

# DASH diet

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The **DASH diet** (**D**ietary **A**pproaches to **S**top **H**ypertension) is a diet promoted by the National Heart, Lung, and Blood Institute (part of the NIH, a United States government organization) to control hypertension. This eating plan is rich in fruits, vegetables, whole grains, and low-fat dairy foods; includes meat, fish, poultry, nuts and beans; and is limited in sugar-sweetened foods and beverages, red meat, and added fats. In addition to its effect on blood pressure, it is considered a well-balanced approach to eating for the general public. It is now recommended by the US Department of Agriculture (USDA) as an ideal eating plan for all Americans.

The DASH diet is based on NIH studies that examined three dietary plans and their results. None of the plans were vegetarian, but the DASH plan incorporated more fruits and vegetables, low fat or nonfat dairy, beans, and nuts than the others studied. Not only does the plan emphasize good eating habits, but also suggests healthy alternatives to "junk food" and discourages the consumption of processed foods. The NIH has published a guidebook, "Your Guide to Lowering your Blood Pressure With DASH", which details the nutrition facts of popular mainstream food items and their healthy alternatives. The manual also provides samples of meal plans and proportions along with their associated nutritional information. The last pages of the manual provides a list of resources and how to obtain them.

The diet reduced systolic blood pressure by 6 mm Hg and diastolic blood pressure by 3 mm Hg in patients with normal blood pressure. Those with hypertension dropped by 11 and 6, respectively. There are several eating plans included in the diet, with the daily caloric intake ranging from 1699 to 3100 dietary calories.<sup>[1]</sup>

## History and Design

Currently, hypertension is thought to affect roughly 50 million people in the U.S. and approximately 1 billion worldwide.<sup>[2][3][*verification needed*]</sup> According to the National Heart, Lung and Blood Institute (NHLBI), citing data from 2002<sup>[2][3][*verification needed*]</sup>, "The relationship between BP and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater is the chance of heart attack, heart failure, stroke, and kidney disease. For individuals 40–70 years of age, each increment of 20 mm Hg in systolic BP (SBP) or 10 mm Hg in diastolic BP (DBP) doubles the risk of CVD across the entire BP range from 115/75 to 185/115 mm Hg."<sup>[3][*verification needed*]</sup>

The prevalence of hypertension led the U.S. [National Institute of Health] (NIH) to propose funding to further research the role of key nutrients in the diet. In 1992 the NHLBI directed five of the most well-respected medical research centers in different cities across the U.S. to conduct the largest and most detailed research study to date. The

DASH study involved teams of physicians, nurses, nutritionists, statisticians and research coordinators working in a cooperative venture in which participants were selected and studied in each of the these five research facilities. The chosen facilities and locales for this multi-center study were (1) Johns Hopkins University in Baltimore, Maryland, (2) Duke University Medical Center in Durham, North Carolina, (3) Kaiser Permanente Center for Health Research in Portland, Oregon, (4) Brigham and Women's Hospital in Boston, Massachusetts and (5) Pennington Biomedical Research Center in Baton Rouge, Louisiana.<sup>[1][verification needed]</sup>

The DASH trials were designed and carried out as a multi-center, randomized, outpatient feeding study with the purpose of testing the effects of dietary patterns on blood pressure. The standardized multi-center protocol was one of the unique features of the DASH diet. Another unique feature of the DASH diet and design was the foods and menu were chosen based on conventionally consumed food items which would be easily adopted by the general public if results were positive.<sup>[4][verification needed]</sup> . The initial DASH study was begun in August 1993 and ended in July 1997.<sup>[5]</sup> Contemporary epidemiological research had concluded that dietary patterns with high intakes of certain minerals and fiber were associated with low blood pressures. The nutritional conceptualization of the DASH meal plans was based in part on this research.<sup>[4][verification needed]</sup>

