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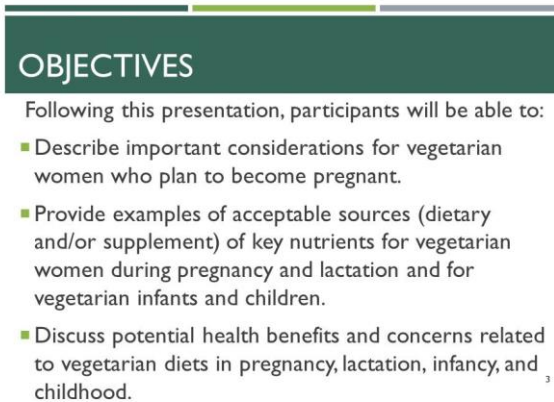


Reed Mangels, Ph.D., R.D., reports no relationship with industry to disclose relative to this CME activity.

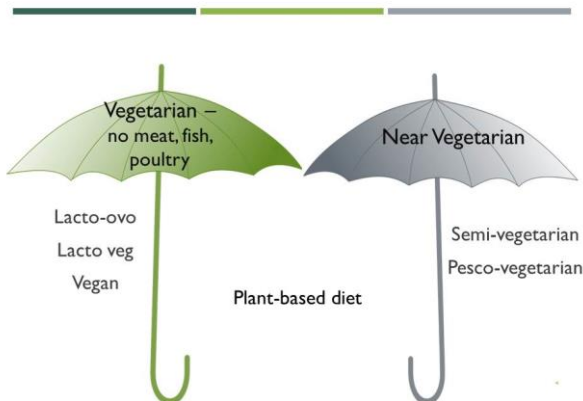
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REASONS FOR VEGETARIANISM

- Personal health
- Benefits the environment
- Religious & spiritual beliefs
- Concern for animals
- Belief in non-violence
- Economics

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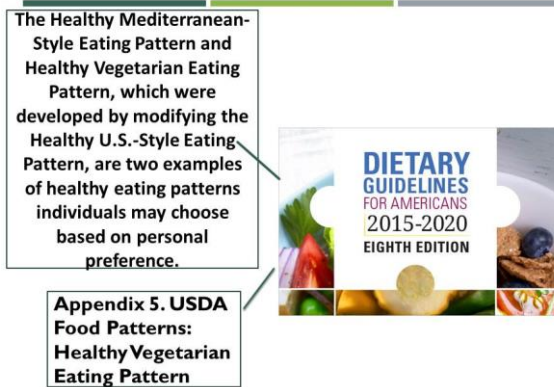


FROM THE ACADEMY
Position of the Academy of Nutrition and Dietetics: Vegetarian Diets

"These diets [vegetarian, including vegan] are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and for athletes."

J Acad Nutr Diet. 2016;116:1970-1980

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The Healthy Mediterranean-Style Eating Pattern and Healthy Vegetarian Eating Pattern, which were developed by modifying the Healthy U.S.-Style Eating Pattern, are two examples of healthy eating patterns individuals may choose based on personal preference.

Appendix 5. USDA Food Patterns: Healthy Vegetarian Eating Pattern

DIETARY GUIDELINES FOR AMERICANS 2015-2020 EIGHTH EDITION

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RESEARCH ABOUT VEGETARIAN DIETS

Research on vegetarians during pregnancy, lactation, infancy and childhood is limited

Most studies are

- ❖ Small
- ❖ Old
- ❖ Conducted outside of the United States

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HEALTH BENEFITS OF VEGETARIAN DIETS IN ADULTS

- Lower BMI
- Lower prevalence of type 2 diabetes
- Lower prevalence of the metabolic syndrome
- Lower prevalence of hypertension
- Possible lower risk of cancer



Am J Clin Nutr 2014;100(suppl):353S-8S.

