Simple Strategies for Yogurt in the Revised WIC Package to Improve Participation and Health

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Yvonne Bronner, ScD
Optimal Bone Health

The Foundation is in Childhood

R Murray, MD FAAP
Department of Human Sciences
The Ohio State University
Robert Murray MD: Disclosures

- Advising
- Speaking
- Writing
- Education

- National Dairy Council
- Abbott Nutrition
- Dannon Co.
- Cargill Inc.
- Sabra Dipping Co.
- Hass Avocado
The Power of WIC

• Bone is living tissue
• Bone health is a childhood issue
• Steady dairy intake is crucial
• Mother and baby are both at risk
• Build a strong dietary pattern life-long
By 2020 one-half of all Americans over 50 years will be at risk for osteoporotic fractures.
The Endocrinologist’s Perspective

on Bone Formation
Bob’s Perspective

Parathyroid Hormone

**GI Tract**
- Calcium + Vit D

**Renal proximal tubule**
- Calcium

**Skeleton**
- Calcium

**Phosphorus**
Bone Remodeling is Constant

- Remodels & then replaces tiny bits of bone
- Bone mineralization process
  - Calcium and phosphorus: blood → bone
- *Any decrease* in circulating calcium
- PTH (parathyroid hormone) will re-establish levels

**Calcium regulation is extremely precise**
Bone Mineralization & Resorption

*Bone growth*
*Or injury (with repair)*
*Or daily calcium intake triggers bone mineralization*

- Calcium and phosphorus goes into bone
- Calcium in blood then falls
- PTH is released
- Resorption from bone restores calcium
- Leaves behind tiny pits in bone
When the Balance Tips

- Blood calcium is tightly controlled
- Dietary calcium & vitamin D promotes denser bone
- **But if** dietary intake is chronically low:

  more calcium is removed from bone pits to keep blood calcium constant

  **without** new bone replacing it
Bone Fractures are a Preventable Outcome
The 4 Bone Factors

Activity

Vitamin D

Calcium

Protein
A Quality Dietary Pattern

- 5 food groups – meals & snacks
  - Fruits
  - Vegetables
  - Whole grains
  - Low-fat milk and dairy
  - Quality protein sources

Promote
- Nutrient Rich Foods
- Nutrients of Concern:
  - Calcium, Vit D, potassium, fiber

Limit:
- Saturated fats
- Added sugars
- Sodium
- Excess calories
A Quality Dietary Pattern & Regular Activity = Health

- Heart Disease
- Stroke
- Diabetes
- Obesity
- Hypertension
- Metabolic syndrome
- Osteoporosis
- Cancers
- Alzheimer’s
Science Seeks Mechanisms & Causes

**OBESERVATION**
- High-Risk Dietary Patterns
- High-Benefit Dietary Patterns

**RESEARCH**
- Search for Risk Factors
- Search for Benefit Factors

- Cholesterol
- Fat
- Saturated fat
- Trans fat
- Sodium
- Sugars
- Plant sterols
- Flavonoids
- Anti-oxidants
- Omega 3 FA
- MUFA, PUFA
- Vitamin D
- Homocysteine

**But...Factors are not Food**
Nutrient Rich *Eating Pattern*

- USDA Food Pattern
- DASH Eating Plan
- Vegetarian Pattern

*The Mediterranean Dietary Pattern*
Dairy Protects Health

- Osteoporosis
- Hypertension
- Cardiovascular disease
- Stroke
- Type II diabetes
- Cancers – breast, colon, prostate
- Obesity
- Metabolic syndrome

- Calcium (30% DV*)
- Potassium (11% DV)
- Phosphorus (20% DV)
- Protein (16% DV)
- Vitamin A (10% DV)
- Vitamin D (25% DV)
- Vitamin B12 (13% DV)
- Riboflavin (24% DV)
- Niacin (10% DV)
- 90-150 kcal/ 8 oz

Two Different Paths to Health

Avoidance of...  Dietary Pattern rich in...

