Clinical Management of Celiac Disease in Athletes

James E. Leone, Ph.D., LAT, ATC, CSCS,*D, CHES
Assistant Professor of Health
Bridgewater State College
Department of Movement Arts, Health Promotion, and Leisure Studies
School of Education and Allied Studies
Email: jleoneatc@yahoo.com
What is *Celiac Disease*?
Background

- Body sensitivity to gluten
- Autoimmune response
- Cellular damage results
  - Small intestine
- Nutrient Absorption
Also known as…

- Celiac sprue
- Gluten sensitive enteropathy
- Coeliac Disease
- Gluten intolerance
- Gee-Herter-Heubner disease
- Non-tropical sprue
Common Differential Dx with CD

<table>
<thead>
<tr>
<th>Illness/Disease</th>
<th>Signs and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Addison disease</td>
<td>Weakness, Fatigue, Weight loss, Nausea, vomiting, Anorexia, Chronic diarrhea, Bronze discoloration of the skin, Adrenal dysfunction</td>
</tr>
<tr>
<td>Pernicious anemia</td>
<td>Weakness, Sore tongue, Paresthesia in extremities, Pallor of lips, gums, and tongue, Pale to bright yellow-colored skin, Nausea, vomiting, Fatigue, Weight loss, Diarrhea and flatulence</td>
</tr>
<tr>
<td>Celiac disease</td>
<td>Arthralgia, Myalgia, Cognitive and attentional disturbances, Diarrhea, Gastrointestinal discomfort, Painful skin rash, Slow growth patterns, Significant weight loss, Vitamin deficiencies</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>Right lower quadrant pain, Cramping and tenderness, Flatulence, Nausea, Fever, Diarrhea, Marked weight loss, Weakness, Lack of ambition</td>
</tr>
<tr>
<td>Diverticular disease</td>
<td>Recurrent left lower abdominal quadrant pain, Alternating constipation and diarrhea, Difficult defecation, Gas, Irritable bowel habits, Low-grade fever, Leukocytosis</td>
</tr>
<tr>
<td>Fibromyalgia (CRPS)</td>
<td>Complex pain patterns, Hypersensitivity to normal stimuli, Diffuse to specific myalgias, Mood disturbances and irritability</td>
</tr>
<tr>
<td>Lactose Intolerance</td>
<td>Mild to severe intolerance to milk products, Gas and accompanying flatulence, Cramping, Diarrhea, Sunken appearance of eyes</td>
</tr>
</tbody>
</table>

Histology
Normal vs. Pathological Villi
Comparison
Crypt Hyperplasia
Prevalence of CD

- Typical stats range between 1 in every 250-300 people*

- More recent data suggest 1 in every 100-150 people**

* Worldwide: geographic regions vary

**Ciacci et al (Scand J Gastroenterol, 1995 Nov, 30:11, 1077-81); Marcu Maaki et al., 2006.
Geographic & Regional Factors

- CD is common in European countries: Ireland, Italy, Sweden, & Austria.
  - Northern Ireland, for example, one in every 300 people has CD.

- In Finland, prevalence may be as high as one in every 100 persons.

- CD also occurs in N. America where the prevalence has been estimated at one in every 3000 people.

Source: http://www.medicinenet.com/celiac_disease/article.htm
Geographic & Regional Factors

- Most population studies underestimate the prevalence of CD because many patients who develop CD have few or no sx’s until later in life.

  (van Dijk & Klinkhamer, 2009)

- Iceberg model

- A recent study in the U.S. suggests that the prevalence of CD in the U.S. is similar to Europe.

Source: http://www.medicinenet.com/celiac_disease/article.htm
The Impact of CD in Athletics*

- NCAA reports approx. 380,000 athletes**

  - If 1:3000 = 127 athletes
  - If 1:250-300 = 1267-1520 athletes
  - If 1:100-150 = 2533-3800 athletes


** Source: NCAA CHOICES Program: 2008
The Impact of CD in Athletics

Approximately 7.2 million H.S. athletes in U.S.*

- If 1:3000 = 2400 athletes
- If 1:250-300 = 24,000-28,800 athletes
- If 1:100-150 = 48,000-72,000 athletes

How to identify CD

Symptoms of celiac disease may include:

