French Fried Potatoes: Research and Resources

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FRENCH FRIED POTATOES TOOKLKIT CONTENTS

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References

Summaries of These Key Scientific Studies:

- ***Freedman and Keast study*** *(Nutr Research, 2011)* on nutrient contribution of potatoes and French fries to children's and adolescents' diets
- ***Freedman and Keast study*** *(J of Nutr Therapeutics, 2012)* on nutrient contribution of potatoes and French fries to adults' diets
- ***Tyburczy et al study*** *(Journal of Agricultural and Food Chemistry, 2012)* on trans fat content in fast foods, including French fries
- ***Doell et al study*** *(Food Additives and Contaminants, 2012)* on trans fat intake in the United States population
- ***Storey and Anderson study*** *(Advances in Nutrition, 2013)* on the latest potato nutrient composition/consumption data
- ***Decker and Ferruzzi study*** *(Advances in Nutrition, 2013)* on innovations and emerging technologies being used to reduce fat content
- ***Otite et al study*** *(Preventing Chronic Disease, 2013)* on reduction in trans fat, including French fries

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Guide to Commonly Used Terms / Abbreviations

BMI – *Body Mass Index:* standardized ratio of weight to height often used as a general indicator of weight status, i.e., underweight, normal weight, overweight or obese. BMI is calculated by dividing body weight (in kilograms) by the square of body height (in meters), or by dividing weight in pounds by the height in inches squared and multiplying by a conversion factor of 703. A BMI between 18.5 and 24.9 is considered normal for most adults. Higher BMIs may indicate that an individual is overweight (25.0 – 29.9) or obese (> 30.0). However, individuals with greater muscle mass may have higher BMIs.

CSFII – *Continuing Survey of Food Intake by Individuals:* USDA surveys designed to measure the types and amounts of foods consumed from a nationally representative sample of children and adults in the United States. The CSFII was conducted in 1989-1991, 1994-1996 and 1998. Beginning in 2002, the USDA and the Department of Health and Human Services (HHS) integrated the CSFII and NHANES dietary data collection efforts. The data are now presented as NHANES and are publicly available.

DASH – *Dietary Approaches to Stop Hypertension:* an eating plan that has been extensively studied for its effects on blood pressure. The DASH diet is centered on fruits, vegetables, low-fat dairy, whole grains, and lean proteins and contains fewer sweets, salty snacks, added sugars and red meat, making it higher in potassium and lower in sodium than the typical American diet.

DGAs or DGs – *Dietary Guidelines for Americans:* A set of guidelines that provide authoritative dietary advice for healthy Americans ages 2 and older. The Guidelines are jointly issued and updated every 5 years by the Department of Agriculture (USDA) and the Department of Health and Human Services (HHS), and serve as the basis for federal food and nutrition policy. The next edition is due to be published in 2015.

DRI – *Dietary Reference Intakes:* general set of reference values that establish the levels of individual nutrients needed for dietary consumption. These values, set by the Institute of Medicine, vary by age and gender and include:

- *Recommended Dietary Allowance (RDA):* average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%-98%) healthy people.
- *Adequate Intake (AI):* established when evidence is insufficient to develop an RDA and is set at a level assumed to ensure nutritional adequacy.
- *Estimated Average Requirement (EAR):* the average daily nutrient intake level estimated to meet the requirement of half the healthy individuals in a particular life stage and gender group.
- *Tolerable Upper Intake Level (UL):* the highest average daily nutrient intake level that is likely to pose no risk of adverse health effects to almost all individuals in the general population.

DV – *Daily Values:* the dietary reference values that are used on all current U.S. Nutrition Facts labels. These values were determined by the FDA to best represent the minimum needs of the general population. Most DVs are derived from Dietary Reference Intakes.

FITS – *Feeding Infants and Toddlers Study:* a dietary intake survey of parents of more than 3,200 infants and toddlers in the U.S. from birth to 48 months of age. The FITS research was sponsored by Nestle, and is a frequently cited source on a broad range of topics related to infant and toddler nutrition, including food and nutrient intakes, feeding practices and transitions, and ethnic differences in food choices. The FITS data suggests that many toddlers and preschoolers have diets low in vegetables and whole grains, and high in sodium, sweets and saturated fat.

GI – *Glycemic Index:* a dietary index used to rank carbohydrate-containing foods and beverages based upon the rate and extent to which they increase blood glucose levels relative to a reference food. The GI is calculated by measuring the rise in blood glucose that occurs after ingesting 50 grams of available carbohydrate from a food or beverage and comparing it with a standard food, usually pure glucose or white bread, which is assigned a value of 100. A food with a high GI (70 or higher) theoretically raises blood glucose faster than a food with a medium (56-69) or low GI (55 or lower). The use of the glycemic index has significant limitations, since it measures foods in isolation. The way the body metabolizes carbohydrates depends on many factors, including how the food is prepared, when it is eaten, what it is paired with, and how much is consumed. This has led researchers to conclude that glycemic index has limited utility as a method to guide dietary choices in free-living populations. In fact, Health Canada recently conducted a comprehensive evaluation of the use of glycemic index claims and concluded that the inclusion of the GI value on food labels would be misleading and would not add value to nutrition labeling and dietary guidelines in assisting consumers to make healthier food choices.[1]

GL – *Glycemic Load:* Glycemic load is based on the glycemic index (GI), and is defined as the grams of available carbohydrate in the food multiplied by the food's GI and divided by 100. Glycemic load is a GI-weighted measure of carbohydrate content. For instance, watermelon has a high GI, but a typical serving of watermelon does not contain much carbohydrate, so the glycemic load is low. Whereas glycemic index is defined for each type of food, glycemic load can be calculated for any size serving of a food, an entire meal, or an entire day's meals.

MyPlate – the current nutrition guide published by the United States Department of Agriculture to illustrate the concepts detailed in the Dietary Guidelines. MyPlate was released in 2011 to replace the Food Guide Pyramid, and depicts a place setting with a glass depicting Dairy and a plate divided into four food groups - Fruits, Vegetables, Protein and Grains. MyPlate is displayed on food packaging and used in nutrition education in the United States.

MUFAs – *Monounsaturated Fatty Acids:* fats that have one double-bond (unsaturated) in a long chain of carbon and hydrogen atoms bound together to form the fatty acid; this chemical property lowers the melting point, making the oils liquid at room temperature. Monounsaturated fats are considered to be "good" fats that reduce total and LDL cholesterol and lower heart disease risk. Common dietary sources include vegetable oils like olive, canola and peanut, as well as olives, avocados and nuts. Most (approximately 80%) of the fat in French fried potatoes are MUFAs and PUFAs.

NHANES – *National Health and Nutrition Examination Survey (NHANES):* a program of studies designed to assess the health and nutritional status of adults and children in the United States. The NHANES program began in the early 1960s and has been conducted as a series of surveys focusing on different population groups or health parameters. NHANES is updated continuously, and examines a nationally representative sample of about 5,000 persons each year from across the country. The NHANES research is conducted by the U.S. Department of Health and Human Services' Centers for Disease Control and Prevention (CDC). The NHANES data are publicly available.

NLEA – *Nutrition Labeling and Education Act:* federal legislation that gives the Food and Drug Administration (FDA) authority to require nutrition labeling of most packaged foods; and to require that all nutrient content claims (for example, 'high fiber', 'low fat', etc.) and health claims meet FDA regulations. NLEA also defines standard serving sizes that you see on food labels based on FDA-established lists of "Reference Amounts Customarily Consumed per Eating Occasion" (RACC).

NSLP – *National School Lunch Program:* a federal food assistance program operating in public and nonprofit private schools and residential child care institutions. It provides nutritionally balanced, low-cost or free lunches to income-eligible children each school day. School districts that choose to take part in the lunch program get cash subsidies and USDA foods from the U.S. Department of Agriculture (USDA) for each meal they serve. In return, they must serve lunches that meet Federal nutrition requirements, and they must offer free or reduced price lunches to income-eligible children.

Par-fried – the most common method to cook French fries commercially, in which foods are fried long enough for the internal temperature to reach 160° F, then cooled down and frozen. Just prior to serving, the potatoes are baked or fried again to reach desired levels of crispness and browning. Par-frying helps prevent potatoes from turning brown when frozen.

PUFAs – *Polyunsaturated Fatty Acids:* fats that have more than one double-bond (unsaturated) in the long chain of carbon and hydrogen atoms, making these oils liquid at room temperature. PUFAs, like MUFAs, are considered to be heart-healthy fats that can reduce total and LDL cholesterol and lower heart disease risk. Typical food sources are soybean, corn and safflower oils, nuts and seeds, and fish. Most (approximately 80%) of the fat in French fried potatoes are MUFAs and PUFAs.

SBP – *School Breakfast Program:* a federal assistance meal program operating in schools and residential childcare institutions that provides nutritionally balanced, low-cost or free breakfasts to income-eligible children each school day. School districts and independent schools that choose to take part in the breakfast program receive cash subsidies from the U.S. Department of Agriculture (USDA) for each meal they serve. In return, they must serve breakfasts that meet Federal nutrition requirements, and they must offer free or reduced price breakfasts to eligible children.

SFAs – *Saturated Fatty Acids:* fats that are typically solid at room temperature. Each carbon atom is fully saturated with hydrogen atoms and, therefore, contains no double bonds. Saturated fats are predominately found in animal products, but certain plant oils (e.g., palm, coconut) also contain saturated fat. High intakes of saturated fat are generally thought to increase total and LDL cholesterol and increase heart disease risk.

SoFAS – *Solid Fats and Added Sugars:* An acronym used in the Dietary Guidelines to describe solid fats (those that are solid at room temperature such as butter, beef tallow, stick margarine and shortening) and added sugars (sugars and syrups that are added to foods or beverages during processing or preparation). The *Dietary Guidelines* recommend that intakes of SoFAS should be kept as low as possible across all age groups, to less than the maximum limits calculated for the USDA Food Patterns.

SNAP – *Supplemental Nutrition Assistance Program:* formerly called the Food Stamp program, a government assistance program to help low-income households pay for food. The amount of SNAP food stamps a household gets depends on the household's size, income, and expenses. The SNAP program is managed by the USDA, which gives money to each state to provide food stamps for its residents. More than one in seven Americans (15.2% as of January 2013) receives SNAP benefits.

TFAs – *Trans Fatty Acids:* fats created by adding hydrogen atoms to liquid vegetable oils through a process called hydrogenation. *Trans* fat intake is associated with increased total and LDL cholesterol, decreased HDL cholesterol, and increased risk of heart disease. Common food sources are commercial baked goods (pastries, biscuits, doughnuts, cakes, cookies), snack foods, stick margarine and shortening, and certain fried foods such as breaded and fried chicken. Over the past several years, the food industry has transformed cooking oils used in food preparation and deep-frying, which has resulted in a significant reduction in *trans* fat in the food supply. French fries are now cooked in predominately *trans*-fat free, all-vegetable oils that contain primarily mono- and polyunsaturated fats.

WIC – *Women, Infants and Children:* a USDA administered food assistance program that provides nutritious foods (primarily through retail grocery stores), nutrition counseling, and referrals to health care and social services. WIC serves income-eligible pregnant, postpartum and breastfeeding women, infants and children up to age 5 who are at nutritional risk. Nearly 9 million people get WIC benefits each month. More than half (53%) of all newborns in the United States receive WIC benefits.

[1] Aziz A, Dumais L, Barber J. Health Canada's evaluation of the use of glycemic index claims on food labels. Am J Clin Nutr published 12 June 2013, 10.3945/ajcn.113.061770

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Frequently Asked Questions About French Fries

OBESITY

Are French fries fattening?

No. There is nothing unique about the calories from French fried potatoes that make you fat. French fried potatoes – like all other calorie-containing foods and beverages– contribute calories to an individual's diet. Research shows that French fried potatoes contribute just 1.5% of the calories in the American diet. Most (98.5%) of our calories are coming from other foods and beverages.[1]

The top sources of calories in the American diet are: grain-based desserts (cakes, cookies, brownies, doughnuts and so forth), yeast breads, chicken and chicken mixed dishes, mixed dishes and soft drinks. In fact, all types of fried potatoes combined don't make the top 10 sources of calories in the diet.[2]

Among children ages 2-18 years, the data show that grain-based desserts are the top contributor of calories. A total of 22% of total calories come from desserts, soft drinks, fruit drinks and candy in the diets of children and adolescents.[2] Fried white potatoes rank 16th in caloric contributions to children's diets, and provide far fewer calories to the average child's diet than the top caloric contributors.

Do French fries contribute any important nutrients to the diet?

Like all forms of potatoes, French fries deliver meaningful amounts of important nutrients such as potassium and dietary fiber, as well as other vitamins and minerals. Nearly all Americans fail to meet dietary recommendations for potassium (97% not meeting goal) and dietary fiber (95% not meeting goal). Similarly, Canadians are falling far short of potassium goals – 96.5% of women and 85% of men ages 31 – 50 had intakes below the Adequate Intake level.[3] Gram-for-gram, French fried potatoes provide more potassium than most other vegetables.[1,4] A small (71 g) serving of French fried potatoes provides 411 milligrams (mg) of potassium and almost 3 grams (g) of dietary fiber.

Data from NHANES showed that potatoes (including French fries) contributed at least 10% of the dietary fiber, vitamin B_6 and potassium to the diets of adults ages 19 and older, and at least 5% of 7 additional essential nutrients (thiamin, niacin, phosphorus, magnesium, vitamin K, iron and copper).[5]

[1] Storey ML, Anderson PA. Contributions of white vegetables to nutrient intake: National Health and Nutrition Examination Survey, 2009-2010. *Adv Nutr* 2013; 4: 345S-350S.
[2] U.S Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010.* 7th edition, Washington, DC: U.S. Government Printing Office, December 2010. Chap 2, pp.12
[3] Tanase CM, Koski KG, Laffey PJ, Cooper MJ, Cockell KA. Canadians continue to consume too much sodium and not enough potassium. *Can J Public Health* 2011; 102(3): 164-168.
[4] U.S. Department of Agriculture, Agricultural Research Service. 2012. USDA National Nutrient Database for Standard Reference, Release 25. Nutrient Data Laboratory Home Page, http://www.ars.usda.gov/ba/bhnrc/ndl
[5] Freedman MR and Keast DR. Potatoes, including French fries, contribute key nutrients to diets of U.S. Adults: NHANES 2003-2006. *Journal of Nutritional Therapeutics* 2012; 1: 1-11.

