



# **Lactose Intolerance:** Health Consequences and Nutrition Solutions

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# Overview



- Introduction to lactose intolerance
- Update on prevalence
- Strategies for meeting nutrient needs
- Resources available
- Speakers
  - Wilma Wooten, MD, MPH: “Lactose Intolerance and African Americans: Implications for the Consumption of Appropriate Intake Levels of Key Nutrients”
  - Theresa Nicklas, DrPH: “Prevalence of Self-Reported Lactose Intolerance in a Multi-ethnic Sample of Adults”

# Varying Degrees of Lactose Sensitivity



## Lactose Maldigestion

Incomplete digestion of *lactose*, the natural sugar in milk, due to low activity of the *lactase* enzyme; may be asymptomatic

## Lactose Intolerance

Gastrointestinal disturbances following the consumption of an amount of lactose greater than the body's ability to digest and absorb

Source: Lactose Intolerance, National Digestive Diseases Information Clearinghouse. 2006.  
<http://digestive.niddk.nih.gov/ddiseases/pubs/lactoseintolerance/> (accessed May 2009).

# Lactose Intolerance

## *Reported Prevalence in U.S.*



Is this accurate?

- Group prevalence
  - 15% of whites
  - 50% of Mexican Americans
  - 80% of African Americans



Source: Theresa A Nicklas, Haiyan Qu, Sheryl O Hughes, Sara E Wagner, Russell Foushee, Richard M Shewchuk. Prevalence of Self-reported Lactose Intolerance in a Multi-ethnic Sample of Adults. *Nutrition Today*, Sept/Oct 2009.

# Implications



- Multiple food groups contribute to maintaining a healthy body and system functions
- Because of its **nutrient-rich** package, consumption of dairy foods can play a unique role in helping to promote health
- People who avoid milk and milk products due to lactose intolerance miss many benefits, as dairy and its nutrients are associated with:
  - Improved nutrient intake and diet quality
  - Bone health and weight management
  - Reduced risk of certain chronic diseases



# Lactose and Dairy Foods



## Lactose Content of Dairy Products

| Product  | Lactose (g)           |
|--|-----------------------|
| Whole, 2%, 1%, Skim Milk (1 cup)               | 13 g                  |
| Lactaid® Milk, low-fat, lactose-free (1 cup)   | 0 g <sup>A</sup>      |
| Cottage Cheese, low-fat, 2% milkfat (1/2 cup)  | 3 g                   |
| Cheddar Cheese, sharp (1 oz)                   | <0.1 g                |
| Swiss Cheese (1 oz)                            | <0.1 g                |
| Mozzarella (1 oz)                              | <0.1 g                |
| American Cheese, pasteurized, processed (1 oz) | 1 g                   |
| Yogurt, low-fat (1 cup)                        | 5 - 19 g <sup>B</sup> |
| Ice Cream (1/2 cup)                            | 2 - 6 g <sup>B</sup>  |

Note: These averages are supplied by the USDA. Lactose content varies by product and the lactose content of a specific product would need to be verified by a vendor.

Unless otherwise indicated, data sourced from: USDA/ARS, Nutrient Data Laboratory, Standard Reference, 22, January 2010

A Lactaid. [http://www.lactaid.com/page.jhtml?id=/lactaid/products.inc#1pct\\_Milk](http://www.lactaid.com/page.jhtml?id=/lactaid/products.inc#1pct_Milk). Accessed January 21, 2010

B Scrimshaw, N.S. and Murray, E.B., Amer. J. Clin. Nutr., Supplement 48 (4), 1988

# “Lactose Intolerance and African Americans: Implications for the Consumption of Appropriate Intake Levels of Key Nutrients”