Junk Food V's Healthy Food
Bone Grows Most in Teen Years
Peak Bone Mass = Teens

- 40-60% of bone mass built in adolescence
- 25% within 2 years of peak height
- Peak:
  - Boys: 14 yrs
  - Girls: 12.5 yrs

After peak, a slow steady decline for life
## Dietary Reference Intakes

### CALCIUM

<table>
<thead>
<tr>
<th>Age Group</th>
<th>RDA (mg/d)</th>
<th>Upper Limit (UL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 mos</td>
<td>200</td>
<td>1000 IU/day</td>
</tr>
<tr>
<td>6-12 mos</td>
<td>260</td>
<td>1500</td>
</tr>
<tr>
<td>1-3 yrs</td>
<td>700</td>
<td>2500</td>
</tr>
<tr>
<td>4-8 yrs</td>
<td>1000</td>
<td>2500</td>
</tr>
<tr>
<td>9-13 yrs</td>
<td>1300</td>
<td>3000</td>
</tr>
<tr>
<td>14-18 yrs</td>
<td>1300</td>
<td>3000</td>
</tr>
</tbody>
</table>

### VITAMIN D

<table>
<thead>
<tr>
<th>Age Group</th>
<th>RDA (mg/d)</th>
<th>Upper Limit (UL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 mos</td>
<td>400</td>
<td>1000 IU/day</td>
</tr>
<tr>
<td>6-12 mos</td>
<td>400</td>
<td>1500</td>
</tr>
<tr>
<td>1-3 yrs</td>
<td>600</td>
<td>2500</td>
</tr>
<tr>
<td>4-8 yrs</td>
<td>600</td>
<td>3000</td>
</tr>
<tr>
<td>9-13 yrs</td>
<td>600</td>
<td>4000</td>
</tr>
<tr>
<td>14-18 yrs</td>
<td>600</td>
<td>4000</td>
</tr>
</tbody>
</table>

Institute of Medicine, 2011
Problem Nutrients

High School Students

• **Males**
  • Vit A, Vit C, Vit E
  • Magnesium, potassium
  • Fiber
  • Calcium

• **Females**
  • Vit A, Vit C, Vit E, Vit D*
  • Magnesium, potassium *
  • Vit B-6
  • Folate *
  • Thiamin
  • Iron *
  • Phosphorous
  • Zinc
  • Fiber *
  • Calcium *

Clark, Fox, JADA 2009; s44
Women in Child-bearing Years

- Intake high:
  - saturated fat and sodium
- Deficiency common:
  - iron, vitamin D
- Intake low:
  - fiber, vitamin E, calcium, magnesium and potassium
- Intake moderately low:
  - vitamins A, C, B-6 and Folate
What is the Importance of Vitamin D?

Major function: increase calcium absorption
– Promotes bone mineralization

But also...
Maintains muscles, prevents gingivitis,
helps control diabetes, arthritis, and inflammation,
lowers cancer risk, and lowers risk of cardiovascular disease

Other Sources
Sun, fish, cereals (fortified), juices, egg, liver, supplements
**Vitamin D deficiency is Common**  
*in ¾ Teens and Adults*  
*in pregnant women*  
*in African Americans & Hispanics*

- Breastfed infants  
  - 25 IU/d
- Low exposure to sun
- Dark skin (melanin)
- Seniors
- Lactose intolerance
- Vegans
- Poor dietary intake

- Fat loss from disease  
  - Crohns  
  - Pancreatic insufficiency  
  - Cystic Fibrosis  
  - Liver disease  
  - Biliary disease  
  - Surgery

- Under age 50 - 400-800 IU daily**
- Over age 50 - 800-1,000 IU daily**
Fetal Skeletal Growth Timeline

- Starts: end of week 2
- Cartilage, muscle, bone
- Ossification of bone matrix
  - 2nd trimester
- Skeletal growth: 3rd trimester
- Continues postnatally
- Fully mature: 20s
Pregnancy & Bone Health