Are French fried potatoes high in calories?

French fried potatoes – like all other foods– contribute calories and choosing a portion that is appropriate for the individual is important. Small (71 g) and medium (117 g) servings of deep-fried French fried potatoes provide 222 and 365 calories, respectively. For someone consuming a 2000-calorie diet, a small serving of French fried potatoes contributes 11% of calories; a medium serving contributes 18% of total calories. French fries also provide meaningful amounts of key nutrients, including potassium, fiber, magnesium, and vitamins B_6 and C. Today, there are many options available for those who wish to manage their calorie intake, such as oven-baked and low-fat French fries. French fries can certainly be included as part of an overall healthy, balanced diet, and research shows they are eaten in moderation.

Fast Food French Fries, small serving, 71 grams[6]	
Calories	222 calories
Fat	10 grams
Saturated fat	1.6 grams
***Trans* fat**	0 grams
Cholesterol	0 mg
Potassium	410 mg (14% DV)
Dietary Fiber	2.7 grams (10% DV)
Magnesium	25 mg (6% DV)
Vitamin B_6	0.264 mcg (13% DV)
Vitamin C	3.3 mg (6% DV)

Oven-Baked Fries, small serving, 74 grams[6]	
Calories	116 calories
Fat	3.6 grams
Saturated fat	0.8 grams
***Trans* fat**	0 grams
Cholesterol	0 mg
Potassium	330 mg (10% DV)
Dietary Fiber	1.9 grams (8% DV)
Magnesium	19 mg (5% DV)
Vitamin B_6	0.136 mcg (6% DV)
Vitamin C	9.38 mg (16% DV)

Are French fries served as part of school meal programs?

You might be surprised to learn that about 90% of the French fries served in schools today are oven-baked, and meet the USDA meal pattern guidelines for calories and sodium. A serving (74 g) of oven-baked fries provides just 116 calories, 3.6 grams fat (0.8 g saturated) and delivers potassium (10% DV), fiber (8% DV), vitamin C (16% DV), magnesium (5% DV) and vitamin B_6 (6% DV).

According to data from NHANES, on average, less than 1% of children's daily calorie intake in schools comes from white potatoes, including French fries. Potatoes in all forms provide a great-tasting, affordable nutrient package that enables schools to meet USDA guidelines for nutrient intake and for vegetable consumption in school meals.

[6] U.S. Department of Agriculture, Agricultural Research Service. 2012. USDA National Nutrient Database for Standard Reference, Release 25. Nutrient Data Laboratory Home Page, http://www.ars.usda.gov/ba/bhnrc/ndl

OILS/FATS

Has anyone independently tested the oils used to fry French fried potatoes to verify the fat content?

Yes. Over the last several years, the oils used to fry potatoes in most fast food restaurants have changed and nearly all oils used are *trans* fat-free. A 2013 Centers for Disease Control study showed that trans fatty acids were reduced by 88% in French fries and other potato products from 2007 to 2011.[7] A study published in 2012 by scientists from the U.S. Food and Drug Administration verified this change.[8] The data showed that there was less than 0.5 gram *trans* fat in 5 out of 7 samples of French fried potatoes; 6 out of 7 samples provided less than one gram *trans* fats.

Most of the fat in French fried potatoes is comprised of monounsaturated fatty acids (MUFA) and polyunsaturated fatty acids (PUFA). In fact, with the new oils used by restaurants today, French fried potatoes are among the top six sources of desirable monounsaturated fats in the diets of children and adults.[9]

Do French fries contain trans fats?

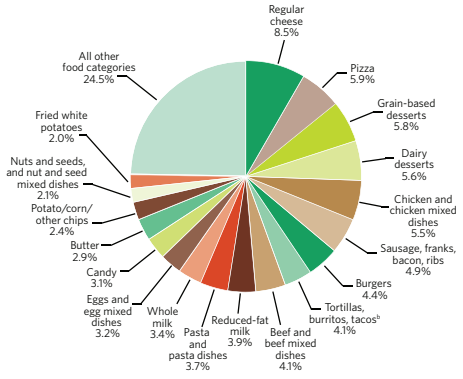
Improvements in cooking oils and preparation methods have essentially eliminated French fries as a source of *trans* fatty acids in the diet. Over the past several years, the food industry has significantly transformed their cooking oils. Today, the oils used to cook French fried potatoes, including in quick serve restaurants, are now predominately *trans*-fat-free, all-vegetable oils that contain primarily mono- and polyunsaturated fats.

What is the saturated fat content of French fries?

You might be surprised to learn that French fried potatoes, including both oven-baked and deep-fried, are not even among the top 10 sources of saturated fat in the diet.[10]

While it is true that the primary fats that raise (bad) LDL-cholesterol levels in the blood are saturated fat and *trans* fats, the oils used

FIGURE 3-4. Sources of Saturated Fat in the Diets of the U.S. Population Ages 2 Years and Older, NHANES 2005–2006[a]



a. Data are drawn from analyses of usual dietary intake conducted by the National Cancer Institute. Foods and beverages consumed were divided into 97 categories and ranked according to the saturated fat contribution to the diet. "All other food categories" represents food categories that each contributes less than 2% of the total saturated fat intake.
b. Also includes nachos, quesadillas, and other Mexican mixed dishes.

Source: National Cancer Institute. Sources of saturated fat in the diets of the U.S. population ages 2 years and older, NHANES 2005–2006. Risk Factor Monitoring and Methods. Cancer Control and Population Sciences. http://riskfactor.cancer.gov/diet/foodsources/sat_fat/sf.html. Accessed August 11, 2010.

[7] Otite FO, Jacobsen MJ, Dahmubed A, Mozaffarian D. Trends in trans fatty acids reformulations of U.S. supermarket and brand name foods from 2007 through 2011. *Prev Chronic* Dis 2013; 10:120198
[8] Tyburczy C, Delmonte P, Fardin-Kia AR, Mossoba MM, Kramer JKG, Rader JI. Profile of *trans* fatty acids (Fas) including *trans* polyunsaturated Fas in representative fast food samples. *J Agric Food Chem* 2012; 60: 4567-4577.
[9] Sources of Oleic Acid Among the US Population, 2005-2006. Risk Factor Monitoring and Methods Branch Website. Applied Research Program. National Cancer Institute. http://riskfactor.cancer.gov/diet/foodsources. Updated May 21, 2010. Accessed May 6, 2013.

by manufacturers to fry potatoes are now primarily made up of monounsaturated and polyunsaturated fats and are either very low in *trans* fat or *trans* fat-free. Today, nearly all restaurant fries are fried in low trans fat or trans fat-free oils. Most fries prepared in schools and homes are oven-baked, with no added oil.

The top 10 sources of saturated fat in the American diet are: 1) regular cheeses [8.5%]; 2) pizza [5.9%]; 3) grain-based desserts [5.8%]; 4) dairy desserts [5.6%]; 5) chicken and chicken mixed dishes [5.5%]; 6) sausages, franks, bacon and ribs [4.9%]; 7) burgers [4.4%]; 8) tortillas, burritos, and tacos [4.1%]; 9) beef and beef mixed dishes [4.1%]; and 10) reduced fat milk [3.9%]. Dairy products are the biggest source of saturated fat in the diet; regular cheese, fluid milk and butter contribute 8.5%, 7.3% and 2.9%, respectively, to the diet. Fried white potatoes ranked 18th, contributing just 2% of the saturated fat in the diet.[10]

NUTRIENT DENSITY

Do the nutrients in a potato disappear when you fry it to make French fries?

Many of the important vitamins and minerals remain in the French fried potato and, in some cases, are actually higher in the French fry. For example, frying increases the concentration of potassium and fiber in potatoes, two nutrients that both Americans and Canadians of all ages don't consume enough of. You might be surprised to learn that gram-for-gram, French fried potatoes provide more potassium than many other commonly consumed vegetables.[11] A small (71 g) serving of French fried potatoes provides 222 calories, 411 mg potassium and 2.7 g dietary fiber, as well as 3 grams of protein and 13% of the Daily Value of Vitamin B_6 , and 6% of the DV for Vitamin C and magnesium.

Isn't all of the nutrition in the skin of the potato?

The nutrients in the potato are not just skin deep. With or without skin, the potato provides key nutrients of concern. Data from the USDA Nutrient Data Laboratory show that while the skin of the white potato provides important nutrients, so does the white flesh of the potato.[6] Even without the skin, a medium (173 g) baked potato provides 676 mg of potassium and 2.6 g of fiber (with skin, a potato provides 941 mg potassium and 3.6 grams fiber.)[12] A small (71 g) serving of French fried potatoes provides 411 mg of potassium and 2.7 g fiber.

Do French fries contain sodium?

Sodium is an essential nutrient; however, too much sodium in the diet may contribute to high blood pressure in salt-sensitive individuals. Most Americans consume more sodium than recommended, on average, about 3,400 mg per day versus the 2,300 mg recommended by the 2010 Dietary Guidelines. Similarly, the majority of Canadians exceed the upper limit for sodium for their age and sex.

[10] U.S Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans, 2010.* 7th edition, Washington, DC: U.S. Government Printing Office, December 2010. Chap 3, pp.26
[11] Storey ML, Anderson PA. Contributions of white vegetables to nutrient intake: National Health and Nutrition Examination Survey, 2009-2010. *Adv Nutr* 2013; 4: 345S-350S.
[12] USDA Nutrient Database for Standard Reference, Release 25, 2012 for medium (173 g) white potato, baked
[13] U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2010. 7th edition, Washington, DC: U.S. Government Printing Office, December 2010. Chap 3, p. 22

Although French fries might taste salty, they are not among the top 20 sources of sodium in the diet.[13] The top five sources are bread, chicken and chicken dishes, pizza, pasta and mixed pasta dishes, and cold cuts (deli and cured meats). A small (71 g) order of French fries (as ordered, without salt added at the table) provides 149 mg (6% DV) of sodium, which is less than a slice of bread or half of a hamburger bun. There are options available for those wishing to manage their sodium intake. For example, low-sodium frozen French fries can be purchased and prepared at home, and you can also request that no salt be added to fries served in restaurants. It's also important to note that French fries, like all forms of potatoes, are quite high in potassium, which helps counterbalance the effects of sodium on high blood pressure. Plus the potassium-to-sodium ratio of French fries is favorable, providing more potassium than sodium. A small (71 g) order of French fries provides 411 mg potassium or more than 10% of the DV.

CONSUMPTION

How many French fries are Americans consuming?

Potatoes in all forms, including French fries, are consumed well within current dietary guidance.

Research shows that, on average, Americans get about 1.5% of their calories a day from French fried potatoes.[6] So, if the average person consumes 2,080 calories per day, French fried potatoes provide, on average, about 31 calories a day.[6] NHANES survey data suggest that about 1 in 8 males and 1 in 10 females consumes French fries on a given day. According to NHANES, even those who consumed the most French fries (90th percentile and above) ate the equivalent of less than half of a small serving from a fast food restaurant, around 100 calories.

How many calories do children consume from French fried potatoes?

Data from the most recent National Health and Nutrition Examination Survey show that French fried potatoes provide a very small proportion of calories to the diets of young children. In fact, French fried potatoes provide 2% or less of the calories consumed by children 2-4 and 5-8 years old, yet they contribute important nutrients to the diet.[14] Similarly, another recent study showed that the daily energy intake from French fried potatoes among children and adolescents ages 6-19 was just 45 calories per day, about 2% of total calorie intake. White potatoes in all forms provide a significant source of nutrients to the diets of children. A recent study among children and adolescents ages 2 to 18 who consumed potatoes demonstrated that potatoes, including French fried potatoes, provided a significant source of at least 10 essential vitamins and minerals in the diet, including dietary fiber (19%), potassium (15%), vitamin B_6 (15%), vitamin K (14%), magnesium (11%), copper (10%) and vitamin E (10%).[15]

[14] Storey ML, Anderson PA. Contributions of white vegetables to nutrient intake: National Health and Nutrition Examination Survey, 2009-2010. *Adv Nutr* 2013; 4: 345S-350S.
[15] Freedman JR, Keast DR. White potatoes, including French fries, contribute shortfall nutrients to children's and adolescents' diets. *Nutr Res* 2011; 31: 270-277.
[16] Olsho LEW, Fernandes MM. Relationship of white potato to other vegetable consumption by schoolchildren and adolescents in the USA: National Health and Nutrition Examination Survey, 2003-2008; 2013; Public Health Nutrition, doi:10.107/S1368980013000037

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Get the Facts on French Fries

French fried potatoes are made from fresh white potatoes. Like potatoes cooked by other methods, French fried potatoes provide important shortfall nutrients and are now prepared with healthier oils. Innovations in food science and technology are driving continuous improvement to ensure this nutritious and popular vegetable continues to align with dietary guidance. When eaten in moderation, French fries can be part of a healthy, well-balanced diet.

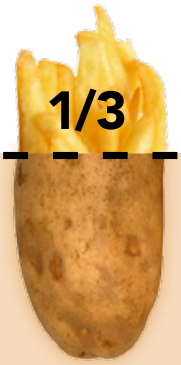
Innovation

Improvements in coatings, cooking methods and cooking oils are enhancing the nutritional profile of potato products.

- All leading manufacturers and most restaurant operators now cook French fries in trans fat-free vegetable oils which contain beneficial mono- and polyunsaturated fats.[1]
- A 2013 CDC study showed that trans fatty acids were reduced by 88% in French fries and other potato products between 2007 and 2011.[2]

In addition to transforming the nutrient profile of cooking oils, emerging technologies using new frying techniques can reduce fat absorption as much as 50% compared to traditional frying methods.[3]

French fries are made from whole white potatoes.



In the United States, about 1/3 of potatoes are grown for use as French fried potatoes, either oven-baked or deep fried.