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HEALTH BENEFITS OF VEGETARIAN DIETS FOR PREGNANCY



- Lower risk of excessive weight gain
- Higher fiber
- Higher folate and magnesium
- Possible reduced risk of preeclampsia

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HEALTH BENEFITS OF VEGETARIAN DIETS FOR CHILDREN

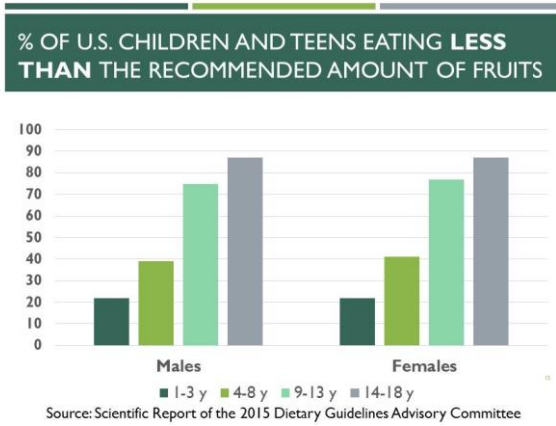
- More fruits and vegetables
- Lower intakes of fat, saturated fat, and cholesterol
- Greater exposure to a variety of whole plant foods



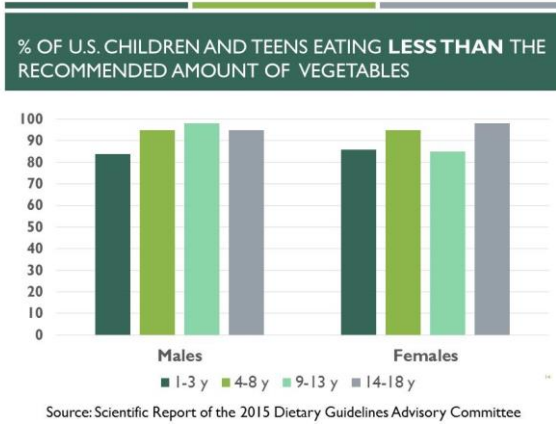
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WHAT ARE CHILDREN AND TEENS IN THE U.S. EATING?

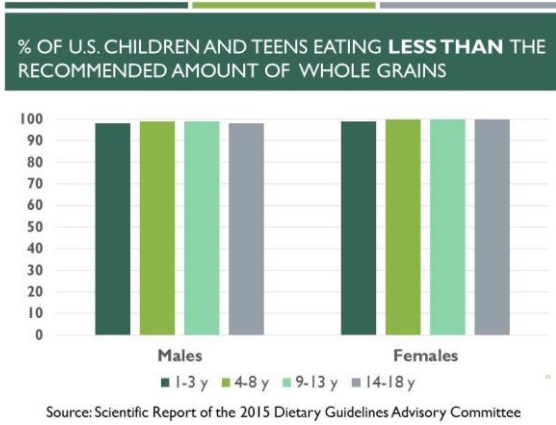
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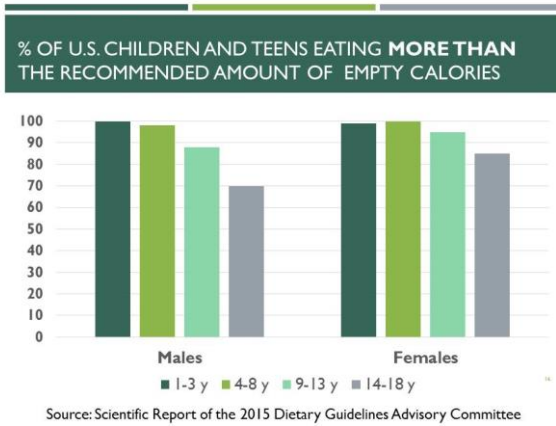
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CONSIDERATIONS WITH LACTO-OVO OR LACTO VEGETARIAN DIETS

- Iron/zinc bioavailability
- Excess saturated fat and cholesterol
- Vitamin B₁₂?
- DHA/EPA (omega-3 fatty acids)



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CONSIDERATIONS WITH VEGAN DIETS

- Iron/zinc bioavailability
- Vitamin B₁₂
- Calcium
- Vitamin D
- DHA/EPA (omega-3 fatty acids)
- Calories (pregnancy and childhood)



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MEET MEGAN



- Megan is 24 years old, has been vegan for the past 2 years and wants to have children.
- What do we need to know about Megan so that we can tailor our recommendations to her needs?