Two experimental diets were selected for the DASH study and compared with each other, and with a third: the control diet. The control diet was characteristically low in potassium, calcium, magnesium and fiber. Moreover, the control diet also featured a fat and protein profile consistent with current or contemporary dietary regimens (a “typical American diet”<sup>[1][verification needed]</sup>). The first experimental diet was an idealized “good” diet consisting of fruits and vegetables but otherwise similar to the control diet (a “fruits and vegetables diet”<sup>[5][verification needed]</sup>), with the exception of fewer snacks and sweets. Magnesium and Potassium levels were close to the 75th percentile of U.S. consumption in the fruits-and-vegetables diet, which also featured a high fiber profile. The second experimental diet combined elements of the previous two (control and fruits-and-vegetables)—this diet has been called “the DASH Diet”<sup>[2][verification needed]</sup> . The Dash diet (or combination diet) was rich in potassium, magnesium and calcium—a nutrient profile roughly equivalent with the 75th percentile of U.S. consumption. The DASH diet was also high in fruits, vegetables & low fat dairy foods, and also rich in fiber and protein (18%). The combination or “DASH” diet was also high in whole grains, poultry, fish and nuts while being low in fat and red meat content, sweets and sugar-containing beverages.<sup>[6][verification needed]</sup>

The DASH diet was also focused on providing liberal amounts of key nutrients thought to play a part in lowering blood pressure, based on past medical studies. The DASH diet was designed to be a whole-food diet, low in processed or refined sugars and high in complex carbohydrates.<sup>[1][verification needed]</sup> One of the unique features of the DASH diet design is that dietary patterns rather than single nutrients were being tested.<sup>[4][verification needed]</sup> Equally important, the DASH diet features a high quotient of anti-oxidant rich foods thought to retard or prevent chronic health problems including cancer, heart disease and stroke.<sup>[1][verification needed]</sup>

8,813 people were screened for the study, out of which were ultimately chosen 459 participants whose demographic characteristics most closely resembled the target population and study requirements. The sample population consisted of healthy men and women with an average age of 46, with systolic blood pressures of less than 160 mm Hg and diastolic blood pressures within 80 to 95 mm Hg. African-American and other minority groups were planned to comprise 67% of the study sample, with 49% of the sample being female.<sup>[4][verification needed]</sup> Indeed, due to the exceptional burden of high blood pressure in minority populations, especially among African-Americans, a major goal of the trial was to recruit enough ethnic minorities to constitute two thirds of the target sample.<sup>[5][verification needed]</sup>

Participants ate one of the three aforementioned dietary patterns in 3 separate phases of the trial, including (1) Screening, (2), Run-in and (3) Intervention. In the screening phase, participants were screened for eligibility based on the combined results of blood pressure readings and a Stanford 7-Day Physical Activity Recall questionnaire. In the 3 week run-in phase, each subject was given the control diet for 3 weeks, had their blood pressure measurements taken on each of five separate days, gave one 24-hour urine sample and completed a questionnaire on symptoms. At this point the subjects were each randomly assigned to one of the three diets outlined above, to begin at the start of the 4th week. The intervention phase followed next; this was an 8-week period in which the subjects followed the diet they had each been randomly assigned to. Blood pressures and urine samples were collected again during this time together with symptom & physical activity recall questionnaires. The first group of study subjects began the run-in phase of the trial in September 1994 while the fifth and final group began in January 1996.<sup>[5][verification needed]</sup> Each of the three diets contained the same 3 grams (3,000 mg) of sodium. Participants were also given two packets of salt, each containing 200 mg of sodium, for discretionary use. Alcohol was limited to no more than two beverages per day, and caffeine intake was limited to no more than three caffeinated beverages.<sup>[6][verification needed]</sup>

