



THE GOOD, THE BAD AND THE GLUTEN



a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine



University
of Victoria

let's talk 
science

Disclosures

- We are medical students
- This session is not intended to give you a diagnosis or replace going to see a health care professional

What you will learn about

- Gluten
- Celiac Disease and how the diagnosis is made
- Gluten sensitivity
- The benefits and downsides of a gluten free diet

About 12,100,000 results (0.48 seconds)

Sans gluten ou coélaque? - celiac.ca

Ad www.celiac.ca/ ▼

L'ACMC est la voix canadienne pour ceux qui évitent le gluten.

Why Gluten Free - TheFERN.org

Ad www.thefern.org/GlutenFree ▼

Understand Gluten Medical Facts & The Latest Ideas. Read Now - Free
TheFERN.org/Newsletter - TheFERN.org

The Gluten-Free Diet: Facts and Myths - The Gluten ...

<https://www.gluten.org/resources/.../the-gluten-free-diet-facts-and-myths/> ▼

Jun 2, 2015 - Who should be on a gluten-free diet? Individuals who have celiac disease require a gluten-free diet for health reasons. Ingestion of gluten in ...

Do You Know These 9 Facts About Gluten?

www.globalhealingcenter.com > Blog Home > Allergy Articles ▼

Jul 10, 2013 - Gluten sensitivities are a fairly new topic. To bring you up to speed, check out these 9 facts about gluten!

The Truth About Gluten - WebMD

www.webmd.com/diet/healthy-kitchen-11/truth-about-gluten ▼

In fact, it isn't. For people with celiac disease, a gluten-free diet is essential. But for others, "unless people are very careful, a gluten-free diet can lack vitamins, ...

Gluten Free Facts | Udi's® Gluten Free Bread

udisglutenfree.com/gluten-free-living/off-to-college/gluten-free-facts/ ▼

Gluten Free Facts. The Basics. What is gluten? Gluten is the protein found in wheat, barley, rye and related wheat species such as spelt and kamut. It helps ...

43 Facts About Gluten You Might Not Know... | Gluten-Free ...

<https://www.glutenfreesociety.org/43-facts-about-gluten-you-might-not-...> ▼

43 Gluten Facts That Doctors Should Get, But Usually Don't. Everyone with celiac disease is gluten sensitive, but not everyone with gluten sensitivity will develop ...

6 Facts About Gluten That You're Probably Getting Wrong ...

time.com/3966978/gluten-free-diet/ ▼

Jul 21, 2015 - Though 9 in 10 Americans have heard of the protein — "gluten-free diet," "gluten sensitivity" — 54% of survey respondents couldn't define it ...

The Facts about Gluten | Dr. Arjan Khalsa

drarjan.com/the-facts-about-gluten/ ▼

There are over 250 symptoms associated with gluten intolerance. That's why I suggest

Gluten

Food

Gluten is a mixture of proteins found in wheat and related grains, including barley and rye. Gluten gives elasticity to dough, helping it rise and keep its shape and often gives the final product a chewy texture. [Wikipedia](#)



Related topics

Celiac disease is triggered by consumption of the protein called gluten, which is found in wheat, barley and rye. celiaccentral.org

Explore: [Celiac disease](#)

Gluten is extracted from flour by kneading the flour, agglomerating the **gluten into** an elastic network, a **dough**, and then washing out the **starch**. [Wikipedia](#)

Explore: [Dough](#), [Starch](#)

Gluten sensitivity (also **gluten intolerance**) is a spectrum of disorders including **celiac disease** in which gluten has an adverse effect on the body. [Wikipedia](#)

Explore: [Gluten-related disorders](#), [Celiac disease](#)

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Bread



Rice flour

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gluten *n.*

a mixture of the two proteins gliadin and glutenin. Gluten is present in wheat and rye and is important for its baking properties: when mixed with water it becomes sticky and enables air to be trapped and dough to be formed

