Lactose Intolerance and Health Disparities Among African Americans and Hispanic Americans: An Updated Consensus Statement

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Abstract: Dairy foods contribute nine essential nutrients to the diet including calcium, potassium and vitamin D; nutrients identified by the 2010 Dietary Guidelines for Americans as being "of public health concern" within the U.S. population. Milk and milk product intake is associated with better diet quality and has been associated with a reduced risk of chronic diseases or conditions including hypertension, cardiovascular disease, metabolic syndrome, Type 2 Diabetes and osteoporosis. Some research also indicates dairy food intake may be linked to reduced body fat, when accompanied by energy-restriction. On average, both African Americans and Hispanic Americans consume less than the recommended levels of dairy foods, and perceived or actual lactose intolerance can be a primary reason for limiting or avoiding dairy intake. True lactose intolerance prevalence is not known because healthcare providers do not routinely measure for it, and no standardized assessment method exists. Avoiding dairy may lead to shortfalls of essential nutrients and increased susceptibility to chronic disease. This updated Consensus Statement aims to provide the most current information about lactose intolerance and health, with specific relevance to the African American and Hispanic American communities. Topics covered include diagnostic considerations, actual and recommended dairy food intake and levels of consumption of key dairy nutrients among African Americans and Hispanic Americans; prevalence of self-reported lactose intolerance among various racial/ethnic groups; the association between dairy food intake, lactose intolerance and chronic disease; and research-based management recommendations for those with lactose intolerance.

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Introduction and Background

Dairy foods contribute essential nutrients to the diet including calcium, potassium and vitamin D; nutrients identified in the 2010 Dietary Guidelines for Americans (DGA) as being "of public health concern" within the U.S. population. Milk and milk product intake is associated with better diet quality and has been associated with a reduced risk of chronic diseases or conditions including hypertension, cardiovascular disease, metabolic syndrome, Type 2 Diabetes and osteoporosis. Some research also indicates dairy food intake may be linked to reduced body fat when accompanied by energy-restriction. On average, both African Americans and Hispanic Americans consume less than the recommended levels of dairy foods and their nutrients. Perceived or actual lactose intolerance is a primary reason for limiting or avoiding consumption of dairy foods. While true lactose intolerance prevalence is not known, research indicates that those who consider themselves lactose intolerant may compromise dairy intake, which may leave them short on essential nutrient intake and more susceptible to some of the chronic diseases mentioned above. Public health authorities agree that for those with lactose intolerance, dairy food intake is not only possible, but also encouraged.

Healthcare providers serve as health and wellness gatekeepers and have the opportunity to educate African Americans and Hispanic Americans about the dietary importance of dairy foods and their nutrients, even for those with lactose intolerance. The National Medical Association's (NMA) 2009 Consensus Statement, "Lactose Intolerance and African Americans: Implications for the Consumption of Appropriate Intake Levels of Key Nutrients" and the National Hispanic Medical Association's (NHMA) 2010 "Health Implications of Dairy Intake in U.S. Hispanics: Opportunities for Nutrition Intervention and Education," both addressed this issue (NMA, 2009; NHMA, 2010). The NMA's 2009 report concluded healthcare providers should encourage patients who believe themselves to be lactose intolerant to be formally tested for lactose intolerance; provide health education regarding the role of dairy nutrients in chronic illness; and encourage the consumption of dairy foods, even in the presence of lactose intolerance with strategies that include the use of reduced-lactose or lactose-free milk and milk products and drinking milk with food or meals (NMA, 2009). The NHMA's 2010 white paper encouraged healthcare providers to advocate for healthy, traditional diets that included 3 to 4 daily servings of low-fat or fat-free dairy foods depending on age; explain the important nutrient package of milk; teach strategies to those with lactose intolerance to keep dairy in the diet; and to utilize culturally and linguistically appropriate nutrition education sources (NHMA, 2010).

Since these two publications were released, new public health recommendations from the 2010 DGA and the National Institutes of Health (NIH) and new primary scientific research dealing with dairy nutrient intake and lactose intolerance have been published. This updated Consensus Statement aims to provide healthcare providers with the most current information about lactose intolerance and health, with specific relevance to the African American and Hispanic American communities, so they can provide accurate dietary recommendations for those with lactose intolerance.

Methodology

A review of the literature published since 2009 was completed and focused on (1) recent findings on dairy and nutrient intakes in the general U.S. population, as well as African Americans and Hispanic Americans; (2) occurrence of chronic disease conditions affecting African Americans and Hispanic Americans; (3) prevalence of lactose intolerance among ethnic/racial groups; (4) diagnosis considerations for lactose intolerance; and (5) prevalence of chronic disease conditions associated with lactose intolerance and/or dairy avoidance. Public health recommendations, national surveys and health organization positions were also reviewed and included.

Findings and Recommendations

Given the low dairy and nutrient intake among African Americans and Hispanic Americans, adequate consumption of dairy foods is particularly important for these two population groups, regardless of whether lactose intolerance is documented or not. For those who consider themselves lactose intolerant, healthcare providers need to stress the importance of dairy intake and offer options to their patients, such as opting for lactose-free dairy foods and consuming milk with meals. New research conducted among African American and Hispanic American groups revealed that among those who considered themselves

lactose intolerant, calcium intake from dairy sources was lower and the incidence for doctor-diagnosed diabetes and hypertension was higher. The NIH, in its 2010 consensus conference report, "Lactose Intolerance and Health," raised concern about the potential link between lactose intolerance, low intake of nutrients found in dairy foods and adverse health outcomes. Both the NIH and 2010 DGA encourage those with lactose intolerance to continue to consume dairy foods and provide strategies to do so. It is important for both African Americans and Hispanic Americans with lactose intolerance to meet nutrient recommendations and it is also essential for healthcare providers to recommend that their lactose intolerant patients consume dairy foods daily. Taken together, the NMA and NHMA reaffirm their previous recommendations from the 2009 Consensus Statement and 2010 white paper respectively, and based on new research and guidelines, jointly recommend that 1) if lactose maldigestion is suspected, standardized and objective testing should be employed in adults and children to determine; 2) if confirmed, encourage patients to keep dairy foods in the diet and employ strategies to help them achieve the recommended dairy food intake levels using culturally and linguistically appropriate communication; 3) whether lactose maldigestion is present or not, given the low dairy intake among African Americans and Hispanic Americans, healthcare providers are encouraged to work with patients to achieve the recommended daily dairy servings for all individuals, which can help improve daily nutrient intakes.

