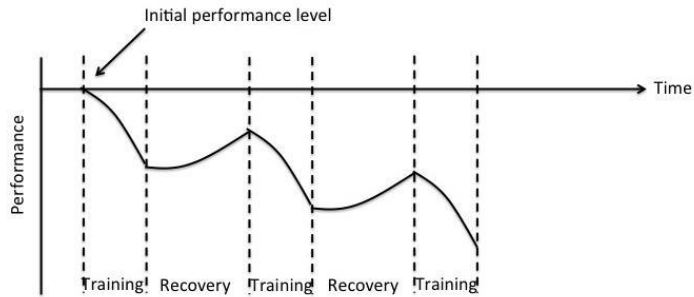
Tendon

Neuro

What can you do?



Overtraining Biochemistry



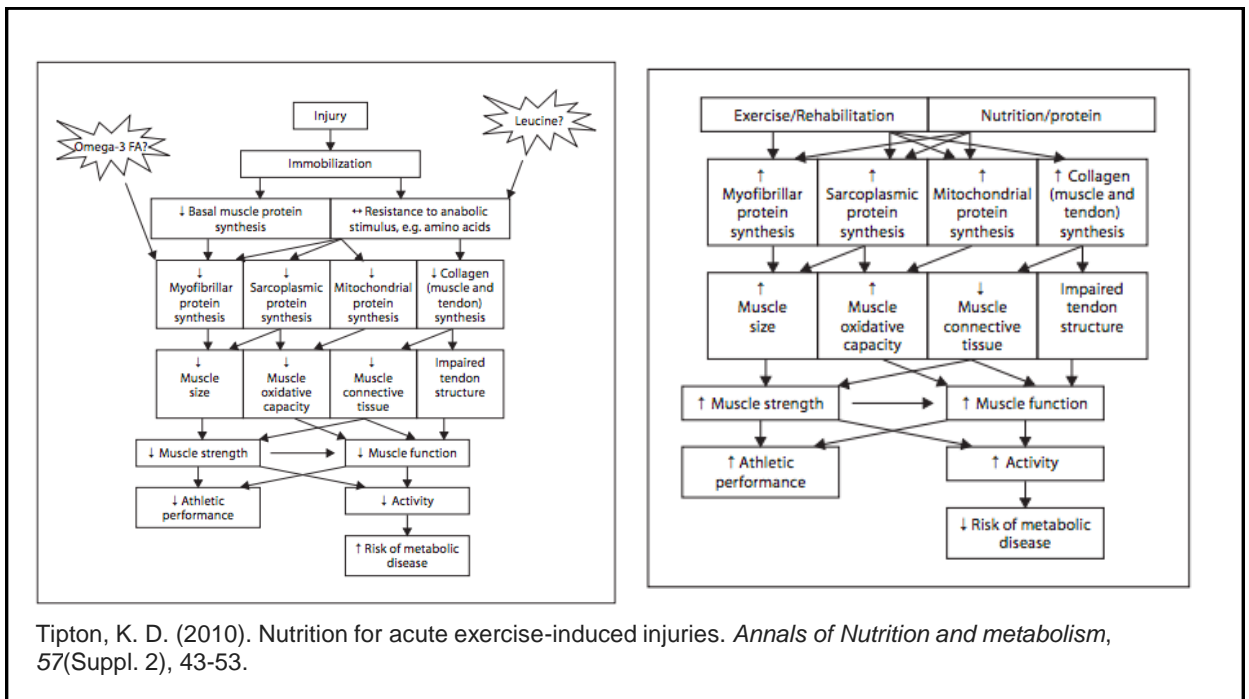
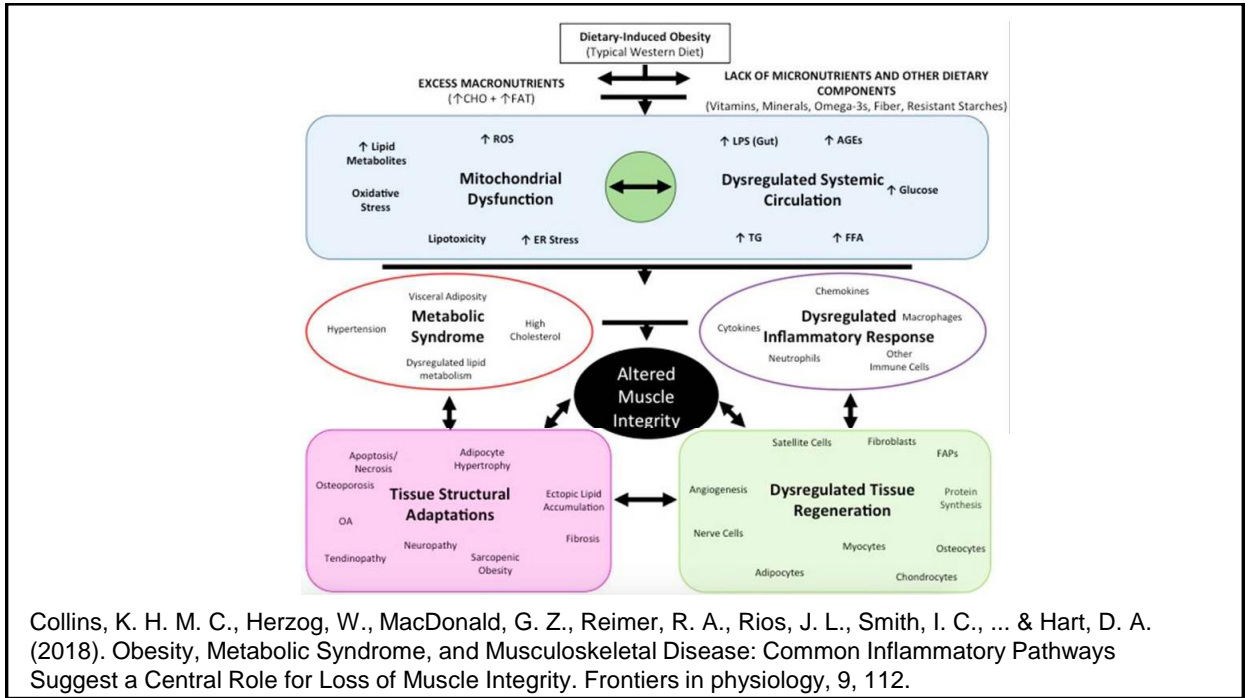
Model of overtraining: Training load followed by insufficient recovery results in decreased performance.