- Higher rate of calcium absorption
- Estrogen protects bone
- Bone mass falls during pregnancy & lactation
- Usually repletes rapidly
- Weight-bearing exercise is critical
- Risk: teen mothers

Website: [http://www.womenshealth.gov/pregnancy](http://www.womenshealth.gov/pregnancy)
Dietary Patterns Matter

Very High Sodium and Protein increase urinary calcium loss
Chronic Conditions can Reduced Bone Mass

• Genetic disorders
• Chronic diseases
• Inflammatory Diseases
• Eating Disorders
• Endocrine disorders
• Certain medications
Dairy intake falls below recommended intake by 4 years old

Average daily consumption of milk and milk products in the U.S.

- **Dairy Research Institute**
- **NHANES 2007-2008**

| Age Group   | Dairy Intake
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3 yrs</td>
<td>2.4</td>
</tr>
<tr>
<td>4-8 yrs</td>
<td>2.0</td>
</tr>
<tr>
<td>9-18 yrs</td>
<td>2.1</td>
</tr>
<tr>
<td>19-50 yrs</td>
<td>1.6</td>
</tr>
<tr>
<td>51+ yrs</td>
<td>1.4</td>
</tr>
</tbody>
</table>
The Power of WIC

- Pregnant women
- Babies
- Children
- Bone health foundation
- Reach daily dairy goals throughout life
- Establish a strong dietary pattern early

Exclusively Breastfeeding Package for Women
- approximate cash value $80 a month for one year

Exclusively Breastfeeding Package for Infants
- approximate cash value $70 a month for age 6-11 months
thanks!
Dr. Herman is an Associate Professor in the Department of Family and Consumer Sciences at California State University, Northridge.

Dr. Herman’s research and experience focuses on maternal and child nutrition with a current focus on childhood obesity. Her site-randomized trial of an economic intervention to increase fruit and vegetable intake demonstrated the efficacy of adding fruits and vegetables to the WIC food package that has now become national policy.

Dr. Herman provides ad hoc advisory services for Dannon.
The Revised WIC Food Package: Can Yogurt Be Utilized to Increase Fruit and Vegetable Consumption?

DENA HERMAN, PHD, MPH, RD
NATIONAL WIC ASSOCIATION MEETING
MAY 18TH, 2015
Learning Objectives

- Understand the current research on utilization of new foods offered as part of the revised food packages
- Enhance current educational activities to increase fruit and vegetable intake
- Identify food combination methods to improve intake of dairy products for vulnerable populations
What does WIC Food Package Research Tell Us?

Fruits and Vegetables

Fresh

- Fresh
  - 28.6%

Frozen

- Frozen
  - 27.8%

- 17.5%

Who is Eating More Fruits and Vegetables?

![Image showing families eating]

Who is Eating More Fruits and Vegetables?

Who is Eating More Fruits and Vegetables?

Did Food Package Changes Affect Prices of FVs?

Zenk et al, J Acad Nutr Dietetics, 2014
Did Food Package Changes Affect Prices of FVs?

Fitted price of frozen vegetables by year and vendor type

Pre-Policy Change

Post-Policy Change

Fitted Price

Year of Observation

Small Stores

Mass Merchandise Stores

Chain Supermarkets

Non-chain Supermarkets

Based on model regressing price on year, store type, neighborhood characteristics, seasonality and interaction between store type and year

Zenk et al, J Acad Nutr Dietetics, 2014
Would WIC Participants Like to Substitute Yogurt for Milk?

