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Consensus Report of the National Medical Association

The Role of Dairy and Dairy Nutrients in the Diet of African Americans

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INTRODUCTION

About the National Medical Association

As the nation's oldest and largest organization representing physicians of African descent in the United States and the Caribbean, the National Medical Association (NMA), established in 1895, is recognized as the collective voice of more than 30,000 physicians and the patients they serve. In the quest to advocate for patients, the NMA has traditionally established national health policy related to issues affecting health and well-being. Given this historical background and continued conviction, the association has committed efforts and resources to examine the role of dairy and dairy nutrients in the African-American diet.

Statement of the Problem

Food preferences and misconceptions regarding dairy consumption may be hindering African Americans from attaining optimal health. Current research on calcium and other nutrients specifically derived from dairy food sources (including phosphorus, vitamin D, protein, potassium, and magnesium) establishes that these nutrients have played important roles in maintaining low body fat; reducing high blood pressure and the risk of hypertension; and preventing some cancers, cardiovascular disease (CVD), and osteoporosis.

Purpose

Given the historical association between African Americans and lactose intolerance, the purpose of this consensus paper is to examine the literature to determine the value of calcium and other dairy nutrients, clarify the associated health benefits derived from dairy consumption, and investigate dairy consumption habits of African Americans. The ultimate goal of this exercise is to generate a consensus report that ascertains if dairy and its nutrients are beneficial food sources in the diet of the African-American population.

METHODOLOGY

The staff of the Program Grants Management, Research and Professional Medical Affairs of the NMA reviewed the literature in the topic areas of concern. A preliminary document was generated and made available for the Consensus Panel Committee. The consensus panel then reviewed the prepared draft statement. A meeting of the consensus panel was convened from September 12–14, 2003, in San Diego, CA, where the panel deliberated and formed workgroups to develop recommendations based on the evidence of the current literature. The panel additionally created a list of specific areas for further assessment. Over the following year, contributions from professional health writers, committee review, and NMA section chairs' review further enhanced the development of the paper. As a result, the recommendations take into consideration review of the latest research findings as of September 2004.

The key elements determined for incorporation in the consensus paper include:

- Nutrients found in dairy products,
- Associated benefits from nutrients found in dairy,
- Issues of lactose intolerance in the African-American population, and
- Research related to dairy consumption in the African-American diet.

To analyze the data related to dairy food consumption habits of African Americans, the NMA examined data from several dairy food intake studies, including the National Panel Data (NPD) Group Diet Intake Estimation Tool (DIET) database and the NPD Group National Eating Trends® (NET®) database. Additionally, the NMA used the dairy food consumption profile data contained in the African-American Lactose Intolerance Understanding Study (AALIUS), which, as of this printing, is an unpublished quantitative consumer research study conducted by NPD Foodworld among a nationally representative sample of African-American adults.

FINDINGS

Recent research shows that there is a clear beneficial relationship between a healthy diet of three-to-four daily servings of low-fat dairy products and the reduction of obesity and hypertension, as well as risk reduction for several diseases that affect African Americans disproportionately. The evidence is suggestive, but less clear, for certain cancers and osteoporosis in African-American women. Nonetheless, significant barriers exist which prevent the achievement of this dietary recommendation.

Eighty-six percent of African Americans get just more than half of the daily recommended amount of calcium, and only half consume one or more servings of dairy a day. Of particular concern, 83% of African-American children 2–17 years if age are not getting enough calcium. New research, including unpublished data from the AALIUS looked at the reasons behind this trend. One reason is that some African Americans

are lactose intolerant or experience symptoms due to lactose maldigestion; however, a surprising discovery showed that the prevalence is much lower than previous estimates. New data from AALIUS show that more than 75% of African Americans do not consider themselves to be lactose intolerant, and African Americans who consume medium-to-high amounts of dairy foods per day (more than one serving) are less likely to experience symptoms.

Based on evidence in the literature, the consensus panel supports the recommendation that African Americans should get three-to-four servings of low-fat dairy a day—coupled with a balanced diet and regular moderate physical activity—to reduce the risk of chronic diseases. These findings are based on research that suggests calcium and other components of dairy products provide significant health benefits; may play a role in weight management, when consumed as part of a calorie reduced diet; and could lead to significant healthcare cost savings.

DISCUSSION

As the NMA continues to tackle the challenge to increase public awareness about the potential value of dairy consumption, researchers are tasked with the challenge to conduct further studies to understand cultural barriers that influence the dietary habits of African Americans. The NMA suggests that AALIUS may be the first study to explore potential sociological and cultural issues that shape African-American dietary patterns and examine resulting nutritional implications. The finding that fewer African Americans than expected perceived themselves to be lactose intolerant was indeed a surprise element of the AALIUS research.

Despite the lactose intolerance or maldigestion phenomenon, many African Americans can successfully consume dairy products by following simple tips:

1) Consume milk in small portions with food (about 1/4 to 1/2 glass);
2) Consume hard cheeses, such as cheddar or Swiss (one-and-one-half ounces are equal to a serving); and
3) Consume live-culture yogurt.

Initially, following these simple rules of thumb can help reduce or eliminate the symptoms seen with lactose intolerance or maldigestion.

To further contribute to the body of science concerning dairy consumption and health benefits, more research in African Americans is needed to examine the beneficial health effect of dairy consumption and the parallel barrier to dairy consumption as a result of perceived or actual lactose intolerance.

RECOMMENDATIONS

After an extensive review of the literature, the NMA consensus panel made recommendations to improve and understand the role of dairy and dairy nutrients in the diet of African Americans. These recommendations are collapsed into six specific categories related to dietary guidelines, strategic planning, partnership/collaboration, research, food industry and dissemination of information.

Of these recommendations, the panel resolved that the most important first step was to make recommendations regarding dietary guidelines. They are as follows:

- African Americans should adopt lifestyle choices consistent with current National Academy of Sciences (NAS) guidelines relating to physical activity and healthful eating, including:
  - Increased fruits/vegetables and fiber;
  - Increased physical activity;
  - Decreased fat, especially saturated and trans fats;
  - Adequate intake relative to energy need; and
  - Increased low-fat dairy consumption of milk, aged cheeses or live-culture yogurt.
- Based on scientific evidence, the NMA consensus panel agrees with the current guidelines for dairy consumption. As such, based on age for otherwise healthy individuals, the American public as a whole and African Americans in particular, should consume three-to-four servings per day of low-fat milk, cheese and/or yogurt (i.e., three servings per day for children, adults and pregnant women; four servings for adolescents and adults over 50 years old).
- The public should also be educated about the importance of including other calcium-rich foods, such as leafy green vegetables (i.e., turnip greens, kale, collards), sardines and salmon, tofu and fortified soy products, and other calcium-fortified food sources in the diet.
- For those individuals who cannot tolerate dairy products in the form of low-fat milk, cheese, or yogurt, lactose-free milk may be an alternative option to obtain needed calcium and other important nutrients.

INTRODUCTION

The NMA is the nation's oldest and largest organization representing physicians of African descent in the United States and the Caribbean. Established in 1895, the NMA is the collective voice of more than 30,000 physicians and the patients it serves. Though committed since its inception to focusing primarily on health issues related to African Americans and disadvantaged or medically underserved populations, NMA's principles, goals, initiatives, and philosophy encompass all sectors of the population.

More than 100 years later, the NMA has achieved a leadership role in medicine and serves as a catalyst for eliminating disparities in health while maintaining parity in medicine and promoting optimal healthcare for all Americans.

In the quest to advocate for patients, the NMA is committed to establishing national health policy for many concerns related to patient health. As the burgeoning epidemic of obesity continues and data related to weight loss associated with dairy consumption are released, the question of the impact of these issues, in the face of the perceived decrease of dairy consumption in the African-American population due to apparent lactose intolerance, must be elucidated. Thus, the impetus for convening a consensus conference to examine the role of dairy and dairy nutrients in the African-American diet was born. To this end, key elements for incorporation in the consensus paper include:

- Nutrients found in dairy products,
- Associated benefits from nutrients,
- Issues of lactose intolerance in the African-American population, and
- Research related to dairy consumption in the American diet.

Recent research on the need for dietary calcium and other nutrients found in dairy foods, combined with evidence that African Americans consume fewer dairy foods than other segments of the U.S. population, has sparked concern for the resulting health consequences of this trend. African Americans who avoid dairy products may be doing so because of the erroneous perception that they suffer from lactose intolerance; however, such avoidance may put them at increased risk for several deleterious illnesses. In fact, the nutrients in dairy products may play a role in the prevention and treatment of osteoporosis, high blood pressure, some cancers, CVD, and obesity. At the same time, the incidence of lactose intolerance may be more perceived than actual, and, in clear cases of poor digestion, more dairy consumption could achieve the two-fold benefit of reducing the discomfort of maldigestion while at the same time protecting the individual from potentially chronic and fatal diseases.

A recent report suggests that eating three-to-four servings of dairy foods each day as part of a healthy diet could lead to healthcare cost savings of more than $200 billion over five years, and $26 billion in the first year alone (McCarron and Heaney, 2004). The authors analyzed the influence of dairy calcium or dairy food consumption on disease risk as reported in the medical literature, then used these estimates of disease risk reduction to calculate one-year and five-year healthcare cost savings. For example, increasing dairy food intake to three-to-four servings per day is associated in the literature with an annual reduction of 5% in the incidence of obesity and a 25% reduction within five years, resulting in one-year healthcare savings approaching $2.5 billion and five-year savings exceeding $37.5 billion. For hypertension, the authors projected an immediate 40% reduction in the prevalence of mild-to-moderate hypertension, and a first-year healthcare cost savings approaching $14 billion, and a cumulative savings of $70 billion at five years.

In collaboration with the National Dairy Council, the NMA conducted a consumer-based study to understand how cultural and physiological factors affect African-American health and nutrition behaviors. The research is designed to explore such issues as:

- "In-market" prevalence of lactose intolerance;
- Actions taken by those who experience symptoms thought to be related to lactose intolerance; and
- How medical professionals diagnose, offer advice on, and treat the condition.

NMA believes this is the first study to explore potential sociological and cultural issues that shape African-American dietary patterns and examine the resultant nutritional implications for the community.

Dairy Consumption Issues

African Americans are at increased risk for chronic diseases such as hypertension, diabetes, stroke, colon cancer, and obesity. The increased risk of these diseases may be increased by a low intake of calcium or other dairy-related nutrients (Heaney, 2000). Calcium intake may also play a role in the prevention of chronic diseases ranging from osteoporosis to premenstrual syndrome (Temple, 2000). Below-threshold intake levels of 600–700 mg of calcium per day, bone loss and hypertension can result; African Americans show average intakes at or below these levels (USDA, Agricultural Research Service, 1994–1996, Table 16, 1999). Although a belief in lactose intolerance may be partly to blame for lower dairy food consumption by African Americans, culturally determined food preferences and dietary practices learned early in life may also play a role. Increased awareness of the health benefits provided by dairy consumption may motivate dietary changes that can help reduce

the incidence of nutrient-related chronic diseases for which African Americans are at increased risk.

