

The concept that diet and blood pressure are linked has been discussed since at least the 1920s. In 1926, Donaldson noted that “vegetarians, we believe, run a consistently lower blood pressure than those who use flesh foods.”<sup>1</sup>

Dr Frank Sacks<sup>2</sup> is a medical doctor and Professor of Cardiovascular Disease Prevention, Department of Nutrition at the Harvard School of Public Health.

He was:

- Chair of the Design Committee of the DASH study which led to the DASH diet.
- Co-Chair of the OmniHeart Trial that showed that variations of the DASH diet that are higher in protein or unsaturated fat improved blood pressure and lipid risk factors when compared to the DASH diet.
- Principal Investigator of the Pounds Lost trial which compared 4 diets varying in protein, carbohydrate and fat content. 811 overweight people were studied for 2 years. All diets showed the same beneficial effects on weight loss and risk factors for heart disease.<sup>3</sup>

In 1975, he was the lead author in a paper studying lipids and lipoproteins in vegetarians.<sup>4</sup> The study compared a group that was predominately vegetarian with some participants consuming eggs and fish with a control group “consuming the usual American diet”. The mean values of the two groups are summarised below.

Measure	Units	Vegetarian	Control	Change (%)
Cholesterol	mmol/L	3.3	4.8	45
LDL cholesterol	mmol/L	1.9	3.1	63
VLDL cholesterol	mmol/L	0.31	0.44	42
HDL cholesterol	mmol/L	1.1	1.3	18
Triglycerides	mmol/L	0.7	1.0	43
Weight	kg	58	73	26
Subscapular skinfold	mm	6	17	180

According to the authors, the study “showed that consumption of dairy foods and eggs, but not body weight, was associated with the lipoprotein and cholesterol findings”.

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In a paper<sup>5</sup> Dr Sacks co-authored in 1974 noted that “the declared consumption of food of

animal origin was highly significantly associated with systolic and diastolic BP after the age and weight effects were removed.”

Another paper <sup>6</sup> from 1981 states “the study suggests an adverse effect of consumption of beef on plasma lipid and BP levels”. The study actually showed that there was a significant increase in systolic blood pressure and plasma cholesterol after a 4 week period of adding 250 g of beef per day to a strict vegetarian diet.

Dr Sacks is well aware that vegetarian diets are associated with lower blood pressure.

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The *Dietary Approaches to Stop Hypertension* (DASH) trial tested 3 types of diet with 459 people to study the effects on blood pressure. The results were published in 1997. <sup>7 8</sup>

The study papers noted that “vegetarians tend to have lower blood pressures than nonvegetarians” <sup>9</sup> and “a predominantly vegetarian dietary pattern is often present in these cultures that have generally low BPs.” <sup>10</sup>

In the DASH trial, the participants were randomly assigned one of the 3 diets for an 8 week period.

The *Control Diet* was “typical of the diets of a substantial number of Americans”. The *Fruits-And-Vegetables Diet* provided “more fruits and vegetables and fewer snacks and sweets than the control diet but was otherwise similar to it”. The *Combination Diet* was “rich in fruits, vegetables, and low-fat dairy foods and had reduced amounts of saturated fat, total fat, and cholesterol.”

Compared with the control diet, the *combination diet* reduced systolic blood pressure by an average of 5.5 mmHg and the *fruits-and-vegetables diet* reduced systolic blood pressure by 2.8 mmHg - not a substantial improvement for 8 weeks.

The *fruits-and-vegetables* diet is a misleading label. The *fruits-and-vegetables* diet had a higher intake of red meat than the other 2 diets and a greater intake of total meat than the *combination diet*. The *combination diet* had more vegetables than the *fruits-and-vegetables diet*. <sup>11</sup>

Below is a comparison of the *control diet*, with the *fruits-and-vegetables diet* and the “*ideal combination*” diet. <sup>12</sup>

Food groups	Control g/day	Fruit & veg g/day	Combo diet g/day
Red meat (beef, pork, lamb and veal)	95	108	24
Meat (red meat, fish, poultry)	192	172	139
Vegetables	147	272	345
Dairy products	89	59	485
Fats and oils	54	43	26
Sweets and sugar containing snacks	152	28	22

Given that “*ideal combination*” diet had more vegetables and less meat and less red meat than the *fruits-and-vegetables* diet then it is expected that the blood pressure would be lower. The *fruits-and-vegetables* diet had only 10% less meat than the high-meat control diet – that is the diet “typical of the diets of a substantial number of Americans.”