- gas
- recurring abdominal bloating and pain
- chronic diarrhea
- pale, foul-smelling, or fatty stool
- weight loss / weight gain
- fatigue
- unexplained anemia (a low count of red blood cells causing fatigue)
- bone or joint pain
- osteoporosis, osteopenia
- behavioral changes
- tingling numbness in the legs (from nerve damage)

- muscle cramps
- seizures
- missed menstrual periods (often because of excessive weight loss)
- infertility, recurrent miscarriage
- delayed growth, failure to thrive in infants
- pale sores inside the mouth, called aphthous ulcers
- tooth discoloration or loss of enamel
- itchy skin rash called dermatitis herpetiformis

CD: Signs & Sx’s
The Culprit

- GLUTEN
Consequences

- Stunted growth
- Failure to thrive
- Loss of key minerals & nutrients
  - Vit. K, Na+, Ca
- Weight Loss
- Seizures
- GI ulcers/CA (adenocarcinoma)
- Death…
Identification & Treatment Options

**Identification**
- ELISA panel test
- Immunoglobulin A (IgA)
- anti-tissue transglutaminase (tTGA)
- IgA anti-endomysium antibodies (AEA)

**Treatment**
- Strict GFD
- Tx for skin issues
  - Dapsone
- Vitamin & mineral supplementation
## Essentials of the GFD

<table>
<thead>
<tr>
<th>Allowed Foods</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Amaranth</td>
<td>Potatoes</td>
</tr>
<tr>
<td>Arrowroot</td>
<td>Quinoa</td>
</tr>
<tr>
<td>Buckwheat</td>
<td>Rice</td>
</tr>
<tr>
<td>Cassava</td>
<td>Sago</td>
</tr>
<tr>
<td>Corn</td>
<td>Seeds</td>
</tr>
<tr>
<td>Flax</td>
<td>Soy</td>
</tr>
<tr>
<td>Indian rice grass</td>
<td>Sorghum</td>
</tr>
<tr>
<td>Job’s tears</td>
<td>Tapioca</td>
</tr>
<tr>
<td>Legumes</td>
<td>Wild Rice</td>
</tr>
<tr>
<td>Millet</td>
<td>Yucca</td>
</tr>
<tr>
<td>Nuts</td>
<td></td>
</tr>
</tbody>
</table>

GFD (Cont.)

<table>
<thead>
<tr>
<th>Foods To Avoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat Including einkorn, emmer, spelt, kamut</td>
</tr>
<tr>
<td>Wheat starch, wheat bran, wheat germ, cracked wheat, hydrolyzed wheat protein</td>
</tr>
<tr>
<td>Barley</td>
</tr>
<tr>
<td>Rye</td>
</tr>
<tr>
<td>Triticale (a cross between wheat and rye)</td>
</tr>
</tbody>
</table>

GFD (Cont.)

<table>
<thead>
<tr>
<th>Other Wheat Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromated flour</td>
</tr>
<tr>
<td>Durum flour</td>
</tr>
<tr>
<td>Enriched flour</td>
</tr>
<tr>
<td>Farina</td>
</tr>
<tr>
<td>Graham flour</td>
</tr>
<tr>
<td>Phosphated flour</td>
</tr>
<tr>
<td>Plain flour</td>
</tr>
<tr>
<td>Self-rising flour</td>
</tr>
<tr>
<td>Semolina</td>
</tr>
<tr>
<td>White flour</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Processed Foods that May Contain Wheat, Barley, or Rye*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bouillon cubes</td>
</tr>
<tr>
<td>Brown rice syrup</td>
</tr>
<tr>
<td>Chips/potato chips</td>
</tr>
<tr>
<td>Candy</td>
</tr>
<tr>
<td>Cold cuts, hot dogs, salami, sausage</td>
</tr>
<tr>
<td>Communion wafer</td>
</tr>
<tr>
<td>French fries</td>
</tr>
<tr>
<td>Gravy</td>
</tr>
</tbody>
</table>

* Most of these foods can be found gluten-free. When in doubt, check with the food manufacturer.