Fung et al, J Nutr Educ Beh, 2012
## Thoughts about Dairy Food at Baseline for Control and Intervention Groups Combined Enrolled in the WIC Yogurt Intervention Study

<table>
<thead>
<tr>
<th>Measure</th>
<th>Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yogurt is available where shop for food</td>
<td>96.0</td>
</tr>
<tr>
<td>Family likes to eat yogurt</td>
<td>96.0</td>
</tr>
<tr>
<td>When buy yogurt, usually buy small containers (4, 6, or 8 oz)</td>
<td>83.3</td>
</tr>
<tr>
<td>Yogurt costs too much</td>
<td>61.8</td>
</tr>
<tr>
<td>Like eating yogurt more than drinking milk</td>
<td>61.5</td>
</tr>
<tr>
<td>Do not know how to include yogurt in recipes</td>
<td>59.8</td>
</tr>
<tr>
<td>Like the taste of milk more than yogurt</td>
<td>53.1</td>
</tr>
<tr>
<td>Yogurt spoils too quickly</td>
<td>28.1</td>
</tr>
<tr>
<td>Have trouble digesting things made with milk</td>
<td>19.3</td>
</tr>
<tr>
<td>Yogurt is not as nutritious as milk</td>
<td>17.9</td>
</tr>
<tr>
<td>Measure</td>
<td>Agree a lot</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Like taste of yogurt from coupons</td>
<td>95.4</td>
</tr>
<tr>
<td>Used coupons for yogurt for self to eat</td>
<td>84.7</td>
</tr>
<tr>
<td>Brochure on yogurt was helpful</td>
<td>70.8</td>
</tr>
<tr>
<td>Would take vouchers for yogurt in place of some of milk</td>
<td>70.1</td>
</tr>
<tr>
<td>Used coupons for yogurt for family to eat</td>
<td>67.5</td>
</tr>
<tr>
<td>Prefer different flavors</td>
<td>56.7</td>
</tr>
<tr>
<td>Used brochure information to include yogurt in snacks</td>
<td>45.1</td>
</tr>
<tr>
<td>Used brochure information to include yogurt in meals</td>
<td>44.3</td>
</tr>
<tr>
<td>Prefer different carton sizes</td>
<td>41.4</td>
</tr>
<tr>
<td>Prefer different brands</td>
<td>32.8</td>
</tr>
</tbody>
</table>
How can we Increase Fruit and Vegetable Intake?

- Make participants aware of how they can use fresh, frozen, and canned fruits and vegetables.

- Offer taste tests, cooking demonstrations, supermarket tours, partner with Farmer’s Markets.

- Focus more on vegetables – intake of fruits is higher, participants less familiar with different types of vegetables.
How Can Promoting Yogurt Increase Fruit and Vegetable Intake?

- Participants indicate preference for yogurt over milk
- Use yogurt as “vehicle” to increase fruits and vegetables in the daily diet
- Yogurt as “flavor enhancer” as sauce or dip for raw and cooked vegetables
- Yogurt pairs well with other food groups to strengthen healthful dietary patterns
Summary and Recommendations

- Changes to the WIC Food Package have resulted in minor increases in fruit and vegetable intake
- Hispanic WIC participants consume more fruit, while African-American participants tend to consume more vegetables
- Yogurt is desired as a substitute for milk by WIC participants
- Yogurt can be used as a means for increasing fruit and vegetable intake among all WIC participants
THANK YOU!
THE IMPLICATIONS FOR BONE HEALTH FROM INCLUDING YOGURT IN THE WIC PACKAGE

National WIC Association Meeting
May 18, 2015
Dr. Bronner is a professor in the Department of Behavioral Health Sciences and founder of the MPH/DrPH program at Morgan State University.

Dr. Bronner’s research and experience focuses on nutrition and maternal and child health. Dr. Bronner served on the 2005 Dietary Guidelines Advisory Committee, and has been a spokesperson for the Academy of Nutrition and Dietetics.