## Study Results

The DASH study showed that dietary patterns can and do affect blood pressure in the normal to moderately hypertensive adult population (systolic < 180 mm Hg & diastolic of 80 to 95 mm Hg).<sup>[5][verification needed]</sup> Respectively, the DASH or “combination” diet lowered blood pressures by an average of 5.5 and 3.0 mm Hg for systolic and diastolic, compared to the control diet. The minority portion of the study sample and the hypertensive portion, from baseline, both showed the largest reductions in blood pressure from the combination diet against the control diet. The hypertensive subjects experienced a drop of 11.4 mm Hg in their systolic and 5.5 mm Hg in their diastolic phases.<sup>[5][verification needed]</sup> The fruits-and-vegetables diet was also successful, although it produced more modest reductions over the control diet (2.8 mm Hg systolic and 1.1 mm Hg diastolic).<sup>[6][verification needed]</sup> In the subjects with and without hypertension, the combination diet effectively reduced blood pressure more than the fruits-and-vegetables diet or the control diet did. The data indicated that reductions in blood pressure occurred within two weeks of subjects’ starting their designated diets, which were favorable results,<sup>[6][verification needed]</sup> and that the results were generalizable to the target sample of the U.S.

population.<sup>[5][verification needed]</sup> Side effects were negligible, but the NEJM study reports that constipation was evidently a problem for some of the subjects. At the end of the intervention phase, 10.1, 5.4 & 4.0 percent of the subjects reported this problem for the control, fruits-and-vegetables and combination diets, respectively. Apart from only one subject (on the control diet) who was suffering from cholecystitis, other gastrointestinal symptoms had a low rate of incidence.

## History

The DASH-Sodium study was conducted following the end of the original DASH study to determine whether the DASH diet could produce even better results if it were low in salt.<sup>[1][verification needed]</sup> Primarily the researchers were interested in gaining more insight into the effect of sodium reduction when combined with the DASH diet. Design of the trials for the DASH-Sodium study were conducted and the trials took place from September 1997 through November 1999. Like the previous study, it was based on a large sample (412 participants) and was a multi-center, randomized, outpatient feeding study.<sup>[7][verification needed]</sup> The participants were adults with prehypertension or stage 1 hypertension (average systolic of 120 to 159 mm Hg & average diastolic of 80 to 95 mm Hg) and were randomly assigned to one of two diet groups.<sup>[6][verification needed]</sup> The two randomized diet groups were the DASH diet and a control diet that mirrored an “average American diet”, and which was somewhat low in key nutrients such as potassium, magnesium and calcium. After being assigned to one of these two diets, and within their assignment the participants ate foods differentiated by 3 distinct levels of sodium content, corresponding to 3,000 mg, 2,400 mg or 1,500 mg/day (hi, intermediate or low), in random order, for 30 consecutive days.<sup>[6][verification needed]</sup> During the two week run-in phase, all participants ate the high sodium control diet. The 30 day intervention phase followed, in which subjects ate their assigned diets at each of the aforementioned sodium levels (high, intermediate and low) in random order, in a crossover design.<sup>[7][verification needed]</sup> During the 30 day dietary intervention phase, each participant therefore consumed his or her assigned diet (either DASH or control) at all three sodium levels.

## Conclusions

The primary outcome of the DASH-Sodium study was systolic blood pressure at the end of the 30 day dietary intervention periods. The secondary outcome was diastolic blood pressure. The DASH-Sodium study confirmed that reductions in sodium intake correlated with significantly lower systolic and diastolic blood pressures in both control and DASH diets. Study results indicate that the quantity of dietary sodium in the control diet was twice as powerful in its effect on blood pressure as it was in the DASH diet. Importantly, the control diet sodium reductions from intermediate to low correlated with greater changes in systolic blood pressure than those same changes from high to intermediate (change equal to roughly 40 mmol per day, or 1 gram of sodium). As stated by Sacks, F. et al., reductions in sodium intake by this amount per day correlated with greater decreases in blood pressure when the starting sodium intake level was already at the U.S. recommended dietary allowance, than when the starting level was higher (higher levels

are the actual average in the U.S.). These results led researchers to postulate that the adoption of a national lower daily allowance for sodium than the currently held 2,400 mg could be based on the sound scientific results provided by this study.<sup>[7][verification needed]</sup>