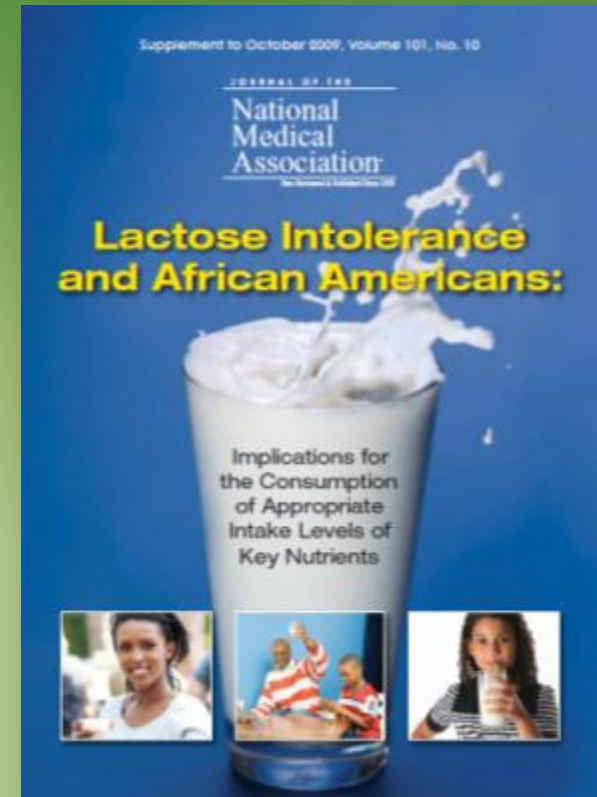
Supplement to the *Journal of the National Medical Association*  
Vol. 101, No. 10, October 2009

Wilma Wooten, MD, MPH  
Chair, National Medical Association Board of Trustees

Disclosure:  
Advisory Committee, National Dairy Council

# “Lactose Intolerance and African Americans: Implications for the Consumption of Appropriate Intake Levels of Key Nutrients”

- Some evidence exists that African Americans may be at risk of nutrient deficits as a result of the underconsumption of dairy products because of lactose intolerance
- Supplement to the *Journal of the National Medical Association* addresses key questions regarding African Americans and lactose intolerance (Vol. 101, No. 10, October 2009)



# Key Objectives

- Discuss **lactose intolerance** in African Americans
- Describe issues related to lactose intolerance as a **barrier** to key nutrients
- Review the **benefits** of key dairy nutrients
- Outline **strategies** to manage lactose intolerance



# LACTOSE INTOLERANCE AND AFRICAN AMERICANS



# Lactose Intolerance

## Symptoms

- Symptoms range from mild to severe
- Include nausea, cramps, bloating, gas, and diarrhea
- Symptoms begin about 30 minutes to 2 hours after eating or drinking foods containing lactose
- Many factors determine severity of symptoms:
  - Amount of lactose a person can tolerate
  - Person's age
  - Ethnicity
  - Digestion rate



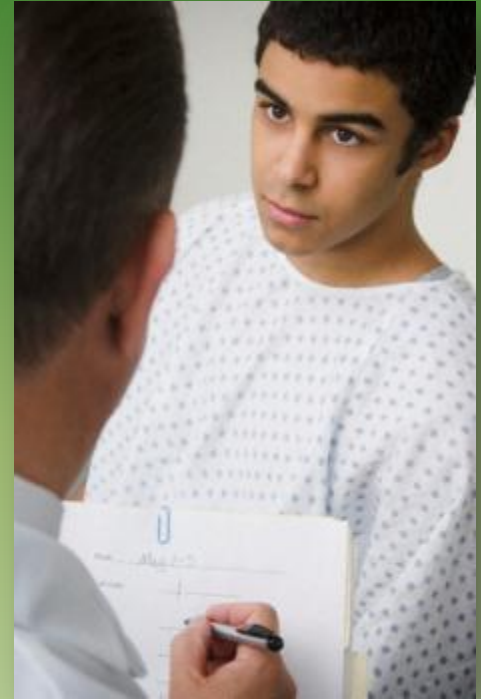
# Lactose Intolerance

## Diagnosis

- Difficult to diagnose based on symptoms alone
- Other conditions cause similar symptoms (e.g., irritable bowel syndrome)

### Diagnostic Testing

- Lactose Tolerance Test (adults)
- Hydrogen Breath Test (adults)
- Stool Acidity Test (children)



# Diagnostic Testing

## Lactose Tolerance Test

- Invasive
- Measure the ability of your intestines to break down lactose (elevated)
- Blood test
- Taken before and after drinking the lactose solution
- Abnormal if glucose rises  $<20$  mg/dL within 2 hours of drinking lactose solution (normal is  $>30$ mg/dL)

## Hydrogen Breath Test

- Non-invasive
- Measures the amount of hydrogen in the air you breathe out (low)
- Breathe into a balloon-type container
- Collected at predetermined time periods
- Normal if the increase in hydrogen is less than 12ppm over the fasting level