Newsholme, E. A., Parry-Billings, M., McAndrew, N., & Budgett, R. (1991). A biochemical mechanism to explain some characteristics of overtraining. In *Advances in nutrition and top sport* (Vol. 32, pp. 79-93). Karger Publishers.

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)

Arnheim DD. (1995) Essentials of athletic training. St Louis: CV Mosby Co



Immobilization

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

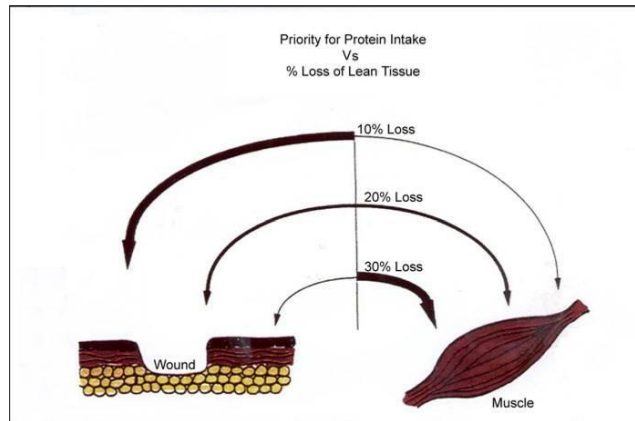


Immobilization



Wall, B. T., & Van Loon, L. J. (2013). Nutritional strategies to attenuate muscle disuse atrophy. *Nutrition reviews*, 71(4), 195-208.

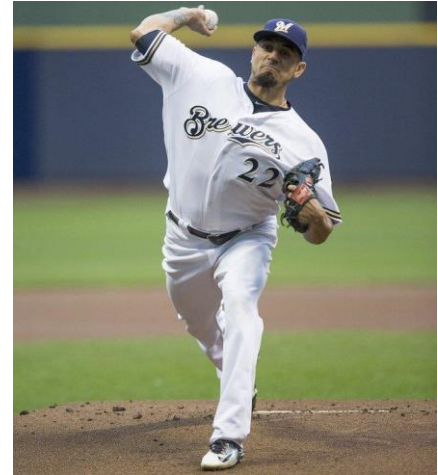
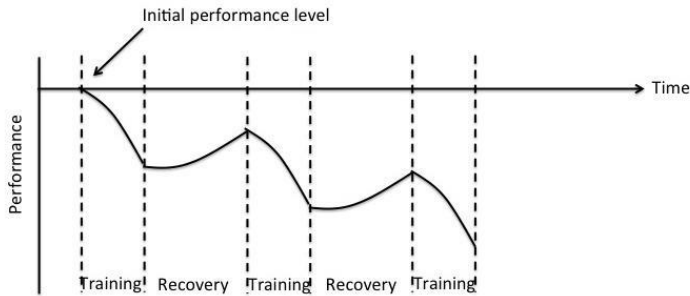
Injury and Body Composition