Gluten: The facts

- Rhymes with highfalutin and Rasputin
- Found in rye, barley, triticale, malt, brewer's yeast, and wheat (wheatberries, durum, emmer, semolina, spelt, farina, farro, graham, einkorn)
- Is not naturally found in rice, oats, corn, or quinoa
- Wheat has been in our diet for over 8000 years

Gluten Free: The Trend

- 10 million Canadians seek gluten free products
- 2012 Canadian sales of gluten free products was estimated at 460 million dollars
- The global market predicts that the gluten free product sales will total 6.2 billion US in 2016

<http://www.agr.gc.ca/eng/industry-markets-and-trade/statistics-and-market-information/by-product-sector/processed-food-and-beverages/reports-and-resources-food-processing-innovation-and-regulations/gluten-free-claims-in-the-marketplace/?id=1397673574797>

What is Celiac Disease and What Causes it?

A decorative horizontal bar consisting of a thick gold line, followed by a white line, and then three thin white lines, all extending across the width of the slide.

The facts and figures

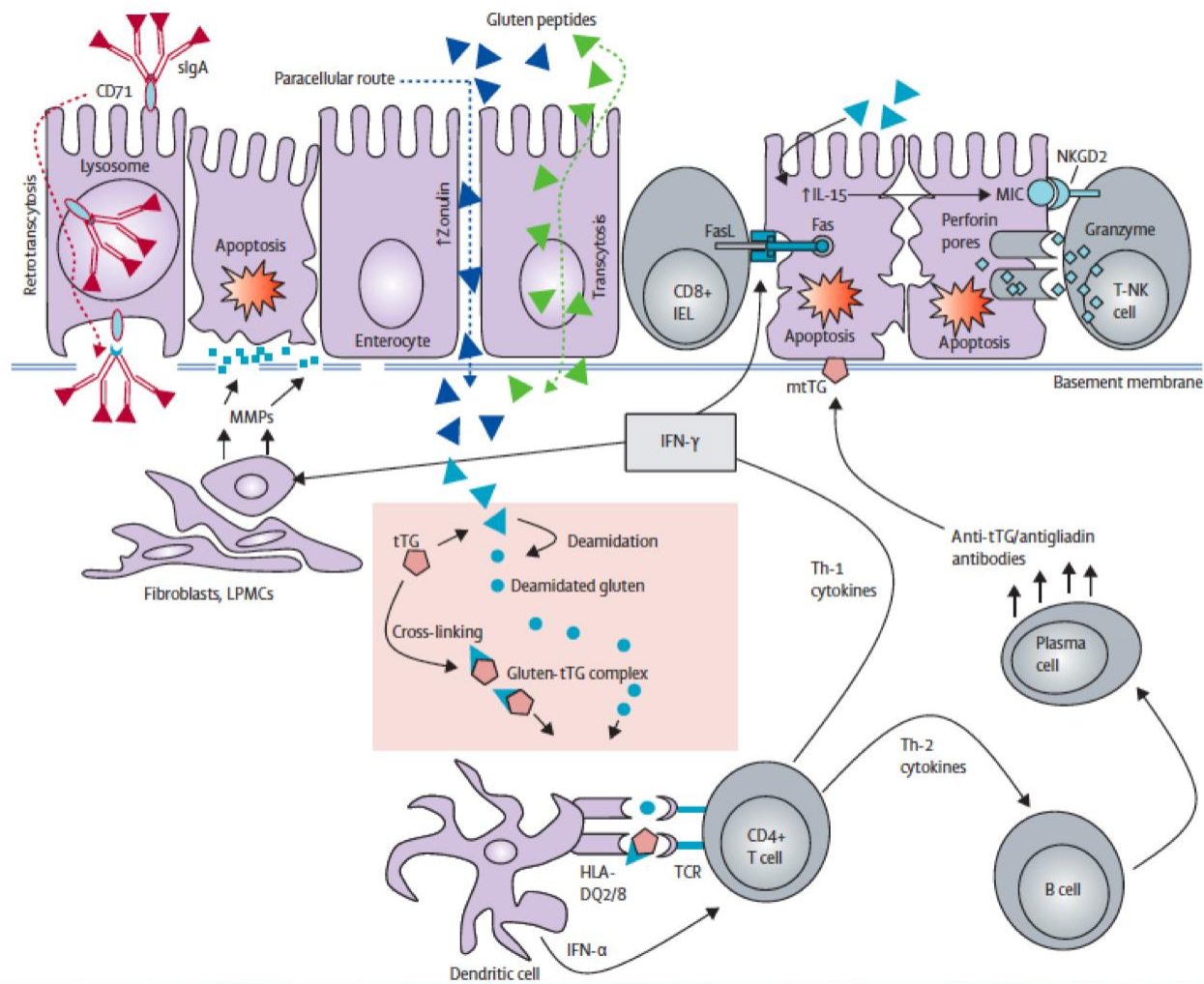
- 1% of people in Canada are affected by Celiac Disease
- More common in women
- Most often presents during infancy
- AKA: non-tropical sprue, celiac sprue, gluten-sensitive enteropathy