Typical nutrition profile of today's cooking oils[4]

16% saturated fat

37% polyunsaturated fat

41% monounsaturated fat

0 grams *trans* fat
0 mg cholesterol

[1] Harnack L, Oakes M, French S, Cody D, Montgomery M, Pettit J, Kind D. Poster Presentation: Trends in the Fatty Acid Composition of Frying Oils Used at Leading Fast Food Restaurants over the Past 12 Years Based on French Fries as a Proxy Indicator. 34th Annual National Nutrient Databank Conference. Grand Forks, ND, July 12-14, 2010.
[2] Otite FO, Jacobsen MJ, Dahmubed A, Mozaffarian D. Trends in trans fatty acids reformulations of U.S. supermarket and brand name foods from 2007 through 2011. *Prev Chronic* Dis 2013; 10:120198
[3] Decker EA, Ferruzzi MG. Innovations in Food Chemistry and Processing to Enhance the Nutrient Profile of the White Potato in All Forms, *Adv Nutr* 2013, 3455-3505
[4] Based upon fatty acid data for Fast foods, potatoes, french fried in vegetable oil. U.S. Department of Agriculture, Agricultural Research Service, 2012. USDA National Nutrient Database for Standard Reference, Release 25, http://www.ars.usda.gov/ba/bhnre/ndl

Nutrition

Like all forms of potatoes, French fries deliver meaningful amounts of key nutrients such as potassium and fiber. In fact, frying, because it reduces water, increases the concentration of many of the important vitamins and minerals in potatoes. Gram-for-gram, French fries provide more potassium than most other vegetables.[5,6]

U.S. Department of Agriculture, Agricultural Research Service, 2010. USDA National Nutrient Database for Standard Reference, Release 23. Nutrient Data Laboratory Home Page, http://www.ars.usda.gov/ba/bhnrc/ndl
*Quick Service Restaurant

Consumption

Potatoes in all forms are consumed well within current dietary guidance.

- Research shows that, on average, Americans get about 1.5% of their calories a day from French fried potatoes. Given that Americans consume an average of 2,080 calories per day, this represents about 31 calories a day.[5]
- NHANES survey data suggest that about 1 in 8 males and 1 in 10 females consumes French fries on a given day.[5]
- Even men and women who consumed the most French fries (90th percentile of consumption and above) consumed just 134 and 118 calories/day, respectively, which is equivalent to about half of a small serving from a fast-food restaurant.[5]

Oven-Baked Fries

small serving, 74 grams[6]

(over 90% of fries served in schools)

- 116 calories
- 3.6 grams fat
  (0.8 g saturated)
  0 mg cholesterol
  0 g *trans* fat
- 330 mg potassium (10% DV)
- 1.9 g fiber (8% DV)
- 5% DV Magnesium
- 6% DV Vitamin B_6
- 16% DV Vitamin C

Deep-Fried Fries

small serving, 71 grams[6]

- 222 calories
- 10 grams fat
  (1.6 g saturated)
  0 mg cholesterol
  0 g *trans* fat
- 410 mg potassium (14% DV)
- 2.7 grams fiber (10% DV)
- 6% DV Magnesium
- 13% DV Vitamin B_6
- 6% DV Vitamin C

French fried potatoes, including both oven-baked and deep-fried, are not among the top 10 sources of saturated fat in the diet.[8]

NHANES data show that French fried potatoes are significant contributors of desirable fats in the diet, including omega-3s and oleic acid, a monounsaturated fatty acid.[7]

French fried potatoes can be a part of a healthy, well balanced diet, and research shows they are consumed in moderation by most Americans.[5]

[5] Storey ML, Anderson PA. Contributions of white vegetables to nutrient intake: National Health and Nutrition Examination Survey, 2009-2010. *Adv Nutr* 2013; 4:335S-344S.
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Scientific Brief #1
June 2012

The White Potato

An Affordable, Nutrient-Dense Vegetable

Intakes of potassium and dietary fiber are low enough in the United States to be a public health concern, and most Canadians do not consume sufficient amounts of potassium or dietary fiber to meet their needs.

The white potato is one of the best sources of potassium and dietary fiber compared to other frequently consumed fruits and vegetables and is also among the lowest-cost sources of potassium.

"Make half your plate fruits and vegetables."

– USDA's *MyPlate*

"Consume vegetables and fruit at all meals and snacks."

– Canada's Food Guide

Background

In an effort to assist Americans in adopting the healthy eating habits promoted in the 2010 Dietary Guidelines for Americans (DGA), the U.S. Department of Agriculture (USDA) released its new food icon, *MyPlate* (1). One of the tips in *MyPlate* to promote a healthier lifestyle is to "make half your plate fruits and vegetables" (2).

Canada's Food Guide recommends a pattern of eating that will help meet nutrient needs and reduce the risk of nutrition-related chronic diseases (3). One of the tips in Canada's Food Guide includes consuming vegetables and fruit at all meals and snacks. Canadians are also encouraged to explore the variety of colors, tastes, and textures that the vegetables and fruit group offers (4).

The Myths

Some researchers have criticized the white potato by concluding that consumption of this vegetable leads to weight gain (5). Some members of the public health community also claim that the complex carbohydrate content of this vegetable may be a contributing factor to the increase in type 2 diabetes and other health problems in the United States, while marginalizing the critical nutrient contributions the white potato in all forms makes to the American diet. A causal relationship between white potato consumption and weight gain, diabetes, and other health problems has not been demonstrated (6,7), yet these individuals ardently discourage consumption of the white potato in any form (8).

The Facts

The facts concerning the white potato tell a different story. A medium skin-on baked white potato (148 g) is an excellent source of potassium (23% DV), vitamin C (24% DV), and vitamin B_6 (23% DV) and a good source of dietary fiber (13% DV) and magnesium (10% DV) based on a 2000 kcal/day diet (9-12). According to the 2010 DGA, intakes of potassium and dietary fiber are low enough in the United States to be a public health concern (13). Most Canadians also do not consume sufficient amounts of potassium or dietary fiber to meet their needs (14,15).

Most Americans and Canadians do not consume sufficient amounts of potassium or dietary fiber to meet their needs.

The white potato is naturally low in nutrients associated with an increased risk of cardiovascular disease (saturated fat, *trans* fat, and cholesterol) and hypertension (sodium) (9). In addition, changes in packaged food formulations and commercial cooking methods have substantially decreased the *trans* fat content of supermarket and restaurant foods without increasing their saturated fat content (16). The Centers for Disease Control and Prevention (CDC) is crediting these changes in packaged food formulations and commercial cooking methods with the reduction of blood levels of *trans* fat in the United States (17).

Role of Potassium in Human Health

Potassium helps to balance the effects of high sodium intake on blood pressure and may also reduce the risk of developing kidney stones and prevent bone loss. However, few Americans or Canadians consume sufficient amounts of potassium to meet the Adequate Intake (AI) for this nutrient (13,14). Because of the critical role of potassium in human health, the 2010 DGA advise "increased intake of dietary potassium from food sources is warranted" (13, pg. 40).

Role of Dietary Fiber in Human Health

Dietary fiber helps provide a feeling of fullness (satiety) and is important in promoting healthy bowel function. Dietary fiber may also help reduce the risk of cardiovascular disease, obesity, and type 2 diabetes. Because most Americans greatly underconsume dietary fiber, the 2010 DGA state "Americans should increase their consumption of beans and peas, other vegetables, fruits, whole grains, and other foods with naturally occurring fiber" (13, pg. 41). Canada's Food Guide encourages increased consumption of fiber-rich foods since many Canadians consume less than half of the recommended daily amount of fiber (18).

Energy, Potassium, and Dietary Fiber Comparison of Fruits and Vegetables

The energy, potassium, and dietary fiber content in Nutrition Labeling and Education Act (NLEA) serving sizes of frequently consumed fruits and vegetables are compared in Table 1 (9,10,19,20). One medium skin-on baked white potato (148 g) and one 2.5-oz serving (70 g or about 10 strips) of oven-heated French fried potatoes provide 792 mg and 330 mg of potassium, 3.3 g and 1.6 g of dietary fiber, and 138 kcal and 116 kcal, respectively. Table 1 illustrates that no other frequently consumed fruits and vegetables can match the potassium content of a medium skin-on baked white potato, and four other frequently consumed fruits and vegetables (broccoli, banana, cantaloupe, and red tomato) exceed the potassium content of a 2.5-oz serving of oven-heated French fried potatoes.

Table 1 also shows that a large skin-on apple is the best source of dietary fiber (5.8 g) among frequently consumed fruits and vegetables, but the amount of dietary fiber provided by a medium skin-on baked white potato is similar to the amount of dietary fiber provided by a medium stalk of broccoli (3.8 g), a medium orange (3.4 g), and a medium banana (3.3 g).

The White Potato: An Affordable, Nutrient-Dense Vegetable

The white potato is one of the best sources of potassium and dietary fiber compared to other fruits and vegetables.

Table 1. Energy, Potassium, and Dietary Fiber Content of Fruits and Vegetables Frequently Consumed by Americans† per Nutrition Labeling and Education Act (NLEA) Serving Size‡

Food Item	NLEA Serving Size (NSS)	Energy (kcal)/NSS (g)	Potassium (mg)/NSS (g)	Dietary Fiber (g)/NSS (g)
Baked White Potato	1 medium, with skin (148g)	138	792	3.3
Broccoli	1 medium stalk (148g)	50	468	3.8
Banana	1 medium (126g)	112	451	3.3
Cantaloupe	1/4 medium (134g)	46	358	1.2
Red Tomato	1 medium (148g)	27	351	1.8
Oven-Heated French Fried Potatoes	2.5 oz (70g)	116	330	1.6
Watermelon	2 cup, diced (280g)	84	314	1.1
Celery	2 medium stalk (110g)	18	286	1.8
Apple	1 large, with skin (242g)	126	259	5.8
Green Bell Pepper	1 medium (148g)	30	259	2.5
Orange	1 medium (154g)	75	256	3.4
Carrot	1 large (78g)	32	250	2.2
Yellow Sweet Corn	1 medium ear, kernels only (90g)	77	243	1.8
Red/Green Grapes	3/4 cup, seedless (126g)	87	241	1.1
Strawberries	8 medium (147g)	47	225	2.9
Onion	1 medium (148g)	59	216	2.5
Romaine Lettuce	1 1/2 cup, shredded (85g)	14	210	1.8
Cucumber	1/3 medium, with skin (99g)	15	146	0.5
Cabbage	1/12 medium head (84g)	21	143	2.1
Iceberg Lettuce	1/6 medium head (89g)	12	125	1.1

† The fruits and vegetables included in Table 1 are limited to those with per capita availability greater than 5 pounds (fresh retail weight) in 2009.
‡ Unless otherwise noted, the values for the fruits and vegetables included in Table 1 are for the raw, edible weight portion.

A medium baked potato with skin provides the same amount of potassium as about 2 medium bananas.

To match the amount of potassium provided by a medium skin-on baked white potato, an individual would have to consume about 2 medium bananas, 3 medium oranges, 3 medium green bell peppers, 28 medium strawberries, or 6 cups of shredded romaine lettuce (Table 2) (9,10,19).

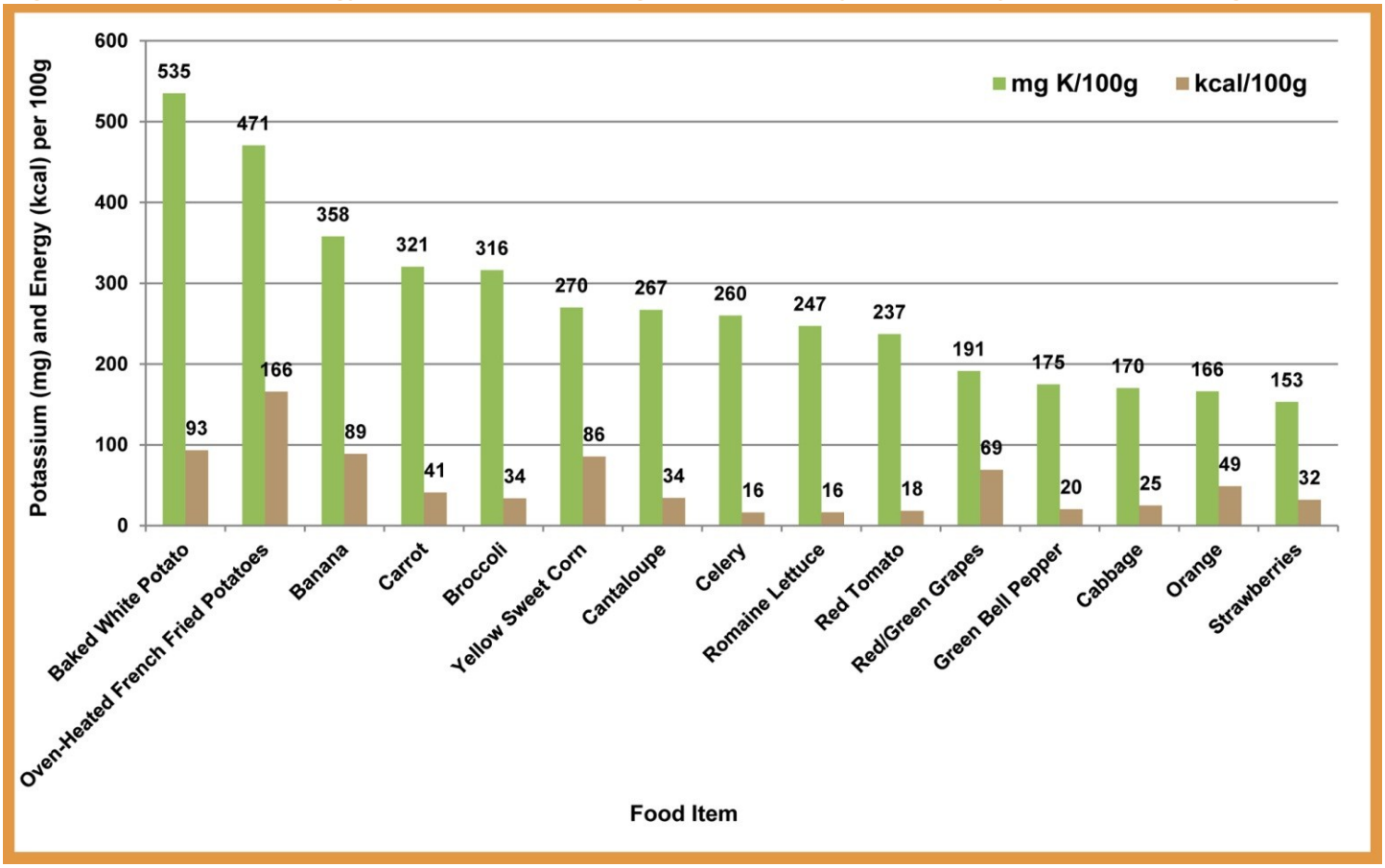
Table 2. Amount and Energy Content of Fruits and Vegetables Frequently Consumed by Americans[†] Needed to Equal Potassium Content (792 mg) of Medium Skin-On Baked White Potato

Food Item	Amount/792mg Potassium	Amount (g)/792mg Potassium	Energy (kcal)/792mg Potassium
Potato, Baked White	1 medium, with skin	148	138
Apple	4.8 medium, with skin	864	449
Banana	1.8 medium	221	197
Broccoli	1.7 medium stalk	250	85
Cabbage	0.5 medium head	465	116
Cantaloupe	0.6 medium	296	102
Carrot	3.2 large	247	101
Celery	5.5 medium stalk	305	50
Corn, Yellow Sweet	3.3 medium ear, kernels only	293	251
Cucumber	1.8 medium, with skin	537	81
Grapes, Red/Green	2.5 cup, seedless	414	286
Lettuce, Iceberg	1.1 medium head	564	76
Lettuce, Romaine	5.7 cup, shredded	320	53
Onion	3.7 medium	543	216
Orange	3.1 medium	476	232
Pepper, Green Bell	3.1 medium	452	92
Potatoes, Oven-Heated French Fried	6.0 oz	168	278
Strawberries	28 medium	517	165
Tomato, Red	2.3 medium	334	61
Watermelon	5 cup, diced	706	212

[†] The fruits and vegetables included in Table 2 are limited to those with per capita availability greater than 5 pounds (fresh retail weight) in 2009.