Approximately 72% of the calcium in the national food supply comes from dairy foods (USDA, Center for Nutrition and Policy Promotion, 2002). In its dietary recommendations for calcium and related nutrients, the NAS recognizes the importance of "unfortified foodstuffs" as the major source of calcium. Meeting calcium needs through dairy foods offers the advantages of providing other beneficial nutrients and yet-unidentified food components, as well as enhancing the body's use of nutrients through nutrient interactions (Institute of Medicine, 1997). Because milk and other dairy foods are abundant sources of calcium, as well as of many other essential nutrients as listed above, intake of these products improves the overall nutritional intake of the diet (Fleming and Heimbach, 1994; Karanja et al., 1994; Devine et al., 1996).

Americans also receive calcium from numerous other sources, including vegetables, fruits, and fish; fortified juices, soy products, and cereals; and nutritional supplements in pill form. Although these nondairy sources of calcium are beneficial and may be an acceptable alternative in some cases, they do not provide the optimal allowance of calcium. Additionally, studies suggest that an interaction of calcium and other ingredients found in dairy products may enhance the observed protection calcium offers. For example, calcium, potassium, and magnesium work together to reduce the risk for hypertension and stroke (Massey, 2001).

In 1997, the NAS increased its calcium recommendations. When dairy product consumption is lower than recommended, related illnesses are more prevalent. Although most minority groups consume less calcium than recommended, this is particularly true for African Americans, who rank lowest in calcium and milk intake. Fewer than 25% of African Americans consume 100% of the 1989 Recommended Dietary Allowance (RDA) for calcium. According to the U.S. Department of Agriculture (USDA), African-American women 20 years of age and older average only 525 mg of calcium a day. However, the recommended intake for adults aged 19–50 years is 1,000 mg daily, and 1,200 mg per day for those over age 50. In addition, African-American adolescent girls average an intake of only 656 mg of calcium per day, well below the recommended 1,300 mg (Agricultural Research Service, 1994–1996, Table 16).

Calcium is clearly an important nutrient in managing some diseases, and emerging research demonstrates that more consistent and profound health benefits result when the source of calcium is dairy foods—low-fat milk, cheese, or yogurt—rather than calcium supplements (Griffith, et al., 1999; Zemel et al., Obesity Research, 2004). When dairy product consumption is lower than recommended, related illnesses are more prevalent. The current USDA Food Guide Pyramid and the 2000 Dietary Guidelines for Americans, both currently under revision, recommend two-to-three servings of dairy foods daily for the general population over age 2. However, current science supports three-to-four servings of dairy foods daily to reduce disease risk. A recent analysis of the medical literature—which reported the influence of dairy calcium or dairy food consumption on the risk of obesity, hypertension, type-2 diabetes, osteoporosis, kidney stones, certain outcomes of pregnancy, and some cancers—concludes that eating three-to-four servings of dairy foods each day could result in substantial healthcare cost savings (McCarron and Heaney, 2004). Although lactose intolerance may be a barrier to dairy consumption by African Americans, strategies are available for learning how to consume dairy foods to comfortably reap their health benefits.

Nutrients Found in Dairy Products

Dairy food sources, such as low-fat milk, cheeses, and yogurt, are naturally nutrient-rich, containing substantial amounts of many essential nutrients, such as calcium, phosphorus, vitamin D, proteins, potassium, and magnesium. Milk and milk products make an important contribution to the American diet. According to the latest government estimates, dairy foods (excluding butter) provide the following percentages of nutrients available in the nation's food supply (USDA Nutrient Content of the U.S. Food Supply, 2000).

- 72% of calcium
- 32% of phosphorus
- 26% of riboflavin
- 20% of vitamin B12
- 23% of vitamin A
- 19% of protein
- 18% of potassium
- 16.5% of zinc
- 15% of magnesium

In addition, dairy foods are a significant source of niacin due to their content of the amino-acid tryptophan, and, through fortification, fluid milk provides the majority of vitamin D in the diet. Nearly all milk sold in the United States is fortified with vitamin D to obtain standardized amounts of 400 I.U. or 10 µg/quart (U.S. Food and Drug Administration, 2003).

To examine the importance of dairy in the diets of African Americans, it is necessary to discuss the nutrients found in dairy food sources. The following information reviews the biological function of six of the above nutrients, the quantity recommended by the FDA, and the amount found in a single serving of dairy, such as milk.

Calcium

This essential mineral is important in many biological functions. Calcium is needed to develop strong bones and teeth; a healthy heart, nerves and muscles; and normal heart rhythm and blood-clotting abilities. The IOM recommends 800–1,200 mg of calcium a day for healthy adults. Dairy products are the predominant source of calcium. One cup of yogurt contains 314 mg, one cup of skim milk contains 302 mg, a cup of full-fat milk contains 291 mg, and one ounce of cheese has 204 mg of calcium, respectively.

Phosphorus

This essential mineral is needed to build strong bones and teeth (about 85% of the body's phosphorus is found in bone). It is also essential for muscle contractions, blood clotting, and normal heart rhythm. The daily allowance for adults is about 800–1,000 mg a day. About 250 mg of phosphorus is found in one cup of milk (whole or skim), about 326 mg is found in one cup of low-fat yogurt, and 211 mg are found in one ounce of cheese.

Vitamin D

The body needs vitamin D, a fat-soluble vitamin, to maintain proper levels of calcium and phosphorus to help build strong bone and teeth. About 5 mcg of vitamin D is needed daily for individuals younger than 50 years—about the amount available in two eight-ounce servings of milk. After age 50, recommended intake doubles to 10 mcg/day and rises to 15 mcg/day for individuals older than 70 years of age.

Whey Proteins

The amino acids that make up protein are the building blocks of cells. Whey protein is of high biological value compared to most other proteins (Shah, 2000) because it has a high content of sulfur-containing amino acids important for the biosynthesis of glutathione, a tripeptide with antioxidant, anticarcinogenic, and immune-stimulating properties (Walzem, 2002). It is the most abundant natural source of branched chain amino acids, which may stimulate muscle protein synthesis. Whey protein consists of several different proteins, including beta-lactoglobulin, alpha-lactalbumin, immunoglobulins, bovine serum albumin, lactoferrin, and lactoperoxidase, as well as glycomacropeptide, a casein-derived protein in cheese whey. Whey protein makes up approximately 20% of total milk protein. Because of its content of essential amino acids, the biological value of whey protein is high compared to that of other dietary proteins (Shah, 2000). About 60 g of protein per day is recommended. This is the equivalent of a glass of milk, a serving of chicken, and a bowl of yogurt, for example.

Potassium

It is an essential mineral that is fundamentally involved in a massive number of physiological processes, such as fluid balance, protein synthesis, nerve conduction, energy production, muscle contraction, synthesis of nucleic acids, and control of heartbeat. Potassium helps to prevent and control blood pressure, both directly and by blunting the effects of salt on blood pressure. Based on the Continuing Survey of Food Intakes by Individuals (CSFII) and National Health and Nutrition Examination Survey (NHANES) data, milk is considered the number-one source of potassium in U.S. diets. This source provides 10.8% of the national intake, which is nearly equal to the amount provided by all fruits and fruit juices (11.5%) (U.S. Department of Agriculture, 1998; NHANES 1999–2000). Each eight-ounce serving of milk provides 350–400 mg of potassium (Duyff, 2002).

The recent IOM report (IOM, Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate, 2004) cited the American diet to be deficient in potassium and recommended an increase of potassium to an average intake of 4,700 mg daily. The recent 2005 Dietary Guidelines Advisory Committee report (DGAC, 2004) also cites potassium as one of a number of nutrients the dietary intake of which is low enough to be of concern.

Magnesium

This essential mineral is vital in assisting in calcium and potassium uptake. It is critical for energy production and proper nerve function. It also promotes muscle relaxation and helps the body produce and use insulin. Magnesium is involved in the formation of bones and teeth, the clotting of blood, and the regulation of heart rhythm. This mineral helps coordinate the activity of the heart muscle as well as the functioning of the nerves

Table 1. Dairy's Nutrient Package

Important Nutrients in Dairy	Percent Dairy Value of Nutrients in Milk (8 ounces) (I)	Dairy's Contribution to the Food Supply (per capita) (II)
Calcium	30	72
Phosphorus	20	32
Vitamin D	25	N/A
Riboflavin	24	26
Protein	16	19
Vitamin B-12	13	20
Potassium	11	18
Vitamin A	10	16
Niacin	10	2
Magnesium	7	15

Sources: 1. Duyff RL, American Dietetic Association: Complete Food and Nutrition Guide, 2002, p. 637.
2. USDA Food Supply Database. Nutrient Content of the U.S. Food Supply, 2000. http://209.48.219.54Fgdatabase/CalPercent.asp

that initiate the heartbeat.

The U.S. Food and Drug Administration's RDA for magnesium is 400 mg a day for men and 310–360 mg a day for women. According to the FDA, a single serving of low-fat milk contains 28 mg of magnesium versus 34 mg and 33 mg for 1% and full-fat milk, respectively. A serving of low-fat yogurt contains 30–40 mg, while cheese individual servings contain from 3–10 mg of magnesium.

Table 1 profiles the dairy nutrient package detailing the important nutrients in dairy foods.

Risk Factors Influenced by Dairy Nutrients

Hypertension

An estimated 50 million Americans have high blood pressure and an additional 45 million are classified as "prehypertensive," putting them at high risk for developing the disease. High blood pressure is a major risk factor for heart disease and stroke; it affects more than 40% of African Americans. High blood pressure develops earlier in life in blacks than in whites and is usually more severe. Consuming dairy products as part of a low-fat, reduced-saturated fat diet, rich in fruits and vegetables as well as lean proteins, reduces blood pressure modestly in African Americans. Experts believe that calcium consumed along with other nutrients found in dairy products helps to stabilize and maintain healthy blood pressure in African Americans. Milk is also a good source of potassium, which also helps maintain normal blood pressure (DGAC, 2004). Studies show these effects to be comparable to drug therapy and to work synergistically with pharmaceutical treatments in mildly hypertensive African-American patients both in free-living conditions and in randomized, controlled clinical trials (Appel et al., 1997; Appel et al., 2003; Svetkey et al., 1999).

Obesity

An estimated 97 million adults in the United States are overweight or obese. This chronic disease substantially raises the risk of morbidity from hypertension, dyslipidemia, type-2 diabetes, coronary heart disease (CHD) and stroke, gallbladder disease, osteoarthritis, sleep apnea and respiratory problems. Additionally, endometrial, breast, prostate, and colon cancer risks are increased. Higher body weights are also associated with increases in mortality from all causes. Over 62% of African Americans are overweight. Obesity in America has reached epidemic proportions (Flegal et al., 2002), with little progress toward identifying effective nutritional and social strategies to prevent or treat the problem. Although increases in overweight and obesity cut across all ages and ethnic groups and include both genders, 50% of non-Hispanic black women and 28% of non-Hispanic black men are overweight or obese, according to the surgeon general. There is increasing evidence in medical literature that supports the position that dairy foods are important to a healthy eating pattern, protective against excess body fat gains, and enhance weight lost on a reduced-calorie diet. Specifically, calcium is an important regulator through modification of both lipogenesis and lypolysis at the adipose cellular level. In several studies, participants who consumed less calcium from dairy sources gained more weight, and those who consumed less calcium and dairy had higher body mass index (BMI) (Zemel MB, *Amer J Clinical Nutr.* 2004; Zemel, *Obesity Research*, 2004, April; Miller SL, *Nutrition Reviews*, 2004).