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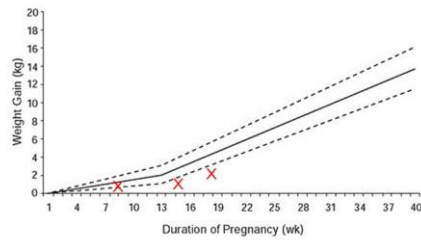
RECOMMENDATIONS FOR PRECONCEPTION HEALTH



- Eat healthy food
- Manage health conditions (including weight, iron, B12 status)
- Be active
- Take folic acid
- Stop smoking/drug abuse
- Reduce alcohol

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MEGAN



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IDEAS FOR INCREASING CALORIES

- Small, frequent meals and snacks
- Concentrated energy and nutrient sources
 - Nuts, nut butters
 - Soy products
 - Bean spreads
- Reduce dietary fiber/include some refined foods
- Increase use of unsaturated oils in cooking and on salads
- Increase calorie content of beverages



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PROTEIN



- RDA is 25 g higher in 2nd and 3rd trimesters and when lactating (1.1 g/kg)
- Many women have this amount of protein in their diet before becoming pregnant
- Additional calories (+340 calories 2nd trimester, +450 calories 3rd trimester)
- Focus on good sources of protein (soy, dairy, eggs, beans, nuts)

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INCREASING PROTEIN

- Smart beverage choices
- Bean and tofu dips and spreads to replace margarine or butter
- Concentrated protein sources – tempeh, extra-firm tofu, lentils, some meat analogues
- Don't rely on non-dairy cheese as a significant source
- Protein powder?

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CALCIUM

<p>Factors Promoting Absorption</p> <ul style="list-style-type: none"> ■ Lactose ■ Vitamin D ■ Unsaturated fats ■ Limiting oxalates, phytates 	<p>Factors Reducing Losses</p> <ul style="list-style-type: none"> ■ Avoiding caffeine ■ Limiting sodium ■ High fruit and vegetable intake
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ALL FOODS LISTED HAVE ~150 MG OF CALCIUM


- 1/2 cup calcium-fortified plant milk, calcium-fortified orange juice, tempeh, soybeans, firm tofu made with calcium and nigari, calcium-fortified yogurt
- 1 c cooked bok choy, collards, kale, mustard greens, okra, white beans
- 2 c cooked broccoli
- 1/4 cup calcium-fortified tofu, almonds
- 2 T almond butter, tahini
- 2 navel oranges
- 10 dried figs
- 1/2 calcium-fortified energy bar



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THE CHALLENGE OF VITAMIN D

Food	Serving Size	Vitamin D (IU)
Cow's milk	8 ounces	120
Cheese, cheddar	1 ounce	7
Egg, extra large	1	46
Fortified plant milk	8 ounces	40-120
Mushrooms, exposed to UV light	1 cup diced	384
Mushroom powder	1 teaspoon	600
White or portabella mushrooms	1 cup	3-9
Margarine, fortified	1 Tbsp	45



Data from USDA National Nutrient Database for Standard Reference, Release 25, 2012 and manufacturer's information.

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FACTORS IMPACTING VITAMIN D STATUS

- Dietary and supplement intake
- Sunlight exposure
- Location/season
- Sunscreen use
- Skin pigmentation
- Pollution

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VEGETARIAN LACTATION



- More breastfeeding
- Longer duration
- Breastfed infants of well-nourished vegetarians grow and develop normally
- Less environmental contaminants in breast milk

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LIPIDS IN VEGETARIAN BREAST MILK

- Total fat content is similar to milk from omnivores
- Saturated fat, EPA, and DHA are lower
- Linoleic and linolenic acid are higher
- Cholesterol is not affected by maternal diet

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DHA – DOCOSAHEXAENOIC ACID

- Little DHA in vegetarian diet; none in vegan
- No DRI for DHA
 - 100-300 mg DHA recommended in pregnancy
 - American Academy of Pediatrics recommends 200-300 mg/day OR 1-2 portions of fish per week (herring, canned light tuna, salmon, etc.) for lactating women

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OMEGA-3 FATTY ACIDS

- ALA: Flaxseed, flaxseed oil, canola oil, soy, walnuts
- EPA and DHA: Fatty fish; microalgae
- ALA → EPA →→DHA but conversion rate is low

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SOURCES OF VEGETARIAN DHA

- Supplements containing microalgae-derived DHA
- Eggs from hens fed microalgae-derived DHA
- Fortified foods including soymilk and energy bars



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MEET SAM



- Sam is 3 months old.
- His parents are vegetarian but use only limited amounts of dairy products and eggs.
- Sam is exclusively breastfed.
- What advice do Sam's parents need?

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GROWTH OF VEGETARIAN INFANTS



- Birth weights of infants of LOV and vegans are similar to infants of nonvegetarians
- Breast fed infants of well-nourished vegetarians grow and develop normally



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VITAMIN B₁₂



- Did Sam's mother have a reliable, daily source of vitamin B₁₂ throughout pregnancy and during lactation?
- If breastfeeding mother's intake is inadequate, infant should receive supplemental vitamin B₁₂

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WHICH OF THESE ARE RELIABLE SOURCES OF VITAMIN B₁₂?