Figure 1 includes the potassium and energy content of frequently consumed fruits and vegetables per 100 grams and illustrates that a skin-on baked white potato and oven-heated French fried potatoes remain the best dietary sources of potassium (9).

Figure 1. Potassium and Energy Content of Fruits and Vegetables Frequently Consumed by Americans† per 100g



† The fruits and vegetables included in Figure 1 are limited to those with per capita availability greater than 5 pounds (fresh retail weight) in 2009 and with mg K/100g greater than 150.

Affordability of the White Potato

In addition to the nutrient contributions that specific fruits and vegetables make in the American diet, the cost of those fruits and vegetables must be taken into account. Access by all people at all times to enough food for an active, healthy life (food security) plays an important role in the well-being of individuals and communities. At least sometime during 2010, however, 14.5% of U.S. households were food insecure (21), while 7.7% of Canadian households were food insecure at least some time during 2007-2008 (22). Many households that experience food insecurity may not have the resources to comply with the *MyPlate* recommendation to "make half your plate fruits and vegetables." A study published in 2011 suggests that increasing consumption of potassium could increase food costs by $380/year for the average consumer (23).

Increasing consumption of potassium could increase food costs by $380/year for the average consumer.

As well as being an important source of potassium, dietary fiber, magnesium, vitamin C, and vitamin B_6, the white potato is also an affordable vegetable. Using a scoring system that integrates the USDA Center for Nutrition Policy and Promotion (CNPP) food price database with the Nutrient Rich Foods (NRF) index, one study gave white potatoes the fifth-highest nutrients-per-cost rating of the 21 selected food subgroups analyzed (24). Additionally, research presented during the 2011 Annual Meeting of the American Dietetic Association found that white potatoes are among the lowest-cost sources of potassium in the American diet (25). The white potato excels in two other factors—ease of preparation and a long shelf life—that are important to many consumers, especially those with limited budgets and/or busy schedules.

Conclusion

The positive qualities of the widely-consumed white potato—nutritious, affordable, easy to prepare and store—are clear. The critical nutrients provided by the white potato in all forms make this vegetable an important part of USDA's *MyPlate* and Canada's Food Guide.

OUR MISSION STATEMENT

The Alliance for Potato Research and Education (APRE) is 100% dedicated to expanding and translating scientific research into evidence-based policy and education initiatives that recognize the role of all forms of the potato—a nutritious vegetable—in promoting health for all age groups.

OUR PHILOSOPHY

APRE is committed to informing the conversation that white potatoes in all forms are affordable, nutrient-dense vegetables; provide critical nutrients; and are an important part of USDA's *MyPlate*. Two of the nutrients provided by white potatoes—potassium and dietary fiber—have been identified by the Institute of Medicine's Food and Nutrition Board and the 2010 Dietary Guidelines Advisory Committee as nutrients that are underconsumed by both children and adults.

OUR ORGANIZATION

APRE is a not-for-profit organization funded by the potato industry, including potato growers and potato food manufacturers. APRE's research program is guided by APRE's Scientific Advisory Council (SAC) and Economics Advisory Council (EAC), both of which include a blue ribbon panel of experts from prominent universities in the United States and Canada. APRE does not lobby or further any political or partisan interest.

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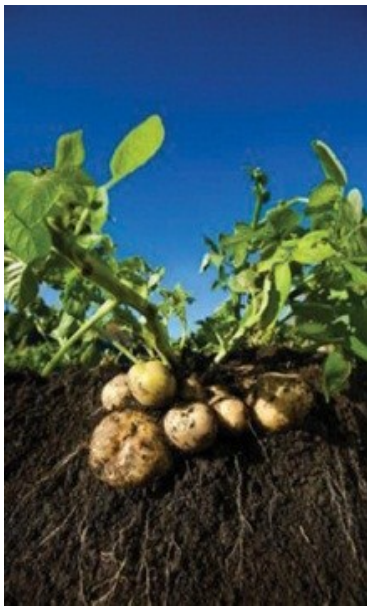
Scientific Brief #2
June 2012

Potato Product Innovation

Fats and Dietary Guidance

White potatoes in all forms, including frozen French fried potatoes (oven heated or deep fried), provide important nutrients, such as potassium, dietary fiber, and vitamin C, and are now prepared with healthier oils. When eaten in moderation, French fried potatoes can be part of a healthy, well-balanced diet. Technological advances continue to improve the nutrition profile of white potatoes in all forms, ensuring this already-nutritious and popular vegetable is aligned with dietary guidance.



White potatoes are the fourth most important food crop in the world and the leading vegetable crop in both the United States and Canada.

Background

Potatoes (*Solanum tuberosum*) are the fourth most important food crop in the world and the leading vegetable crop in both the United States and Canada (1,2). Given the popularity of potatoes, it is worth exploring how this vegetable fits within dietary guidance for total fat, saturated fat, and *trans* fat.

In the United States, 26% of potatoes are grown for sale as fresh whole potatoes, and one-third of potatoes are grown for frozen French fried potatoes, either oven heated or deep fried (3). This paper examines dietary consumption patterns and marketplace changes to provide a current assessment of frozen white potatoes, including both oven heated and deep fried. More specifically, French fried potatoes' contribution to calories, total fat, *trans* fat, and saturated fat intake are evaluated in terms of overall food intake and dietary guidance.

As currently consumed, white potatoes are not substantial sources of saturated or *trans* fat, and emerging evidence suggests they contribute only a small percent of energy intake while contributing critical nutrients (4-6).

Balancing Calories, Fat, and Nutrition: Potatoes in the Context of Overall Diet

Diseases and conditions of overnutrition seem to grab headlines, yet underconsumption of key nutrients is also a continuing concern for the United States and Canada. Thus, public dietary guidance in both countries accounts for dietary excesses as well as deficiencies by encouraging eating patterns that:

- Meet nutrient needs;
- Achieve and sustain healthy weight; and
- Reduce risk for chronic diseases, such as heart disease, type 2 diabetes, cancer, and osteoporosis (6,7).

While staying within calorie needs, individuals are advised to increase vegetable and fruit intake and choose foods that provide more potassium, dietary fiber, calcium, and vitamin D, which are nutrients of concern in American diets. These foods include vegetables, fruits, whole grains, and milk and milk products (6).

"Consume less than 10 percent of calories from saturated fatty acids."

"Keep *trans* fatty acid consumption as low as possible."

– 2010 DGA

Dietary Guidance and Fat

Dietary fat is one of three macronutrients (the others being protein and carbohydrate) that provide energy. In addition to providing calories, fat is a source of essential fatty acids and aids in absorbing fat-soluble vitamins (A, D, E, and K). While some dietary fat is critical to human health, fat is of concern because it is a concentrated source of energy that can contribute to excess calories, and certain types of fat can increase risk for certain diseases.

Specific to cardiovascular disease, the *2010 Dietary Guidelines for Americans* (*2010 DGA*) note that the types of fatty acids consumed are more important than is the total amount of fat in the diet (6). Individuals are advised to:

- "Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids.
- Keep *trans* fatty acid consumption as low as possible, especially by limiting foods that contain synthetic sources of *trans* fatty acids, such as partially hydrogenated oils, and by limiting other solid fats.
- Reduce the intake of calories from solid fats…" (6).

In its 2005 report *Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids (Macronutrients)*, the Institute of Medicine (IOM) did not set maximum intake levels for saturated or *trans* fats, but recommended consuming as little as of these nutrients as possible while still consuming a diet adequate in important essential nutrients (8). Specific to saturated fats, the IOM concluded, "It is neither possible nor advisable to achieve 0 percent of energy from saturated fatty acids in typical whole-food diets. This is because all fat and oil sources are mixtures of fatty acids, and consuming 0 percent of energy would require extraordinary changes in patterns of dietary intake. Such extraordinary adjustments may introduce undesirable effects (e.g., inadequate intakes of protein and certain micronutrients) and unknown and unquantifiable health risks" (8).

Concerning *trans* fats, the IOM report states, "Because *trans* fatty acids are unavoidable in ordinary, nonvegan diets, consuming 0 percent of energy would require significant changes in patterns of dietary intake. As with saturated fatty acids, such adjustments may introduce undesirable effects (e.g., elimination of commercially prepared foods, dairy products, and meats that contain *trans* fatty acids may result in inadequate intakes of protein and certain micronutrients) and unknown and unquantifiable health risks. Nevertheless, it is recommended that *trans* fatty acid consumption be as low as possible while consuming a nutritionally adequate diet" (8).

Neither the IOM nor the *2010 DGA* set an upper limit for *trans* fat intake. Instead, they advise minimizing consumption of *trans* fats, but not at the expense of nutrient adequacy. However, the American Heart Association (AHA) recommends limiting *trans* fat intake to less than 1% of total daily calories (9). Applying AHA guidance for *trans* fat intake to the federal government's 2000 kcal/day reference point for total calories would limit *trans* fat intake to less than 20 kcal/day (less than 2 g/day).

In 2006, the *Trans* Fat Task Force formed by Health Canada and the Heart and Stroke Foundation of Canada released a joint report with quantifiable recommendations to reduce *trans* fat in the food supply through the following voluntary industry actions:

- Limiting total *trans* fat content of vegetable oils and soft, spreadable margarines to 2% of total fat content; and
- Limiting total *trans* fat content of all other foods to 5% of total fat content, including ingredients sold to restaurants (10).

Food Technology, Nutrition, and the Current Marketplace

Food technology continues to improve the nutritional profile of French fried potatoes. In recent years, *trans* and saturated fats have decreased in packaged foods as well as in food service settings, including restaurants and schools (6,11,12). Researchers are also exploring ways to transfer health-promoting micronutrients from frying oils to French fried potatoes (13).

Marketplace Changes Reduce *Trans* and Saturated Fats

Reductions in *trans* and saturated fats have been achieved by modifying cooking methods and reformulating products. Food technology methods to reduce the levels of *trans* fatty acids in food ingredients and in frying oils include modification of hydrogenation to reduce *trans* fatty acid content of partially hydrogenated fats, production of oil seeds with modified fatty acid composition, use of tropical oils, and interesterification of mixed fats (14).

Concerns that voluntary or mandatory reductions in *trans* fats from partially hydrogenated oils would lead to increases in the saturated fat content of U.S. foods are, almost without exclusion, not borne out by the data. In fact, for the most part, the opposite has occurred. As supported by several studies along with corroborating evidence from industry surveys, *trans* fat reduction is typically concurrent with a decrease in saturated fat for a given food. (11,12,15,16).

Concerns that voluntary or mandatory reductions in *trans* fats from partially hydrogenated oils would lead to increases in the saturated fat content of U.S. foods are not borne out by the data.

The Grocery Manufacturers Association (GMA) conducts an annual Health and Wellness Survey. Fifty-seven companies, which account for approximately half of U.S. food and beverage sales, have provided data for the GMA survey since 2002. The 2010 data collected and analyzed by Georgetown Economic Services for the GMA survey showed that food and beverage companies collectively have eliminated or reduced *trans* fats in more than 10,000 product choices and saturated fat in more than 6,600 product choices (16).

A U.S. Department of Agriculture (USDA) Economic Research Service (ERS) report examining trends in *trans* fat content of new food products introduced between 2005 and 2010 showed a significant decline in amounts of *trans* fats. The five food categories with the highest *trans* fat content showed a 73% decline, while other food categories showed a 50% decline (12). The same analysis showed that new products without *trans* fats generally contained less saturated fat, sodium, and calories.

The USDA/ERS research is consistent with the findings of another study that explored changes in levels of *trans* fat and saturated fat in major brand-name U.S. supermarket and restaurant foods that were reformulated to reduce *trans* fatty acid content from 1993 through 2006 (first evaluation) and 2008 through 2009 (second evaluation). In a comparison over time of 83 reformulated products (58 supermarket foods and 25 restaurant foods), *trans* fat content was reduced to less than 0.5 g/serving in 95% of the supermarket products and 80% of the restaurant products, with mean absolute reductions of 1.8 g/serving (84 percentage points) and 3.3 g/serving (92 percentage points), respectively. In most restaurant and supermarket foods, there was a reduction in the total combined level of *trans* fat and saturated fat (11).

While most marketplace studies show corresponding reductions for saturated fat when *trans* fat is reduced, the data are inconsistent for snack foods (such as cookies and chips). U.S. snack foods (including cookies and chips) historically have contributed substantial amounts of commercially-produced *trans* fat (17). A recent study of label information for more than 5,000 chip and cookie products introduced for sale between 2001 (prior to *trans* fat labelling) and 2009 (after *trans* fat labelling) showed that *trans* fat reduction in cookie products led to significantly higher levels of saturated fat and significantly higher ratios of saturated fat to total fat. However, use of partially hydrogenated vegetable oil has declined in chip products without a corresponding increase in total fat or saturated fat content (18).