Causes

- Unknown
- Considered to be a combination of:
 - Environment
 - Immune system
 - Genetics

The nitty-gritty details

- HLA-DQ2 or HLA-DQ8 mutation
- Gluten is poorly digested, accumulates under intestinal lining cells
- These cells release tTG which acts on gluten to modify it
- Immune cells attack gluten and TTG complex
- Other immune cells are recruited, antibodies against gluten and TTG
- Intestinal lining is damaged in the process



<http://www.thelancet.com/action/showFullTextImages?pii=S0140-6736%2809%2960254-3>

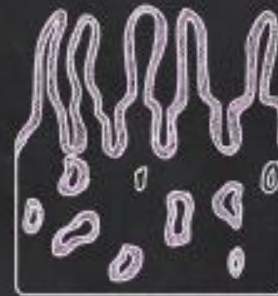
Donuts



Intestinal damage of **GLUTEN**



Small Intestine



Healthy small intestine



Celiac Disease

Symptoms

- Varied, but usually a combination of:
 - Diarrhea
 - Weight loss
 - Anemia
 - Vitamin/mineral deficiency
 - Lack of growth/weight gain in children
 - Bloating
 - Gas

Adding more complexity

- Most commonly presents in infancy, but can present anytime
- Can be relapsing and remitting
- Can spontaneously remit in the patient's 20's
- Some patients may be asymptomatic despite an abnormal biopsy
- Some patients can be symptom free with an abnormal biopsy

How a diagnosis is made

- History of malabsorption
- Anti tTG antibody test
- **Endoscopy + intestinal biopsy**
- **All testing made while patient is on a gluten – rich diet**
- **There has to be improvement seen on a follow-up biopsy after the initiation of a gluten free diet**

Things that can look like Celiac disease

- Tropical sprue
- Eosinophilic enteritis
- Milk-protein intolerance in children
- Lymphoma
- Bacterial overgrowth
- Crohn's disease
- Gastrinoma

Treatment

- Gluten restriction
- Iron supplements
- Folate supplements

Complications

- Increased risk of cancer (colon and small intestine)
- **Adherence to a strict gluten-free diet reduces the risk**

Gluten Sensitivity and Intolerance

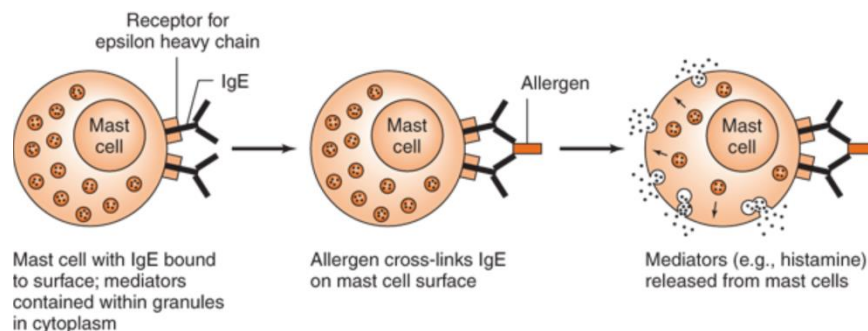
- Wheat allergy
- Non-celiac Gluten Sensitivity (NCGS)

