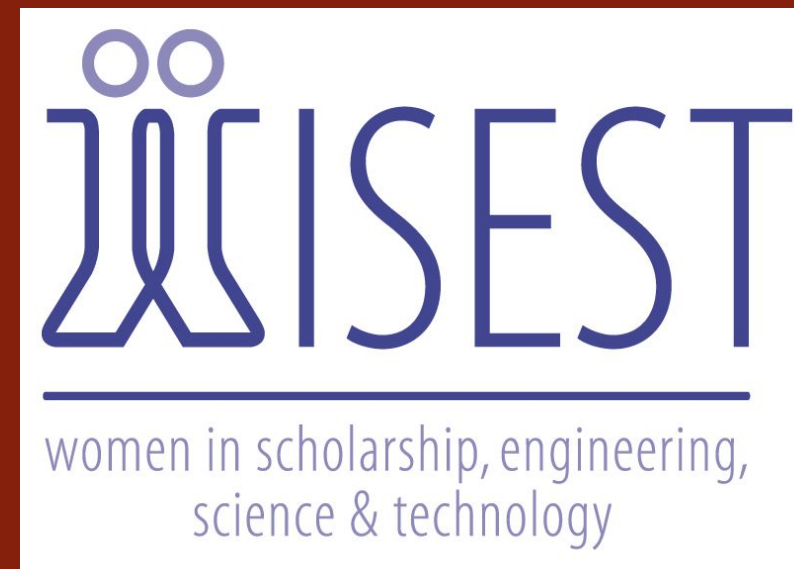


# Folate: A Micronutrient at Risk in the Diets of Individuals with Celiac Disease



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## Introduction

- Celiac disease: an autoimmune response to gluten in the walls of the small intestine.
- Causes autoimmune response and inflammation to the tissue, the flattening of villi, and the malabsorption of nutrients.
- The treatment for this disease is the avoidance of gluten through a gluten-free diet.
- Many gluten-free products lack important micronutrients such as folate, whereas gluten-containing foods are enriched with these micronutrients.
- This study looks at the presence of folate within the commercially available gluten-free diet.
- Folate is an essential micronutrient, especially for pregnant women.