INTRODUCTION AND BACKGROUND

Lactose Intolerance: Statement of the Problem

In 400 B.C., Hippocrates first described the condition that some believe to be a reference to lactose intolerance stating, "there are some who do not bear it [cheese] well…" (Adams, 1886). However, lactose intolerance has only been diagnosed medically in the past century (Kretchmer, 1981). Lactose intolerance refers to the collective gastrointestinal symptoms (e.g., abdominal discomfort, nausea, cramps and flatulence) associated with lactose maldigestion, the condition resulting from incomplete digestion of the primary disaccharide found in milk and many dairy foods, lactose (Miller et al., 2007; Mattar et al, 2012). Lactase non-persistence is the progressive physiological decline in intestinal lactase activity over time. Lactose maldigestion occurs when insufficient amounts of lactase are available in the small intestine to hydrolyze lactose into its two constituents, galactose and glucose (Miller et al., 2007; Mattar et al., 2012). Lactose intolerance is when an individual has gastrointestinal distress and is not the same as a milk protein allergy although some of the symptoms may be similar (Miller et al., 2007). While lactose intolerance's cause is low levels of lactase in the gastrointestinal tract, milk protein allergy is caused by an abnormal immune response to the ingestion of cow's milk protein (Miller et al., 2007).

Lactose maldigestion is estimated to occur in approximately 80% of African Americans, 50% of Mexican Americans and 15% of Caucasians (Jarvis and Miller, 2002; Sabi, 1994; Scrimshaw et al., 1988); however, lactose maldigestion does not always manifest in the symptoms of lactose intolerance. Thus, the prevalence of lactose intolerance among various groups is likely less (Nicklas et al., 2009; Keith et al., 2011), though its true prevalence is difficult to estimate due to the inherent limitations associated with the condition including improper diagnosis, lack of a standardized assessment methodology and no consistent definition (Suchy et al., 2010).

Lactose intolerance is a primary reason for dietary dairy limitation or avoidance (Wilt et al., 2010; Keith et al., 2011). One of the unintended consequences of eliminating dairy is that it results in low intake of key nutrients (Suchy et al., 2010). Dairy foods contribute many essential nutrients to the diet including calcium, potassium and vitamin D (Keast et al., 2013; O'Neil et al., 2012). African Americans and Hispanic Americans with lactose intolerance may alter their dietary habits by limiting dairy intake, which can greatly affect their nutrient intake. As a result, they may be more susceptible to certain diseases such as diabetes or cardiovascular disease (Suchy et al., 2010), chronic conditions where nutrients found in dairy foods may play an important preventive role (2010 DGA; 2010 DGAC). Reduced consumption of dairy foods should be of high concern for African Americans and Hispanic Americans who are already not meeting dairy recommendations (3 servings per day for most people), consuming only 1.2 and 1.5 servings of dairy foods per day on average, respectively (DRI, 2009-2010). Like the American public as a whole, these groups are also under-consuming dairy's key nutrients including calcium,

potassium and vitamin D (WWEIA, 2013 and 2010 DGA).

Healthcare providers serve as health and wellness gatekeepers and have the opportunity to educate African Americans and Hispanic Americans about the dietary importance of dairy foods and their nutrients, even for those with lactose intolerance. In 2009, the National Medical Association (NMA) published a Consensus Statement, "Lactose Intolerance and African Americans: Implications for the Consumption of Appropriate Intake Levels of Key Nutrients" (NMA, 2009), and in 2010, the National Hispanic Medical Association (NHMA) published a white paper, "Health Implications of Dairy Intake in U.S. Hispanics: Opportunities for Nutrition Intervention and Education" (Mercado and Fileti, 2010). These papers aimed to address dairy intake and lactose intolerance among the respective African American and Hispanic American populations. Since these reports were released, a significant amount of research has been published on dairy and nutrient intake among racial/ethnic groups and lactose intolerance, including its prevalence and association with disease risk. This paper aims to provide updated information about lactose intolerance and health since the 2009 Consensus Statement and 2010 white paper publications and to educate health providers serving the African American and/or Hispanic American community about:

- Current public health recommendations for dairy food and nutrient intakes for Americans
- Dairy food and nutrient intake trends among African Americans and Hispanic Americans
- The link between dairy foods, chronic diseases and conditions and their prevalence in racial/ethnic groups
- The prevalence of lactose intolerance among African Americans and Hispanic Americans, its link to dairy and nutrient intake and its association with chronic disease
- Diagnostic considerations for lactose intolerance
- Research-based management strategies to help African Americans and Hispanic Americans with lactose intolerance continue to keep dairy foods in their diets

About the National Medical Association

The NMA is the oldest and largest non-profit, professional organization in the world, representing over 30,000 African American healthcare providers and the patients they serve. Since its foundation in 1895, the NMA has taken an active role to promote health and wellness and eliminate health disparities among people of African descent. The organization and its members are committed to preventing disease and disabilities and supporting efforts to improve availability of quality healthcare for African Americans. To that end, NMA's disease targets include asthma, cardiovascular disease and stroke, cancer, diabetes, chronic kidney disease and end stage renal disease, HIV/AIDS and obesity. Because the NMA recognizes the significant role nutrition plays in disease prevention and management, the organization strives to educate its members and their patients about the role of diet quality and nutrient adequacy in health management.

About the National Hispanic Medical Association

The NHMA is a non-profit association serving as the collective voice for over 45,000 Hispanic healthcare providers in the United States. The NHMA strives to be the national leader to improve Hispanic health and to help eliminate health disparities among Hispanic Americans by empowering healthcare providers of Hispanic descent. Through its programs, the NHMA aims to enhance the health status of and promote healthy lifestyles among Hispanics and other underserved minorities, decrease childhood obesity, and decrease diabetes. The NHMA is dedicated to employing preventive strategies and advocates wellness strategies to help reach these goals. The NHMA recognizes the opportunities to improve Hispanic American and racial/ethnic health through culturally relevant diets and nutrition education.