Cancer

Deaths due to cancer make up the second leading cause of death in the United States (U.S. Centers for Disease Control and Prevention, 2003), accounting for 22.9% of all deaths. Colon cancer is the third most common type of cancer in men and women, while breast cancer is the second most common cancer in women. The death rates for both types of cancer exceed that of whites (National Cancer Institute, 2003).

Dairy food consumption may influence the occurrence of several types of cancer, particularly colon and breast cancers. Animal studies, tissue culture studies (Slattery, 2004), and a limited number of human studies (Holt, 1999; Satia-Abouta J, et al., 2004) also show an inverse relationship between dairy food intake and colon disease. When patients with a history of developing colon polyps increased their intake of low-fat dairy food, they showed a significant reduction of precancerous colon change.

Insulin Resistance Syndrome

Insulin resistance occurs when muscle, fat, and liver cells do not use insulin properly. The pancreas produces more insulin, but the inability to keep up with the body's need for insulin leads to excess build-up of glucose in the bloodstream. As a result, many people with insulin resistance have both high levels of blood glucose and high levels of insulin circulating in their blood. Higher glucose levels than normal leads to "prediabetes" or "glucose intolerance," which increase the risk for developing type-2 diabetes. Excess weight is known to contribute to insulin resistance (NIDDKD, 2004). According to the American Heart Association, more than 60 million Americans have insulin resistance, with one in four going on to develop type-2 diabetes (AMA, 2004).

According to the American Diabetes Association, in the United States, there are 18.2 million people, or 6.3% of the population, who have diabetes. Despite the fact that an estimated 13 million have been diagnosed with diabetes, regrettably, 5.2 million people, or nearly one-third of those diagnosed, are unaware that they have the disease (American Diabetes Association, 2004, www.diabetes.org).

Diabetes is a major health problem among African Americans, affecting more than 2.8 million blacks, or over 8% of the black population. African Americans are twice as likely as non-African Americans to have diabetes and are more likely to develop complications and experience greater disability from those complications than white Americans (NDIC, 2002). The most common form of diabetes is type-2, or adult-onset dia-

betes. Until recently, it occurred most often in older adults. With the rise in obesity, type-2 diabetes is now seen at an increased rate in children, adolescents, and young adults (Figure 1).Type-2 diabetes in children and adolescents, as a new health problem, has not yet generated accurate statistics regarding the exact number of cases. However, recent reports indicate that 8–45% of children with newly diagnosed diabetes have type-2 diabetes.

Heart Disease

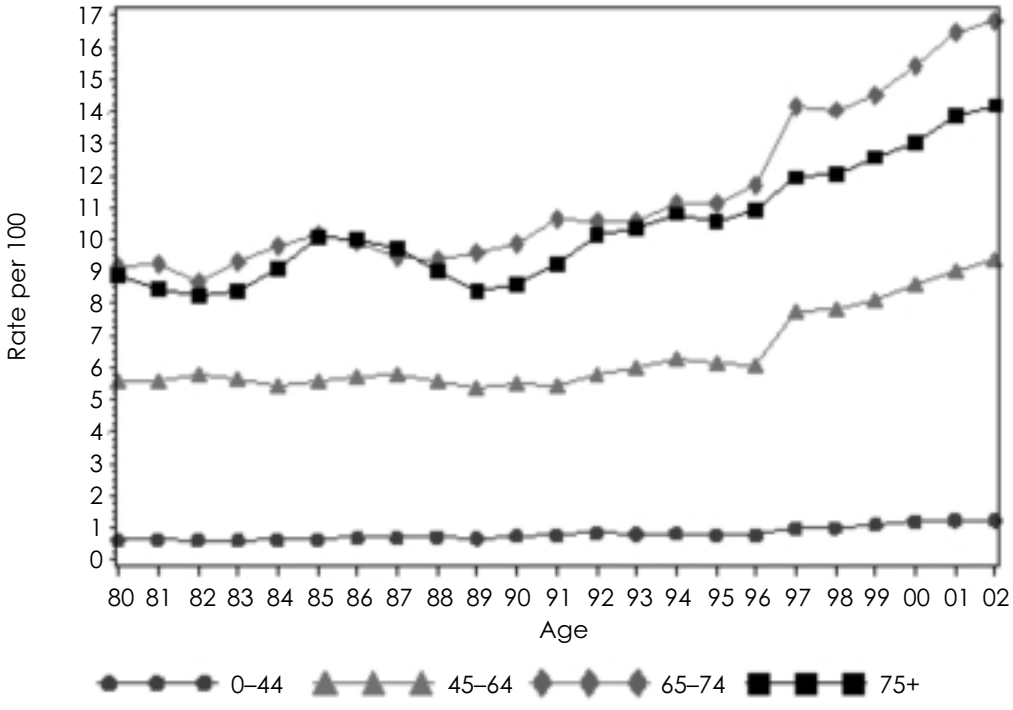
According to the American Heart Association (Heart Disease and Stroke Statistics, 2004 Update, American Heart Association), over 64 million Americans have one or more types of CVD. In 2001, CVD accounted for 38.5% of all deaths or one in every 2.6 deaths in the United States. CVD is also the leading cause of death for African women (40.1%) and men (33.5%).

There is widespread concern that consuming more dairy products means consuming more fat—particularly saturated fat—and cholesterol, and studies have shown a correlation between total fat and saturated fat intakes and heart disease (Jakobsen, 2004). However, studies have not consistently demonstrated a positive correlation between dairy products and heart disease (Elwood, 2004; Al-Delaimy, 2003). Genetic individuality appears to play a significant role in how people respond to dietary fat. Epidemiological studies (Millen, 2004) suggest that full-fat dairy products and saturated fat intake increase some risk biomarkers. A preponderance of studies, however, show decreased risk in individuals consuming low-fat dairy products and either no association or modest increase in risk with full-fat dairy consumption (Millen, 2004).

Osteoporosis

The debilitating bone disease osteoporosis is a major public health threat for over 34 million Americans aged 50 years and older. There is no cure for this disease, but health experts agree that an adequate intake of calcium throughout life, especially in childhood and adolescence, is an important step to building strong bones and preventing osteoporosis. Bone mass in later adult years is primarily influenced by peak bone mass, about 90% of which is reached by 20 years of age (Heaney, Osteoporosis Int., 2000). Available evidence indicates that calcium intake improves bone growth and slows bone loss in African Americans just as it does in other ethnic groups. Calcium is crucial in building and maintaining strong bones and teeth and in helping to prevent osteoporosis. Although African Americans have a lower risk for osteoporosis than Caucasians, the North American Osteoporosis Risk Assessment Study (NORA) revealed that African Americans are at greater risk then previously thought (Siris et al., 2001). Approximately 38.9% of African-American women age 50 and older had low bone density, while 4% had osteoporosis. The figure for osteoporosis includes only those who had not been previously diagnosed. The National Osteoporosis Foundation (NOF) estimates that some 300,000 African-American women have osteoporosis. The implication is that African Americans would potentially

Figure 1. Diabetes Prevalence in U.S. Population



Source: Centers for Disease Control and Prevention, National Center for Health Statistics, 2004

benefit from awareness of the lifestyle changes needed to reduce their risk of osteoporosis.

Issues of Lactose Intolerance

Definition and Prevalence

Lactose intolerance may result in individuals who have a genetically determined low level of lactase, an enzyme produced by the cells lining the small intestine. Lactase is necessary to digest lactose, the natural sugar found in milk. When sufficient lactase is not present, lactose is not properly broken down in the small bowel and travels through the small intestine. Symptoms of excessive gas, stomach distention, and even diarrhea may occur if excessive lactose is consumed. According to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), up to 75% of all adult African Americans and Native Americans and 90% of Asian Americans have the potential for symptoms of lactose intolerance.

According to NIDDK, between 30- and 50 million Americans have the potential for lactose intolerant symptoms. A number of experts have proposed that the prevalence of symptoms of lactose intolerance has been exaggerated. Individuals who have the potential for lactose intolerance due to low lactase levels are called lactose "maldigesters". The development of symptoms in these individuals depends on the dose of lactose consumed. Individuals who have lactose maldigestion tend to produce enough lactase to permit consumption of reasonable quantities of dairy products without developing symptoms.

Estimates indicate the prevalence of lactose maldigestion in the United States at 15% in Caucasians, 53% in Mexican Americans, 62–100% in Native Americans, 80% in African Americans, and 90% in Asian Americans [Lactose Intolerance, National Institutes of Health (NIH), 1994; Sahi, 1994; Suarez and Savaiano, 1997; Scrimshaw and Murray, 1988]. These prevalence rates came from studies using breath hydrogen testing with 25- or 50 g per dose of lactose in water. Although this test assesses lactose maldigestion, it does not accurately estimate the chances that individuals will experience lactose intolerant symptoms after consuming a cup of milk (12 g of lactose) with a meal (Jarvis and Miller, 2002).

Lactose intolerance is a highly individual phenomenon and is affected by many physiological and psychological factors (McBean and Miller, 1998). Thus, it is difficult to measure its true prevalence in the population. The symptoms of lactose intolerance (such as flatulence or bloating) are nonspecific, making it difficult without direct-breath hydrogen tests to determine whether lactose or some other gastrointestinal problem is causing distress (Jarvis and Miller, 2002).

Historical Perspective

Babies are born with the capacity to digest lactose via production of the digestive enzyme lactase. Otherwise, they would not be able to make use of mother's milk, which contains lactose. But sometime after weaning, this capacity is normally lost, and there is a gene that has been discovered that is responsible. The significance of lactose maldigestion was questioned when researchers detected the unique genetic dichotomy that divides the population into lactase persistent "digesters" and lactase nonpersistent "maldigesters." With the advent of the human genome sequencing, it has been established that many mutations have spread rapidly in a short span of time. For example, the gene for lactose tolerance that allows human adults to digest milk became dominant among communities that practiced agriculture an estimated 10,000 years ago. It has been established that certain human populations have experienced a mutation of chromosome 2, which results in a bypass of the normal shutdown in lactase production, allowing members of these groups to continue consumption of fresh milk and fresh milk products throughout their lives (Sahi, 1994).

Lactase persistence, the genetic trait in which intestinal lactase activity persists at childhood levels into adulthood, varies in frequency in different human populations, being most frequent in northern Europeans and certain African and Arabian nomadic tribes, who have a history of drinking fresh milk. However, persons from other areas, such as East Asia, remain lactase nonpersistent and may find it difficult to digest milk.

There is some ambiguity as to where and when the mutations occurred. Some researchers argue for separate mutation events in Sweden and the Arabian Peninsula near 4,000 BC. Others argue that a single event in the Middle East at around 4,500 BC took place. Irrespective to the precise origin, most western Eurasians and people of western Eurasian ancestry show the effects of this mutation, while most eastern Eurasians, sub-Saharan Africans, and native peoples of the Americas and Pacific Islands do not (Kozlov et al., 1992).