- a) Tempeh
- b) Shiitake mushrooms
- c) Tofu made with nigari
- d) Brewer's yeast
- e) All of the above
- f) None of the above



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FOODS COMMONLY FORTIFIED WITH VITAMIN B₁₂

- Breakfast cereals
- Meat analogs
- Nutritional yeast (check label – not all contain B₁₂)
- Plant milks (soy, rice, almond, nut, hemp, oat, etc)



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VITAMIN B₁₂ ABSORPTION

Form of vitamin B ₁₂	% of vitamin B ₁₂ absorbed
Naturally occurring	50
Low dose crystalline (<5 mcg)	60
25 mcg crystalline	5
≥100 mcg crystalline	1
≥500 mcg crystalline	0.5-1

IOM, 1998; Scand J Gastroenterol, 1971

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SUPPLEMENTS FOR BREASTFED INFANTS



- Iron: AAP: 1 mg/kg/d beginning at 4 mo and continuing until iron-containing foods are introduced
- Vitamin B₁₂: if mother's diet is inadequate
- Vitamin D: AAP: 400 IU/day

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SOLID FOODS



- **4-6 months:** Human milk or formula, iron-fortified infant cereal
- **6-8 months:** Add strained fruit, fruit juice, strained vegetables, tofu, pureed legumes, yogurt, crackers, toast, dry cereal
- **9-10 months:** Add soft bread, soft or cooked fruit, soft mashed vegetables, cheese

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MILK




- **Birth to 1 year:** Breast milk or an infant formula.
- **After 1 year:** Can introduce fortified full-fat soymilk or whole cow's milk

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FORMULA-FED INFANTS

- **Cow's milk-based:** Lacto- or lacto-ovo vegetarian families
- **Soy-based:** Vegan families
- **Homemade formulas?** Soy milk or other plant milks?



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	Almond Milk (8 oz)	Formula (8 oz)	Human Milk (8 oz)
Kcal	60	161	172
Protein (g)	1	3.3	2.5
Fat (g)	2.5	8.5	10.8
CHO (g)	9	15.7	17
Calcium (mg)	200	124	79
Sodium (mg)	150	44	42

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MEET JULIA



- Julia is 2 years old.
- She has been vegetarian from birth; family is considering transitioning to vegan diet
- What advice do Julia's parents need?

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GROWTH OF VEGETARIAN CHILDREN

- Lacto-ovo vegetarians:
 - NSD in heights and weights compared to NV (UK, Taiwan)
- Vegans:
 - Heights and weights within normal range (UK)
 - Preschoolers slightly lighter than standards (UK)



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IRON RDA



- Vegetarian child, 1-3 y 12.6 mg
- Nonvegetarian child, 1-3 y 7 mg

- Vegetarian child, 4-8 y 18 mg
- Nonvegetarian child, 4-8 y 10 mg

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IRON

- Heme vs. non-heme iron
- Inhibitors
- Enhancers



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IRON SOURCES

- Soyfoods (soybeans, tofu, tempeh, meat analogs)
- Dried beans (chickpeas, pinto beans, lentils, etc)
- Nuts and seeds
- Whole grains
- Fortified breads and cereals
- Dried fruit
- Baked potatoes

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IRON-RICH MENU FOR A YOUNG CHILD



Breakfast

Cream of Wheat, instant, fortified, cooked, 1/3 cup
Orange slices (vitamin C source)

Lunch

Tofu, firm, 1/4 cup
Whole-wheat bread, 1/2 slice
Collard greens, chopped, steamed, 1/4 cup
Strawberries (vitamin C source)

Dinner

Lentils, cooked, 1/4 cup
Green peas, cooked, 1/4 cup
Enriched pasta, 1/4 cup
Tomato sauce (vitamin C source)

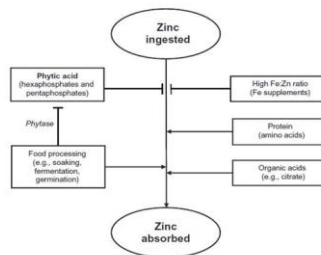
Snacks

Hummus, 1/4 cup
Dried apricots, stewed, 1/4 cup
Ready-to-eat cereal, enriched, 1/2 cup
Orange juice (vitamin C source)

The Dietitian's Guide to Vegetarian Diets, 3rd ed., 2010

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DIETARY FACTORS THAT INFLUENCE ZINC ABSORPTION



Adv Food Nutr Res. 2015;74:93-131.