Dr. Bronner is currently a Nutrition Advisor for The Dannon Company’s One Yogurt Every Day initiative.
OVERVIEW

- Most Americans do not meet recommended intake of dairy foods
- A lack of dairy may contribute to nutrient gaps in dietary intake
- Nutrient gaps – especially at certain ages like adolescence, during pregnancy and later adulthood – are related to key health concerns
- Concerns about lactose intolerance
- Education and implementation examples are key – dairy is nutrient dense, and yogurt is convenient, versatile and “healthy”
AMERICANS AREN’T MEETING DAIRY REQUIREMENTS


AFTER AGE OF 3, THE CONSUMPTION GAP WIDENS

2010 DGA Daily Dairy Recommendations vs. Average Daily Dairy Consumption

2007-2008 USDA National Health and Nutrition Examination Survey
WHY ARE WE CONCERNED?

- Most dairy contains key nutrients that are important for health such as calcium, vitamin D, potassium, protein and magnesium.\(^4\)

- In fact, calcium, vitamin D and potassium are 3 of 4 nutrients of concern in the 2010 Dietary Guidelines for Americans.\(^1\)

- A dairy gap is often a nutrient gap.

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LIFE COURSE PERSPECTIVE

AMERICANS ARE NOT MEETING NUTRIENT RECOMMENDATIONS

% of Americans *not* meeting nutrient recommendations

Moshfegh et al, NHANES analysis, 2005
CHILDREN AND ADOLESCENTS ARE NOT MEETING CALCIUM RECOMMENDATIONS

Percentage of children achieving the recommended daily adequate intake for calcium

IN FACT, ROUGHLY 2/3 OF ALL AGES FALL SHORT ON INTAKE OF CALCIUM AND VITAMIN D

Usual Intakes from Food and Water
Percentage of Americans Above Adequate Intakes

Vitamin D

Calcium

FEMALES ACHIEVE ONLY ABOUT HALF OF THE RECOMMENDED POTASSIUM INTAKE PER DAY

The Institute of Medicine recommendation for Adequate Intake of Potassium is 4700 mg per day. The average potassium intake of the U.S. population 2 years and older is 2640 mg per day.⁸

Eating foods with potassium is important in controlling blood pressure because potassium blunts the effects of sodium.

The more potassium we eat, the more sodium we pass out of the body through urine.

Potassium also helps relax blood vessel walls, which helps lower blood pressure.
WHAT FOODS HAVE POTASSIUM?

- Fruits, vegetables, fat-free or low-fat (1%) dairy foods and fish — are good natural sources of potassium.

- For example, a medium banana has about 420 mg of potassium.

- A half cup of plain mashed sweet potatoes has 475 mg.
IMPLICATIONS OF NUTRIENT GAPS

1. Adolescent bone health
2. Prenatal development
3. Osteoporosis
4. Health disparities
DAIRY NUTRIENTS ARE KEY FOR DEVELOPING BABIES, ADEQUATE DIET DURING PREGNANCY AND MOTHERS’ LONG TERM BONE HEALTH
NEARLY HALF OF BONE MASS IS ACCUMULATED DURING TEEN YEARS AND 90% IS ATTAINED BY 20 YEARS OF AGE

Gender

Bone Mass (Grams of Calcium)

Fracture Threshold

Age (Years)

9 National Institute for Health, Osteoporosis and Related Bone Diseases National Resource Center.
AFRICAN AMERICANS AND HISPANICS CONSUME LESS DAIRY

Recommended intake: 3 servings

AVERAGE AMERICAN DAIRY CONSUMPTION BY RACE

NUTRIENT GAPS MAY CONTRIBUTE TO HEALTH DISPARITIES

- Heart disease, hypertension, obesity and type 2 diabetes tend to disproportionately affect minorities.\textsuperscript{17}

- Yogurt is linked to decreased risk of such diseases and linked to improved blood pressure and metabolic profile.\textsuperscript{18,19}

- Minorities are also disproportionately affected by lactose intolerance, and yogurt is an easily digestible dairy option.\textsuperscript{17,20}

- Yogurt was recently added to the WIC package recommendations\textsuperscript{21}, and can help bring key nutrients to WIC participants.


WHAT IS LACTOSE INTOLERANCE?