Wheat Allergy

- Greater incidence in children of a younger age
- Estimated prevalence of 0.4% in American adults
- IgE mediated immune reaction to different antigens
- Diagnosed with allergy testing

From: Immunology

Review of Medical Microbiology and Immunology, 13e, 2014



Legend:

Immediate (anaphylactic) hypersensitivity.

Non-Celiac Gluten Sensitivity

- Intestinal and extra-intestinal symptoms related to ingestion of gluten containing foods in patients that are not affected by celiac disease or wheat allergy
- 0.5-13% of the population

Is it real?

- Common symptoms
- No Serological markers
- Mild celiacs?

Biesiekierski JR, Newnham ED, Irving PM, et al. Gluten causes gastrointestinal symptoms in subjects without celiac disease: a double-blind randomized placebo-controlled trial. *Am J Gastroenterol* 2011; 106: 508–14.

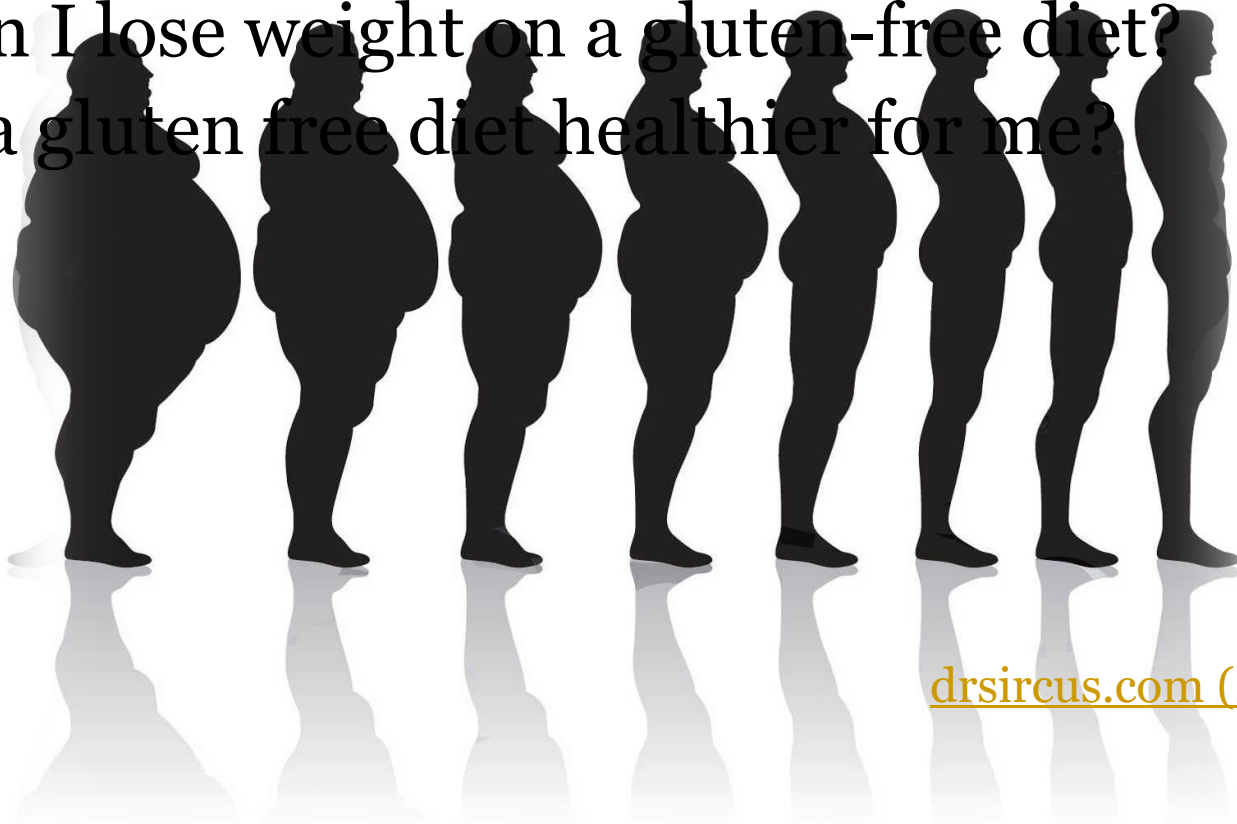
Molina-Infante, J., Santolaria, S., Sanders, D., and FernándeX-Beñares, F.. (2015) Systematic Review: Noncoeliac Gluten Sensitivity. *Alimentary Pharmacology and Therapeutics*. doi:10.1111/apt.13155