Case Studies in Athletics
Case Study #1

Celiac Disease Symptoms in a Female Collegiate Tennis Player: A Case Report

- **Treatment:** The athlete underwent a series of blood & allergen tests to confirm/refute a dx of CD. When CD was suspected, dietary modifications were made to eliminate all wheat-based & gluten-based products from the athlete's diet.

- **Uniqueness:** The athlete was able to fully compete in a competitive NCAA D-I tennis program while experiencing the debilitating effects associated w/ CD. The immediacy of sx onset was notable because the athlete had no history of similar complaints.

### Basic Food Panel

<table>
<thead>
<tr>
<th>Result Value (mg/dL)</th>
<th>Allergens</th>
<th>Clinical Significance</th>
<th>Reference Range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Insignificant</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Insignificant</td>
<td>Moderate</td>
</tr>
<tr>
<td>Cow's Milk</td>
<td>Gliadin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow's Milk</td>
<td>Gluten</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow's Milk</td>
<td>Wheat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rye</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gliadin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rye</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Subjective Findings
1. History of digestive disturbances (ie, cramping, bloating, and diarrhea)
2. History of vague and diffuse myalgia and arthralgia
3. Behavioral and mood disturbances
4. Inability to concentrate and other cognitive problems
5. General malaise
6. Pubertal delay

Objective Findings
1. Failure to grow and thrive (children)
2. Enlarged abdomen and vomiting (children)
3. Short stature in physically mature adults
4. Weight loss, anorexia, and lack of sufficient body fat
5. Muscle atrophy and wasting

Clinical Findings
1. Anemia and abnormal blood tests
2. Rickets (from vitamin D deficiency) and other vitamin deficiencies
3. Dermatitis herpetiformis
4. Extreme sensitivity to allergen exposure testing and ELISA* testing
5. Chronic history of miscarriages (females)
6. Higher mortality rates

*ELISA indicates enzyme-linked immunosorbent assay.

Case Study #2

Celiac Disease in an Elite Female Collegiate Volleyball Athlete: A Case Report

- **Background:** Athlete lost 8.1 kg during the first 20 days of training, & we initially suspected an eating disorder.
  - found she did not have psychological sx’s indicative of an eating disorder.
  - Results of routine blood tests revealed critically high platelet counts; in conjunction w/ physical findings, the athlete was referred to a gastroenterologist.

- **Treatment:** Tx w/ a GFD, which excludes wheat, barley, and rye.

- **Uniqueness:** The presence of active CD may not be uncommon. However, elite athletes who face CD present a new challenge for the athletic trainer. The athletic trainer can help guide the athlete in coping w/ lifestyle changes associated w/ a GFD.

## Athlete’s Blood Panel

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Normal Range</th>
<th>9 Months Before Diagnosis</th>
<th>Flag</th>
<th>At Time of Diagnosis</th>
<th>Flag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemoglobin, g/dL</td>
<td>11.5–16.0</td>
<td>10.3</td>
<td>Low</td>
<td>11.3</td>
<td>Low*</td>
</tr>
<tr>
<td>Hematocrit, %</td>
<td>37.0–47.0</td>
<td>33.4</td>
<td>Low</td>
<td>36.5</td>
<td>Low*</td>
</tr>
<tr>
<td>Mean corpuscular volume, fL</td>
<td>80.0–100.0</td>
<td>76.3</td>
<td>Low</td>
<td>72.5</td>
<td>Low*</td>
</tr>
<tr>
<td>Mean corpuscular hemoglobin, pg</td>
<td>27.0–34.0</td>
<td>23.6</td>
<td>Low</td>
<td>22.5</td>
<td>Low*</td>
</tr>
<tr>
<td>Red blood cell distribution width, %</td>
<td>11.6–16.5</td>
<td>14.5</td>
<td>WNL†</td>
<td>17.8</td>
<td>High‡</td>
</tr>
<tr>
<td>Platelet count, $\times 10^3/\mu$L</td>
<td>150–450</td>
<td>444</td>
<td>WNL</td>
<td>542</td>
<td>Critically high§</td>
</tr>
</tbody>
</table>

*Low values suggest anemia, but no differences identified.
†WNL = values within normal limits.
‡High red blood cell distribution width outside the normal range.
§Critically high platelet count well outside the normal range.