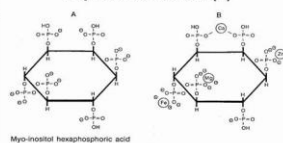
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ZINC



- Phytate inhibits zinc absorption.
- Vegetarians may require as much as 50% more zinc than non-vegetarians.
- Little is known about zinc status of vegetarians.

Structure of Phytic Acid (A) and Phytic Acid Chelate (B)



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ZINC

- Limited data suggest similar zinc density in diets of vegetarian and nonvegetarian children
- Phytates and fiber in plant foods inhibit zinc absorption in adults
- Phytates may have little effect on zinc absorption in young children (8-50 months old in recent study*).

*J Nutr 2015;145:1763-9.

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DIETARY MODIFICATIONS TO IMPROVE ZINC ABSORPTION

- Choose yeast-raised or lactic-acid-fermented sourdough bread over whole-grain quick breads.
- Include more fermented soy foods.
- Emphasize foods that are good sources of zinc and protein.
- Eat foods containing organic acids with foods high in zinc to enhance absorption.

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PROTEIN FOR CHILDREN



- Vegan children may have somewhat higher protein needs than nonvegan children due to the amino acid composition and digestibility of plant proteins.
- A conservative estimate is a 30-35% increase for 1-2 year olds, 20-30% for 2-6 year olds, 15-20% for >6 years.

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DIETARY FAT - FUNCTIONS

- Concentrated energy source (9 kcal/g)
- Source of essential fatty acids
- Promotes absorption of fat-soluble vitamins (A, D, E, K)

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HOW MUCH FAT DO CHILDREN NEED?

- Breast milk – 55% of calories from fat
- AI – 31 g/day for 0-6 month olds; 30 g/day for 0.5-1 year olds
- AMDR –
 - 1-3 year olds: 30-40% calories
 - 4-18 year olds: 25-35% calories

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IN AN 800 CALORIE DIET (TYPICAL FOR A 1 YEAR OLD), INCLUSION OF THESE FOODS WILL →30-40% CALORIES FROM FAT

- 1.5 cups of full-fat soymilk,
- ¼ cup of tofu,
- ¼ avocado,
- 2 tablespoons of hummus, and
- 1 tablespoon of nut butter

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TREATMENT OF CHILDHOOD OBESITY WITH A PLANT-BASED DIET

- 28 obese children (9-18 years old)
- Half on AHA diet; half on no-added-fat vegan diet for 4 weeks
- Both groups lost weight
- Children in the vegan diet group had 9 and children on AHA had 4 statistically significant beneficial changes from baseline
- Children in the vegan group had significantly
 - Decreased BMI
 - Decreased systolic BP
 - Decreased total and LDL cholesterol

J Pediatr. 2015 Apr; 166(4):953-9

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Foods	SNAPSHOT of the WIC Food Packages ¹			
	Children		Women	
	Food Package IV 1 through 4 years	Food Package V: Pregnant and Postpartum (Monthly) Breastfeeding (up to 1 year postpartum)	Food Package VI: Postpartum (up to 6 months postpartum)	Food Package VII: Fully Breastfeeding (up to 1 year post-partum)
Juice, single strength	155 fl oz	144 fl oz	96 fl oz	144 fl oz
Milk ²	16 qt	15 qt	16 qt	14 qt
Breakfast cereal ³	36 oz	36 oz	36 oz	36 oz
Cheese	N/A	N/A	N/A	1 lb
Eggs	1 dozen	1 dozen	1 dozen	2 dozen
Fruits and vegetables	\$8.00 in cash value vouchers	\$11.00 in cash value vouchers	\$11.00 in cash value vouchers	\$11.00 in cash value vouchers
Whole wheat bread ⁴	2 lb	1 lb	N/A	1 lb
Fish (canned) ⁵	N/A	N/A	N/A	20 oz
Legumes, dry or canned and/or	1 lb (64 oz canned) Or	1 lb (64 ounce canned) And	1 lb (64 ounce canned) Or	1 lb (64 ounce canned) And
Peanut butter	18 oz	18 oz	18 oz	18 oz