Making the diagnosis

- Diagnosis of exclusion
- Gluten challenge

Gluten-free Diet

- Can I lose weight on a gluten-free diet?
- Is a gluten free diet healthier for me?



drsircus.com (2016)

Gluten-free Diet?

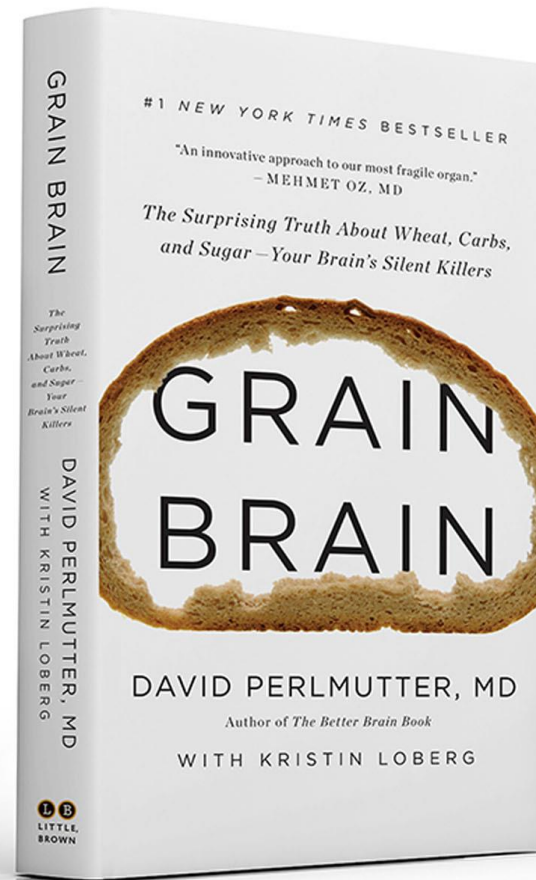
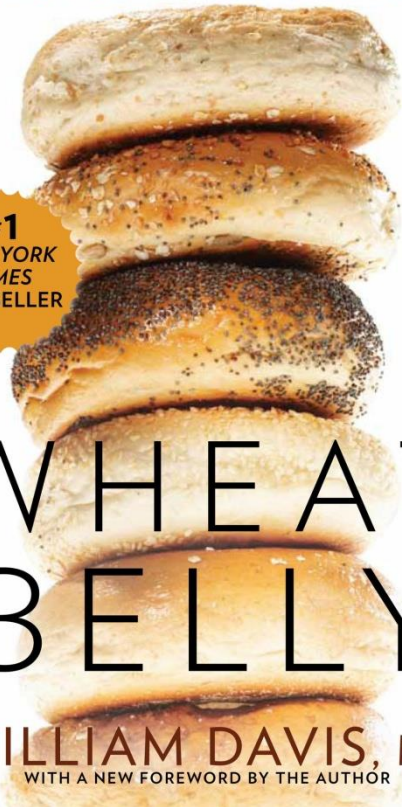
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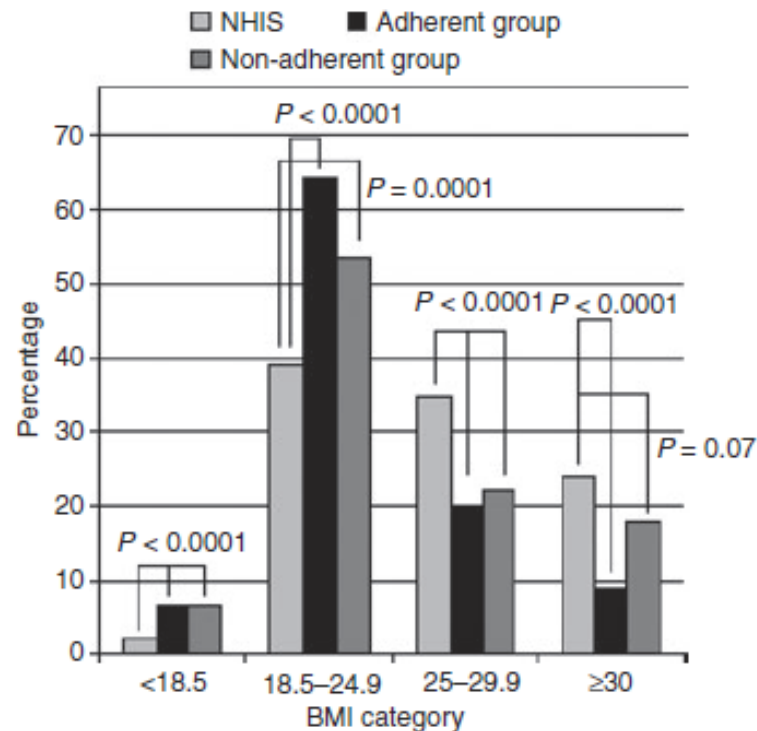
WHEAT BELLY