Methodology

A review of the literature, which focused mainly on original research published since the studies included in the 2009 NMA report, was completed. Subject matter of the review focused on (1) recent findings on dairy food and nutrient intakes in the general U.S. population, as well as African Americans and Hispanic Americans; (2) occurrence of chronic disease conditions affecting African Americans

and Hispanic Americans; (3) prevalence of lactose intolerance among ethnic/racial groups; (4) diagnosis considerations for lactose intolerance; and (5) prevalence of chronic disease conditions associated with lactose intolerance and/or dairy avoidance. In addition, major public health recommendations, national surveys and health organization positions were also reviewed. Current recommendations, studies that introduced new or unique findings and landmark research that provide a framework for the statement were included.

DAIRY INTAKE AND CHRONIC DISEASE AMONG MINORITY GROUPS

Current Recommendations for Dairy and Nutrient Intake

The dairy food group (milk, cheese and yogurt) is a substantial contributor of many nutrients important for good health, including calcium, potassium, phosphorous, magnesium, zinc, protein, vitamin A, vitamin D, vitamin B12 and riboflavin (Keast et al., 2013; O'Neil et al., 2012). Intake of milk and milk products is associated with better overall nutrient intake and diet quality (Ballew et al., 2000; Ranganathan et al., 2005; Weinberg et al., 2004). The 2010 DGA recommends 3 daily servings of low-fat or fat-free milk or milk products for individuals ages 9 years and older, 2.5 servings for children ages 4 to 8 years and 2 servings for children ages 2 to 3 years (2010 DGA). Low-fat and fat-free milk and milk products are labeled as *foods to increase* by the 2010 DGA and provide three of the four *nutrients of public health concern* that Americans are under-consuming: calcium, potassium and vitamin D (2010 DGA). In the U.S., milk is the number one food source of these three essential nutrients (Keast et al., 2013; O'Neil et al., 2012). According to the 2010 DGA, moderate evidence indicates that intake of milk and milk products is linked to improved bone health, particularly in children and adolescents. In addition, the 2010 DGA suggests moderate evidence also indicates milk and milk product intake is associated with a reduced risk of cardiovascular disease and Type 2 Diabetes and with lowering blood pressure in adults. The 2010 DGA advocates the Dietary Approaches to Stop Hypertension (DASH) Eating Plan as a healthful pattern that "embodies" the DGA's dietary recommendations; DASH is rich in low-fat dairy foods, fruits and vegetables and is designed to help individuals manage or lower their blood pressure (NHLBI, 2006).

The Institute of Medicine (IOM) recently updated its Dietary Reference Intakes (DRI) for calcium and vitamin D and after review of the evidence, based their recommendations on the amounts needed to support bone health during each life stage (IOM, 2011). The new DRIs for calcium and vitamin D include both the Estimated Average Requirements (EARs) and the Recommended Dietary Allowances (RDAs) (IOM, 2011). The EAR is a value that reflects a population's median requirement and is used to assess the adequacy of nutrient intakes for population groups (IOM, 2011). The RDA is a value that is based on the EAR, covers the requirement for nearly all of the population (97.5%) and is used for individual guidance and developing dietary patterns in the DGA (IOM, 2011). The RDAs range from 1,000 to 1,300 mg for calcium and 600 to 800 IU for vitamin D for most individuals, depending on age (IOM, 2011), and the 2010 DGA is aligned with these most recent RDAs for calcium and vitamin D. In the report, *Bone Health and Osteoporosis*, the Surgeon General also provided evidence in support of adequate calcium and vitamin D intake, and states that three glasses of milk daily can help individuals meet calcium needs (SG, 2004). In addition to calcium and vitamin D, the Surgeon General states that consuming adequate amounts of other dairy nutrients, including potassium, magnesium, phosphorus and protein, are critical for optimal bone building and maintenance (SG, 2004). The IOM and the Surgeon General warn about a potentially detrimental effect of dairy avoidance on bone health and these public health authorities, along with the 2010 DGA, offer solutions for individuals who experience lactose intolerance. Recommended solutions include opting for lower lactose or lactose-free dairy options and consuming dairy foods in small amounts at a time (IOM, 2011; SG, 2004; 2010 DGA).

Health professional groups also support dairy intake (Table 1). The American Academy of Pediatrics (AAP) recommends three to four daily servings of milk and milk products for children and adolescents (Greer et al., 2006). The AAP recommends these dairy products be low-fat for children ages 2 years and older (Daniels et al., 2008). Reduced-fat dairy is recommended for children 1 to <2 years of age who have a family history of dyslipidemia, obesity or cardiovascular disease (Daniels et al., 2008); whole milk is recommended for all others in this age group