Discussion of Case Studies

- One presents w/ clinically significant sx’s
- Other presents w/ underlying sx’s (anorexia n.)
- BOTH are likely CD, but high functioning
- Different ways in which they were managed
  - Many doctor’s have not experienced or heard of CD, particularly in athletes
“I have been searching & searching for any research on CD & athletes, & I came across your article in the JAT. I am the captain of the men’s soccer team at X University & I was just dx w/ CD. I have had 2 injury filled & frustrating yrs as I pushed myself through my muscle fatigue, weight loss, & weakness. I have high hopes to return to my former health. I am wondering how hard to train & whether there are supplements that celiac athletes should take? I am desperate for some kind of help. Any information would be appreciated!”

Personal communication, 3/18/2006
“I found your web abstract on CD. I have a 20 yr old daughter who is a basketball player at the national level. She had a 3 week episode of serious leg cramps & is now hospitalized for vertigo & cramps that go on for 2 hrs at a time. She has had so many tests, but nothing has been found. She has lost weight, but denies an ED. Please help!”

☐ Communication from Finland
Summary for the Clinical Management of CD:

- The ATC’s role:
  - Know what it is! (first things first!)
  - Challenge your clinical thinking/paradigm
  - Educate your colleagues; including physicians!
  - Be aware of physical signs:
    - Mouth sores
    - Unexplained weight loss
    - Skin reactions
    - Abnormal blood panels
Psychological Management…

- DOES MATTER!
  - Helping athlete to cope
  - Support systems
  - Sense of loss
Take-Home Points:

- People w/ CD can’t eat foods or use items w/ gluten
- CD harms the small intestine.
- People w/ untreated CD can’t get needed nutrients.
- Without tx, people w/ CD can develop other health problems.
- CD is dx by blood tests & biopsy of the small intestine.
- A GFD must be followed for life.
- A dietitian can help people choose the right foods.
Celiac Disease Radio Segment with Dr. Green:


*Discusses overview of CD*

Four Presentations from Experts from the Celiac Center

http://www.youtube.com/CeliacDiseaseCenter.

*Includes following panel:*

Peter Green, MD
*Introduction to the Center and recent new information on celiac disease*

Suzanne Lewis, MD
*Evaluation of poorly responsive patients*

Suzanne Simpson, RD
*Why see an expert nutritionist for evaluation of celiac disease*

Christina Tennyson, MD
*Nutrient and vitamin replacement*
Resources

- **Celiac Disease Awareness Campaign**
  National Digestive Diseases Information Clearinghouse
  2 Information Way
  Bethesda, MD 20892–3570
  Phone: 1–800–891–5389
  Fax: 703–738–4929
  Email: celiac@info.niddk.nih.gov
  Internet: www.celiac.nih.gov
American Celiac Society
P.O. Box 23455
New Orleans, LA 70183–0455
Phone: 504–737–3293
Email: info@americanceliac society.org
Internet: www.americanceliac society.org
American Dietetic Association
120 South Riverside Plaza, Suite 2000
Chicago, IL 60606–6995
Phone: 1–800–877–1600
Email: knowledge@eatright.org
Internet: www.eatright.org
Celiac Disease Foundation
13251 Ventura Boulevard, #1
Studio City, CA 91604
Phone: 818–990–2354
Fax: 818–990–2379
Email: cdf@celiac.org
Internet: www.celiac.org
Celiac Sprue Association/USA Inc.
P.O. Box 31700
Omaha, NE 68131–0700
Phone: 1–877–CSA–4CSA (272–4272)
Fax: 402–558–1347
Email: celiacs@csaceliacs.org
Internet: www.csaceliacs.org
Gluten Intolerance Group of North America
31214 124th Avenue SE
Auburn, WA 98092
Phone: 253–833–6655
Fax: 253–833–6675
Email: info@gluten.net
Internet: www.gluten.net
National Foundation for Celiac Awareness
P.O. Box 544
Ambler, PA 19002
Phone: 215–325–1306
Email: info@celiaccentral.org
Internet: www.celiaccentral.org
Select References

4. NCAA CHOICES Program: 2008
THANKS FOR ATTENDING!

James.Leone@bridgew.edu
or
Jleoneatc@yahoo.com

School of Education & Allied Studies

First in Education. Second to None.