WILLIAM DAVIS, MD
WITH A NEW FOREWORD BY THE AUTHOR



Science?

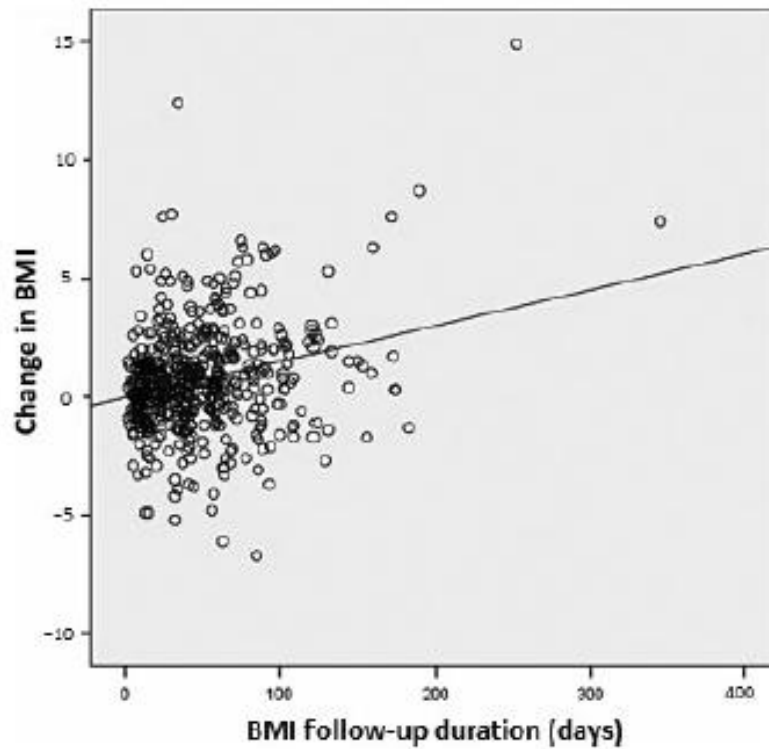
- Celiac Center at Boston's Beth Israel Deaconess Medical Center
- Study of 679 celiac
- BMI's from celiac



Kabbani, T. A., *Alimentary Pharmacology and Therapeutics*, 2012

Science?