Data indicate that haplotype diversity was generated both by point mutations and recombinations. The four globally common haplotypes (A, B, C, and U) are not closely related and have different distributions; the A haplotype is at highest frequencies solely in northern Europeans, where lactase persistence is common; and the U haplotype is virtually absent from Indo-European populations. Much more diversity is seen in sub-Saharan Africans than in non-Africans, consistent with an "Out of Africa" model for people originating from the Old World (Hollox EJ, et al., 2001). Those population groups that retain the ability to produce lactase and digest milk into adulthood are found to be descended from people who first began domesticating animals for milking during the Neolithic period, about 4,000 BC (Simoons, 1978). In population groups where cultural changes have created adaptation to certain behaviors, including drinking milk, the rate of genetic adaptation increases significantly.

There is a close correlation between an estimated 30% of the world's population who are tolerant to lactose and the earliest human groups who began milking animals. These persons are represented among modern-day Mediterranean, East African, and Northern European populations. On average, 20% of white

Americans in general are lactase nonpersistent. However, among subgroups, the rates are higher: 90–100% among Asians and Asian Americans, 80% of Native Americans, 75% of African Americans (most of whom are identified as from West Africa), and 50% of Hispanics worldwide (Mogelonsky, 1995).

Gastrointestinal distress after milk consumption in adults was described in ancient Greek and Roman texts. Additionally, although there were a small number of isolated clinical reports in the late 19th- and early 20th centuries, the issue was not widely studied until the 1960s, when new techniques were developed to study enzymatic action in the intestines (Dahlqvist, 1977). Worldwide surveys conducted in the 1960s and 1970s indicated that loss of lactase activity in adulthood is the common condition in humans and that terms like "lactase deficient" incorrectly imply that this is somehow abnormal (Flatz, 1987). Early studies with 50-g doses of lactose were used to establish maldigestion. Gastrointestinal symptoms of intolerance were routinely reported in these studies and provided a basis for dietary direction, limiting milk intake among the lactase nonpersistent (Saviano, 2003).

Myths and Misconceptions

Widespread misconceptions prevail concerning lactose intolerance. It is not a food allergy, nor does it mean having to give up dairy products completely. Dietary strategies can improve tolerance to lactose, but without simultaneous education on the health benefits of dairy, these strategies are only minimally effective. Lactose intolerance has a physiological basis (lactase nonpersistence), but psychological and cultural factors may also sustain it. True prevalence of lactose intolerance is uncertain, since most estimates are based on artificial dietary conditions and therefore may overestimate the condition (Weiss, 2004). Studies have further shown the importance of dairy in the daily diet, and that cautious consumption of small servings of dairy products can be tolerated even by those who consider themselves lactose-intolerant (Jarvis and Miller, 2002). Many African Americans can successfully consume dairy products by following simple tips:

1) Consume milk in small portions with food (about 1/4 to 1/2 glass);
2) Consume hard cheeses, such as Cheddar or Swiss (one-and-one-half ounces are equal to a serving); and
3) Consume live-culture yogurt.

Hence, it is necessary to realize two parallel and equally important ambitions: communicate to the public the health benefits of dairy foods as their motivation for dietary changes and educate individuals regarding strategies to overcome lactose intolerance or maldigestion.

Evidence of Dairy Nutrients and Associated Health Benefits

Calcium

Among other conditions, a deficiency of calcium has been associated with colon cancer, high blood pressure, and osteoporosis. A growing body of evidence has shown that the calcium consumed in dairy products has significant implications on weight loss management (Zemel MB, et al. Obesity Research. 2004; Parikh SJ, 2003).

Vitamin D

Vitamin D promotes retention and absorption of calcium and phosphorus, primarily in the bones. Vitamin D helps ensure that the body absorbs and retains calcium and phosphorus, both critical for building bone. Laboratory studies also show that vitamin D keeps cancer cells from growing and dividing.

Whey Protein

Emerging research suggests that whey-derived bioactive components may have antimicrobial and antiviral properties, enhance immune defense, possess antioxidative activity, help protect against cancer and CVD, and enhance the performance of physically active individuals (U.S. Dairy Export Council; Walzem et al., 2002; Harper, 2003; International Dairy Federation, 1997; International Dairy Federation, 1998). It is important to note that the majority of studies examining potential health benefits of whey/whey components are in vitro and in vivo experimental animal investigations, with only limited human trials. Additional research, particularly clinical studies in humans, is necessary to substantiate whey's positive role in health and prevention of disease.

Magnesium

Magnesium plays a part in reducing elevated blood pressure by relaxing the muscles that control blood vessels and by allowing blood to flow more freely. Its beneficial effect on blood pressure is further enhanced due to its ability to help equalize the levels of potassium and sodium in the blood. Clinical researchers have uncovered a correlation between insulin resistance and magnesium deficiency (DeFelicie, 2002; Fox, 2001).

Potassium

Potassium helps to regulate blood pressure (Insel et al., 2002.) It is also a critical nutrient for normal muscle contractions and transmission of nerve impulses. Potassium deficiency can lead to cardiac arrhythmias, weakness, and glucose intolerance, as well as increased blood pressure and increase bone turnover. Lastly, potassium deficiency may be associated with the increased risk for stroke.

Phosphorus

Phosphorus allows proper digestion of riboflavin and niacin, aids in transmission of nerve impulses, assists the kidneys effectively excreting wastes, forms the proteins that aid in reproduction, and may help block cancer. This mineral also creates and manages energy; synthesizes protein, fat, and carbohydrates; contracts muscles; and maintain the body's fluid and electrolyte balance. It is also essential for stimulating hormone production and helping the body utilize B vitamins (Knochel, 1999).

Dairy Foods' Role in Health Promotion and Disease Prevention

For African Americans, low calcium intake may be a contributing factor to an increased risk of developing several preventable diseases, including hypertension, overweight and obesity, colon and other types of cancer, insulin resistance, heart disease, and osteoporosis. Following is an overview of each area in which research has demonstrated a potential connection between dairy food consumption and reduced risk of diseases.

Obesity and Overweight

Multiple disease outcomes are related to poor nutrition and sedentary lifestyle, but obesity—as evidenced by the current American epidemic—is a sensitive and pervasive indicator of these behaviors. Prevalence in both adults and children has increased in past decades to an extent that affects the health of millions of Americans. According to data from the NHANES 1999–2000, 28% of non-Hispanic African-American adult males and 50% of non-Hispanic African-American adult females are currently obese (BMI >30) (Flegal, 2002). Multiple diet-related factors contribute to the etiology of obesity, but there is little consensus regarding strategies needed to manage the problem. Recent research suggests that suboptimal intakes of calcium and other yet-unidentified components of dairy foods may mediate increases in body weight and body fat via several pathways (Zemel, et al., 2000; Shi, et al. 2000).

This relationship first emerged accidentally, during a study in the 1980s investigating the antihypertensive effect of dairy products in obese African-American men (Zemel et al., 1990). Increasing dietary calcium from ~400 to ~1,000 mg/day through the consumption of two cups of yogurt daily produced expected decreases in blood pressure, which were accompanied by an unexpected 4.9 kg reduction in body fat. Although the data describes the effects of this diet on blood pressure and related cardiovascular variables (Zemel J, *Am Coll Nutr.* 2003), the absence of a plausible mechanism linking dietary calcium or dairy intake to energy metabolism delayed further pursuit of these observations. However, the cloning of adipocyte genes involved in the regulation of energy metabolism resulted in elucidation of new metabolic pathways, which provided a theoretical framework and compelling mechanisms to explain this phenomenon (Zemel, *Am J Clin Nutr.* 2004). These observations have since been validated in both population studies and randomized clinical trials (Zemel MB, *Obesity Res.* 2004).

Calcium and other components in milk, yogurt, and cheese may play a role in regulating body fat and weight gain (Zemel, 2000; Shi, et al., 2000; Davies et al., 2000; Lin, et al., 2000; Carruth and Skinner, 2001; Zemel and Teegarden, 2003). When laboratory mice were fed diets high in calcium from either supplements or nonfat dry milk, they reduced weight and body fat gain; animals fed nonfat dry milk reduced these factors to a greater degree than those fed supplements (Zemel et al., 2000). These animal studies, along with cellular research, delineated a mechanism by which higher dietary calcium intakes manipulate the hormonal environment of the fat cell, promoting greater breakdown and oxidation and inhibiting fat synthesis and storage.

Human studies also support a potentially beneficial role for calcium/dairy foods in weight control. For example, data from NHANES III showed an inverse association between intake of calcium/dairy foods and obesity, especially in adult women (Zemel, et al., 2000). Other investigators conducted secondary analysis of five clinical studies (four observational and one double-blind, placebo-controlled, randomized trial) and found that a lower calcium intake was associated with a higher body weight for all 780 women in the studies (Davies, et al., 2000). The Coronary Artery Risk Development in Young Adults (CARDIA) study followed more than 3,000 black and white young adults for 10 years. It concluded that dairy food consumption was inversely associated with obesity and as well as with other related factors in insulin resistance (Pereira, et al., 2002).

Further support for a beneficial effect of calcium-rich foods on body weight regulation is derived from a study in adult females (Lin, et al., 2000) and two additional studies in young children (Carruth and Skinner, 2001; Skinner, et al., 2003). The former, a two-year prospective study of 54 females ages 18–31 years, established that total calcium, specifically calcium from dairy foods, was negatively associated with changes in body weight and body fat (Lin, et al. 2000). Calcium from dairy foods protected and maintained women's levels of body fat and staved off gains in fat. Females who took in higher calcium levels (corrected for total energy intake) from dairy foods gained less weight and body fat throughout the term of the study than those with lower calcium intakes. Likewise, in preschoolers, higher average intakes of calcium and dairy foods consumed between two- and three years of age were significantly associated with lower body weight at 5.8 years (Carruth and Skinner, 2001). When this longitudinal study was extended in the same group of children until age 8, dietary calcium intake was also associated with a lower percentage of body fat. Milk and other dairy products were the main source of dietary calcium, while milk alone provided 50% of the total calcium intake (Skinner, et al., 2003). Another study (Buchowski et al., 2002) reported an inverse association between calcium or dairy intake and adiposity in lactose-tolerant and lactose-intolerant African-American women.

The first randomized clinical trial directly investigating the effects of calcium/dairy foods on body weight and body fat loss found that a high-calcium diet and a high-dairy diet enhanced the effectiveness of a calorie-restricted diet in weight control—and increased the percentage of fat lost from the trunk region. Dairy foods exerted a significantly greater effect than a calcium supplement (Zemel, et al., 2004). This six-month randomized, controlled clinical trial evaluated whether dairy products or calcium could accelerate weight and fat loss in 32 obese young adults on a calorie-restricted diet. Participants were randomly

assigned to follow one of three diet regimens as outpatients. All were provided 500 kcal/day less than were needed for weight maintenance:

1) Control diet providing zero-to-one serving of dairy products per day, 400–500 mg/day calcium, and a daily placebo supplement;
2) A calcium-supplemented diet (high calcium—for a total of 1,200–1,300 mg/day) identical to the control diet, with the placebo replaced by 800 mg of calcium carbonate;
3) A high dairy diet (placebo supplemented) containing three daily servings of dairy products for a total calcium intake of 1,200–1,300 mg/day.