Table 1. Lactose Intolerance: What Authoritative Organizations Advise

Dietary Guidelines for Americans, 2010 General public, ages 2 years and over	• "Those who think they have a food intolerance should be medically evaluated to avoid unnecessarily eliminating foods from their diet… For some food intolerances, like lactose intolerance, smaller portions (e.g., 4 ounces of milk) or a modified version of the offending foods (e.g., lactose-reduced or lactose-free milk, yogurt or cheese) may be well tolerated." • "Increase intake of fat-free or low-fat milk and milk products, such as milk, yogurt and cheese." Source: ***http://www.cnpp.usda.gov/dietargyguidelines.htm***.
NIH Consensus Development Conference: Lactose Intolerance and Health General public	"Conclusions: • Lactose intolerance is a real and important clinical syndrome, but its true prevalence is not known. • The majority of people with lactose malabsorption do not have clinical lactose intolerance. Many individuals who think they are lactose intolerant are not lactose malabsorbers. • Many individuals with real or perceived lactose intolerance avoid dairy and ingest inadequate amounts of calcium and vitamin D, which may predispose them to decreased bone accrual, osteoporosis and other adverse health outcomes. In most cases, individuals do not need to eliminate dairy consumption completely. • Even in persons with lactose intolerance, small amounts of milk, yogurt, hard cheeses and reduced-lactose foods may be effective management approaches … Lactase-treated products may be tolerated better than non-treated products, but more research is needed. • Evidence-based dietary approaches with and without dairy foods and supplementation strategies are needed to ensure appropriate consumption of calcium and other nutrients in lactose intolerant individuals. • Educational programs and behavioral approaches for individuals and their healthcare providers should be developed and validated to improve the nutrition and symptoms of individuals with lactose intolerance and dairy avoidance." Source: ***http://consensus.nih.gov/2010/lactosestatement.htm***.
American Academy of Pediatrics Children and teens	• "The American Academy of Pediatrics supports use of dairy foods as an important source of calcium for bone mineral health and of other nutrients that facilitate growth in children and adolescents. If dairy products are eliminated, other dietary sources of calcium or calcium supplements need to be provided …" • "Treatment of lactose intolerance by elimination of milk and other dairy products is not usually necessary given newer approaches to lactose intolerance, including the use of partially digested products (such as yogurts, cheeses, products containing Lactobacillus acidophilus and pretreated milks). Evidence that avoidance of dairy products may lead to inadequate calcium intake and consequent suboptimal bone mineralization of protein and other nutrients that are essential for growth in children." Source: ***http://pediatrics.aappublicatiosn.org/cgi/content/full/pediatrics;118/3/1279PEDIATRICS*** *Vol. 118 No. 3 September 2006, pp. 1279-1286.*

(Kleinman RE, 2009). Childhood and adolescence represents a time of critical bone development and growth (Greer et al., 2006). The AAP recommends against eliminating milk and dairy products for most children with lactose intolerance since many alternative, lactose-reduced or lactose-free products currently exist. The AAP further emphasizes that eliminating milk from the diet in children may lead to inadequate calcium intake and suboptimal bone mineralization as milk provides many essential nutrients important for overall growth and development (Heyman et al., 2006). Similar to the IOM and the Surgeon General's recommendations, the AAP recommends children with lactose intolerance try various strategies such as consuming lactose-free dairy foods or drinking milk with meals to obtain dairy nutrients (Heyman et al., 2006).

Dairy and Nutrient Intake in African Americans and Hispanic Americans

Dairy intake among certain minority groups continues to be less than recommended (Table 2). Analysis of the 2009-2010 national diet survey (National Health and Nutrition Examination Survey; NHANES) indicates that on average, Americans consume 1.7 cups equivalents of dairy foods each day (DRI, 2009-2010) and are not meeting dairy food intake recommendations. Hispanic Americans consume less dairy (1.5 cup equivalents per day) compared to non-Hispanic whites (1.9 cup equivalents per day), and non-Hispanic blacks consume even less at only 1.2 cup equivalents per day ($p<0.01$). Children ages 2 to 3 years are the only group that, as a whole, meet dairy food intake recommendations (2 servings per day), and current consumption trends indicate that once children start school, their intake of milk declines, regardless of ethnicity. Milk is the primary dairy food consumed by the American population (DRI, 2009-2010). On average, non-Hispanic black American children aged 2 to 18 years consume 1.8 dairy servings per day; and 76% drink milk once they reach school age (5 years of age). This number drops to 44% during adolescence (ages 13 to 17 years). For Hispanic Americans, children aged 2 to 18 years consume an average of 1.9 dairy servings per day and 87% drink milk when they reach school age; this number drops to 53% during adolescence (DRI, 2009-2010).

Many African Americans and Hispanic Americans have lower intake of nutrients found in dairy foods (Table 3). For those 2 years of age and older, average calcium intake is only 865 mg/day among non-Hispanic blacks, 992 mg/day among all Hispanics and 1,079 mg/day for non-Hispanic whites (WWEIA, 2012) compared to the RDA for 19-30 year olds which is 1,000 mg/day (IOM, 2011). For vitamin D, average daily intake for those ages 2 years and older is 4.3 µg among non-Hispanic blacks, 5.2 µg for all Hispanics and 5.6 µg for non-Hispanic whites compared to RDA for 19-30 year olds which is 600 IU/day or 15 µg/day (IOM, 2011). African Americans may be at a higher risk for vitamin D deficiency. According to the IOM's DRI report for calcium and vitamin D, sun exposure likely contributes meaningful amounts of vitamin D to North Americans and thus, individuals who have dark skin pigmentation may be at risk for not getting enough vitamin D (IOM, 2011). Like vitamin D, potassium intake is low for all groups ages 2 years and older with average daily intakes of 2,304 mg among non-Hispanic blacks, 2,556 mg among all Hispanics and 2,728 mg for non-Hispanic whites (WWEIA, 2012) compared to the recommended Adequate Intake level of 4,700 g/day for both males and females between 19 and 30 years of age (DRIs, 2005). Similar intake trends are apparent for other dairy nutrients such as magnesium and phosphorus as well (WWEIA, 2012). A recent study reported that a significant portion of the U.S. population is not meeting the EAR for calcium (38%), vitamin D (70%) and magnesium (45%), and only 3% of the population have intakes above the Adequate Intake (AI) for potassium (Fulgoni et al., 2011). Although usual intakes among racial/ethnic groups were not assessed in this report, given that African Americans and Hispanic Americans have lower average intakes of these nutrients and lower dairy intake as a whole, a higher percentage of African and Hispanic Americans are not likely meeting their daily recommended intakes for many of these nutrients. Research indicates 3 to 4 servings of dairy foods would be needed to ensure adequate intakes of calcium and magnesium, and more than 4 servings would be needed to meet potassium recommendations (Nicklas et al., 2009).