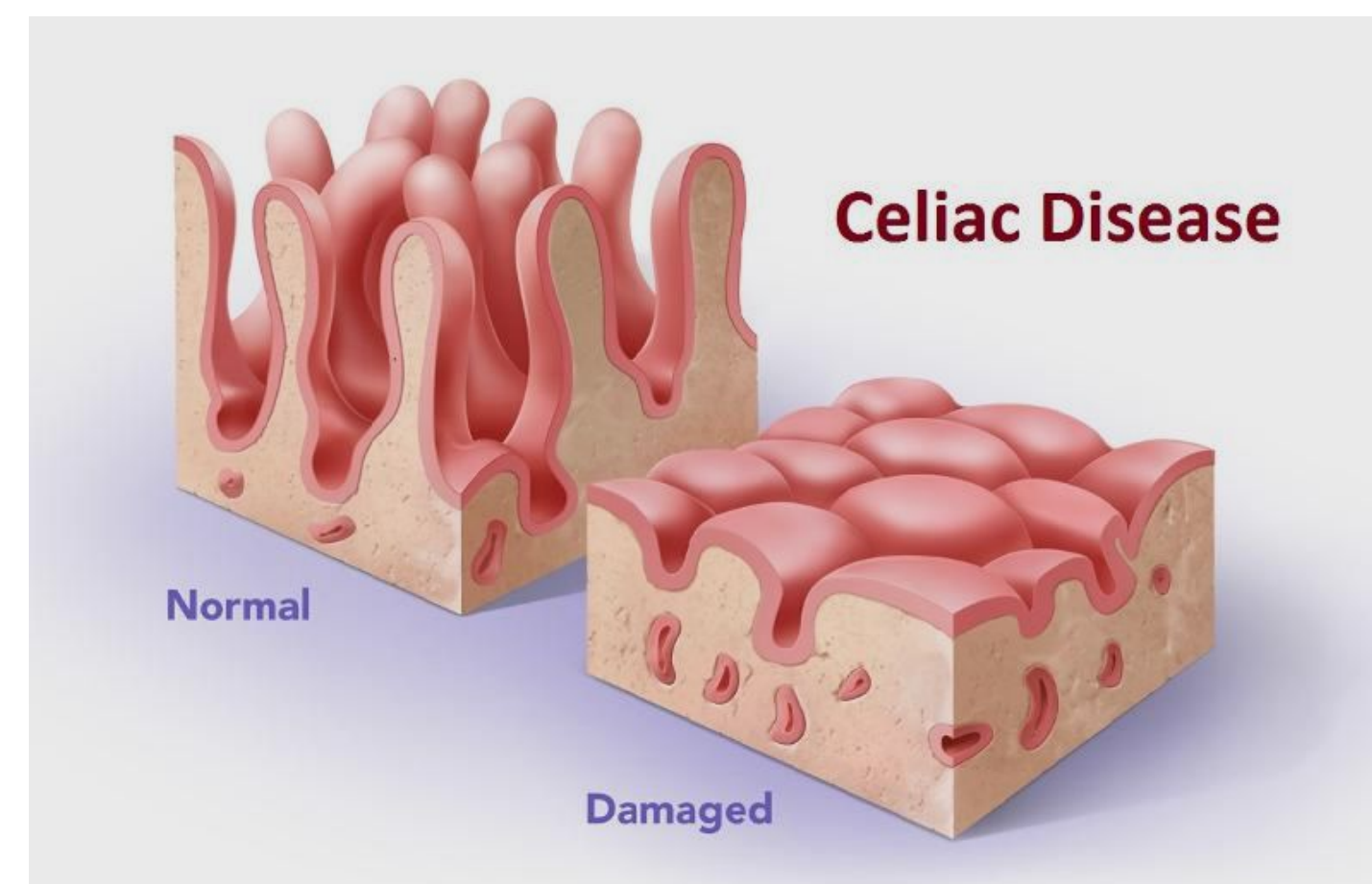


Figure 1: damaged microvilli.  
Retrieved from <http://sites.psu.edu/siowfa15/2015/12/04/should-you-be-gluten-free-and-not-have-celiac-disease/> (Aug 4, 2016)