# Lactose Intolerance

## *Perception vs. Reality*

- Camp Calcium – African American girls, ages 11 to 15 years old, with symptoms of lactose maldigestion:
  - Consumed dairy-based diet for 21 days
  - Lactose digestion assessed by 8-hour breath hydrogen test and symptoms evaluated hourly
- Result:
  - Breath hydrogen excretion decreased significantly
  - GI symptoms were negligible
- Existence of lactose maldigestion does not result in lactose intolerance with dairy-rich diet

Source: Weaver, et al.. Improved Lactose Digestion and Intolerance Among African-American Adolescent Girls Fed Dairy-Rich Diet. *Journal of the American Dietetic Association* . 2000;

100:524-528.



LACTOSE INTOLERANCE:

# BARRIER TO KEY NUTRIENT INTAKE



# Missed Dietary Opportunity

- An estimated 75% of African Americans fail to meet daily calcium requirements because of lactose intolerance or maldigestion
- One study of lactose intolerant African Americans showed they could consume cheese
- Healthy Eating Index (HEI) lowest in African Americans compared to other groups
  - 2 – 3 y.o. children had 72 (74) HEI,
  - 11 - 18 y.o. dropped to 57 (62.5)
  - 19 - 50 y.o. had lowest HEI at 56 (66.5)



- Low fruits
- Little calcium products
- High fats
- High Na+
- Low fiber

# Dairy Intake in African Americans

- Just over half (55%) of African Americans eat one or more servings of dairy foods a day
- African American children consume only 0.8 to 1.0 servings of milk per day
- Less than 7 percent of African Americans meet the 2005 Dietary Guidelines for Americans recommended three servings of dairy foods per day (NHANES data, Beydoun 2008)



# Dairy Nutrient Intake: African Americans and Pregnancy

- African American pregnant women have been found to have lower calcium intakes than their majority counterparts (5% vs. 8%)
- Lower calcium intake is associated with Vitamin D deficiency
- African American women are 10 times more likely to be vitamin D deficient than white women
- 92.4% of African American newborns and 66.1 % of white babies were vitamin D deficient at birth
- Babies who are vitamin D deficient are more susceptible to rickets, a disease that affects the development of bones, and osteomalacia



Sources: 10X Vit D Def in AA Women: Nesby-O'Dell, Shanna et al. Hypovitaminosis D prevalence and determinants among African American and white women of reproductive age: third National Health and Nutrition Examination Survey, 1988-1994. Am J Clin Nutr 2002;76:187-92.

# Under Consumption of Key Dairy Nutrients

- Decreased dairy products may also play a role in vitamin D deficiency seen in African American youth
- Vitamin D adequacy has been associated with decreased risk of diabetes, CVD, and selected cancers
- Reis et al (2008)
  - Analyzed 2001-2004 NHANES data using logical regression analysis (cross-section data)
  - Included 2,997 whites and 866 African Americans >40y.o
  - Demonstrated that 1/3 of the higher prevalence of Peripheral Arterial Disease (PAD) in AA was attributable to a lower vitamin D status

Sources:

Harris. *Journal of Nutrition*. April 2006.136:1126-1299.

Reis et al. *AmerJClinMed*. Dec 2008.88(6):1469-1477.



# Barriers

- Poor diet quality (as most Americans)
- Under-consumption of the recommended allowance of dairy products
- Unaware of the suggested minimum servings associated with the major food groups
- Unaware of the nutrients provided by the food groups



# BENEFITS OF KEY DAIRY NUTRIENTS



# Key Nutrients

## *(per 8 fluid ounces of milk)*

- Calcium 30% Daily Value
- Vitamin D 25% Daily Value
- Riboflavin 24% Daily Value
- Phosphorous 20% Daily Value
- Protein 16% Daily Value
- Vitamin B12 13% Daily Value
- Potassium 11% Daily Value
- Vitamin A 10% Daily Value
- Niacin (equivalents) 10% Daily Value

Source: Percent of Daily Value based on rounded values for 8-ounce cup of milk as found on Nutrition Facts Label according to FDA.