The DASH diet and the control diet at low salt levels were both successful in lowering blood pressure, but the largest reductions in blood pressure were obtained by eating a combination of these two (i.e., a low-salt version of the DASH diet). The effect of this combination at a sodium level of 1,500 mg/day was an average blood pressure reduction of 8.9/4.5 mm Hg (systolic/diastolic). The hypertensive subjects experienced an average reduction of 11.5/5.7 mm Hg.<sup>[6][verification needed]</sup> The DASH-sodium results indicate that low sodium levels correlated with the largest reductions in blood pressure for participants at both normative and hypertensive levels with the hypertensive participants showing the greatest reductions in blood pressure overall. Moreover, the African-American study participants showed particularly significant reductions in blood pressure.<sup>[1][verification needed]</sup>

## References

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## Further reading

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## External links

- [What Is the DASH Eating Plan?](#) at The National Heart, Lung, and Blood Institute (NHLBI)
  - [VIDEO - Which Diet Works: A Nutritional Review](#), Gail Underbakke, MS, RD, speaks at the University of Wisconsin School of Medicine and Public Health
  - [DASH A Diet for all diseases](#) at cspinet.org
  - [DASH for Women](#) at womensheartfoundation.org
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# Dash Diet Recipes

Recently US World & News Report (June 7, 2011) ranked the DASH diet as the **best diet** overall. Why? Because the DASH diet has been [proven to lower blood pressure and cholesterol without medication](#). It has also been shown to be associated with lower risks for stroke, heart attack, heart failure, some types of cancer, and kidney stones. New research shows that it can help to prevent or reverse diabetes. And the DASH diet is great for the [whole family](#). Children who follow the DASH eating pattern are less likely to be overweight than their peers. It is recommended by the National Institutes of Health, the

American Heart Association, the US Dietary Guidelines, the AMA heart guidelines for women, and the treatment guidelines for hypertension.

## DASH Diet Recipe Tips

Look for color when making DASH-friendly meals. The more color on your plate, the healthier the meal. On this page we have several examples of colorful meals, and the associated recipes.

And of course, the DASH diet is a complete eating plan, it is more than just recipes. It refers to the entire balance of your daily diet. And, following a plan that helps to lower blood pressure is more than just lowering sodium.

Do you need special recipes? Not necessarily. Focus on making meals that include fruits, vegetables, and nonfat or low fat dairy foods. Choose recipes that are low in added-sodium ingredients, such as salt, baking soda, and baking powder. Choose desserts based on fruit rather than on pastries, to avoid extra sodium. Have at least two side vegetables, especially if your main dish doesn't include them.

For additional recipes, see our page with links to many [healthy recipe sites](#), or buy our book, [The DASH Diet Action Plan](#) to learn the complete DASH diet plan, along with 28 days of menu plans and DASH recipes. See more DASH diet recipes at [Superfast Meals](#) and [Spaghetti Squash](#). Learn about the DASH Diet at [what is the DASH diet?](#)



### Blackened Chicken with Berry Salad

This delicious salad includes lots of vegetables, fruit, along with a lean protein source.

1 teaspoon blackening spice mixture

4 ounces boneless, skinless chicken breast

1 cup romaine lettuce

Rub chicken breast with spice mixture, grill until internal temperature is 165°F. Make the salad base with romaine lettuce strips. Top with a variety of vegetables, such as grated carrots, radishes, pea pods, tomato, peas, pepper

strips, red cabbage. Then top with a mix of berries, including raspberries, sliced strawberries, and blueberries. Slice the grilled chicken breast into strips and place on top of the salad. Top with your favorite oil and vinegar or raspberry vinaigrette dressing. (Note, to keep sodium low, be sure the spice mixture is salt-free, and use dressings with low sodium).