Results showed that participants assigned to the standard diet, the high-calcium diet, and the high-dairy diet lost 6.4%, 8.6%, and 10.9%, respectively, of their body weight in six months. Participants on the high-dairy diet lost 70% more body weight than those on the standard calorie-reduced diet. The loss of body fat was significantly augmented by the high-calcium, and high-dairy diets by 38% and 64%, respectively. Fat lost from the trunk region on the control, high-calcium, and high-dairy diets represented 19%, 50.1%, and 66.2% of total fat loss, respectively. In addition, the high-dairy group showed significant improvement in glucose tolerance after six months on the diet, while the other two groups showed no change. The high-dairy diet produced a significant 44% decrease in plasma insulin levels as well as a "modest reduction" in systolic blood pressure, while the other two groups did not.

Two recent reviews (Zemel, 2003; Parikh and Yanovski, 2003) provide comprehensive updates of the association among calcium, dairy foods, and weight maintenance, and addressed some of the caveats, such as the threshold effect (wherein benefits are greatest in those individuals who previously consumed less than 600 mg/day calcium) and subgroups that appear to be better responders (women, African Americans). Perhaps the work is best put into perspective by considering the impact of the relationship between dietary calcium and body weight on a population basis. Dairy foods and calcium may shift metabolism somewhat modestly on an individual short-term basis, but increasing calcium intakes to recommended levels could decrease the prevalence of overweight and obesity by as much as 60–80% (Heaney, 2003).

Hypertension

Increasing dietary calcium through dairy products lowers blood pressure and may reduce the risk of hypertension (Pereira, et al., 2002; Miller, et al., 2000; Jorde and Bonaa, 2000; Birkett 1998; Griffith, et al., 1999; Van Beresteijn, et al., 1990). This effect occurs in untreated adults with hypertension, adults with normal blood pressure, women with gestational hypertension, and young children. Dietary sources of calcium (i.e., milk, cheese, or yogurt) appear to exert a greater antihypertensive action than calcium alone (Griffith, et al., 1999; Van Beresteijn, et al., 1990). This finding may be explained by the presence of nutrients in addition to calcium in dairy foods, such as potassium and magnesium, which may act in concert to lower blood pressure (Van Beresteijn, et al., 1990; McCarron, 1997). A consensus in the scientific literature establishes a calcium intake of 1,000–1,500 mg each day as sufficient to lower blood pressure in individuals who are responsive (McCarron and Reusser, 1999).

The Dietary Approaches to Stop Hypertension (DASH) trial, a study sponsored by the National Heart, Lung, and Blood Institute, showed that consuming a diet containing three servings daily of low-fat dairy foods, eight-to-10 daily servings of fruits and vegetables, and a low intake of total fat and of saturated fat substantially reduced adults' blood pressure, with results occurring in as little as two weeks (Appel, et al., 1997; Obarzanek and Moore, 1999). Researchers suggest that if Americans follow the DASH diet, they could reduce CHD by 15% and stroke by 27% (Appel, et al., 1997).

The DASH diet has been demonstrably effective in lowering blood pressure in African Americans and in those with hypertension (Tucker, 2001). A subgroup analysis of the DASH data showed that the DASH diet was twice as effective at lowering blood pressure in African Americans as in Caucasians (Svetkey, et al., 1999). There was a joint effect of race and hypertension status on blood pressure response to the DASH combination diet. Hypertensive African Americans experienced greater reductions in both systolic and diastolic blood pressure, compared to normotensive African Americans and both hypertensive and normotensive whites.

The DASH-Sodium study replicated the DASH trial findings (Sacks, et al., 2001). This multicenter, randomized, controlled trial found that a diet low in total fats, saturated fats, and sodium—while high in low-fat dairy products, fruits, and vegetables—lowered blood pressure in adults with and without hypertension. The study randomly assigned its 412 participants to consume either a typical American diet or the DASH diet. Within each diet group, subjects consumed foods with varying levels of sodium. High-sodium food had ~3,400 mg, intermediate ~2,400 mg, and low ~1,500 mg of sodium. The DASH diet lowered blood pressure at all sodium levels. While the greatest reduction occurred when subjects consumed the DASH diet at the lowest sodium level, it should be noted that the DASH diet alone produced as much of a blood pressure reduction, without sodium restriction, as did the most severe sodium restriction regimen in the control subjects. Both clinical trials and observational studies support a blood pressure-lowering effect of calcium and dairy. This benefit may be part of the reason why diets rich in dairy also appear to protect against stroke (Massey, 2001).

A recent study in free-living individuals (Appel, et al., 2003) further validates the efficacy of the DASH diet, since individuals who followed blood pressure-lowering lifestyle recommendations (including weight loss, exercise, and limiting alcohol consumption) in addition to consuming a DASH-type diet experienced the greatest numerical decreases in blood pressure. The authors predict the effect might have been greater if

individuals had better success in achieving the goals of the diet and recommend improving understanding of how to motivate people to make healthy dietary changes. Another study (Conlin, et al., 2003) explored the ability of the DASH diet to enhance the response to a commonly used blood pressure-lowering drug and reported that both systolic and diastolic blood pressures decreased most significantly in African Americans who followed the DASH diet and took antihypertensive medication. Inclusion of the DASH diet on the most recent report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VII) suggests consensus on its efficacy (Lenfant, et al., 2003).

Cancer

Epidemiological studies report either no risk or a reduced risk of some types of cancer in association with dairy consumption. Inverse associations exist between milk and other dairy foods, or calcium, and endometrial cancer (Barbone et al. 1993; Terry, et al., 2002), breast cancer (Biffi, et al. 1997; Lipkin and Newmark, 1999; Shannon, et al., 2003), pancreatic cancer (Michaud, et al., 2003), renal cancer (Prineas, et al., 1997), and colorectal cancer (Holt, 1999; Ma, et al., 2001; Parodi, 2001).

Breast Cancer

Two recent studies (Voorrips, et al., 2002; Ronco, et al., 2002) noted weak positive relationships between high-fat dairy products and breast cancer risk. However, these and other studies have failed to find a significant positive association with total fat intake and breast cancer. A large study of nurses saw no increased risk of breast cancer with higher saturated fat intakes and in fact showed that consumption of dairy foods, especially low-fat products and fat-free milk, was inversely associated with risk of breast cancer (Shin, et al., 2002). The database used to assess habitual dietary CLA intake in free-living women may not account for the natural variability of CLA content of foods that occurs as a consequence of season, feeding practices, and other factors (Peterson, et al., 2002) and therefore may not have accurately estimated CLA intake. Voorrips and colleagues (2002) specifically noted a positive relationship between breast cancer and food containing conjugated linoleic acid (CLA), such as butter, cheese, full-fat milk, and meat. However, in animal and tissue culture studies, CLA was found to be anticarcinogenic in mammary tumor models.

Ovarian Cancer

Regarding protection against ovarian cancer, one epidemiological study found a stronger significant effect of dairy sources of calcium compared to a nonsignificant gradient in risk related to calcium supplement intake (Goodman, et al., 2002).

Colon Cancer

Clinical studies also demonstrate a protective role of dairy foods against colon cancer. According to the National Cancer Institute, African Americans have a higher incidence of colon cancer (males: 67.9%, females: 54.0%) compared to Caucasians (males: 66.0%, females 47.6%). Mortality is also higher for African Americans. Holt and colleagues found a significant reduction of precancerous changes in the colon in 70 multiethnic patients with a history of developing colon polyps when they increased their intake of calcium with low-fat dairy foods (Holt, et al., 1998). A comparison of the effects of calcium supplements to low-fat dairy foods in 40 subjects at risk for colonic neoplasia found that both supplemental calcium and dairy foods lower epithelial cell proliferation indexes from a higher to a lower-risk pattern (Holt, et al., 2001).

Prostate Cancer

There is conflicting evidence for an association between calcium/dairy food intake and risk for prostate cancer. A prospective study links high intakes of calcium with increased risk of prostate cancer (Chan, et al., 2001). However, recent evidence suggests that low vitamin D rather than high calcium affects the outcome (Vieth, 2002; Beer, et al., 2003). Findings from a case control study in Italy did not support the hypothesis that calcium or milk intake increases risk of prostate cancer (Tavani, et al., 2001), nor did a recent study of male participants in the Baltimore Longitudinal Study of Aging (Berndt, et al., 2002). A comprehensive unpublished review of the available data by scientists at the American Institute of Cancer Research (AICR) concluded there is insufficient evidence to suggest an increase in prostate cancer risk with higher calcium or dairy food intakes (AICR, 2002).

Insulin Resistance Syndrome

Obesity and sedentary lifestyles are known risk factors leading to the development of insulin resistance, which can lead to prediabetes. Both insulin resistance and prediabetes increase the chance of developing type-2 diabetes, as well as cardiovascular heart disease. Increasing evidence points to the role of dairy and dietary calcium in reducing the incidence of obesity. However, there is a paucity of data directly linking dairy foods and the reduction of insulin resistance, diabetes, or IRS. Researchers (Tuomilehto, et al., 2001) have been able to conclude that the risk of diabetes can be decreased by approximately 60% by diet and exercise alone, and, thus, lifestyle dietary changes can play a role in the decreased risk of diabetes and insulin resistance syndrome. In a cross-sectional study of men and women between 30 and 64 years of age, more than one serving every day of milk products revealed a 40% lower risk of the components of IRS, but only in men (Mennen LI, 2000). Milk consumption has been associated with decreasing risk of the complications of the insulin resistance syndrome, including coronary artery disease, stroke, and hypertension (Ness AR, 2001). The CARDIA study has shown an inverse relationship between dairy food consumption and insulin resistance (Pereira, et al., 2002). After tracking more than 3,000 adults for 10 years, it was found that overweight subjects who consumed dairy products more than 35 times a week suffered 72% less insulin

resistance syndrome than those who consumed dairy less than 10 times a week. A more recent study (Reusser, et al., 2003) showed a positive influence of dietary habits that included dairy products on cardiovascular risk factors, including hypertension, insulin resistance syndrome, and obesity. While these promising studies show a statistical relationship between dairy consumption and reducing the risk for insulin resistance syndrome, intervention studies are needed to further test these findings.

Cardiovascular Disease

Positive associations between dietary fat and cholesterol and low-density lipoprotein cholesterol (LDL-C) resulted in popular counsel to replace regular dairy products with reduced-fat or fat-free versions to lower risk of CHD (Sacks and Katan, 2002). However, as demonstrated in the DASH diet, some full-fat dairy products (i.e., approximately a serving of cheese) can fit within an overall diet moderate in fat and low in saturated fat (Swain, et al., 1999).

As the panel of relevant biomarkers grows exponentially (Brewer, 2003), a much clearer picture is emerging of the actual risk associated with full-fat dairy consumption. A detailed explanation appears below, but briefly, it is now understood that one's genetic disposition determines the body's reaction to total fat, so that certain people may safely consume full-fat products without any negative consequences. In addition, greater understanding of gene-nutrient interactions (Krauss and Dreon, 1995) is helping to define at-risk populations and those individuals who may or may not benefit from reducing dietary fat intake.