# Chronic Disease Risk May Also Be Impacted by Dairy Intake

- Osteoporosis (myriad of data to support)
- Other chronic diseases that may also be impacted:
  - Hypertension
  - Obesity
  - Cancer
  - Diabetes

# Benefits of a Nutrient-Rich Diet

- Hypertension, insulin resistance syndrome, and obesity – all risk factors for cardiovascular disease – have been shown to be positively influenced by dietary patterns that include adequate intake of dairy products
- Reusser et al
  - Randomized, controlled trial in an African American population
  - Tested the benefits of a nutrient-rich diet -- including 3 dairy servings
  - Showed a decrease risk for HTN, insulin resistance, stroke, and heart disease
  - Confirmed benefits for African Americans without significant adverse effects such as symptoms of lactose intolerance

\*Source: Reusser et al. Adequate nutrient intake can reduce CVD in AA. J Natl Med Assoc. 2003 Mar;95(3):188-195.



# STRATEGIES TO MANAGE LACTOSE INTOLERANCE



# Lactose Intolerance

## *Dietary Strategies*

- Lactose intolerance is easy to manage
- Not able to improve the body's ability to produce lactase
- Symptoms can be controlled through dietary strategies

# Simple Guidelines

- Lactose intolerant African Americans could achieve needed levels of dairy products
- Effective physician/dietitian-patient communication
- General nutrition information
- Slow introduction of dairy into diet
- Overcoming the barrier of lactose intolerance to reduce health disparities



# Strategies to Address Lactose Intolerance

## *Consumers/Patients and Physicians/Dietitians*

- KNOW (GET INFORMED):
  - Consumers/patients and physicians/dietitians must understand how to minimize lactose intolerance symptoms
  - View dairy foods as an investment in human health and not just food consumption
  - Become educated on current guidelines
    - DASH Diet Guidelines
    - 2005 Dietary Guidelines
    - 2007 IOM Report (Nutrition Standards in Schools)

# Strategies to Address Lactose Intolerance

## *Physicians/Dietitians*

- ASK:
  - Include the inquiry about lactose intolerance as a core question when taking a medical history
  - This can help reduce dairy nutrient deficiencies
- ADVISE:
  - Encourage patients/consumers to be formally tested for lactose intolerance OR
  - Provide guidance on gradual introduction of dairy into the diet

# Strategies to Address Lactose Intolerance

## *Physicians/Dietitians*

- IDENTIFY THOSE AT RISK:
  - Review positive linkages between dairy products and key diseases states
  - Identify pregnant women, the elderly, hypertensives, diabetics, and other risk groups whose health may be even marginally improved by protecting against nutrient insufficiency
- EDUCATE
  - Disseminate dietary guidelines and DASH Diet info to African Americans patients to educate about the critical role of consuming at least three (3) daily servings of milk, yogurt, or cheese and how this helps you get calcium, riboflavin, protein, potassium, and other nutrients

# Strategies to Address Lactose Intolerance

## *Consumers/Patients*

- Gradually increasing low-fat and fat-free dairy products into the diet have been found to be an effective method to reduce symptoms
- Yogurt can minimize lactose intolerance symptoms because it aids in the creation of a lactose enzyme that can aid in lactose digestion



# Alternative Options

- Elimination of milk and other dairy products is not usually necessary (as per AAP)
- Other options can include:
  - Yogurt
  - Hard, aged cheeses
  - Lactose-free milk, or
  - Enzyme lactase (prior to the consumption of milk products)
- Evidence supports that avoidance of dairy products may lead to inadequate calcium intake and consequent suboptimal bone mineralization



# Summary

- Lactose intolerance is common, easy to manage, and can be controlled with dietary strategies.
- Since dairy nutrients address important health concerns, addressing lactose intolerance is an investment in health.
- It is possible to consume dairy, even in the face of a history of maldigestion or lactose intolerant issues.
- Gradually increasing lactose in the diet – drinking small milk portions with food, eating yogurt, and consuming cheese – is an effective strategy to manage lactose intolerance and help meet optimal dairy needs.



# “Prevalence of Self-Reported Lactose Intolerance in a Multi-ethnic Sample of Adults”

## Phase I: Pilot Study

Theresa Nicklas, DrPH  
Professor

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Baylor College of Medicine  
Department of Pediatrics

### Disclosure:

Funding source is Dairy Management, Inc. and United States Department of Agriculture.