Dairy Intake and Chronic Disease

Intake of dairy foods and its nutrients have been linked to reduced risk of several chronic diseases and adequate intakes (3 – 4 servings/day) are recommended by public health authorities (e.g., 2010 Dietary Guidelines, IOM's DRIs for calcium and vitamin D, Surgeon General [2010 DGA; IOM, 2011; SG, 2004] AAP). Nutrients found in milk have been established as critical components for optimal bone growth and maintenance and reduced osteoporosis risk (SG, 2004; Greer, 2006; IOM, 2011). In addition to its role in bone health, some research indicates milk and/or dairy food intake is associated with a reduced risk of chronic diseases or conditions including hypertension, cardiovascular disease, metabolic syndrome and Type 2 Diabetes (Elwood et al., 2010; Doidge et al., 2012; Tremblay and Gilbert, 2009; Ralston et al., 2011). Some research also indicates dairy food intake may be linked to reduced body fat when accompanied by energy-restriction (Chen et al., 2012). Diseases such as obesity, cardiovascular disease and/or diabetes are already highly prevalent among the U.S. population

Table 2. Average dairy food intake among various population groups ages 2 years and older according to the National Health and Nutrition Examination Survey (NHANES) 2009-2010

Food (cup equivalents/day)	*Non-Hispanic Black*	*Hispanic*	*Non-Hispanic White*
Milk	0.6 ± 0.0[b]	0.9 ± 0.0[c]	1.1 ± 0.0[c]
Cheese	0.6 ± 0.0[b]	0.6 ± 0.0[b]	0.8 ± 0.0[a]
Yogurt	*	*	0.1 ± 0.0
Total Dairy	1.2[b]	1.5[c]	1.9[a]

(n=8,944)
*less than 0.05
For each dairy food, different superscripts (a,b,c) indicate statistically significant differences in intake between ethnicity/race groups ($p<0.05$)

Source: Dairy Research Institute® (NHANES 2009-2010). Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey Data. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2009-2010]. [***http://www.cdc.gov/nchs/nhanes.htm***]

Table 3. Average intake of select dairy nutrients from food among various population groups ages 2 years and older according to the National Health and Nutrition Examination Survey (NHANES) 2009-2010

Nutrient (per day)	*Non-Hispanic Blacks*	*All Hispanics*	*Non-Hispanic Whites*
Calcium (mg)	865 ± 16.0	992 ± 19.4	1,079 ± 13.2
Vitamin D (µg)	4.3 ± 0.14	5.2 ± 0.08	5.6 ± 0.20
Potassium (mg)	2,304 ±41.0	2,556 ± 34.3	2,728 ± 27.0
Magnesium (mg)	251 ± 4.0	284 ± 4.3	299 ± 3.3
Phosphorus (mg)	1,226 ± 23.2	1,369 ± 15.7	1,429 ± 12.6

Source: U.S. Department of Agriculture, Agricultural Research Service. 2012. Nutrient Intakes from Food: Mean Amounts Consumed per Individual, by Race/Ethnicity and Age, What We Eat in America, NHANES 2009-2010. Available: ***www.ars.usda.gov/ba/bhnrc/fsrg. Accessed on 01/23/13***.

(CDC Website; Roger et al., 2012). African Americans may be at an even a higher risk of obesity, diabetes and hypertension (NMA, 2009; Wooten and Price, 2004; CDC Website), and Hispanic Americans for obesity, diabetes and osteoporosis (Mercado and Fileti, 2010; CDC Website) (Table 4).

Obesity in African Americans and Hispanic Americans

Compared to whites, African Americans had a 51% higher obesity rate and Hispanics had a 21% higher obesity rate from 2006-2008 (CDC, 2009). A 2012 systematic review stated that racial disparities among obesity rates are widening with substantial racial/ethnic differences already existent in childhood (Dixon et al., 2012). Based on NHANES 2009-2010, the prevalence of children ages 2-19 years with a body mass index (BMI) ≥95th percentile was 24.3% among non-Hispanic black children, 21.2% among Hispanic American children and 14.0% among non-Hispanic white children (Ogden et al., 2012). Specific to Hispanic American children, 14.8% of Hispanic infants were at high weight-for-recumbent length (≥95th percentile) compared to 9.7% of U.S. infants in

Table 4. Percent of non-Hispanic blacks, all Hispanics and Mexican Americans, ages 20y or older*, with common chronic diseases in the U.S.

Chronic Disease	*Non-Hispanic Blacks*	*All Hispanics*	*Mexican Americans*	*Non-Hispanic Whites*
Obesity[1]	50%	39%	40%	34%
Metabolic Syndrome[2]	39%	--	41%	32%
Diabetes[3]	13%	12%	13%	7%
Hypertension[4]		25%		
Men	43%	--	28%	34%
Women	46%	--	29%	31%
Osteoporosis Or Low Bone Mass *(Femur Neck or Lumbar Spine)*[5]				
Men	24%	--	53%	43%
Women	53%	--	86%	77%

*50y or older for osteoporosis statistics; 18y or older for hypertension *All Hispanics* statistics
Sources:
[1]NHANES 2009-2010 data; Flegal KM, Carroll MD, Kit BK, Ogden CL. Prevalence of obesity and trends in the distribution of body mass index among U.S. adults, 1999-2010. *J Am Med Assoc.* 2012;307:491-497.
[2]NHANES 2003-2006 data; Ervin RB. Prevalence of metabolic syndrome among adults 20 years of age and over, by sex, age, race and ethnicity, and body mass index: United States, 2003-2006. National health statistics reports; no 13. Hyattsville, MD: National Center for Health Statistics. 2009.
[3]2007–2009 National Health Interview Survey data, for diagnosed diabetes only; Centers for Disease Control Website, Diabetes Public Health Resource. Available: Accessed 01/23/13.
[4]NHANES 2008 data; Roger VL, Go AS, Lloyd-Jones DM, et al., Heart disease and stroke statistics-2012 Update: a report from the American Heart Association. *Circulation.* 2012;125:e2-e220.
[5]NHANES 2005-2008 data; Centers for Disease Control Website, Osteoporosis or Low Bone Mass at the Femur Neck or Lumbar Spine in Older Adults: United States, 2005-2008. Available: ***http://www.cdc.gov/nchs/data/databriefs/db93.htm*** Accessed 01/23/13.

general (Ogden et al., 2012). In 2009-2010, 33.1% of Hispanic children ages 2 to 5 years were overweight or obese (Ogden et al., 2012). Childhood obesity can open the door to other comorbidities including obesity later in life, metabolic abnormalities and/or diabetes and elevated blood pressure (Dixon et al., 2012). Thus, management strategies directed at racial/ethnic groups are imperative to reducing obesity and maintaining optimal health. Research indicates that some dietary and lifestyle interventions may help reduce obesity and its comorbidities among some racial/ethnic groups (Osei-Assibery et al., 2010). For example, culturally tailored lifestyle interventions can produce weight loss in African Americans, and culturally and linguistically appropriate lifestyle programs for weight loss have aided Mexican American women in weight loss (Osei-Assibery et al., 2010).