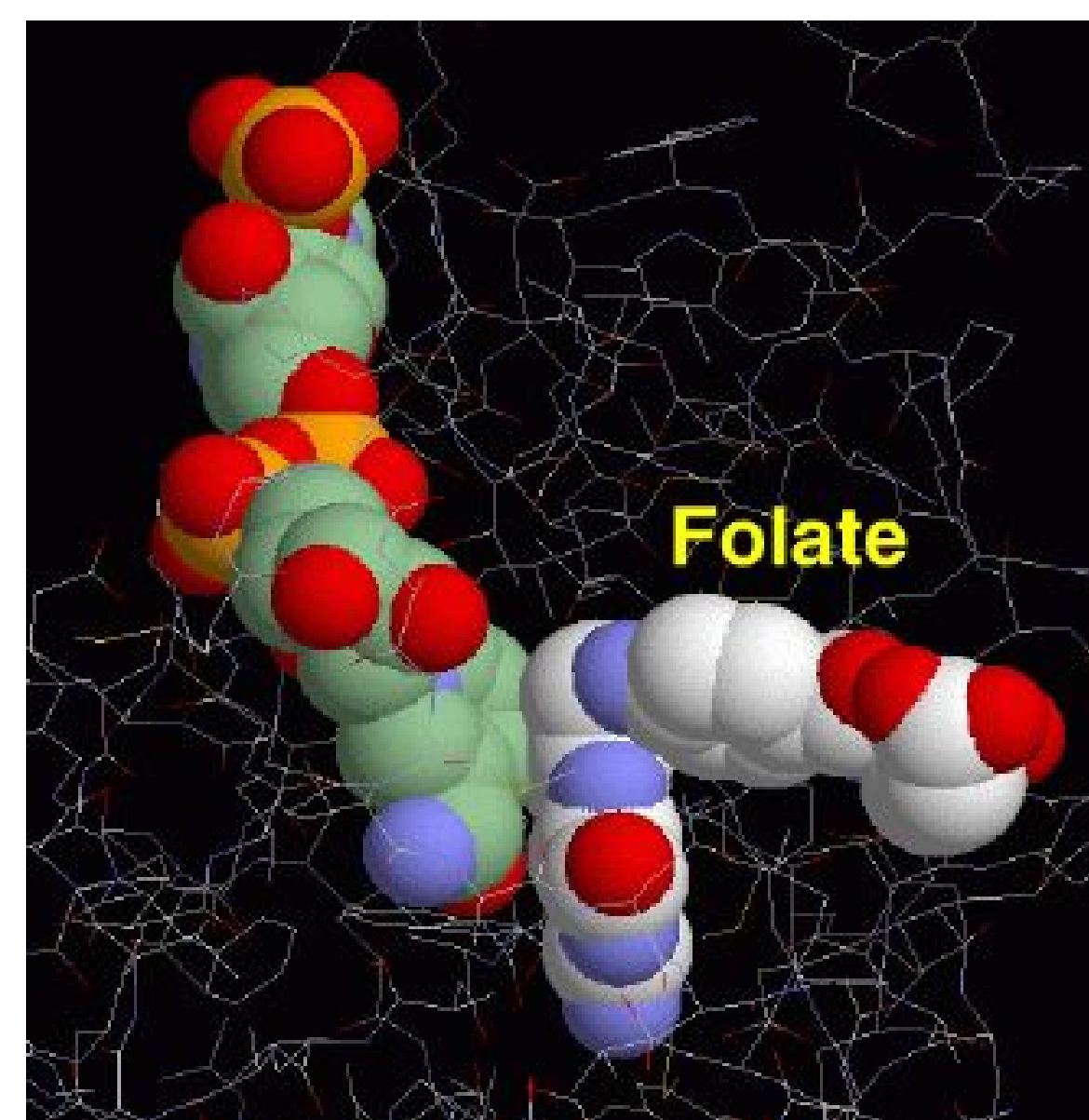


Figure 2: The structure of a folate molecule.  
Retrieved from <http://pdb101.rcsb.org/motm/34> (Aug 6, 2016)

Demographic	Estimated Average Requirements (EAR) of folate (µg/day)
Infants (0-6 mo)	65
Children (4-8 yr)	200
Females (14-70 yr)	400
Males (14-70 yr)	400
Pregnancy (19-50 yr)	600

Table 1: The data presented was retrieved from Health Canada's Dietary Reference Intake Table (Aug 7, 2016)<sup>1</sup>

## Methods

- Visited grocery stores (n=3 commercial chains) within the Edmonton area and collected data on their gluten-free products. Data included price, nutritional information, ingredients on nutrition facts table, and gluten-free certification labels on food labels.
- Focused on processed foods that contain grains (e.g breads, breakfast cereals, pasta etc) that were gluten containing and gluten free.
- Inserted data collected on the 387 items into Microsoft Excel to compare.



Figure 3: Researcher collecting data from local grocery store



Figure 4: Gluten-free section typically found in most grocery stores

## Results

Food Type	Folate content of gluten-containing food (% of daily nutritional intake)	Folate content of gluten-free food (% of daily nutritional intake)
White bread	45	0
Whole grain bread	15	0
Flavoured cracker	10	0
All purpose flour	20	0
Cereal	15	8
Granola	15	0
Spaghetti	80	0
Potato chips	10	0

Table 2: The data presented shows specific examples selected from the wide amount of data collected.