A study on differential effects of specific saturated fatty acids (SFA) and their food sources on plasma lipids and lipoproteins revealed that not all SFAs impart the same risk of CHD. Using data from the Nurses' Health Study, Hu, et al. (1999) identified the profile of fatty acids that foods contributed and reported an increased relative risk only for longer chain SFA (16:0 and 18:0), which was no longer significant after controlling for other dietary variables. High-fat dairy products increased risk nonsignificantly by 8% ($p=0.33$). Low-fat dairy products, on the other hand, decreased risk by 18% ($p=0.11$), a statistically significant finding. Only by analyzing the ratio of high-fat to low-fat dairy products did the study show risk to be significantly increased by 27%. Consistent with these observations, analysis of dietary patterns in the Health Professionals Follow-Up Study (Hu, et al., 2000) found that low-fat dairy products grouped with other foods (cold cereal, fruit, whole-grain products) exerted a negative effect on risk. This relationship was not statistically significant, however. Although high-fat dairy products were factors in a Western diet pattern that increased CHD risk, adjustment of the data for saturated fat intake only slightly attenuated the results, suggesting that other factors of the dietary pattern are much more important in imparting risk. It is well established that saturated fat increases HDL levels, but it remains to be determined how manipulation of the LDL:HDL ratio affects overall risk of CHD.

Beyond consideration of macronutrients, other nutrients such as calcium, potassium, and magnesium, may protect against CHD. This benefit may occur either directly (through lowering blood pressure) or indirectly (by lowering blood levels of total and LDL cholesterol) (Denke, et al., 1993; Svetkey, et al., 1999; Obarzanek, et al., 2001). The DASH combination diet (rich in fruits/vegetables and low-fat dairy products, and low in fat), when compared to the control diet, significantly reduced total and LDL levels without affecting blood triglyceride levels, whereas the diet high in fruits and vegetables did not produce significant changes in blood lipids (Obarzanek, et al., 2001). In addition to blood pressure and lipid-lowering, the DASH diet lowered blood levels of homocysteine, an amino acid linked to increased CHD risk (Appel, et al., 2000). A 25-year prospective study of 5,765 men living in Scotland found no evidence that drinking milk was associated with increased risk of CHD or death from all causes (Ness, et al., 2001).

Studies have found that unfermented milk or yogurt can lower blood cholesterol in both humans and experimental animals (Buonopane, et al., 1992; Golay, et al., 1990). Buonopane and colleagues studied the effects of supplementing the usual diet with a quart of skim milk for eight weeks on serum cholesterol level, blood pressure, and serum triglyceride level in 82 adults. Supplemental milk treatment was associated with a 6.6% reduction in serum cholesterol, as well as a reduction in serum triglycerides in a subgroup with elevated baseline cholesterol levels. Reductions in systolic and diastolic blood pressure also occurred. Earlier studies had similar findings. In one experiment, volunteers exhibited a 5–15% decrease in blood cholesterol levels in response to consumption of whole and fat-free milk (Howard and Marks, 1977). In another study, subjects who added yogurt to their diets reduced their blood cholesterol levels by 5–10% in one week (Hepner, et al., 1979).

Other studies have found that whey protein contains bioactive components that may positively affect cardiovascular health (Harper, 2003). For example, whey-derived peptides may reduce the risk of hypertension, inhibit platelet aggregation, and lower blood cholesterol levels. Whey peptides have been shown to inhibit the activity of angiotensin-converting enzyme (ACE) (Fitzgerald and Meisel, 2000; Pihlanto-Leppala, et al., 2000; Takano, 1998), which constricts vascular smooth muscle and increases blood pressure by converting the inactive angiotensin-I hormone into angiotensin-II. Alpha-lactalbumin and beta-lactalbumin are among the several whey-protein-derived ACE inhibitors identified (Shah, 2000; Fitzgerald and Meisel, 2000; Pihlanto-Leppala, et al., 2000; Takano, 1998). In vitro and experimental animal studies suggest that peptides derived from glycomacropeptide and lactoferrin may inhibit platelet aggregation and thrombosis (Rutherfurd and Gill, 2000). In addition, whey proteins may reduce blood cholesterol levels or have a favorable affect on blood lipid levels (Walzem, et al., 2002; Beena and Prasad, 1997; Kawase, et al., 2000).

Genetic individuality in response to dietary fat may explain the high degree of variability in clinical trials and the lack of consensus among epidemiological studies. Two studies (Krauss

and Dreon, 1995; Krauss, 2001) reported on the atherogenic lipoprotein phenotype (ALP) characterized by many of the same components that comprise metabolic syndrome. These findings suggest that approximately 30% of the population will benefit in terms of lowering CHD risk by adopting a low-fat diet. A significant percentage of the population, however, actually responds adversely to lower fat intakes, in that LDL-C decreases but converts to a small, dense, and more readily oxidized particle.

A recent review discusses how several cardiovascular risk factors, including hypertension, insulin resistance syndrome, and obesity, as tested in randomized, controlled trials emphasizing African-American populations, have been positively influenced by dietary patterns that include an adequate intake of dairy products (Reusser, et al., 2003).

Osteoporosis

According to recent estimates from the NOF, 44 million Americans either have the bone-thinning disease osteoporosis (10 million) or have low bone mass (34 million), placing them at high risk for the disease (NOF, 2003). Although African Americans have a lower risk for osteoporosis than Caucasians or Hispanics, primarily resulting from resistance to the bone resorption apparatus controlled by parathyroid hormone (Heaney, 2002), the NORA study found that African Americans (particularly women) are at greater risk than previously thought (Siris ,et al., 2001). NORA found that 38.9% of African-American women had osteopenia, and 4% had osteoporosis, suggesting that their absolute risk of fracture may be substantial, although less than that of women of other racial and ethnic groups. A shorter hip axis length could account for the fact that the rate of hip fracture in African Americans is 32% lower than in Caucasians (Heaney, 2002). Despite lower reported rates of hip fracture, African-American women who suffer fractures are more likely to be nonambulatory at discharge and twice as likely to die from hip fracture compared to Caucasian women (Geller and Derman, 2001).

Little information is available for blacks (including Africans, African Americans, and West Indians) on the importance of calcium for bone acquisition during growth, for bone loss with age, or for reducing risk of fracture. Published evidence indicates that inadequate calcium intake limits bone acquisition and maintenance in African Americans just as in other races. However, it is clear the calcium intake needed to ensure optimal skeletal health is lower in African Americans than in other racial groups (Heaney, 2002). Therefore, skeletal health should not determine the calcium requirement for African Americans because their optimal calcium intake protects other systems as well (such as the cardiovascular system). The goal of calcium intake for African Americans should be one that promotes total body health (Heaney, 2002).

It is well established that calcium is necessary for building and maintaining strong bones and helping to prevent osteoporosis (Heaney, 2000). Bone health is dependent on several nutrients in addition to calcium, such as protein, phosphorus, and zinc, most of which occur together in dairy foods. Replacing just one nutrient (namely, calcium) is likely to have less-than-optimal results (Heaney, 2002). In an analysis of papers published since 1975 describing studies of the relationship of calcium intake and bone health, Heaney found that of 52 investigator-controlled calcium intervention studies, 50 demonstrated better bone balance at high intakes, greater bone gain during growth, reduced bone loss in the elderly, or reduced fracture risk (Heaney, 2000). Of the 86 observational studies, 64 were positive, confirming that the strong correlation observed in the intervention studies also exists in free-living persons. Fully three-fourths of the observational studies support the hypothesis that increased calcium and calcium-rich dairy foods protect the skeleton. Six of the intervention studies used dairy foods as the calcium source, and all reported the positive link between calcium intake and bone health (Baran, et al., 1989; Cadogan, et al., 1997; Chan, et al., 1995; Prince, et al., 1995; Renner, et al., 1998; Storm, et al., 1998). All showed significant positive effects that were at least as strong as the effects of calcium supplements. This is not surprising, as it has been long established and well understood that milk supports growth; thus, it is evident that milk and milk products are naturally dense sources of the nutrients needed for bone development and maintenance.

A study conducted to assess understanding of osteoporosis risk factors and attitudes toward the disease among African-American and Hispanic women found these populations were not well-versed in or practicing lifestyle behaviors and dietary habits that would promote and maintain optimal bone mass (Geller and Derman, 2001), though many of the risk factors for osteoporosis are modifiable. Geller and Derman conclude, "osteoporosis education and prevention initiatives are needed specifically for African-American and Hispanic women to promote healthy behaviors, identify women at risk, and encourage early diagnosis and treatment" (Geller and Derman, 2001).

Barriers to Improving Dairy Consumption by African Americans

According to current research, social and cultural habits and attitudes can affect tolerance to milk. Johnson and colleagues (1993a) studied 45 African-American subjects who had confirmed lactose maldigestion or low lactase levels. In a double-blind test, each subject received 315 mL of lactose-containing milk or lactose-hydrolyzed milk alternately on three different days. One-third of the subjects experienced symptoms of intolerance to both types of milk, indicating their symptoms were not due to lactose. Estimates of the prevalence of lactose maldigestion can overestimate the number of people who experience symptoms after consuming physiologic amounts of dairy foods (i.e., 8 ounces of milk containing 12 g of lactose). Well-controlled studies have demonstrated that the vast majority of lactose maldigesters can consume amounts of lactose found in a standard serving of milk or other dairy products without experiencing adverse symptoms (Jarvis and Miller, 2002).

The quantity of lactose consumed relates directly to the appearance and severity of lactose-intolerant symptoms (Hertzler, et al., 1996; Suarez, et al., 1995; Tamm, 1994; Villako and Maaroos, 1994). Suarez and colleagues have conducted several studies in multiethnic populations (African Americans, other minorities, and whites) investigating lactose-intolerant symptoms from the consumption of dairy products (Suarez, et al., 1995, 1997, 1998). For example, in a randomized, double-blind crossover trial, 30 people who identified themselves as lactose intolerant were all able to tolerate one cup of milk per day (Suarez, et al., 1995). Subjects consumed either a cup of regular lactose-containing milk or lactose-hydrolyzed milk with breakfast for a one-week period. Researchers measured participant's breath hydrogen concentrations after consumption of 15 g of lactose (one cup of milk contains 12 g of lactose) to determine the number of lactose maldigesters. Based on breath hydrogen concentrations, 70% of the subjects were maldigesters, whereas 30% were digesters. All subjects reported minimal gastrointestinal symptoms, and researchers found no significant differences in symptoms when either lactose digesters or maldigesters consumed lactose-containing or lactose-free milk. Researchers concluded that individuals who describe themselves as intolerant may erroneously believe abdominal symptoms are due to lactose intolerance. These results and those of a subsequent study (Suarez, et al., 1997) indicate that lactose maldigesters can comfortably consume one cup of milk with breakfast or two cups of milk in divided doses with breakfast and dinner. The most recent study by this group found that women with limited lactose digestion could eat a dairy-rich (four-serving) diet that includes milk, yogurt, and cheese without impediment, supplying approximately 1,500 mg of calcium per day (Suarez, et al., 1998).

Gradual exposure to dairy foods can improve the tolerance to lactose (Hertzler and Savaiano, 1996b; Johnson, et al., 1993b; Tamm, 1994). Hertzler and colleagues (1996) found that daily consumption of lactose in lactose maldigesters was able to reduce lactose intolerance by adaptation of colonic bacteria to lactose. Twenty subjects received increasing amounts of lactose or dextrose for 10 days and then were switched to another treatment. They consumed lactose and dextrose at meals during the respective 10-day periods, increasing the doses from 42 g/day to 70 g/day (for lactose, this would be equivalent to moving from 3.5–6 cups of milk per day). At the end of each 10-day period, subjects received a challenge dose of lactose or dextrose. When researchers compared the tolerance to lactose versus dextrose, subjects showed a 50% decrease in symptoms of intolerance and a significant improvement in their ability to digest lactose. These results indicate that the naturally occurring bacteria of the gut were able to adapt to the presence of lactose and degrade the milk sugar faster and with less gas production. A study on African-American adolescent girls (Pribila, et al., 2000) fed a dairy-rich diet for 21 days showed an adaptation to lactose. Subjects consumed 33 g of lactose per day for 21 days. Researchers assessed lactose digestion and reports of intolerance symptoms at the beginning and end of the 21-day intervention. Based on a breath hydrogen assessment, 14 of the 17 subjects were lactose maldigesters, but breath hydrogen decreased over the 21-day period, suggesting a colonic adaptation to the high-lactose diet. Gastrointestinal symptoms were negligible during the breath hydrogen assessments and during the 21-day intervention.