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BUY

- Choose from **these brands and products only:**

Refrigerated



8th Continent
(original or vanilla)
Half-gallon



Silk
(original)
Half-gallon or quart

Shelf stable



Westsoy Organic Plus
(plain or vanilla)
Quart or half-gallon



Pacific Ultra Soy
(original or vanilla)
Quart

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Tofu

BUY

- 16 oz (1 lb) containers only
- Choose from **these brands and products only:**



Azumaya Tofu
Firm or Extra Firm



House Foods
Firm, Medium Firm or Extra Firm

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VEGETARIAN SUPPLEMENTS

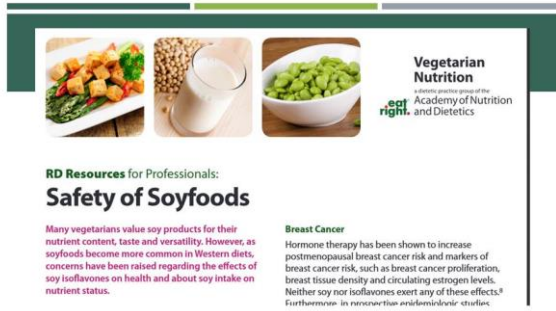
- Supplements should be used to make up for any dietary shortfalls
- Nutrients to consider include
 - Vitamin D
 - Vitamin B₁₂
 - Iron
 - Zinc
 - DHA
 - Folic acid (600 mcg in pregnancy)
 - Iodine (150 mcg in pregnancy)

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SAMPLE NUTRIENT CONTENT OF VEGETARIAN PRENATAL SUPP (SELECTED NUTRIENTS SHOWN)

	Amt in 1 tablet	DRI, pregnancy, 19-50 y
Vitamin D (IU)	600	600
Folic acid (mcg)	800	600
Vitamin B ₁₂ (mcg)	12	2.6
Calcium (mg)	200	1000
Iron (mg)	27	27
Iodine (mcg)	0	220
Zinc (mg)	15	11

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Vegetarian Nutrition
a short course from the Academy of Nutrition and Dietetics

eat right.

RD Resources for Professionals:
Safety of Soyfoods

Many vegetarians value soy products for their nutrient content, taste and versatility. However, as soyfoods become more common in Western diets, concerns have been raised regarding the effects of soy isoflavones on health and about soy intake on nutrient status.

Breast Cancer
 Hormone therapy has been shown to increase postmenopausal breast cancer risk and markers of breast cancer risk, such as breast cancer proliferation, breast tissue density and circulating estrogen levels. Neither soy nor isoflavones exert any of these effects.¹ Furthermore, in retrospective epidemiologic studies,

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SOY

- Based on intakes of traditional societies, a couple of servings of soy appears to be safe during pregnancy, lactation, and childhood.
- Soy foods are not an essential part of a vegetarian diet but can add variety and supply nutrients including protein, calcium, vitamin D, vitamin B₁₂, iron and zinc.

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COUNSELING VEGETARIAN CLIENTS

- “Tell me which foods you eat and which foods you avoid.”
- Plant-based counseling materials
- Respect clients’ food preferences
- Be aware of current research and new food products
- Provide ideas for preparing staple foods



Adapted from Life Cycle Nutrition: An Evidence-Based Approach, 2009.

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PROMOTING PLANT-BASED DIETS FOR CHILDREN

- Engaging books/DVDs in children and YA sections of libraries
- Increased exposure to plant-based meals in school cafeterias, childcare, camps, after-school programs
- Education of primary care providers, coaches, teachers
- Other???

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PROMOTING PLANT-BASED DIETS FOR CHILDREN

- Engaging books/DVDs in children and YA sections of libraries
- Increased exposure to plant-based meals in school cafeterias, childcare, camps, after-school programs
- Education of primary care providers, coaches, teachers
- Other???

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RESOURCES – WEBSITES AND BLOGS

- Vegetarian Nutrition DPG www.vndpg.org
- Vegetarian Nutrition DPG Consumer website www.vegetariannutrition.net
- Academy of Nutrition and Dietetics Vegetarian Nutrition EAL <http://andevidencelibrary.com>
- Vegetarian Resource Group www.vrg.org
- The Vegan RD (Virginia Messina, MPH, RD) <http://www.theveganrd.com/>
- Jack Norris, RD <http://jacknorrisrd.com/>

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RESOURCES - BOOKS

- *The Dietitian's Guide to Vegetarian Diets, 3rd ed.*
- *The New Becoming Vegetarian*
- *Becoming Vegan Comprehensive Edition*
- *Vegan for Life*
- *Simply Vegan*