For packaged foods available in grocery stores, the FDA reported that some food categories have been reformulated to remove partially hydrogenated fats completely, including frozen potato products and frozen seafood.

Trans and Saturated Fat Greatly Reduced in French Fried Potatoes

Studies of French fried potatoes show consistent declines in the presence of both *trans* fats and saturated fats. Frozen potato fries no longer contain partially hydrogenated vegetable oils, food service frying oils have been reformulated to reduce *trans* and saturated fats, and deep-fat fryers are no longer used in most schools (11,15,19,20). French fried potatoes, including both oven heated and deep fried, are not among the top five sources of *trans* fat or among the top 10 sources of saturated fat (6,12).

Specific to packaged foods available in grocery stores, the U.S. Food and Drug Administration (FDA) reported that some food categories have been reformulated to remove partially hydrogenated fats completely, including frozen potato products and frozen seafood (19). Several studies have also shown saturated and *trans* fat reductions for French fried potatoes served in quick service restaurants (QSR) due to product reformulations, including frying oils.

Using data from the University of Minnesota Nutrition Coordinating Center Food and Nutrient Database, researchers analyzed the fatty acid composition of French fried potatoes available at six leading fast food restaurants between 1996 and 2008. Major changes in the fatty acid composition of French fried potatoes were observed at four of the six restaurant chains examined, with the most marked changes occurring between 2004 and 2008. At the four chains where major changes occurred, the saturated and *trans* fatty acid compositions of French fried potatoes decreased while the polyunsaturated and/or monounsaturated fatty acid compositions increased. The researchers concluded, “Results suggest that fast food restaurants are making major changes in the frying oils they use” (15).

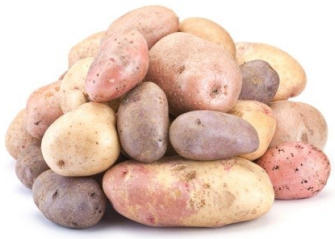
Researchers at the USDA Nutrient Data Laboratory assessed the fatty acid profiles of three top-selling fast food chain menu items—boneless fried chicken pieces, French fried potatoes, and hash browns—between 2001 and 2005 and again in 2008. Lab analyses for total fat and fatty acid composition showed a noticeable reduction of total, *trans*, and saturated fats in fast food menu items in three of the four restaurant chains sampled (21).

More recently, FDA researchers conducted laboratory analyses to assess the *trans* and saturated fat contents of menu item samples from 17 fast food restaurants belonging to major U.S. chains and operating in Prince George's County, Maryland (22). For French fried potatoes, five of the seven samples contained 0.2 g or less of *trans* fat and less than 3.5 g of saturated fat per serving, with a range of 0.1-3.1 g/serving for *trans* fat and 1.84-5.85 g/serving for saturated fat.

These studies show a consistent pattern of reduced saturated and *trans* fats in French fried potatoes served in most QSR.

In addition to improvements in the fat profile of French fried potatoes, the potential exists to increase health-promoting microconstituents, such as vitamins, minerals, and phytochemicals.

Beyond improvements in the fat profile of French fried potatoes, the potential exists to increase health-promoting microconstituents, such as vitamins, minerals, and phytochemicals. In addition to the nutrients naturally occurring in white potatoes (e.g., potassium, dietary fiber, and vitamin C), tocopherols, carotenoids, phytosterols, polyphenols, and other health-promoting microconstituents have all been shown to be present in substantial amounts in French fried potatoes as a result of transference from frying oils (13). Oil type, oil quality, and frying procedures all affect these substances. French fried potatoes are a popular food, so improving their nutrition profile could potentially make significant incremental contributions of important health-promoting microconstituents.



Calorie and Fat Intake in the U.S. and Canada: How Do Potatoes Fit?

White potatoes' contribution to intake of calories, total fat, *trans* fat, and saturated fat in terms of overall food intake appears to be relatively low, although continuing research is needed to ensure accuracy as the marketplace and consumption patterns shift over time.

Analyzing National Health and Nutrition Examination Survey (NHANES) data, the Centers for Disease Control and Prevention (CDC) concluded that energy, total fat, and saturated fat intake among Americans remained relatively stable between 1999 and 2008 (23). In 2007-2008, mean daily energy intake was 2504 kcal for men and 1771 kcal for women. Mean daily total fat intake was 33.6% of kcal for men and 33.5% of kcal for women, and mean daily saturated fat intake was 11.0% of kcal for men and 11.1% of kcal for women.

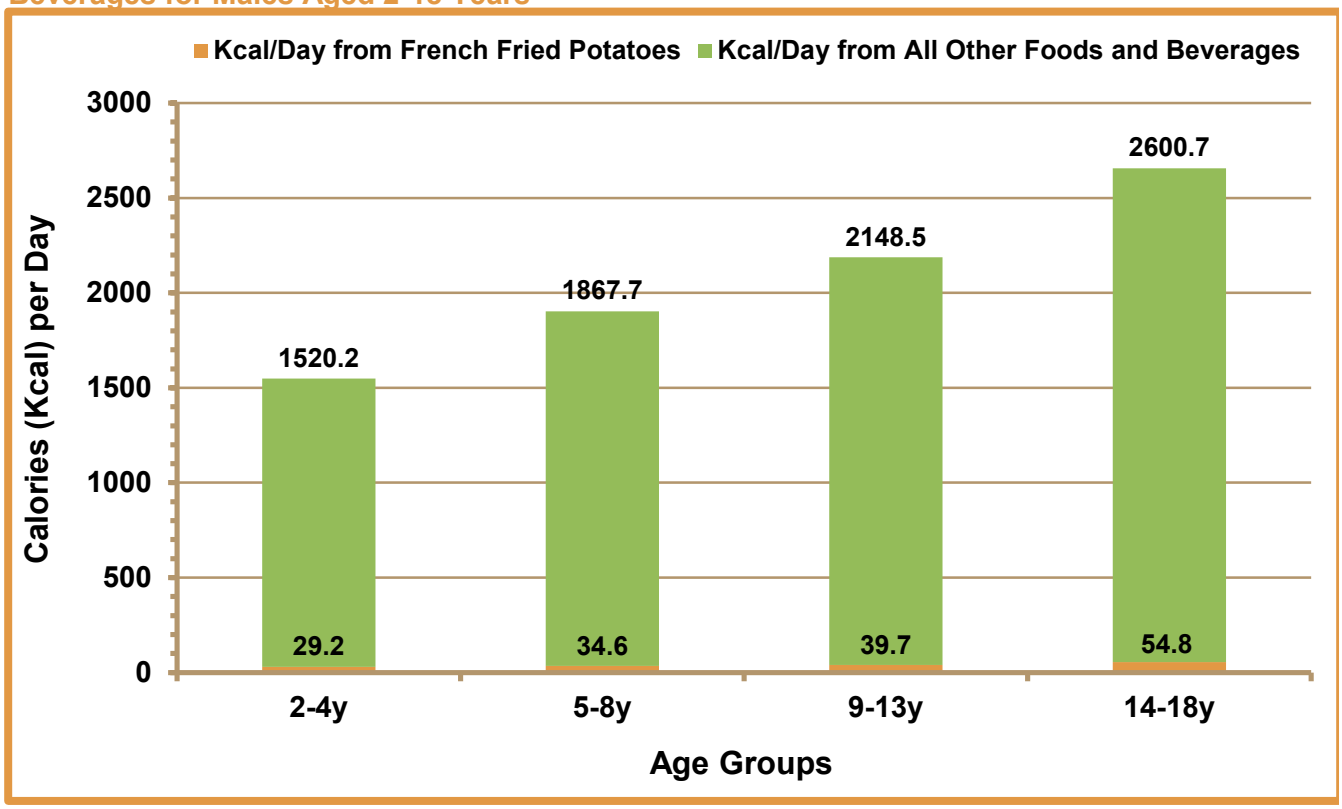
NHANES data suggest that white potatoes contribute a very small portion of total calories consumed by children and teens aged 2-18 years.

Calorie Contributions of French Fried Potatoes

An analysis of 2005-2006 and 2007-2008 NHANES data suggests that intake from white potatoes (baked, boiled, roasted, stewed, stuffed, mashed, with sauce, French fried, hash browned, home fried, potato skins, and potato salad) is relatively low and declining among adults (19+ years) (4). Among all adults, 50% did not consume any white potatoes on the day of the NHANES survey, and the 90th percentile of white potato consumption was 103 g, which is less than one medium skin-on baked white potato (148 g). French fried potato intake also declined with age. Mean calories from French fried potatoes declined from 78.5 and 39.4 kcal/day among men and women aged 19-30 years to 9.7 and 4.6 kcal/day among men and women aged 71+ years. Seventy-five percent of all adults did not consume any French fried potatoes on the day of the NHANES survey.

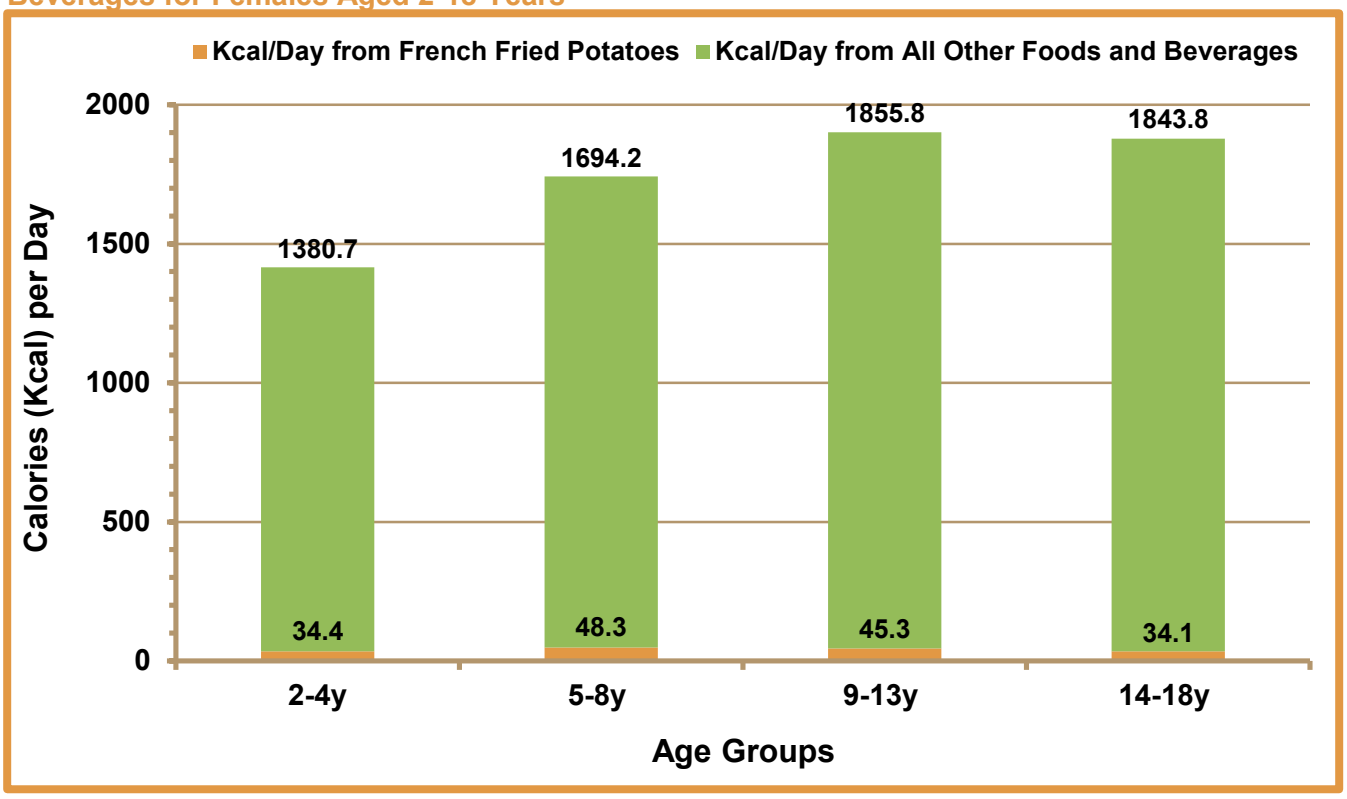
Using the same NHANES data set and potato preparation categories, the researchers also found that white potatoes contribute a very small portion of total calories consumed by children and teens aged 2-18 years (5). Among males, mean calories from white potatoes increased from 45 kcal/day in early childhood (2-4 years) to 79.5 kcal/day among teens (14-18 years). A similar pattern of white potato consumption was observed for females. Mean calories from white potatoes increased from 46.4 kcal/day for females aged 2-4 years to 61.5 kcal/day for females aged 14-18 years. Males aged 2-4, 5-8, 9-13, and 14-18 years consumed a mean of 29.2, 34.6, 39.7, and 54.8 kcal/day from French fried potatoes, respectively (Figure 1).

Figure 1. Mean Calories per Day from French Fried Potatoes and All Other Foods and Beverages for Males Aged 2-18 Years



Females aged 2-4, 5-8, 9-13, and 14-18 years consumed a mean of 34.4, 48.3, 45.3, and 34.1 kcal/day from French fried potatoes, respectively (Figure 2).