The type of dairy food consumed can influence the symptoms of lactose maldigestion. Studies show that subjects tolerate whole milk and chocolate milk better than lower-fat milks

Table 2. Calcium and Lactose Content of Dairy Foods

Food	Calcium (mg)[1]	Lactose (g)[2]
Lowfat Milk (8 ozs.)	290	12
Yogurt nonfat flavored (8 ozs.)	345	4-17
Cheddar cheese (1 oz.)	204	0.6-0.9
Yogurt (8 ozs.)	274-452	4-17

Source: 1. USDA/ARS 2002 Nutrient Data Laboratory, National Nutrient Database for Standard Reference, Release 17.
2. National Dairy Council; Scrimshaw NS, Murray AB, *Am J Clin. Nutr.* 48(suppl. 4):1998.

and unflavored milks (Dehkodi, et al., 1995; Lee and Hardy, 1989; Leichter 1973). Apparently, the fat content of whole milk slows gastric emptying, improving lactose tolerance. The mechanism by which cocoa improves lactose tolerance is not known (McBean and Miller, 1998). Subjects tolerate most cheeses because of their low levels of lactose and high solids content (Kosikowski and Mistry, 1997). Lactose maldigesters tolerate yogurts (Martini, et al.,1991; Kolars, et al., 1984; Shermak, et al., 1995; Savaiano, et al., 1984). The improved tolerance to the lactose in yogurt is the result of more effective digestion attributed to the semisolid state of yogurt and the release of lactase enzyme by the bacterial cultures within the digestive tract when a subject consumes yogurt (Vesa, et al., 1996). For comparison, Table 2 illustrates calcium and lactose content of an average serving of milk, cheese, or yogurt.

Finally, there are proven benefits of including dairy in diets rich in fruits and vegetables for reducing blood pressure. However, before it will be possible to educate African Americans about the health benefits of a diet rich in low-fat dairy products, fruits, and vegetables, it is necessary to address the assumption that this population cannot consume dairy without discomfort.

Analysis of Consumer-Based Research

As part of the Three-a-Day of Dairy campaign, in collaboration with the National Dairy Council, the NMA conducted consumer-based research to understand how cultural and physiological factors affect African-American health and nutrition behavior. The research was designed to explore such issues as "in-market" prevalence of lactose intolerance, the actions by those who experience symptoms thought to be related to lactose intolerance, and how medical professionals diagnose, treat, and provide advice regarding this condition. The NMA believes this is the first study to explore potential sociological and cultural issues that shape African-American dietary patterns and examine the resultant nutritional implications for the community.

This research includes a review of databases that include the following:

- Quantitative consumer data captured in the NPD Group's NET® database;
- Nutrient intake data from the NPD's Nutrient Intake Database; and
- A customized quantitative study among a nationally representative sample of African-American adults regarding personal experiences and consumption of dairy products called the "Dairy Consumption and Lactose Intolerance Among African Americans" of the ALLIUS study.

NPD's annual sample consists of 2,000 households containing approximately 5,000 individuals. The sample is divided into 52 subsamples, and each week a group of nearly 60 households begins recording all the foods and beverages consumed by all household members. Each household maintains a daily eating diary for two weeks. NPD's database was used to calculate nutrient intake by quantifying the NET food frequency records using the USDA Continuing Survey of Food Intakes by Individuals 1994–1996, 1998. The "Dairy Consumption and Lactose Intolerance Among African Americans" study, aspart of ALLIUS, was conducted among 2,016 African-American adults and 1,084 U.S. general population adults, 18 and older, closely matched to U.S. Census data for gender, age, income, region, and household composition.

Study Results

African Americans Not Meeting the Dietary Reference Intakes (DRIs) for Key Nutrients

According to the NPD, African Americans average only 66% of the DRI for calcium, compared to an average of 75% for the balance of the population. This low-calcium intake stems directly from lower dairy product consumption, because African Americans' consumption of calcium from nondairy sources closely mirrors that of the balance of the U.S. population (Table 3). In addition, African Americans on average do not meet recommendations for key nutrients found in dairy products such as magnesium and vitamin D.

The Dairy Consumption Habits of African Americans

While evidence supports numerous benefits as discussed in the aforementioned section, including risk reduction of major chronic diseases that affect African Americans by the consumption of calcium and other nutrients contained in dairy foods, a significant barrier exists for African Americans to increase dairy consumption. African Americans are eating far fewer dairy products on average than the general U.S. population. Only about 44% of African-American adults claim to eat one or more servings of dairy products each day, compared with about

Table 3. Percentage of Calcium Recommendations Met By Average Person

	African Americans	Balance of Population
Percentage of Calcium DRI* Met	66%	75%
Percentage of Calcium DRI Met from Dairy Sources	47%	57%
Percentage of Calcium DRI Met from Nondairy Sources	19%	18%

* DRI – Dietary Reference Intake
Source: NPD Group, Nutrient Intake Database, 2003; five years ending Feb. 2002

69% of the general population (NPD/NET, 2003). Focusing on the three product categories (milk, cheese, and yogurt), supported within the Three-a-Day of Dairy program, it is possible to make the comparisons in Table 4. African Americans are below-average consumers of milk and yogurt and close-to-average consumers of cheese, according to the NDP. Compared to the general population, African Americans are above-average consumers of whole milk, lactose-free milk, and reduced-fat or calorie-reduced cheeses. African Americans are also more likely to drink whole milk (rather than a reduced-fat version) than the general population (NPD/NET, 2003). In relation to types of milk and milk alternatives, African Americans are well above average consumers of lactose-free milk but about average consumers of soy beverages. Still, consumption of these milk alternatives remains small.

African Americans consume milk (Table 4) at about two-thirds the rate of the general population and consume it "as a glass" at roughly half the rate of the general population (Table 5). Of particular concern is the consumption of milk among African-American children. Looking at milk consumption over a lifetime, African Americans lag behind Caucasians at all ages, but the gap is most pronounced among children 2–15 years of age (Figure 2).

Although milk consumption among African Americans lags behind the general population for all occasions, the dinner meal is where the largest gap occurs (Table 5), because African Americans choose other beverages far more often than milk (NPD/NET, 2003). Milk is consumed at 42% of all in-home dinner meals for all children, but is chosen only 7% of the time by African-American children. African-American adults show a similar pattern. Milk is consumed only 6% of in-home dinners versus 23% for all adults (Table 6). Initial qualitative findings indicate African Americans do not choose milk at dinner, because it is not perceived as "going with" a variety of foods prevalent in the African-American diet. This finding points to the idea that overall flavor and taste profiles for African Americans differ from those of other groups. Taken with other issues, these preferences keep milk consumption levels below those of the general population.

The Barrier of Lactose Intolerance

To examine the idea that there are cultural and physiological barriers that influence nutrient and dairy intake in African Americans, the Dairy Consumption and Lactose Intolerance Among African Americans study was conducted. This study proceeded to identify and understand specific behaviors associated with:

- Barriers to dairy consumption,
- Potential solutions for improving nutritional behaviors, and
- Overall African-American health.

Table 4. NET® In-Home Consumption Annual Eating Occasions Per Capita 2001/2002

	General Population	African Americans
All Milk	296	197
Whole Milk	56	62
Lactose-Free/Reduced Milk	2	8
All Cheese	101	81
Fat/Calorie-Reduced etc. Cheeses	11	14
Yogurt	15	6
Soy Beverages	3	2

Source: NPD Group NET® database, 2003; two years ending Feb. 2002.

Table 5. Annual Consumption Per Capita—Milk Consumed as a Glass

Meal Occasion	All Children (General Population)	African-American Children	Gap	All Individuals (General Population)	African-American Individuals	Gap
Total Meal Occasions	280	114	-59%	165	78	-52%
Breakfast	89	61	-31%	47	39	-18%
Lunch	57	22	-62%	37	15	-59%
Dinner	105	16	-85%	64	14	-79%
Carried	5	1	-80%	2	<1	-83%
Snack	25	15	-40%	1	1	-23%

Source: NPD Group NET® database, 2003; two years ending Feb. 2002.

Critical to understanding the reasons for the shortfall in dairy consumption among African Americans is an exploration of lactose intolerance. Among respondents, 49% of African-American adults claimed to have experienced some type of physical discomfort at some time after eating dairy foods, such as milk, cheese, yogurt, or ice cream (ALLIUS, 2003 unpublished data). However, when asked directly if they considered themselves to be lactose intolerant, only 24% of respondents answered positively. These data add perspective to the studies mentioned earlier showing higher percentages of African Americans experiencing lactose intolerance (Sahi, 1994; Scrimshaw and Murphy, 1988).

Among respondents who have ever experienced physical discomfort after eating a dairy food, 27% say they experience discomfort all of the time, while 39% say they feel discomfort occasionally or rarely (ALLIUS, 2003 unpublished data). They linked this discomfort to a particular product, with milk being the most often associated (87%), followed by ice cream (55%), cheese (25%), and yogurt (12%). Furthermore, among respondents who believed they were lactose intolerant, 85% stated they would be willing to add more dairy products to their diet if they could avoid the symptoms of lactose intolerance.

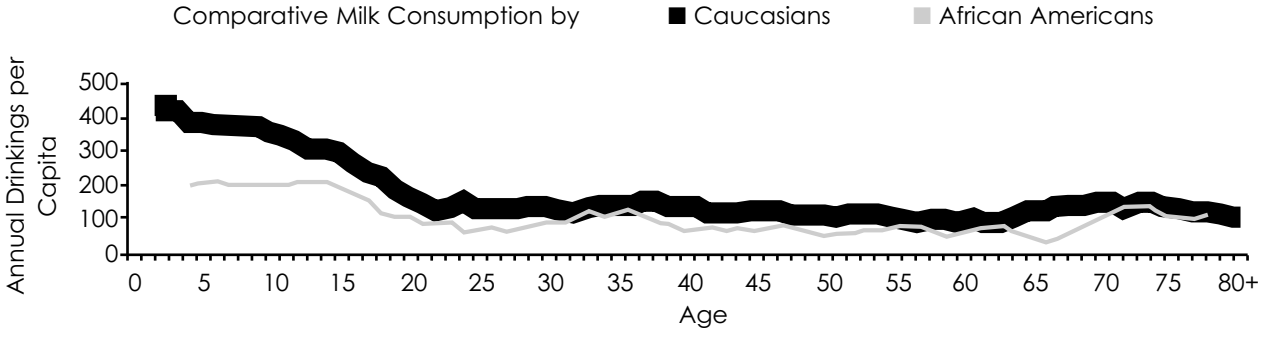
The impact of lactose intolerance on dairy product consumption in the African-American community is clear. Those African-American respondents who were medium-to-high consumers of dairy products (i.e., ate dairy products more than

Table 6. Share of Beverages Consumed at In-Home Dinners 2001/2002

Total Sample (General Population)		African Americans	
		Total Children (age 2–17)	
Milk	42	Fruit Drinks	33
Soda	21	Soda	24
Fruit Drinks	13	Fruit Juice	16
Fruit Juice	10	Iced Tea	14
Iced Tea	10	Milk	7
		Total Adults (age 18+)	
Soda	29	Soda	36
Milk	23	Iced Tea	22
Iced Tea	17	Fruit Drinks	17
Coffee	7	Fruit Juice	7
Fruit Drinks	6	Milk	6
Alcohol	6	Alcohol	5
Fruit Juice	5	Coffee	2
Hot Tea	5	Hot Tea	2

Source: NPD Group NET® database, 2003; two years ending Feb. 2002.