## Tuna Salad Plate

1 can water packed, low sodium tuna

1 hard boiled egg, diced

1/4 cup diced celery

2 tablespoons light mayonnaise

1 cup romaine lettuce

pepper strips, grated carrot, grape tomatoes, shredded red cabbage

Mix together tuna, egg, celery and mayonnaise. Make salad base with romaine lettuce, topped with a variety of sliced vegetables. Place 1/2 cup tuna on top.



## Fabulous Frittata

6 eggs (or egg substitute)

1 cup frozen extra-sweet sweet corn

1 cup sliced pepper strips

1 cup grape tomatoes, cut in half

1/4 cup sliced onion

2 tablespoons canola oil

1 teaspoon dry basil ( or 1 tablespoon diced fresh basil)

4 ounces shredded colby/Jack cheese or other cheese blend

Lightly stir eggs, add basil. Pour canola oil into In non-stick frying pan with

metal handle, over medium heat. When oil is hot, add pepper strips, onion, and frozen sweet corn. (You can substitute a frozen mixture of pepper strips and onions, if desired). Saute for 3 minutes, stirring and turning over. Then add tomatoes, and continue to stir and turn over. Cook an additional 5 minutes, or until onions are translucent. Pour egg-basil mixture over the vegetables. Use spatula to lift edges or separate slightly in the interior, and allow eggs to fall to bottom of mixture as the frittata cooks. When egg mixture is thickened all the way through, top with cheese. Then brown under broiler for 2 - 3 minutes. Makes 6 servings. Tip: be sure to use a pan with a metal handle; plastic will melt under the broiler. We used an All-Clad pan.

Looking for a [lighter latke](#) for Chanukah?

### **Lighter Latkes**

3 tsp canola or olive oil

2 lbs Idaho potatoes (4 - 5), peeled

3/4 cup finely chopped red onion (1 medium)

1/4 cup all-purpose white flour

1 tsp salt

1/4 tsp black pepper

1 egg, lightly beaten

1 egg white, lightly beaten

Preheat oven to 450 F. Prepare 2 baking sheets by covering with aluminum foil, then cover each with 1 tsp of the oil. Alternately you could spray lightly with non-stick

vegetable spray (such as Pam, which is canola oil).

Using a grater or the shredding blade of a food processor, grate potatoes. Place in a large bowl and add onions, flour, salt and pepper. Toss with 2 forks to mix well. Add egg, egg white and the remaining 1 tsp of oil.

Drop rounded tablespoonfuls of the potato mixture onto the prepared baking sheets and press lightly to form cakes. Bake for 10 minutes, or until golden brown on the bottom. Turn the latkes over, switch the position of the baking sheets (top versus bottom racks), and bake for about 5 minutes longer, or until golden brown.

Transfer to a platter, arranging the latkes browned-side up, and serve. Makes about 24 latkes.

Each latke has 51 Cal, 1 g fat, 0 saturated fat, 9 mg cholesterol.

Recipe adapted from Eating Well magazine, Dec 1994.

## Low Fat Pumpkin Pie

4 egg whites, slightly beaten

16 ounce can pumpkin (or the meat from 1-lb pumpkin)

1/2 cup brown sugar

2 Tbsp molasses

1/2 tsp salt

1/2 tsp cinnamon

1/2 tsp pumpkin pie spice

12 oz can evaporated skim (fat free) milk

9" unbaked pie shell

Preheat oven to 425 F. Combine ingredients in above order. Mix well. Pour into pie shell (or into an au gratin dish for a fat-free dessert). Bake for 15 minutes at 425F. Then reduce temperature to 350F, and bake for 45 more minutes. Makes 8 servings.

Each piece of pumpkin pie has 240 Cal, 7 g fat, 3 g saturated fat, and 7 mg cholesterol.

Without the crust, each piece would have 130 Cal, 0 fat, 0 saturated fat, and 2 mg cholesterol. For a low sugar version, use Splenda™ instead of brown sugar, and increase molasses to 3 tablespoons.

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