Figure 2. Mean Calories per Day from French Fried Potatoes and All Other Foods and Beverages for Females Aged 2-18 Years

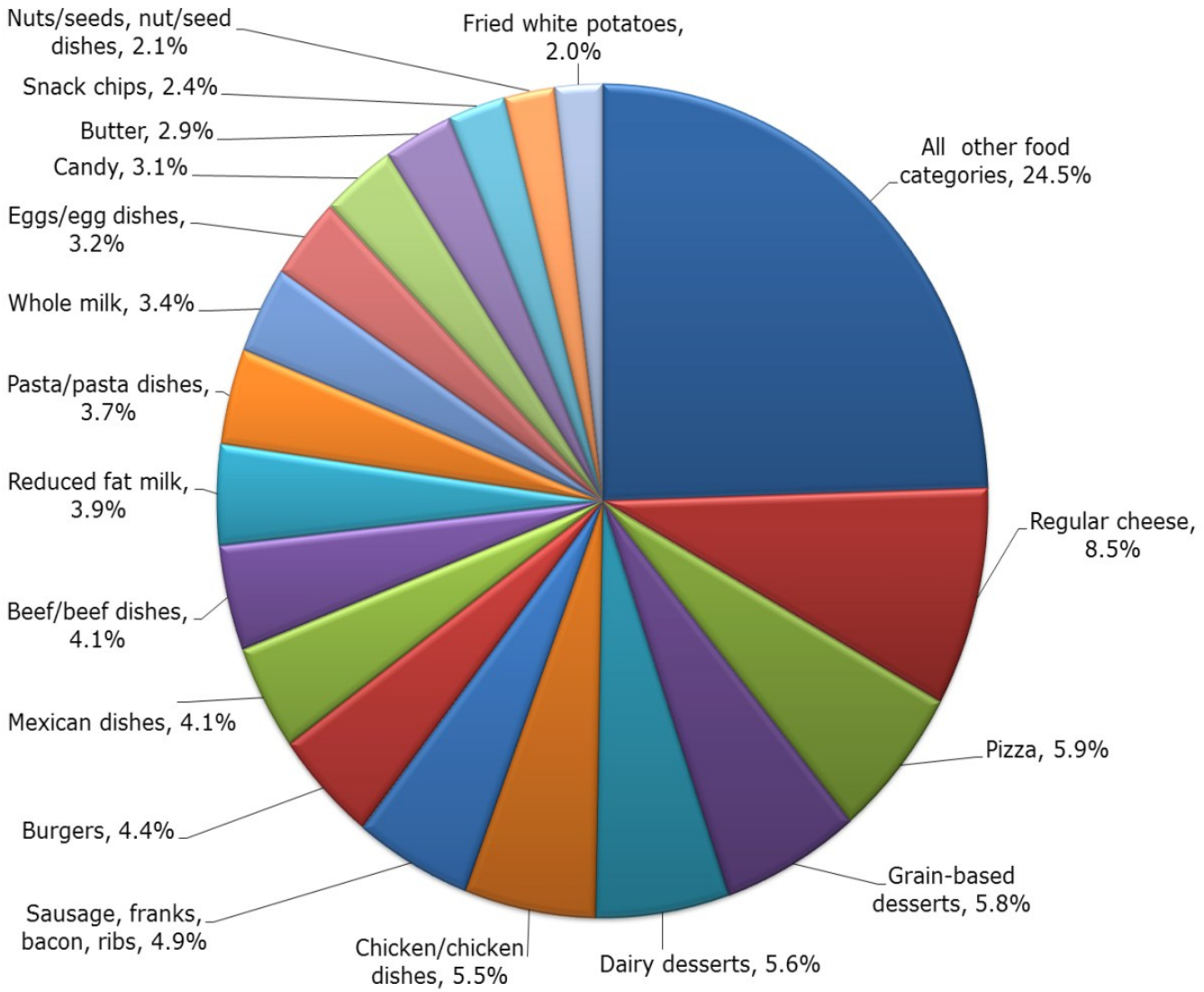


Fried white potatoes contribute only 2.0% of saturated fat intake and are not among the top 10 contributors of saturated fat in the American diet.

Saturated Fat Contribution of French Fried Potatoes

At 11% of total calories, saturated fat intake is above the limit of 10% of total recommended in the *2010 DGA*. In the United States, the top five contributors of saturated fat are regular cheese (8.5%), pizza (5.9%), grain-based desserts (5.8%), dairy desserts (5.6%), and chicken/chicken dishes (5.5%) (6). Fried white potatoes contribute only 2.0% of saturated fat intake and are not among the top 10 contributors of saturated fat in the American diet (Figure 3).

Figure 3. Dietary Sources of Saturated Fat for U.S. Population (2+ Years) from NHANES 2005-2006[†]



[†] 2010 Dietary Guidelines for Americans, pg. 26

One 2.5-oz serving (70g or about 10 strips) of oven-heated French fried potatoes provides 10% DV for potassium (330mg) and 6% DV for dietary fiber (1.6g) and only provides 116 kcal, 6% DV for total fat (3.6g), and 4% DV for saturated fat (0.8g).

As currently consumed, white potatoes are not a substantial source of saturated fat in the American diet, and emerging evidence suggests that white potatoes in all forms contribute only a small portion of energy to total calories (4-6). White potatoes in all forms also provide important nutrients. A medium skin-on baked white potato (148 g)—the Nutrition Labeling and Education Act (NLEA) serving size for this vegetable—is naturally low in saturated fat and is an excellent source of potassium [23% of the Daily Value (23% DV)], vitamin C (24% DV), and vitamin B_6 (23% DV) and a good source of dietary fiber (13% DV) and magnesium (10% DV) based on a 2000 kcal/day diet (24-26). One 2.5-oz serving (70 g or about 10 strips) of oven-heated French fried potatoes—the NLEA serving size for this potato product—provides 10% DV for potassium (330 mg) and 6% DV for dietary fiber (1.6 g) and only provides 116 kcal, 6% DV for total fat (3.6 g), and 4% DV for saturated fat (0.8 g) based on a 2000 kcal/day diet (24-26). Even if oven-heated French fried potato intake were to double, the calorie and saturated fat contributions from this potato product would still be relatively low. However, the intake of potassium and dietary fiber, which have been identified by the IOM and the *2010 DGA* as two of the four nutrients of concern, would increase substantially.

Trans Fat Intake Declining

Mean estimated *trans* fat intake ranged from 1.0-2.5% of mean daily energy intake for Americans and Canadians during the 1990s (8). An FDA analysis of the Continuing Survey of Food Intakes by Individuals (CSFII) 1994-1996 identified the major sources of *trans* fat intake as margarine (16.6% or 0.42% of total calories); cake and related products (23.8% or 0.61% of total calories); cookies and crackers (9.8% or 0.25% of total calories); fried potatoes (8.3% or 0.21% of total calories); chips and snacks (4.8% or 0.12% of total calories); and household shortening (4.3% or 0.11% of total calories). Intake of naturally-occurring *trans* fats associated with consumption of animal products represented 20.6% of *trans* fat intake (9,17).

Since the 1990s, partially hydrogenated fats have substantially declined in the food supply. Canada was the first country in the world to introduce mandatory labeling of *trans* fat (27). After implementing mandatory labeling of *trans* fat in 2005, Health Canada reported that mean *trans* fat consumption dropped from mid-1990s levels of 8.4 g/day to 3.4 g/day by 2008 (28). In the United States, levels of commercially-produced *trans* fats have decreased dramatically in the food supply since requiring the inclusion of *trans* fat on the Nutrition Facts label in 2006 (6,11). From 2000 to 2009, blood levels of *trans* fatty acids in white adults in the U.S. population decreased by 58% according to the CDC, which credits marketplace changes for the decrease (29).

Potatoes in the School Setting

White potatoes in the school setting are not a substantial source of calories, saturated fat, or *trans* fat among school children. A survey of school foodservice directors showed that 9 out of 10 potatoes served in schools are baked, boiled, mashed, or otherwise prepared without a fryer (20), and only 11% of school kitchens even have deep-fat fryers. According to the most recent publicly-available NHANES data, school-aged children, on average, consume less than 1% of their daily calories from white potatoes at school, including French fried potatoes (5).

School-aged children, on average, consume less than 1% of their daily calories from white potatoes at school, including French fried potatoes.

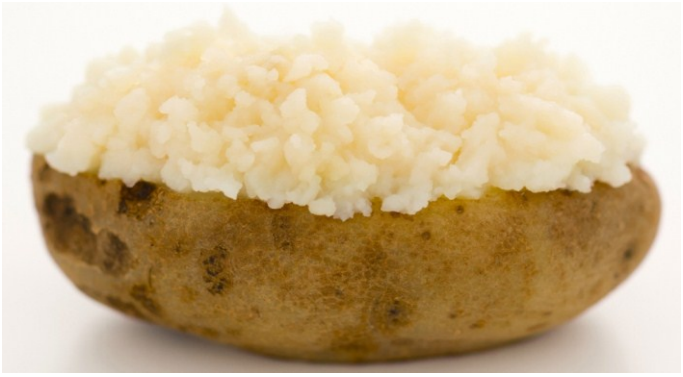
Depending on the age of the child, the revised nutrition standards in the National School Lunch and School Breakfast Programs require school meals to provide the potential energy of 900-1450 kcal/school day. Therefore, the low calorie contribution of white potatoes in school cafeteria settings (less than 9.0-14.5% of kcal/school day) is noteworthy (30). The nutritional and caloric contribution of school meals continues to grow increasingly important as more U.S. children, particularly those from low-income families, participate in the National School Lunch and School Breakfast Programs (31).

Federal regulations in the United States and provincial policy in Canada also include requirements to reduce and/or eliminate *trans* fat in foods served in the school setting. As recommended by the 2006 Canadian *Trans* Fat Task Force, the Province of Ontario limits *trans* fat in foods and beverages sold in schools, as well as in food ingredients used in school meal preparation, to less than 2% of total fat for cooking oils and soft margarines and to less than 5% of total fat for all other foods and beverages (32). In the United States, the revised nutrition standards in the National School Lunch and School Breakfast Programs that were finalized in January 2012 require "that food products and ingredients used to prepare school meals contain zero grams of added *trans* fat per serving (less than 0.5 g per serving as defined by FDA) according to the nutrition labeling or manufacturer's specifications" (30).

Conclusion

White potatoes in all forms, including frozen French fried potatoes (oven heated or deep fried), contribute important nutrients—potassium, dietary fiber, magnesium, vitamin C, and vitamin B_6—to the diets of Americans and Canadians. Emerging evidence also suggests that white potatoes in all forms contribute relatively small amounts of calories, saturated fat, and *trans* fat to the overall diet.

Studies are still being conducted, but existing research reveals a significant reduction of *trans* fat levels in French fried potatoes without a corresponding increase in saturated fat levels. Innovations in food technology are continually improving nutrient profiles of all forms of the white potato to ensure that this already nutritious and popular vegetable continues to align with dietary guidance.



The predominant type of unsaturated fatty acids that occur naturally are *cis* fatty acids. Most *trans* fatty acids are commercially-produced via a process called hydrogenation.

Fat Primer

Dietary fat consists primarily of triglycerides (98%) and smaller amounts of phospholipids and sterols. Triglycerides include one glycerol molecule esterified with three fatty acid molecules (8). These fatty acid molecules are categorized as saturated, monounsaturated, or polyunsaturated and describe the degree to which the carbon-carbon links in the fatty acid chain are bonded with hydrogen. Triglycerides typically contain a mixture of the three types of fatty acids.

Saturated Fats

Saturated fatty acids are composed of carbon-carbon links that are fully bonded (i.e., saturated) with hydrogen and are commonly found in foods from animal sources, such as cheese and butter. According to the *2010 DGA*, "A strong body of evidence indicates that higher intake of most dietary saturated fatty acids is associated with higher levels of blood total cholesterol and low-density lipoprotein (LDL) cholesterol, both of which are risk factors for cardiovascular disease" (6).

Trans Fats

Trans fatty acids are a type of unsaturated fatty acid. Small amounts of *trans* fatty acids occur naturally in foods from ruminant animals (e.g., beef and dairy products), while most *trans* fatty acids are commercially-produced via a process called hydrogenation. *Trans* fatty acids are structurally different from *cis* fatty acids, which are the predominant type of unsaturated fatty acids that occur naturally in foods from plants. "*Trans*" and "*cis*" refer to the position of the hydrogen atoms at the site of a carbon double bond. Hydrogen atoms on opposite sides of a carbon double bond are in the "*trans*" position, while hydrogen atoms on the same side of a carbon double bond are in the "*cis*" position.

The hydrogenation of unsaturated fatty acids to form *trans* fatty acids was widely used in food processing due to the increased stability of *trans* fatty acids versus unsaturated fatty acids. This increased stability made many foods, including frying oils, less susceptible to spoilage. At one point, substituting intake of saturated fats with commercially-produced *trans* fats (e.g., using margarine instead of butter) was also thought to be a means of lowering risk of cardiovascular disease (9).

However, increased *trans* fatty acid intake has since been shown to raise serum levels of low-density lipoprotein (LDL) cholesterol, and a preponderance of data suggests that hydrogenated fatty acid intake lowers serum levels of high-density lipoprotein (HDL) cholesterol relative to saturated fatty acid intake. High levels of LDL cholesterol along with low levels of HDL cholesterol have been implicated in an increased risk of cardiovascular disease (6,8).

Solid Fats

The term "solid fats" is sometimes used to refer to saturated and *trans* fats since most fats with a high percentage of these fatty acids are solid at room temperature (6). However, scientific data specific to the term "solid fats" are lacking.

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OUR MISSION STATEMENT

The Alliance for Potato Research and Education (APRE) is 100% dedicated to expanding and translating scientific research into evidence-based policy and education initiatives that recognize the role of all forms of the potato—a nutritious vegetable—in promoting health for all age groups.

OUR PHILOSOPHY

APRE is committed to informing the conversation that white potatoes in all forms are affordable, nutrient-dense vegetables; provide critical nutrients; and are an important part of USDA's *MyPlate*. Two of the nutrients provided by white potatoes—potassium and dietary fiber—have been identified by the Institute of Medicine's Food and Nutrition Board and the 2010 Dietary Guidelines Advisory Committee as nutrients that are underconsumed by both children and adults.

OUR ORGANIZATION

APRE is a not-for-profit organization funded by the potato industry, including potato growers and potato food manufacturers. APRE's research program is guided by APRE's Scientific Advisory Council (SAC) and Economics Advisory Council (EAC), both of which include a blue ribbon panel of experts from prominent universities in the United States and Canada. APRE does not lobby or further any political or partisan interest.

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APRE Children's Menu

For

Health Professionals

apre | Alliance for Potato Research & Education

Dear Health Professional,

Welcome to the Alliance for Potato Research and Education (APRE) Children's Menu. I am the President and CEO of APRE, a new not-for-profit organization that is 100% dedicated to expanding and translating scientific research into evidence-based policy and education initiatives that recognize the role of all forms of the potato—a nutritious vegetable—in promoting health for all age groups.