Although the 2010 Dietary Guidelines Advisory Committee concluded that intake of milk and milk products does not provide a unique role in weight control (USDA/USDHHS, Nutrition Evidence Library Website), a recent meta-analysis of 22 randomized controlled trials assessing dairy food intake and body fat concluded that in the context of energy restriction, dairy intake showed a modest reduction of body fat (Chen et a., 2012). However, this meta-analysis also found no link between dairy intake and body weight in long-term trials. Studies assessing the link between dairy intake, weight and/or body fat are limited among racial/ethnic groups. One earlier study found that African American adults following a calorie-restricted, dairy-adequate (3 servings of dairy per day) diet for 24 weeks lost significantly more weight than those only on a calorie-restricted diet with one or fewer servings of dairy per day (Zemel et al., 2005). In light of recent research and public health authority conclusions, studies assessing dairy intake and body fat among racial/ethnic groups are warranted.

Other Health Disparities in African Americans and Hispanic Americans

In addition to obesity, diabetes and hypertension are chronic diseases that are more pronounced in African Americans (NMA, 2009; Hoffman, 2009; Spencer et al., 2012). Although studies indicate that metabolic syndrome incidence is less common in African Americans versus Caucasians, its clinical outcomes of stroke, myocardial infarction and Type 2 Diabetes are more common in African Americans (Hoffman, 2009), indicating differing pathophysiological precursors between these groups. There is some evidence that African American children and adolescents are more insulin resistant, have increased insulin secretion and clearance, and increased endothelial dysfunction compared to their Caucasian peers, all laying the groundwork for increased rates of Type 2 Diabetes, cardiovascular disease and complications later in life (Hoffman, 2009). In addition, African Americans suffer from the highest rates of hypertension in the U.S., an additional risk factor for cardiovascular disease (Rogers et al., 2012). A meta-analysis of prospective studies assessing dairy food consumption and disease outcomes concluded, using adjusted estimates of relative risk, that higher dairy intake was associated with lower incident diabetes, ischemic heart disease and stroke by 15%, 21% and 8%, respectively (Elwood et al., 2010). In addition, a dairy-adequate (about 2.7 servings of dairy per day), DASH diet was more pronounced at lowering blood pressure among African Americans (Appel et al., 1997).

Adequate calcium intake may be particularly important for African Americans. Since calcium intake is often linked to bone health, and studies indicate African Americans build bone that is as dense, or denser, than whites (Heaney, 2006), it may be concluded that their calcium needs are less. However, the same physiological mechanisms that allow African Americans to adapt to prevailing low calcium intakes without compromising bone structure to the extent observed in whites can also lead to hypertension and metabolic syndrome (Heaney et al., 2006), two conditions for which adequate calcium intake may be instrumental in reducing risk. Thus, a dairy- and calcium-adequate diet such as DASH may positively impact the health of African Americans. While dairy intake and diets such as the DASH diet may have a beneficial affect on the health of African Americans, barriers such as lactose intolerance (Keith et al., 2011), low adherence to nutritional counseling and patients' lack of knowledge exist (Spencer et al., 2012).

For Hispanic Americans, metabolic syndrome, diabetes and osteoporosis are additional health disparities that may affect Hispanic Americans more than other racial/ethnic groups (Mercado and Fileti, 2010). As with African Americans, metabolic risk may begin early in childhood (Davis et al., 2010; Cruz et al., 2004). The largest percentage of Hispanic Americans are comprised of Mexican Americans (U.S. Census Bureau, 2010), and according to NHANES 1999 to 2008, metabolic syndrome risk factors associated with cardiovascular disease and Type 2 Diabetes are increasing among Mexican American female adolescents while for most other ethnicities, they are decreasing (Okosun et al., 2012). Mexican Americans are not the only group affected (CDC, 2012). In 2010, Puerto Rico had the largest age-adjusted prevalence of diagnosed diabetes among adults aged 18 years and older when assessed by U.S. Census region and state (CDC, 2012). Regardless, all Hispanic populations are at risk for metabolic syndrome, although its clinical manifestations and severity differ between Hispanic groups and by demographics (Marcial et al., 2011). Diabetes is twice as common among Mexican-Americans and Puerto Ricans compared to Caucasian Americans and more than 10% of all Hispanic Americans have diabetes (RWJ Website). Obesity and lack of physical activity are key risk factors for diabetes among Hispanic Americans, and this group has higher rates of diabetic retinopathy and kidney disease compared to Caucasian Americans (RWJ Website). For Hispanics, acculturation plays a significant role in diabetes risk; studies indicate that low acculturation is associated with healthier diets and lower incidence of Type 2 Diabetes as well as lower rates of blood pressure and smoking (Perez-Escamilla and Putnik, 2007). Hispanics are also at risk for osteoporosis (Mercao and Flieti, 2010). While Hispanic Americans have bone density comparable to white Americans, their bone density and fracture risk is affected by both racial and lifestyle variables (Walker et al., 2008; Cooper and Ballard, 2011). For example, some research indicates that in some regions of the country, fracture risk is increasing most rapidly among Hispanics (Cooper and Ballard, 2011), although its cause is not known.

LACTOSE INTOLERANCE

Although lactose intolerance started being medically diagnosed over a century ago (Kretchmer, 1981), relatively little is known about its prevalence rates, effect on health and diagnosis/management. In 2010, the NIH held a consensus conference that convened topic experts to discuss the latest research and key issues concerning lactose intolerance including its prevalence among various racial/ethnic groups, link to nutrient intake and chronic disease, and management (Suchy et al., 2010). The conference concluded that 1) true prevalence rates are unknown; 2) lactose intolerance may pose nutritional risk due to altered dietary patterns (e.g., low dairy intake) and subsequent adverse health outcomes; and 3) many individuals can consume some amount of lactose, depending on lactose intolerance severity, with minimal or no symptoms (Suchy et al., 2010). Since the NIH conference was held, new research on lactose intolerance has been published that continues to provide insights on this condition.