# Why the disparity?

- Prevalence rates for lactose intolerance are grossly overestimated (15% whites, 80% African Americans, 50% Mexican Americans)
- Potential reasons:
  - Diagnostic conditions for lactose maldigestion
  - Inaccurate assumption that lactose maldigestion equals lactose intolerance
  - Poor diagnosis based on subjective information over objective analysis

# “Prevalence of Self-Reported Lactose Intolerance in a Multi-ethnic Sample of Adults”

## Primary Goal:

- To determine the prevalence of *self-reported lactose intolerance* among a national sample of European American, African American and Hispanic American adults

## Secondary Goals:

- To determine whether select health disparities and calcium intake correlate with self-reported lactose intolerance
- To determine facilitative strategies to overcome limited dairy consumption due to lactose intolerance

# Study Methods

## Survey Development

- Nominal group technique
- Cognitive interviews
- Expert review

## Survey Contents

- Lactose intolerance questions
- Calcium questions
- Facilitative questions
- Health questions



## Key Survey Question: *“Do you think that you are lactose intolerant?”*

- A person was classified as having lactose intolerance if they said ‘yes’ after a brief description of the condition was provided
- People who responded ‘no’ or ‘don’t know’ were classified as not lactose intolerant

# Study Results

| Race/Ethnicity    | Sample       | Crude LI (%)  | Age-Adjusted LI (%) |
|-------------------|--------------|---------------|---------------------|
| European American | 486          | 8.64%         | 7.72%               |
| African American  | 355          | 22.82%        | 19.50%              |
| Hispanic American | 243          | 9.05%         | 10.05%              |
| <b>Total</b>      | <b>1,084</b> | <b>13.38%</b> | <b>12.04%</b>       |

LI: Lactose intolerance

Source:

Theresa A Nicklas, Haiyan Qu, Sheryl O Hughes, Sara E Wagner, Russell Foushee, Richard M Shewchuk.  
Prevalence of Self-reported Lactose Intolerance in a Multi-ethnic Sample of Adults. *Nutrition Today*, Sept/Oct 2009.



# Phase II: Main Study

- Conducted larger, multi-racial/ethnic national representative sample (n= 3,635)
- Random digit dialing of survey
- Mean age: 48.88 years (+/- 13.11 years)
- Gender: 68.6% female/32.4% male
- Self-Perceived Lactose Intolerance (SPLI)
  - 7% Whites
  - 22% Blacks
  - 10% Hispanics
- SPLI vs. Non-SPLI
  - ↓ Total calcium intake
  - ↓ Dairy intake
- Self-Reported Health Conditions
  - ↑ Diabetes
  - ↑ Hypertension



# Conclusions

- The prevalence of self-perceived lactose intolerance is lower than what has been previously estimated based on lactose maldigestion rates
- It is impossible to determine if lactase maldigestion is the source of the symptoms without objective testing
- This data is important for health professionals to consider when making dairy food recommendations for ethnic minorities



# Summary/Resources

# Conclusions



- There are varying degrees of sensitivity to lactose
- A recent study shows that rates of self-perceived lactose intolerance are lower than what has been previously estimated
- Dietary strategies exist to incorporate dairy foods into the diets of those who are lactose intolerant



# Upcoming Event

- NIH Consensus Development Conference: Lactose Intolerance and Health (February 22 – 24)
- Learn more:  
<http://consensus.nih.gov/2010/lactose.htm>



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February 22–24, 2010  
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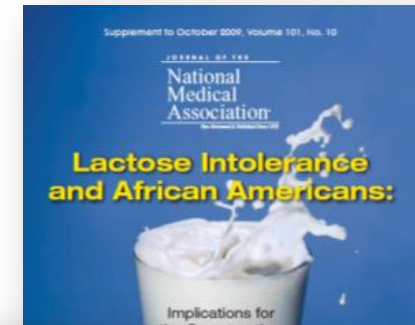
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**Background**

Lactose intolerance is the inability to digest significant amounts of lactose, a sugar found in milk and other dairy products. Lactose intolerance is caused by a shortage of the enzyme lactase, which is produced by expression of lactase-phlorizin hydrolase gene by the cells that line the small intestine. Lactase breaks milk sugar down into two simpler forms of sugar called glucose and galactose.

# Lactose Intolerance Resources

- Credits for participation and survey
- Coming soon: Lactose Intolerance Health Education Kit  
[www.nationaldairyCouncil.org](http://www.nationaldairyCouncil.org)





Questions?

Thank you!