- Change in BMI

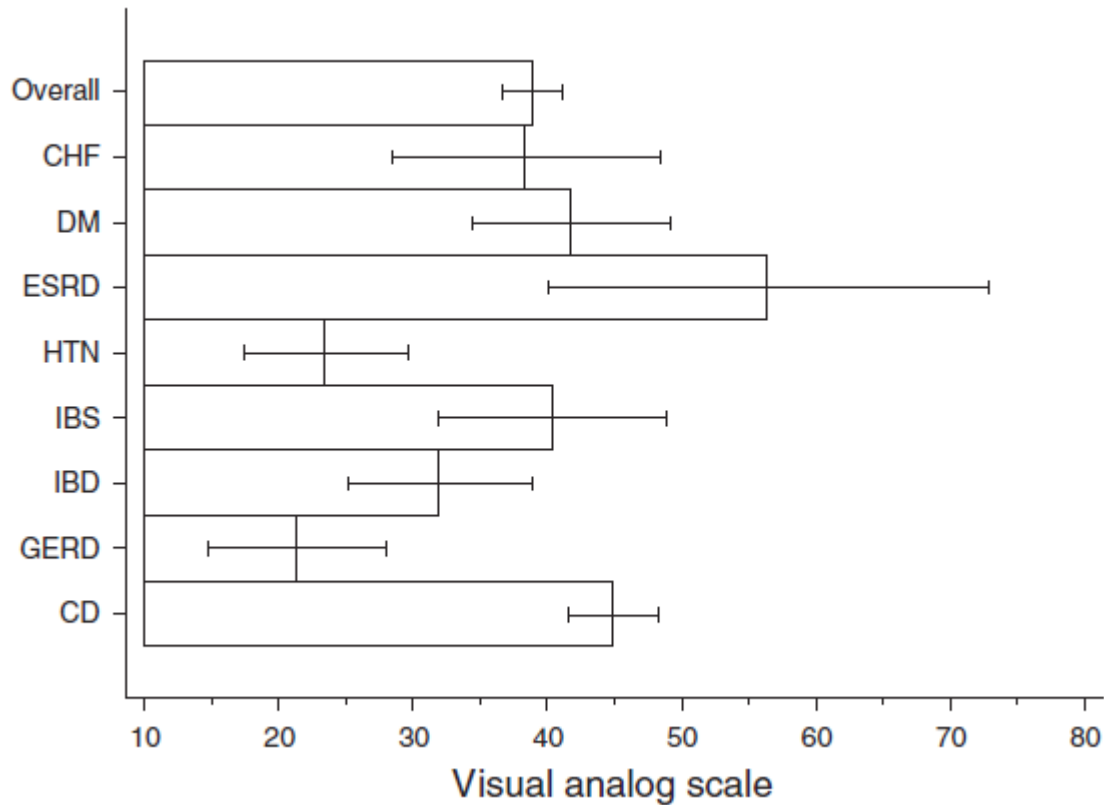


Kabbani, T. A., *Alimentary Pharmacology and Therapeutics*, 2012

Variables

- Was the weight gain/loss a result of the diet?
- What accounts for the difference between adherers and non-adherers?
- Health benefits besides weight change?

Adherence



Shah, Sveta, *American Journal of Gastroenterology*,
2012

Sources of Gluten

- Pasta
- Noodles (-rice noodles)
- Breads & Pastries
- Crackers
- Baked Goods
- Cereal & Granola
- Breakfast Foods
- Breading & Coating Mixes

- **French fries**
- **Potato Chips**

Celiac Disease Foundation,
2016

Is Gluten-Free Better for You?