Lactose intolerance is a condition in which people have digestive symptoms—such as bloating, diarrhea, and gas—after eating or drinking milk or milk products.
HOW DOES LACTOSE INTOLERANCE AFFECT HEALTH?

- Lactose intolerance may cause unpleasant symptoms that keep people from consuming milk and milk products that are major sources of calcium, potassium, vitamin D and other nutrients in the diet.
IS THERE A SOLUTION?

- Most people with lactose intolerance can eat or drink some amount of lactose without having digestive symptoms. Individuals vary in the amount of lactose they can tolerate.

- What most people don’t know is that yogurt can be a more easily digestible alternative to milk because it contains live and active cultures that aid lactose digestion.\(^{17}\)

- Additionally, yogurt, on average, contains less lactose than milk and may allow more people to enjoy dairy products with fewer associated symptoms.\(^{20}\)

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Dairy foods including low-fat and nonfat yogurt, milk and cheese are nutrient dense and contribute high quality protein and calcium, among other nutrients, to the diet.

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Fruit NF Yogurt* (8 oz)</th>
<th>Plain NF Greek Yogurt (8 oz)</th>
<th>NF Milk* (1 cup)</th>
<th>NF Cheddar Cheese (1 oz)</th>
<th>American Cheese* (1 oz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>9.99</td>
<td>24.97</td>
<td>8.75</td>
<td>9</td>
<td>5.08</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>43.13</td>
<td>8.82</td>
<td>12.3</td>
<td>2</td>
<td>1.34</td>
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<tr>
<td>Calcium</td>
<td>345</td>
<td>270</td>
<td>316</td>
<td>250</td>
<td>293</td>
</tr>
<tr>
<td>Magnesium</td>
<td>34</td>
<td>27</td>
<td>37</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Potassium</td>
<td>440</td>
<td>345</td>
<td>419</td>
<td>18</td>
<td>37</td>
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<tr>
<td>Vitamin D (IU)</td>
<td>118</td>
<td>0</td>
<td>120</td>
<td>1</td>
<td>84</td>
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<tr>
<td>Saturated Fat</td>
<td>0.27</td>
<td>0.29</td>
<td>0.4</td>
<td>0</td>
<td>5.06</td>
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<tr>
<td>Calories</td>
<td>216</td>
<td>145</td>
<td>91</td>
<td>44</td>
<td>102</td>
</tr>
</tbody>
</table>

*Fortified with vitamin D

Adding one yogurt to the diet every day would increase consumption of dairy from 52% (current average) to 84%.\(^1\)

Yogurt consumption is associated with bone mineral density and improved bone health.\(^23\)

Yogurt is a source of high-quality protein.\(^{18}\)

Yogurt consumers tend to have better metabolic profile and blood pressure.\(^{18,19}\)

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Pairs well and therefore may encourage the consumption of fruits, vegetables and whole grains.

Low-fat or nonfat yogurt is a healthful choice from the dairy group that:

- Is low in saturated fat.\(^4\)
- Is a lower sodium dairy option.\(^4\)
- Has lower lactose, with active cultures for easier digestion.\(^{20}\)
- Provides 25% more potassium than an equal 8 oz serving of milk.\(^4\)

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SUMMARY

- Most Americans do not meet recommended intake of dairy foods.
- A lack of dairy may contribute to nutrient gaps in dietary intake.
- Nutrient gaps – especially at certain stages like preconception, pregnancy, childhood, adolescence and later adulthood – are related to key health concerns.
- Education is key – one yogurt every day works well with other strategies to increase nutrient density and improve total diet quality.
GOOD NUTRITION IS A PROTECTIVE FACTOR THAT WIC PROMOTES AND PROVIDES!!


RESOURCES CONT.


15. International Osteoporosis Foundation; What is Sarcopenia? http://www.iofbonehealth.org/


THANK YOU!
QUESTIONS??

Robert Murray, MD, FAAP
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