Figure 2. Racial Comparison of Milk Consumption in Annual Drinking per Capita, by Age



Source: NPD Group NET® database, 2003; seven years ending February 2002.

once a day) were significantly less likely to have ever experienced physical discomfort after eating a dairy product and were significantly less likely to believe themselves to be lactose intolerant (ALLIUS, 2003 unpublished data). Conversely, lighter dairy consumers were significantly more likely to have ever experienced physical discomfort after eating a dairy product and were significantly more likely to believe they were lactose intolerant. Respondents who experienced symptoms every time or most of the time after they ate dairy products were most likely to reduce dairy products significantly or completely eliminate them from their diets. The reduction of dairy product consumption appears to be highly related to frequency of symptoms.

Combined, these data point to the idea that lactose intolerance is not an "all-or-none" condition, but one that may lead to physical discomfort associated with certain foods or certain circumstances. The implication is that an educational campaign could be useful in informing consumers about potential ways to avoid these symptoms, improve their dietary habits, and increase dairy intake.

DISCUSSION

Many African Americans experience greater risk for several chronic diseases (such as CHD, high blood pressure, stroke, diabetes, obesity, and some cancers) than the general public. However, based on the data reviewed related to the nutrients and associated health benefits of dairy, lactose intolerance is higher and dairy food consumption is lower in African Americans compared to Caucasians. Available evidence indicates that consuming at least three servings of low-fat milk, cheese, or yogurt daily may help reduce the risk of hypertension, CVD, colon cancer, and osteoporosis in all Americans, but specifically in African Americans. It, therefore, stands to reason that for many African Americans, dairy should be considered one of the preferred sources of calcium and other key nutrients that play a role in preventing or improving certain chronic diseases that plague this population.

The DASH study demonstrated that a diet low in sodium, total fat, and saturated fat; rich in fruits and vegetables; and containing three servings of low-fat milk, cheese, or yogurt reduced blood pressure significantly more than a traditional western diet and was twice as effective in African Americans than in Caucasians (Appel, et al., 1997). Previous research shows that calcium, potassium, and magnesium (which occur together in dairy foods) are effective at lowering blood pressure. Increasing calcium intake by adding approximately three servings of dairy foods per day significantly reduced precancerous changes in the colon when compared to the control group (Holt, et al., 1998, 2001). Calcium, vitamin D, and perhaps other components of dairy foods (CLA, sphingolipids) may contribute to reducing colon cancer risk. An analysis of NHANES data by Zemel and colleagues (2000) found that women who consumed three or more servings of dairy foods daily reduced their risk of being in the highest weight category by 84%. According to an NIH expert panel, dairy is the preferred source of calcium (NIH Consensus Panel on Optimal Calcium Intake, 1994).

The studies reviewed in this report suggest that food misconceptions and preferences about dairy may adversely affect African Americans' calcium intake. Health professionals treating African Americans and other minority populations should educate their patients on the benefits of low-fat milk, aged cheese, and live-culture yogurt in their overall health and weight control goals.

Other Sources of Calcium

For those few individuals (such as vegans) who cannot tolerate or do not consume dairy products due to dietary practices, it is important to note that other calcium-rich options do exist (Gebhardt and Thomas, 2002). Such options include:

- Lactose-free or reduced milk and lactase-enzyme dietary supplements;
- Nondairy sources of calcium, such as sardines and salmon, leafy green vegetables (mustard greens, turnip greens, kale, or collards), legumes, tofu and fortified soy products, and fortified orange juice;
- Lactase supplements; and
- Calcium supplements.

Keep in mind, however, that the bioavailability of calcium, or the amount absorbed, varies depending on the food source and overall diet. For example, increasing fiber intake may be associated with negative calcium balance. Also, the bioavailability of calcium from soy beverages is less than that of milk and, ounce-for-ounce, will not provide the same amount of calcium and other key nutrients (Heaney, et al, 2000). Many calcium-fortified foods and calcium supplements do not provide the same nutritional profile as dairy foods (Devine, A., 1996). In contrast, calcium absorption from low-oxalate vegetables (for example, kale, broccoli, collard greens) is as good as it is from milk, but large quantities would be needed to achieve the appropriate RDA.

Risks Associated with Increased Levels of Dairy Intake

As estimated for 2000, milk and other dairy products (excluding butter) contributed only 9% of the total calories available but provided 72% of calcium (USDA, 2000). While evidence supports the health benefits of at least three daily servings of low-fat dairy, concerns of increased calcium intake must be addressed. There are minimal risks, for the healthy individual, to increasing dairy consumption in the diet to three-to-four servings a day. However, the strategy of increasing calcium intake by increasing dairy products may be of concern because of the tendency to increase the intake of saturated fat. This potential problem can be averted by the use of low-fat dairy products in form of milk, aged cheeses, and live-cultured yogurt. Reduced-fat or nonfat dairy products contain as much calcium per serving size as high-fat dairy products.

Popular belief has suggested that increased calcium may be associated with the risk for kidney stones. Regarding dairy products, recent studies have shown that drinking milk may help to reduce the risk of kidney stones. Specifically, the calcium in milk may be protective (Borghi, 2002; Curhan, et al., 1993; Curhan, et al, 1997; Massey, 1998). In contrast to calcium-rich foods, research indicates that calcium supplements may not protect against kidney stones (Curhan, et al., 1993, 1997). Individuals with mild or subclinical illnesses manifesting as a dysregulation of 1,25-dihydroxy vitamin-D synthesis (e.g., primary hyperparathyroidism, sarcoidosis) may be at increased risk from higher calcium intakes. Nevertheless, in intervention studies of less than four years, no adverse renal effects of moderate supplementation up to 1,500 mg/day were reported.

Lastly, the use of dairy food products to increase the intake of calcium and other key nutrients could increase side effects in

individuals who are truly lactose intolerant or sensitive to milk products. If the strategies to improve tolerance of dairy products fail, lactose-free milk or nondairy alternative sources are available as discussed in the preceding section of this discussion.

Hence, it could be inferred that an otherwise-healthy adult can safely consume a minimum of three servings of low-fat dairy (an equivalent of approximately 750–900 mg of calcium), as part of a well-balanced diet containing additional dietary sources of calcium. The NIH Consensus on Optimal Calcium Intake (1994, revisions 1999) concluded that a modest increase in calcium intake should be safe for most people. Only when total calcium intake exceeded 2,500 mg/day did adverse effects seem more likely to occur.

CONCLUSION

Through continued education of the African-American population about the health benefits associated with dairy consumption and strategies to combat symptoms of lactose intolerance, significant gains may be realized in improving the overall health of this target population. Low-fat dairy foods, fruit, and vegetables, and a low intake of total fat and saturated fat, coupled with regular moderate physical activity, may be the prescription for longevity and optimal health.

Consensus Panel Recommendations

New evidence suggests that the inclusion of dairy products in the diet confers certain health benefits related to chronic diseases, such as hypertension, obesity, and colon cancer. Based on an extensive review of the literature, this NMA consensus panel made recommendations in specific categories on how to improve and understand the role of dairy and dairy nutrients in the diets of African Americans. The categories are related to dietary guidelines, strategic planning, partnership/collaboration, research, food industry, and dissemination of information. The recommendations in these six categories are as follows:

Dietary Guidelines

- The NMA recommends African Americans adopt lifestyle choices consistent with current NAS guidelines relating to physical activity and healthful eating, including:
    - Increased fruits/vegetables and fiber;
    - Increased physical activity;
    - Decreased fat, especially saturated and trans fats;
    - Adequate intake relative to energy need; and
    - Increased consumption of low-fat milk, cheese, and/or yogurt.
- Based on scientific evidence, the NMA consensus panel agrees with the current guidelines for dairy consumption. As such, based on age for healthy individuals, the American public as a whole and African Americans in particular should consume three-to-four servings per day of low-fat milk, cheese, and/or yogurt (i.e., three servings per day for children, adults, and pregnant women; four servings for adolescents and adults over 50 years old).
- The public should also be educated about the importance of including other calcium-rich foods, such as leafy green vegetables (i.e., turnip greens, kale, collards), sardines and salmon, tofu and fortified soy products, and other calcium-fortified food sources in the diet.
- For those individuals who cannot tolerate dairy products in the form of low-fat milk, cheese, or yogurt, lactose-free milk may be an alternative option to obtain needed calcium and other important nutrients.

Strategic Planning

- The NMA should utilize culturally sensitive strategies that address barriers and facilitate improvement of eating habits, (including dairy consumption) and physical activity behaviors of African Americans.

Partnership/Collaboration

- Collaborative efforts should be explored between NMA and historically black colleges and universities (HBCUs) to conduct ongoing research on the nutritional health status and on health outcomes for African Americans. Information gleaned from this research will assist in developing culturally sensitive, culturally literate health information on the importance of diet in the prevention and management of obesity and other chronic diseases.
- The NMA should consider collaborations with current U.S. public health agencies, payers, schools, and training programs to utilize healthcare delivery system databases and to develop policy and financing related to dietary guidelines.
- NMA should develop appropriate guidelines for partnership with the dairy industry and research.
- NMA should collaborate with the National Dairy Council and other entities to develop educational campaigns to raise awareness of low-fat dairy (i.e. milk, cheese, or yogurt) and other calcium-rich foods in the diet.

Research

- Researchers who study dietary habits of specific populations should collaborate with HBCUs, such as Morgan State University, to explore opportunities for research and data analysis of existing information, such as the CSFII NHANES and other databases, to determine the status of dietary habits of African Americans.
- Researchers who study dietary behaviors should explore opportunities for studies to be conducted on the impact of improved dietary changes of African Americans.
- Researchers who study dietary behaviors should establish an ongoing cost/benefit analysis of lifestyle modifications and dietary changes in the African-American community.
- An expert panel should be convened to design and implement a study on African-American dietary patterns and consumption and publish final recommendations and results of research.
- Based, on current research, NMA should target and promote health information on the importance of dietary intake in the prevention and management of obesity.

Food Industry

- The dairy food industry should develop food products that are consumer-friendly, culturally sensitive, nutritionally sound, convenient, available, tasteful, cost-effective, with attractive packaging, and have a stable shelf-life.

Dissemination

- The NMA should promote, for its constituency and their patients, the use of culturally competent information about healthy lifestyle behaviors, including physical activity and dietary choices that are nutritionally sound.

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