Lactose Intolerance: Prevalence and Links to Chronic Disease

The NIH concluded that inherent limitations, such as improper diagnosis and lack of a universal definition, pose challenges in estimating prevalence rates (Suchy et al., 2010). While lactase nonpersistance is estimated to occur in approximately 80% of African Americans, 50% of Mexican Americans and 15% of Caucasians (Jarvis and Miller, 2002; Sabi, 1994), recent studies using self-reported rates of lactose intolerance indicate rates are much lower. A 2009 study that determined the self-reported prevalence rates of a nationally representative sample of African American, Hispanic American and European American adults concluded that after age-adjustments, 19.50%, 10.05% and 7.72% of these racial/ethnic groups considered themselves lactose intolerant, respectively (Nicklas et al., 2009). A study addressing self-reported incidence of lactose intolerance and its impact on dairy intake among African Americans found similar rates (24%) in this group (Keith et al., 2011). Not surprisingly, African Americans who reported themselves as being lactose intolerant were less likely to consume dairy foods (35%) compared to those who did not report lactose intolerance (45%) (Keith et al., 2011). However, lactose intolerance did not account for all the lower dairy intake among African Americans compared to the general U.S. population; 26% of African Americans reported that they 1) consumed less than one serving per day of dairy foods on average; 2) are not lactose intolerant; and 3) do not experience discomfort every/most of the time after consuming a dairy food, indicating other factors may also influence lower dairy food intake among African Americans.

Two of the confounding factors that impede determining true prevalence rates are the lack of diagnosis or misdiagnosis (Suchy et al., 2010). In fact, among self-reported lactose intolerant individuals, only 19% of African Americans and 29% of the general U.S. population reported a medical professional diagnosis (Keith et al., 2011), indicating a majority of the population is not being formally diagnosed. Objective testing and formal medical diagnosis is essential since the gastrointestinal symptoms experienced may not be related to lactose intolerance and can be caused by other conditions (Casellas et al., 2010). Recent research on the subject led authors to conclude, "daily life symptoms that patients associate with lactose intolerance are often unrelated to lactose malabsorption. Even among true lactose malabsorbers, symptom recall tends to be amplified by the patient" (Casellas et al., 2010).

One of the main concerns regarding improper diagnosis of lactose intolerance is that it may lead to unintended consequences, because those who think they have lactose intolerance tend to consume fewer dairy foods and consequently less of the nutrients they contain (Suchy et al., 2010; Wilt et al., 2010; Keith et al., 2011). While the NIH highlighted this concern, few studies have assessed the link between lactose intolerance, dairy intake and chronic disease within racial/ethnic groups. One study assessed the relationship between self-perceived lactose intolerance, dairy calcium intake and hypertension and diabetes (Nicklas et al., 2011). In a national sample of 3,452 adults that included non-Hispanic blacks and Hispanics, 12.3% perceived themselves to be lactose intolerant (20.1% non-Hispanic blacks, 8.8% Hispanics and 7.8% non-Hispanic whites), and a significantly higher percentage of respondents with self-perceived lactose intolerance reported having physician-diagnosed diabetes and/or hypertension compared to those who did not perceive themselves as lactose intolerant (Nicklas et al., 2011). The odds for physician-diagnosed diabetes or hypertension decreased by 0.7 and 0.6, respectively for every

Table 5. Lactose and calcium content of common dairy foods

Nutrient	*Low-fat Milk (1 cup)*	*Low-fat Plain Yogurt* (1 cup)*	*Low-fat, Hard Cheeses (1.5 oz)‡*
Lactose (g)	11-13	11-17	0.3-1.0
Calcium (mg)	305	332	301
Calcium/Lactose Ratio (mg/g)	23-28	20-30	301-1,003

Adapted from Suchy FJ, Brannon PM, Carpenter TO, et al. NIH Consensus Development Conference Statement: lactose intolerance and health. *NIH Consens State Sci Statements* 2010;27:1-127, Table 1.
*According to Suchy et al., despite the higher lactose content, low-fat plain yogurt may be better tolerated than low-fat milk by those with lactose malabsorption.
‡Examples include Cheddar, provolone, mozzarella, etc.

1,000 mg increase in daily calcium intake from dairy foods. An earlier study conducted among 10-13 year-old preadolescent girls also found that perceptions about milk intolerance lead to adverse clinical manifestations (Matlik et al., 2007). Of the 246 participants, comprised of Hispanic, Asian and non-Hispanic white girls, 47 considered themselves as milk intolerant; however, hydrogen breath analysis revealed that only 45% of those 47 girls were lactose maldigesters. Regardless, girls with perceived milk intolerance consumed an average of 212 mg less calcium daily and had significantly lower spinal bone mineral content compared to girls who did not self-perceive milk intolerance (Matlik et al., 2007).

Lactose Intolerance: Management Strategies

The NIH and the 2010 DGA both conclude that those with lactose intolerance can continue to include dairy foods in the diet (Suchy et al., 2010; 2010 DGA). The literature review supporting the NIH conference's final statement states that research to date indicates that those with lactose intolerance or malabsorption can ingest 12 grams of lactose in a single dose when taken with food with minimal or no symptoms (Wilt et al., 2010). This amount is equivalent to a cup of milk which is a full serving of dairy (USDA Foodcomp, 25; 2010, DGA) (Table 5). The NIH and 2010 DGA recommend trying smaller portions of milk, yogurt or cheese and opting for reduced lactose or lactose-free dairy products as management strategies to help incorporate dairy foods into the diets of those with lactose intolerance (Suchy et al., 2010; DGA, 2010). Other strategies include drinking milk or taking dairy foods with meals, eating yogurt with live and active culture to help digest lactose, and eating natural cheeses such as Cheddar or Swiss as these are naturally lower in lactose (NMA, 2009) (Table 5).