- Australian study compared 3213 food products across 10 food categories
 - Dried pasta, bread, breakfast cereals, cereal bars, cakes, sweet biscuits, ice cream, corn/potato chips, cured meats, sugar based confectionaries
- Concluded that *“the consumption of GF is unlikely to confer health benefits, unless there is clear evidence of celiac disease”*
- Limitations:
 - Based off AU “Health Star Rating”
 - Also investigated: energy, sat. fat, total sugar, Na, protein, & dietary fibre
 - Australian products Wu, Jason H. Y., *British Journal of Nutrition*, 2015
 - Limited to store bought products

Conflicting Evidence/Possible Harm

- Obesity increasing in celiac disease?
- Increased energy in the form of fat?
 - Bread/pasta for high fat/protein processed foods
- Low in dietary fiber?
- Decrease in B-vitamins & Folate?
 - Not reported in gluten-free foods

Theethira, T. G., *Expert Review of Gastroenterology & Hepatology*, 2



Nutrition Facts

Serving Size (298g)

Amount Per Serving

Calories 610

% Daily Values*

Total Fat 20g **31%**

Saturated Fat 10g **50%**

Trans Fat 0.5g

Cholesterol 45mg **15%**

Sodium 1060mg **44%**

Total Carbohydrate 82g **27%**

Dietary Fiber 7g **28%**

Sugars 9g

Protein 32g **64%**

Vitamin A 30% • Vitamin C 20%

Calcium 40% • Iron 45%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than		
Sodium	Less than		
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Individual Multigrain

Nutrition Facts

Serving Size (278g)

Amount Per Serving

Calories 720

% Daily Values*

Total Fat 29g **45%**

Saturated Fat 11g **55%**

Trans Fat 0.5g

Cholesterol 100mg **33%**

Sodium 1420mg **59%**

Total Carbohydrate 89g **30%**

Dietary Fiber 11g **44%**

Sugars 14g

Protein 26g **52%**

Vitamin A 35% • Vitamin C 15%

Calcium 40% • Iron 20%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than		
Sodium	Less than		
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Individual Glutenwise

Sources of Gluten

- Pasta
- Noodles (-rice noodles)
- Breads & Pastries
- Crackers
- Baked Goods
- Cereal & Granola
- Breakfast Foods
- Breeding & Coating Mixes
- Croutons
- Flour Tortillas
- Sauces & Gravies
- Beer & Malt Beverages
- Brewer's Yeast
- Energy/Granola Bars
- French Fries
- Potato Chips
- Lunch Meats
- Candy
- Soups
- Multi-grain/artisan tortilla chips
- Salad Dressings & Marinades
- Starch or Dextrin
- Brown rice Syrup
- Meat substitutes
- Soy sauce
- Self-basting poultry
- Pre-seasoned meats
- Cheesecake filling
- Eggs served at restaurants

Celiac Disease Foundation,
2016

Other issues....

- Cost?
 - Several studies have found that a gluten-free diet costs considerably more than other diets
 - 76-518% more for wheat-based products
 - 2-124% for standard “everyday products”

Singh, J., *Journal of Human Nutrition and Dietetics* (20

Canada Celiac Association

- The downsides of eating gluten free?
- This is an expensive and restrictive diet that you are committing to for the rest of your life
- The food tends to have more carbohydrates and fat than their gluten-containing counterparts so you have to be careful of portion size
- GF foods are not fortified with iron and B vitamins like regular wheat flour is, so you need to make sure you are getting enough of those nutrients
- GF foods are also usually lower in fibre than wheat-based foods so you need to make sure you get enough fibre as well

Celiac.ca, 2016

Summary

- Difficult diet to adhere to
- Costs are substantial
- Potential health benefits can be attributable to other causes
- Potential harm
- Only treatment available for celiac disease