APRE is committed to informing consumers via health professionals that the white potato is an affordable, nutrient-dense vegetable and is an important part of USDA's *MyPlate* and Canada's Food Guide. White potatoes in all forms provide important nutrients, such as potassium, magnesium, dietary fiber, vitamin C, vitamin B_6, iron, and phenolics. Two of these nutrients—potassium and dietary fiber—have been identified by the Institute of Medicine's Food and Nutrition Board and the 2010 Dietary Guidelines Advisory Committee as nutrients of concern since most children and adults do not consume sufficient amounts of these nutrients to meet their needs.

One of the most important topics APRE will address is children's nutrition, especially when families come together to share a meal—whenever or wherever that may occur. Today's lifestyle is non-stop action for many families, so APRE has developed its Children's Menu to help health professionals educate busy parents with busy children on how to make delicious and healthful choices whether dining out or eating at home.

The APRE Children's Menu is a collection of 12 child-friendly meals that were developed by a registered dietitian and are based on the *2010 Dietary Guidelines for Americans*. Our meals also comply with the nutrition standards for minimum and maximum calories, percent of calories from saturated fat, and sodium included in the updated school meal regulations for kindergarteners through fifth-graders [7 CFR § 210 & 220 (2012)], but they can easily be modified to meet these nutrition standards for the other grade categories.

I am confident that the APRE Children's Menu will provide you with a useful tool for showing parents and children how to make informed and wholesome choices together that include all forms of the delicious, nutritious white potato for mealtimes that can be enjoyed anytime, anywhere.

Sincerely,

Maureen Storey

Maureen Storey, Ph.D.
President and CEO
Alliance for Potato Research and Education

apre

"Make half your plate fruits and vegetables."
– USDA's *MyPlate*

Menu #1

Scrambled Egg with Hash Brown Patty, English Muffin & Fresh Fruit

(Approx. 466 kcal, 25.9% kcal from total fat, 9.7% kcal from sat fat, 333 mg sodium)

1 large egg
1 frozen plain hash brown patty (about 3"x1½"x½"), baked as directed
½ toasted whole-wheat English muffin
1 packet (about 2 tsp.) fruit jam
¾ cup fresh apple slices with skin
½ cup 100% orange juice
1 cup 1% milk

Over medium heat, scramble egg in non-stick pan and cook until completely set. Place scrambled egg on plate and serve with hash brown patty, English muffin, jam, apple slices, orange juice, and milk.

"Consume vegetables and fruit at all meals and snacks."
– Canada's Food Guide

Menu #2

Veggie & Egg White Scramble with Toast & Mandarin Oranges

(Approx. 491 kcal, 17.7% kcal from total fat, 6.1% kcal from sat fat, 403 mg sodium)

1 cup diced boiled potato without skin
1 tsp. olive oil or garlic-infused olive oil
2 Tbsp. diced red bell pepper
1 egg white (about 2 Tbsp.) or 2 Tbsp. fat-free liquid egg substitute
1 Tbsp. grated Parmesan cheese
2 tsp. chopped scallions
1 packet (about 1 tsp.) low-sodium catsup
1 slice toasted whole-wheat bread
1 packet (about 2 tsp.) fruit jam
½ cup juice-packed mandarin oranges
1 cup 1% milk

Over medium heat, sauté potato in olive oil until lightly browned. Reduce heat to low, add red pepper, and sauté for 2 additional minutes. Stir in egg white and cook until egg white is completely set. Transfer potato and egg mixture to plate, sprinkle with Parmesan cheese and scallions, and serve with catsup, toast, jam, mandarin oranges, and milk.

Menu #3

Turkey Half-Sandwich with French Fried Potatoes & Watermelon

(Approx. 616 kcal, 29.5% kcal from total fat, 9.3% kcal from sat fat, 558 mg sodium)

2 oz. roasted turkey breast without skin
½ slice (about ½ oz.) low-sodium Cheddar cheese, cut diagonally from whole slice
¼ cup shredded romaine lettuce
1 slice toasted whole-wheat bread, cut on diagonal
2½ oz. fast food-style French fried potatoes, fried in vegetable oil
1 packet (about 1 tsp.) low-sodium catsup
8 medium (about 2¾ oz.) baby carrots
1 cup diced fresh watermelon
1 cup 1% milk

Assemble half-sandwich by arranging turkey, Cheddar cheese, and romaine lettuce on one bread triangle and topping with second bread triangle. Place sandwich on plate and serve with fries, catsup, baby carrots, watermelon, and milk.

The white potato is one of the best sources of potassium and dietary fiber compared to other fruits and vegetables.

Menu #4

Chicken Noodle Soup with Roasted Potato "Boats" & Fresh Fruit

(Approx. 572 kcal, 25.7% kcal from total fat, 6.7% kcal from sat fat, 634 mg sodium)

1 cup ready-to-serve reduced-fat, reduced-sodium chicken noodle soup
1 5¼-oz. baked potato with skin, cut lengthwise into 4 wedges
2 tsp. olive oil or garlic-infused olive oil
1 tsp. grated Parmesan cheese
1 packet (about 1 tsp.) low-sodium catsup
1 cup fresh sugar snap peas
1 cup fresh seedless grapes
1 cup 1% milk

Heat soup on stove or microwave until hot. Brush potato wedges with olive oil and broil until golden brown. Remove from broiler and sprinkle with Parmesan cheese. Place soup in bowl, and place potato "boats" on plate. Serve with catsup, peas, grapes, and milk.

Menu #5

Beef Steak with Roasted Potato "Fan" & Broccoli

(Approx. 647 kcal, 23.8% kcal from total fat, 9.3% kcal from sat fat, 521 mg sodium)

3 oz. tri-tip steak
1 5½-oz. peeled raw potato
1 tsp. Italian salad dressing
1 tsp. minced fresh chives
Dash paprika
1 packet (about 1 tsp.) low-sodium catsup
1 cup frozen chopped broccoli, steamed or microwaved
1 cup juice-packed fruit cocktail
1 cup 1% milk

Broil steak to desired doneness and transfer to plate. Slice potato hasselback-style into "fan" by making cross-wise cuts about ¼" apart without completely slicing through potato. Brush potato with Italian dressing. Bake at 425 F (218 C) until golden brown. Remove from oven, sprinkle with chives and paprika, and transfer to plate containing steak. Serve with catsup, broccoli, fruit cocktail, and milk.

Menu #6

Skewered Pork & Veggies with "Smashed" Potatoes & Fruity Strawberry Yogurt

(Approx. 568 kcal, 33.5% kcal from total fat, 8.7% kcal from sat fat, 407 mg sodium)

½ cup diced boiled potato without skin
3 oz. cubed pork top loin, all visible fat removed
½ cup cubed zucchini
½ cup white button mushrooms
1 Tbsp. olive oil
¼ tsp. onion powder
1 tsp. whipped butter
4 oz. low-fat strawberry yogurt
½ cup sliced fresh strawberries
1 cup non-fat milk

Roughly mash potato and transfer to plate. Thread pork, zucchini, and mushrooms onto skewer, brush with olive oil, and sprinkle with onion powder. Wooden skewers should be soaked in water for at least 30 minutes prior to using. Grill over medium heat or bake at 350 F (177 C) until pork is cooked through and vegetables are fork-tender. Remove skewer from grill or oven, remove pork, zucchini, and mushrooms from skewer, and transfer to plate containing "smashed" potato. Serve with butter, yogurt topped with strawberries, and milk.

Make delicious and healthful choices whether dining out or eating at home.

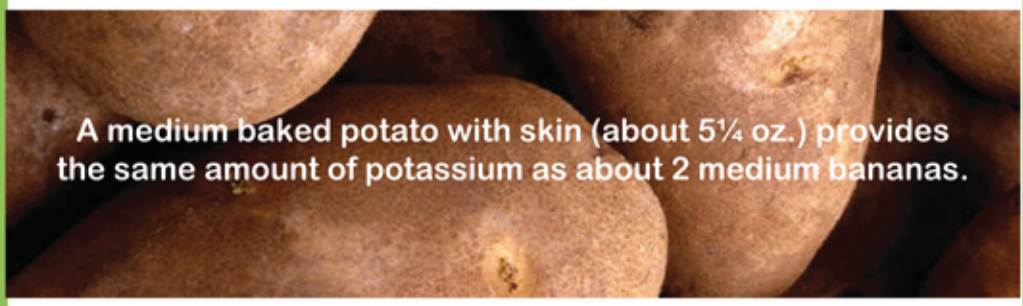
Menu #7

Stuffed Southwest Potato Skins with Mini-Salad & Fresh Fruit

(Approx. 573 kcal, 35.8% kcal from total fat, 9.4% kcal from sat fat, 390 mg sodium)

1 7½-oz. baked potato with skin, halved lengthwise
3 oz. cooked ground turkey (93% lean)
2 Tbsp. salsa
Dash chili powder
2 Tbsp. shredded low-fat Cheddar cheese
1 Tbsp. chopped scallions
½ cup shredded romaine lettuce
2 tsp. olive oil
½ tsp. cider vinegar
¼ cup chopped fresh tomato
1 cup diced fresh watermelon
1 cup 1% milk

Scoop out flesh from potato halves until ¼" from skin. Mix turkey with salsa and chili powder and divide between potato skins. Bake potato skins at 350 F (177 C) for about 10 minutes or until heated through. Remove potato skins from oven, sprinkle with Cheddar cheese and scallions, and transfer to plate. Toss romaine lettuce with olive oil and vinegar, transfer to plate containing potato skins, and top with tomato. Serve with watermelon and milk.



Menu #8

BBQ Chicken Drumstick with French Fried Potatoes & Veggie Dippers

(Approx. 598 kcal, 31.9% kcal from total fat, 6.8% kcal from sat fat, 630 mg sodium)

1 roasted chicken drumstick without skin (about 3½ oz. of meat)
1 Tbsp. low-sodium BBQ sauce
2½ oz. fast food-style French fried potatoes, fried in vegetable oil
1 packet (about 1 tsp.) low-sodium catsup
¼ cup broccoli florets
¼ cup red bell pepper strips
1 Tbsp. reduced-fat ranch salad dressing
½ cup juice-packed fruit cocktail
1 cup 1% milk

Brush roasted drumstick with BBQ sauce and place on plate. Serve with fries, catsup, broccoli, red pepper, ranch dressing, fruit cocktail, and milk.

Menu #9

"Thanksgiving Anytime" Dinner

(Approx. 604 kcal, 28.9% kcal from total fat, 7.8% kcal from sat fat, 523 mg sodium)

½ cup diced roasted turkey without skin
¼ cup ready-to-serve, low-sodium turkey gravy
½ cup instant mashed potatoes, prepared as directed
½ cup frozen green beans, steamed or microwaved
1 Tbsp. blanched slivered almonds
1 whole-wheat dinner roll (about 2½" diameter)
1 tsp. whipped butter
1/2 cup juice-packed peach slices
1 cup non-fat milk

Heat turkey and gravy in microwave until hot. Place mashed potatoes on plate and top with turkey and gravy. Serve with green beans topped with slivered almonds, dinner roll, butter, peach slices, and milk.

Most Americans and Canadians do not consume sufficient amounts of potassium or dietary fiber.

Menu #10

BBQ Chicken Slider with French Fried Potatoes & Applesauce

(Approx. 575 kcal, 17.9% kcal from total fat, 7.5% kcal from sat fat, 371 mg sodium)

2 oz. chopped roasted chicken breast without skin
2 Tbsp. low-sodium BBQ sauce
1 Tbsp. diced green bell pepper
1 whole-wheat dinner roll (about 2½" diameter), sliced in half
12 frozen regular-cut French fried potatoes, baked as directed
1 packet (about 1 tsp.) low-sodium catsup
½ cup fresh cucumber slices with peel
½ cup sweetened applesauce
1 cup 1% milk

Combine chicken, BBQ sauce, and green pepper and heat mixture in microwave until hot. Fill dinner roll with chicken mixture and place on plate. Serve with fries, catsup, cucumber slices, applesauce, and milk.

Menu #11

Primavera Baked Potato with Whole-Wheat Roll & Fresh Melon

(Approx. 605 kcal, 22.6% kcal from total fat, 6.1% kcal from sat fat, 608 mg sodium)

½ cup frozen mixed vegetables, steamed or microwaved
¼ cup frozen chopped broccoli, steamed or microwaved
¼ cup canned white beans, rinsed and drained
2 tsp. olive oil or garlic-infused olive oil
½ 10½-oz. baked potato with skin (about 5¼ oz.)
1 Tbsp. grated Parmesan cheese
1 whole-wheat dinner roll (about 2½" diameter)
1 cantaloupe wedge (about 1/8 of medium melon or 2½ oz.)
1 cup 1% milk

Over medium heat, sauté vegetables and beans in olive oil until heated through. Place potato on plate, top with vegetable and bean mixture, and sprinkle with Parmesan cheese. Serve with dinner roll, cantaloupe, and milk.

Menu #12

Garlic Chicken & Broccoli Sauté with Fresh Fruit

(Approx. 638 kcal, 37.6% kcal from total fat, 8.1% kcal from sat fat, 445 mg sodium)

2 oz. diced roasted chicken breast without skin
½ cup frozen chopped broccoli, steamed or microwaved
1 Tbsp. chopped scallions
¼ tsp. minced garlic
2 tsp. olive oil
1 Tbsp. grated Parmesan cheese
2½ oz. fast food-style French fried potatoes, fried in vegetable oil
1 packet (about 1 tsp.) low-sodium catsup
1 cup fresh pineapple chunks
1 cup 1% milk

Over medium heat, sauté chicken, broccoli, scallions, and garlic in olive oil until heated through. Transfer to plate and sprinkle with Parmesan cheese. Serve with fries, catsup, pineapple, and milk.

The white potato is an affordable vegetable as well as an important source of many critical nutrients.

NOTES

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To learn more about APRE, visit our website at:

www.apre.org

APRE is proud to be a National Strategic Partner of the USDA/CNPP *MyPlate* Program.

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Freedman MR and Keast DR. Potatoes, including French fries, contribute key nutrients to diets of U.S. adults: NHANES 2003-2006. *Journal of Nutritional Therapeutics* 2012; 1: 1-11.