Although some public health authorities mention alternatives, such as calcium-fortified soy and/or orange juice, as a means of meeting calcium intake recommendations, recent research suggests that this strategy is not ideal and fails to address the multiple key nutrients also found in dairy products. A taste testing study assessing the impact of ethnicity (African American, Hispanic American or Caucasian) and lactose intolerance on sensory preferences indicate that lactose-free cow's milk is significantly more liked than soy beverages among those with lactose intolerance, regardless of ethnicity (Palacios et al., 2009). A follow-up study in lactose intolerant African American, Hispanic American and Caucasian school children ages 8-16 years found similar results: children showed greater acceptance of lactose-free cow's milk compared to soy beverages, within flavor (e.g., plain or chocolate) category (Palacios et al., 2010). In addition to taking into account taste liking, the replacement of dairy foods with calcium alternative foods may not be nutritionally feasible. According to a recent study, while a calcium-equivalent serving of cow's milk requires 1.1 servings of fortified soy beverage, 0.6 serving of fortified orange juice, 1.2 servings of bony fish, or 2.2 servings of leafy greens, the replacement of dairy with these foods alters the overall nutritional profile of the diet such that intake of other key nutrients, such

as protein, potassium, riboflavin and vitamin B12 can be affected (Fulgoni et al., 2011). Taken together, while fortified soy beverages may be recommended for those with lactose intolerance, research indicates that these beverages are not well-liked and alternate calcium containing foods or fortified foods are not nutritionally equivalent replacements for cow's milk.

SUMMARY AND RECOMMENDATIONS

Summary of Findings

The 2010 DGA recommends most Americans consume 3 daily servings of low-fat or fat-free milk or milk products; on average, African Americans consume 1.2 servings/day and Hispanic Americans consume 1.5 servings/day. Intake of dairy foods and their nutrients has been linked to reduced risk of several chronic diseases that disproportionately affect the African American and Hispanic American communities, so consuming recommended amounts of dairy foods is particularly important for these two population groups. The estimated amount of health care savings that could be achieved with adequate dairy intake translates to $3.5 billion in savings each year, achievable by the second year of higher intake and reaching cumulative savings of $14 billion by year five (McCarron, 2004). Lactose intolerance can be a primary obstacle for adequate dairy food intake. New research, conducted among a population that included non-Hispanic blacks and Hispanic Americans, reveals that among those who consider themselves lactose intolerant, calcium intake from dairy foods is lower and the incidence for some chronic conditions (e.g., diabetes, hypertension) is higher. Thus, it is essential that healthcare providers be well informed about lactose intolerance and its perceived prevalence among different racial/ethnic groups, its link to nutrient intake, its potential link to higher chronic disease incidence and most importantly, the misperception that it requires dairy reduction or avoidance. While lactose intolerance is a highly individualized condition, research indicates that on average, those with lactose intolerance or maldigestion can consume the equivalent of one serving of milk with food at a given time and experience minimal or no symptoms (Suchy et al., 2010). Public health authorities also recommend additional strategies as a means to help keep dairy in

Table 6. Strategies that may help those with lactose intolerance keep dairy in their diet

STRATEGIES THAT MAY HELP
Start small—start with a small amount of milk or desired dairy food daily and increase slowly over several days to weeks to tolerance
Take dairy with meals—mix milk, yogurt or cheese with other foods to help slow digestion and allow the body more time to digest lactose
Opt for natural cheeses—natural cheeses such as Cheddar, Colby, Monterey Jack, mozzarella, Swiss and queso fresco contain smaller amounts of lactose and may be better tolerated
Consume yogurt—yogurt with live and active cultures help breakdown lactose and contain solids that can slow digestion
Get help—lactase enzyme pills help digest dairy's lactose when taken with the first sip or bite of dairy
Try lactose-free dairy products—they are real milk products with the same nutrients found in dairy foods, but do not contain lactose

Sources: Suchy FJ, Brannon PM, Carpenter TO, et al. NIH Consensus Development Conference Statement: lactose intolerance and health. *NIH Consens State Sci Statements* 2010;27:1-127; U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2010. 7th Edition, Washington, DC: U.S. Government Printing Office, December 2010; National Dairy Council Website. Available: ***www.nationaldairy-council.org*** Accessed on 01/23/13.

the diet in the presence of lactose intolerance. While other foods provide some of dairy's nutrients, new research confirms cow's milk is better liked compared to soy beverage options, and the nutrients in milk are not easily replaced by other calcium alternatives and intake of other nutrients, including some of "public health concern", may be compromised. Thus, whether lactose intolerance is present or not, given the low dairy intake among African Americans and Hispanic Americans, healthcare providers are encouraged to work with patients to achieve recommended daily dairy servings for all individuals, which can help improve daily nutrient intakes.

Recommendations

Healthcare providers are education gatekeepers and advisors and have the opportunity to advocate the important role dairy foods and their nutrients play in the diets of all African Americans and Hispanic Americans. Together, the NMA and NHMA reaffirm their previous recommendations from the 2009 Consensus Statement and 2010 white paper respectively, and based on new research and guidelines, jointly recommend that:

1. If lactose intolerance is suspected, standardized and objective testing (e.g., hydrogen breath test) should be employed to determine if the patient has lactose maldigestion, as the symptoms of lactose intolerance are non-specific and the patients' gastrointestinal disturbances might be due to an unrelated underlying condition.
2. If lactose intolerance is confirmed, encourage patients to keep dairy foods in the diet and employ the following strategies to help them achieve recommended dairy food intake levels using culturally appropriate foods and linguistically appropriate communication:
   - Consume milk, cheese and yogurt with meals keeping in mind that up to a cup of milk may be well-tolerated
   - Consider lactose-free dairy products, such as lactose-free milk and lactose-free cottage cheese
   - Start with small amounts of dairy foods and individualize treatment
   - Yogurt is semi-solid and contains live and active cultures, both of which may make it easier to digest for those with lactose intolerance
   - Natural cheeses such as mozzarella, Swiss, Cheddar and queso fresco contain virtually no lactose and may be better tolerated
3. Whether lactose maldigestion is present or not, given the low dairy intake among African Americans and Hispanic Americans, healthcare providers are encouraged to work with patients to achieve recommended daily servings for all individuals, which can help improve daily nutrient intakes.

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