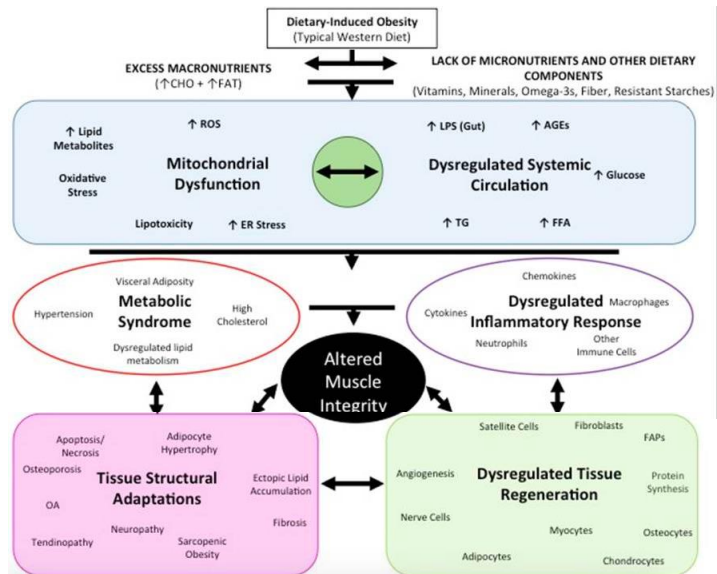
Demling, R. H. (2009). Nutrition, anabolism, and the wound healing process: an overview. *Eplasty*, 9.

Chronic Injury

Chronic Injury Intervention



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



Collins, K. H. M. C., Herzog, W., MacDonald, G. Z., Reimer, R. A., Rios, J. L., Smith, I. C., ... & Hart, D. A. (2018). Obesity, Metabolic Syndrome, and Musculoskeletal Disease: Common Inflammatory Pathways Suggest a Central Role for Loss of Muscle Integrity. *Frontiers in physiology*, 9, 112.

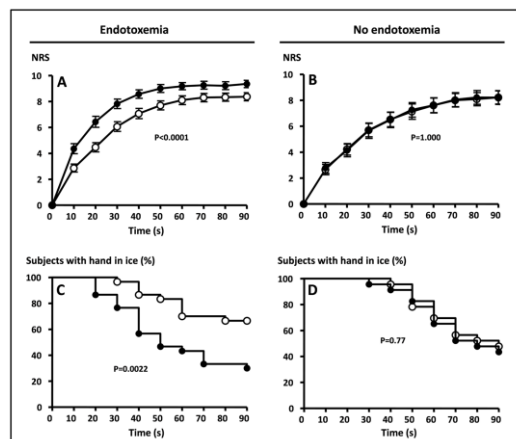
Pro-Inflammatory Diet and Chronic MSK Dysfunction

Table 2
Pro-inflammatory chemistry of the metabolic syndrome

Hyperglycemia	↑ NF- κ B
Hyperinsulinemia	↑ CRP
Hypertriglyceridemia	↑ TNF
Hyperuricemia	↑ IL-6
↓ HDL	↑ Increased white blood cell count
↓ protein synthesis	↑ plasminogen activator inhibitor
↑ protein catabolism	↑ Fibrinogen
↑ gluconeogenesis	↑ Leptin
↑ serum amyloid A	↑ Resistin
↑ angiotensinogen	↓ adiponectin

Seaman, D. R. (2013). Body mass index and musculoskeletal pain: is there a connection?. *Chiropractic & manual therapies*, 21(1), 15.

Inflammation and Pain



de Goeij, M., van Eijk, L. T., Vanelderden, P., Wilder-Smith, O. H., Vissers, K. C., van der Hoeven, J. G., ... & Pickkers, P. (2013). Systemic inflammation decreases pain threshold in humans in vivo. *PLoS One*, 8(12), e84159.

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

Eat		Avoid
Grass Fed Meat, Eggs		Bread, Pasta, Rice
Vegetables		Processed Sugar
Fruits		Milk
Nuts		Legumes (inc. peanuts)
Dark Chocolate (80% cocoa)		Processed Oils (Sunflower, Palm, Canola)
Herbs and Spices		Margarine
Whole Fat Cheese		Soy
Olive or Coconut Oil		
Full Fat Grass Fed Butter		
Almond, Coconut Milk		
Yogurt		
Red Wine		

In summary...

Modulate inflammation to
remove the barriers for
tissue healing.

Questions/Comments?