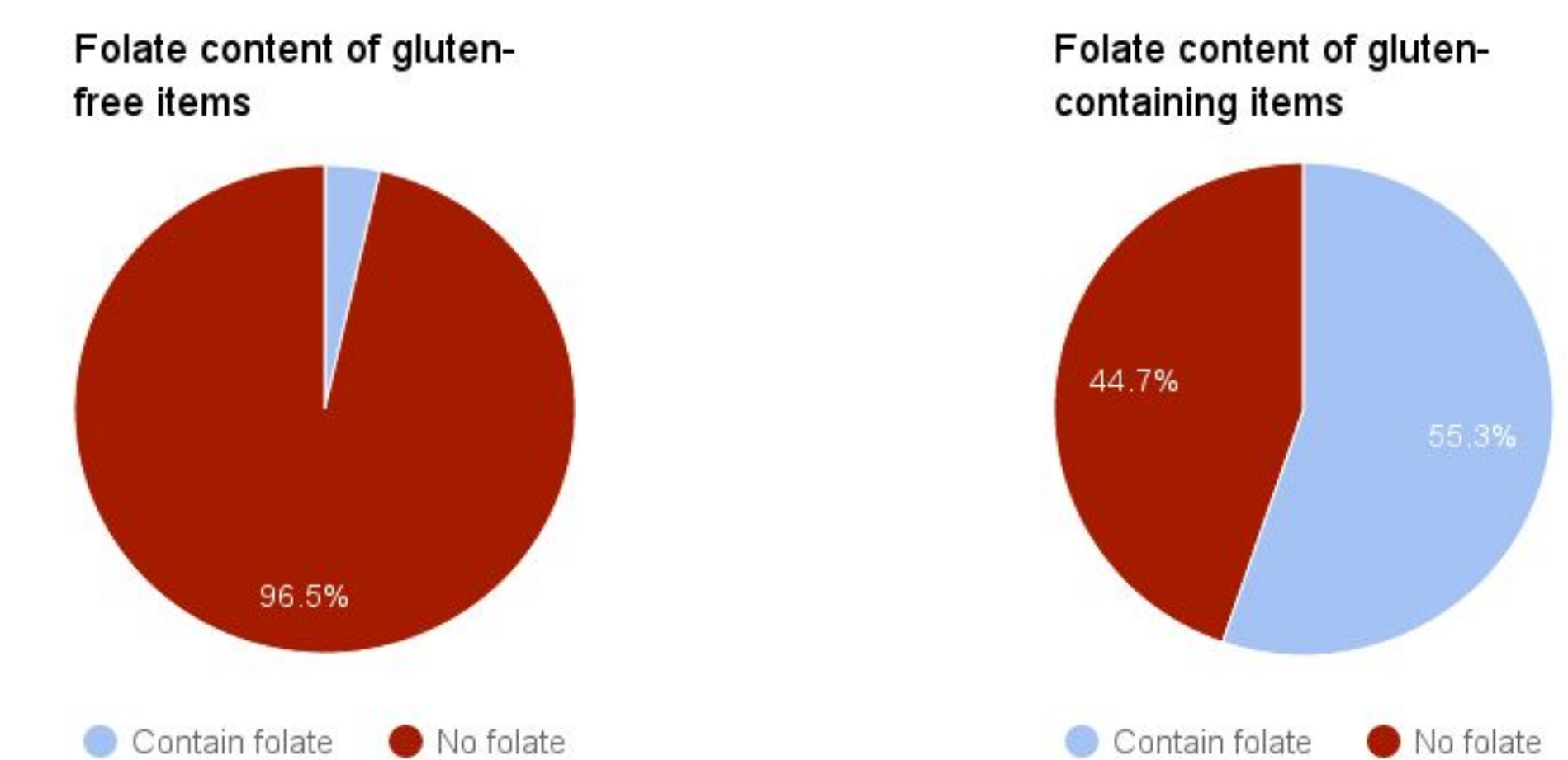


Chart 1 and 2: The folate content of the total amount of items in the study.

Type of Flour	Average µg of Folate/100g
Brown rice flour	16
White rice flour	4
Soy flour	305
Sorghum flour	25
Corn Flour	25

Table 3: Average amounts of folate in gluten-free flours taken from the Canadian Nutrient File<sup>2</sup> (Aug, 9, 2016)

## Conclusions

- There is a low amount of folate in commercially available gluten-free foods in comparison to the commercially available gluten-containing foods.
- Those who are reliant on the commercial gluten-free diet would possibly receive a much lower amount of folate than those who are not.
- This data may draw concern to the micronutrient intake and supplementation of celiac patients on the gluten-free diet.

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## Literature Cited

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<sup>1</sup>"Dietary Reference Intakes Tables." *Dietary Reference Intakes Tables [Health Canada, 2005]*. Health Canada, 29 Nov. 2010. Web. 08 Aug. 2016.

<sup>2</sup>"Canadian Nutrient File." *Government of Canada*. Health Canada, 14 July 2016. Web. 9 Aug. 2016