Abstract:

Many adult Americans fail to meet nutrient requirements. The objective of this study was to examine 24-hour dietary recall data from NHANES 2003–2006 to test the hypothesis that white potatoes (not sweet potatoes) contributed important nutrients within energy needs to adults' diets. Potato content of survey foods was determined using US Department of Agriculture (USDA) recipe databases (Standard Reference [SR]-Link files). SR codes were linked to USDA food composition data to determine nutrient content. Daily nutrient intakes among consumers of potatoes (including french fries [FF]), and consumers of FF alone, were determined by applying the composition database to respondent's recall data. Sample weighted data were analyzed; t-tests assessed differences between age-sex groups.

Approximately 35% of adults consumed potatoes; 12% consumed FF. Intakes were lowest in adults aged 51+ y ($P < .01$). More males, compared to females, consumed potatoes ($P < .05$) and FF ($P < 0.01$). Males consumed larger amounts of potatoes (127 g/d) and FF (85 g/d) ($P < .01$). In all age-sex groups, potatoes and FF provided 7-11% of total energy (within daily energy requirements); 3-14% of daily fat (>75% MUFA+PUFA); >15% dietary fiber, >13% vitamin B6 and potassium; >5% thiamin, niacin, phosphorus, magnesium and copper; and <5% sodium. Potatoes provided >10% vitamin C for all age-sex groups and >5% vitamin K and iron for most groups; FF provided >5% vitamin E and folate intakes for all. These cross-sectional data showed that potatoes and FF, in amounts consumed by adults, contributed important nutrients in line with dietary recommendations.

Key Findings:

This study looked at the consumption of all potato products and French fries among adults aged 19 and older, and the nutrient contribution of potatoes and fries to their daily diets.

Researchers found:

- People eat potatoes and French fries in moderation, in amounts well within recommendations of the 2010 U.S. Dietary Guidelines.
- On the day of the survey, about 35% of adults consumed potatoes, and 12% consumed French fries. The amount of French fries consumed was 70 grams, equivalent to a small portion at a quick service restaurant.
- Both potatoes and French fries contributed significant amounts of key nutrients of public health concern, including dietary fiber, potassium, folate, magnesium, and vitamins C and K, to the diet.
- Potatoes, including French fries, can be part of a healthy diet that is consistent with national dietary recommendations.

Freedman MR and Keast DR. White potatoes, including French fries, contribute key shortfall nutrients to children's and adolescents' diets. *Nutrition Research* 2011, 31(4):270-7.

Abstract:

To test the hypothesis that white potatoes (WP), oven-baked fries (OBF), and french fries (FF) contribute important nutrients within energy needs to children's and adolescents' diets, secondary analysis of 24-hour dietary recall data from the National Health and Nutrition Examination Survey 2003-2006 was conducted. Potato content of survey foods was determined using US Department of Agriculture recipe databases (Standard Reference (SR)-Link files). Nutrient content of potatoes was determined by linking SR codes to US Department of Agriculture food composition data. Daily nutrient intakes from potatoes were determined by applying the composition database to respondent's recall data. Sample-weighted data were analyzed; t tests assessed differences between age and sex groups. Results indicated that approximately 35% of children and adolescents consumed WP + FF + OBF; 18% consumed FF. Intakes were lower in children compared with adolescents ($P < .01$). Among adolescents, more boys than girls consumed FF ($P < .05$); boys ate larger amounts of WP + FF + OBF (134 g/d) and FF (100 g/d) ($P < .01$). Both WP + FF + OBF and FF provided 9% to 12% of total daily energy (but was within energy requirements in the highest consumers); 8% to 15% of daily fat (>75% monounsaturated fatty acids + polyunsaturated fatty acids); ≥ 10% dietary fiber, vitamin B(6), and potassium; 5% or greater thiamin, niacin, vitamin K, phosphorus, magnesium, and copper; and less than 5% sodium intake, for all sex -age groups. The combination WP + FF + OBF provided 5% or greater vitamin C for all sex-age groups and 5% or greater vitamin E and iron for most groups; FF provided 5% or greater vitamin E intakes for all. These cross-sectional data show that WP, including FF, provided shortfall nutrients within energy requirements to children and adolescents and, when consumed in moderate amounts, can be part of healthful diets.

Key Findings:

- This study looked at the consumption of white potatoes, French fries, and oven-baked fries in American children and teenagers and examined the nutrient contribution of those foods in the diet.
- About 35% of children and adolescents ate some form of potatoes on the day of the survey, with 18% consuming French fries. While consumption was prevalent, the amount consumed was moderate.
    - Among all who ate French fries, daily consumption amounts were equivalent to a small serving of French fries at a quick service restaurant (70 grams).
    - Even those consuming the most fries only consumed about 100 grams on average, less than a medium serving of fries.
- French fries made important contributions to children's and teens' diets, including meaningful amounts of four of the five "shortfall" nutrients: fiber, potassium, magnesium and vitamin E.
- French fries contributed 14-16% of total potassium intake and 16-20% of fiber intake while providing < 10% of calorie intake and < 4% of sodium intake.
- These data suggest that white potatoes, including French fries, provide important nutrients to children and adolescents and can be part of a healthy diet.

Tyburczy C, Delmonte P, Farden-Kia AR, Mossoba MM, Kramer JK, Rader JI. Profile of *trans* fatty acids (FAs) including *trans* polyunsaturated FAs in representative fast food samples. *J. Agric. Food Chemistry* 2012; 60: 4567-4577.

Abstract:

The content of *trans* fat in foods is most commonly determined by summing the levels of individual *trans* fatty acids (FAs), analyzed as FA methyl esters (FAME) by gas chromatography. Current Official Methods of the American Oil Chemists' Society (AOCS) enable quantitation of total *trans* fat in foods but were not designed for the determination of *trans*FA isomeric compositions. In the present study, the content of *trans* fat in 32 representative fast food samples ranged from 0.1 to 3.1 g per serving, as determined according to AOCS Official Method Ce 1j-07. Further analysis of FAME using the 200 m SLB-IL111 ionic liquid column yielded quantitative results of total, *trans*, saturated, and cis unsaturated fat that were comparable to those of Method Ce 1j-07 and also allowed for the complementary determination of individual *trans* 18:1, *trans* 18:2, and *trans* 18:3 FA isomeric compositions under conditions suitable for routine sample analysis.

Key Findings:

- Levels of *trans* fatty acids has significantly decreased in restaurant foods over the last several years. This study was designed to provide a snapshot representation of the *trans* fat content in commonly selected fast food items, including French fries, in Prince George's County, MD from May – July, 2011.
    - Five of the seven samples of French fries contained less than 0.2 grams of *trans* fat per serving (equivalent to a medium size at a fast food restaurant). One sample was significantly higher in *trans* fat, likely because the restaurant had not yet shifted to the predominately *trans* fat-free oils that have become the current industry standard.
- This study demonstrates important progress has been made by the industry in reformulating oils used in the production and preparation of French fries and other fast food items.

Doell D, Folmer D, Lee H, Honigfort M, Carberry S. Updated estimate of *trans* fat intake by the US population. *Food Additives and Contaminants:* Part A: Chemistry, Analysis, Control, Exposure and Risk Assessment, 2012; 1-4.

Abstract:

The dietary intake of industrially-produced *trans* fatty acids (IP-TFA) was estimated for the US population (aged 2 years or more), children (aged 2-5 years) and teenage boys (aged 13-18 years) using the 2003-2006 National Health and Nutrition Examination Survey (NHANES) food consumption database, market share information and trans fat levels based on label survey data and analytical data for packaged and in-store purchased foods. For fast foods, a Monte Carlo model was used to estimate IP-TFA intake. Further, the intake of *trans* fat was also estimated using *trans* fat levels reported in the US Department of Agriculture (USDA) National Nutrient Database for Standard Reference, Release 22 (SR 22, 2009) and the 2003-2006 NHANES food consumption database. The cumulative intake of IP-TFA was estimated to be 1.3 g per person per day (g/p/d) at the mean for the US population. Based on this estimate, the mean dietary intake of IP-TFA has decreased significantly from that cited in the 2003 US Food and Drug Administration (FDA) final rule that established labelling requirements for *trans* fat (4.6 g/p/d for adults). Although the overall intake of IP-TFA has decreased as a result of the implementation of labelling requirements, individuals with certain dietary habits may still consume high levels of IP-TFA if certain brands or types of food products are frequently chosen.

Key Findings:

- The average dietary intake of *trans* fats in the United States population (aged 2 or more) is 1.3 grams per day. This is a significant reduction from the average estimated intake of 4.6 grams per day in 2003, at the time when the *trans* fat labeling requirements were established.
- The data show that many foods, including frozen potato products like French fries, have been reformulated to remove partially hydrogenated oils that are the primary source of *trans* fat.
- None of the 16 frozen potato product samples that were assessed contained any partially hydrogenated oil. Likewise, none of them contained detectable levels of *trans* fats.

Storey ML and Anderson PA. Contributions of White Vegetables to Nutrient Intake: NHANES 2009-2010. *Advances in Nutrition* 2013; 4: 335S-344S.

Abstract:

Vegetables, especially white potatoes, provide significant levels of key nutrients of concern, such as potassium and dietary fiber. Per capita availability (PCA) data for vegetables-often used as a proxy for vegetable consumption-show that vegetable consumption, including consumption of white potatoes, declined in the past decade. Using dietary data for participants in the NHANES 2009-2010, we examined total vegetable, white potato, and French-fried potato consumption among all age-gender groups as well as mean energy, potassium, and dietary fiber intakes. Mean total energy intake for the US population (≥2 y old) was 2080 kcal/d, with white potatoes and French-fried potatoes providing 4% and 2% of total energy, respectively. Individuals who consumed white potatoes had significantly higher total vegetable and potassium intakes than did non-consumers. In addition, the proportion of potassium and dietary fiber contributed by white potatoes was higher than the proportion that they contributed to total energy. Among white potato consumers aged 14-18 y, white potatoes provided 23% of dietary fiber and 20% of potassium but only 11% of total energy in the diet. The nutrient-dense white potato may be an effective way to increase total vegetable consumption and potassium and dietary fiber intake.

Key Findings:

- This study examined the intake and nutrient contribution of total vegetables, white potatoes and French fries in Americans aged 2 and older, based on national dietary intake survey data.
- Individuals that consumed white potatoes had significantly higher total vegetable intake and potassium intake than non-consumers.
- On average, Americans get about 1.5% of their calories a day from French fries. Given that Americans consume an average of 2,080 calories per day; this represents about 31 calories per day.
- Even among the highest consumers (men and women in the 90th percentile), French fries provided 134 and 118 calories/day, respectively, which is equivalent to less than half of a small (71 gram) serving at a fast food restaurant.

Decker EA, and Ferruzzi MG. Innovations in food chemistry and processing to enhance the nutrient profile of the white potato in all forms. *Advances in Nutrition* 2013; 4: 345S-350S.

Abstract:

Potatoes can be an important part of a balanced diet because they are an excellent source of many nutrients, including nutrients that are commonly underconsumed (dietary fiber and potassium). Despite the existence of many positive nutrients in potatoes, the popular press has recently aligned potatoes, and particularly fried potatoes, with an unhealthy diet. This article examines the nutritional content of potatoes and how these nutrients are affected by cooking and other food-processing operations. In addition, it examines how the nutritional content of potatoes is altered by cooking methods and how fried potatoes can have wide variations in fat content depending on the cooking method. Finally, the potential of new food-processing technologies to improve the nutritional content of cooked potatoes is evaluated.

Key Findings:

- This study reviews how various cooking methods can impact the nutrient content of the potato and highlights recent food science innovations that can improve the nutritional profile of the white potato in all forms.
- Frying causes a loss in water content of the potato, which concentrates nutrients like potassium in French fries.
- Emerging technologies including using coatings and new frying and draining techniques can significantly reduce fat content. These products are beginning to appear in national markets, and offer enhanced nutritional profiles compared to traditional products.

Otite FO, Jacobsen MF, Dahmubed A, Mozaffarian D. Trends in *trans* fatty acids: reformulations of US supermarket and brand-name foods from 2007 through 2011. *Prev Chronic Disease* 2013; 10:120198

Abstract:

INTRODUCTION:
Although some US food manufacturers have reduced *trans* fatty acids (TFA) in their products, it is unknown how much TFA is being reduced, whether pace of reformulation has changed over time, or whether reformulations vary by food type or manufacturer.

METHODS:
In 2007, we identified 360 brand-name products in major US supermarkets that contained 0.5 g TFA or more per serving. In 2008, 2010, and 2011, product labels were re-examined to determine TFA content; ingredients lists were also examined in 2011 for partially hydrogenated vegetable oils (PHVO). We assessed changes in TFA content among the 270 products sold in all years between 2007 and 2011 and conducted sensitivity analyses on the 90 products discontinued after 2007.

RESULTS:
By 2011, 178 (66%) of the 270 products had reduced TFA content. Most reformulated products (146 of 178, 82%) reduced TFA to less than 0.5 g per serving, although half of these 146 still contained PHVO. Among all 270 products, mean TFA content decreased 49% between 2007 and 2011, from 1.9 to 0.9 g per serving. Yet, mean TFA reduction slowed over time, from 30.3% (2007-2008) to 12.1% (2008-2010) to 3.4% (2010-2011) (P value for trend < .001). This slowing pace was due to both fewer reformulations among TFA-containing products at start of each period and smaller TFA reductions among reformulated products. Reformulations also varied substantially by both food category and manufacturer, with some eliminating or nearly eliminating TFA and others showing no significant changes. Sensitivity analyses were similar to main findings.

CONCLUSIONS:
Some US products and food manufacturers have made progress in reducing TFA, but substantial variation exists by food type and by parent company, and overall progress has significantly slowed over time. Because TFA consumption is harmful even at low levels, our results emphasize the need for continued efforts toward reformulating or discontinuing foods to eliminate PHVO.

Key Findings:

- This study looked at changes in *trans* fat content of products in major US supermarkets from 2007 to 2011.
- Among all food categories examined, the largest percentage declines were seen in French fries/ other potato products, an 88% reduction.
- All 18 French fry/potato products that contained *trans* fats in 2007 were reformulated to 0.5 grams per serving or less by 2008, and remained at this level through 2011.
- This provides strong evidence to support the statement that improvements in cooking oils and preparation methods have essentially eliminated French fries as a source of *trans* fats in the diet.