The “Ideal Combination Diet” had a very large increase in the amount of dairy consumed, despite the fact that Sacks published a paper<sup>13</sup> that “showed that consumption of dairy foods and eggs, but not body weight, was associated with the [adverse] lipoprotein and cholesterol findings”.

The *OmniHeart Trial* compared the standard DASH diet with 2 variants. The first variant replaced some carbohydrate with protein and the second variant replaced some carbohydrate with unsaturated fat. The “OmniHeart Diets provide more options for heart health”.<sup>14</sup>

- 1 | **Diet 1: (DASH Diet)** A carbohydrate-rich diet of 58% carbohydrate, 15% protein, and 27% fat. Despite the claim, this is a high-fat, low-carbohydrate diet.
- 2 | **Diet 2: (Protein)** A higher protein diet that had 10% more protein and 10% less carbohydrate (48% carbohydrate, 25% protein, and 27% fat). The 10% protein increase in the higher protein diet emphasized plant protein. It was noted that the meat and dairy food sources were also increased “somewhat”.
- 3 | **Diet 3: (Unsaturated fat)** A higher unsaturated fat diet that had 10% more

unsaturated fat and 10% less carbohydrate (48% carbohydrate, 15% protein, and 37% fat). Olive oil, canola oil, and olive oil spread were used as the unsaturated fat source. The average American diet contains 33% fat.

The 10% reduction in carbohydrate in the higher protein diet and the higher unsaturated fat diet was achieved by replacing some fruits with vegetables, reducing sweets, and using smaller portions of grain products. These diets are more concerned with pampering to American preferences rather than offering best health outcomes.

Nutrient (% of calories)	Carbohydrate Diet	Protein Diet	Unsaturated Fat Diet
Carbohydrates	58	48	48
Total fat	27	27	37
Monounsaturated fat	13	13	21
Protein	15	25	15

According to the study, “all three diets reduced blood pressure, total and low-density lipoprotein cholesterol levels, and estimated coronary heart disease risk” and the “partial substitution of carbohydrate with protein and unsaturated fat likely led to further improvement in CVD risk factors.”<sup>15</sup>

The conclusion from this paper states that “the OmniHeart diet patterns offer substantial flexibility in macronutrient intake that should make it easier to eat a heart-healthy diet and reduce cardiovascular disease risk.”

Despite the claims that the “DASH diet is a carbohydrate-rich, reduced-fat diet”<sup>16</sup>, a diet consisting of 58% carbohydrate and 27% total fat is not a high-carbohydrate diet nor a low-fat diet.

In 2018, the DASH diet was ranked *Best Diet Overall* for eighth year in a row by U.S. News and World Report.<sup>17</sup>

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Seventh Day Adventist studies have shown that as the diet becomes increasingly vegan then the prevalence of hypertension (high blood pressure) decreases.<sup>18</sup>

A similar conclusion was found in meta-analysis study from 2014<sup>19</sup> and the earlier studies from Harvard School of Public Health that were highlighted earlier.

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**The creators of the DASH diet are well aware that vegetarian and vegan diets are by far the most effective way of reducing blood pressure to optimal levels. However, they created the DASH diet so that it would “contain enough animal products to make them palatable to nonvegetarians.”** <sup>20</sup>

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## Footnotes

1. Donaldson, A. N. (1926) The relation of protein foods to hypertension. *California and Western Medicine*. 24 (3), p330
2. Harvard School of Public Health (n.d.) Frank Sacks | Harvard T.H. Chan School of Public Health [online]. Available from: [www.hsph.harvard.edu/frank-sacks/](http://www.hsph.harvard.edu/frank-sacks/) (Accessed 18 October 2016).
3. de Souza, R. J. et al. (2012) Effects of 4 weight-loss diets differing in fat, protein, and carbohydrate on fat mass, lean mass, visceral adipose tissue, and hepatic fat: results from the POUNDS LOST trial. *The American Journal of Clinical Nutrition*. 95 (3), 614-625.
4. Sacks, F. M. et al. (1975) Plasma Lipids and Lipoproteins in Vegetarians and Controls. *New England Journal of Medicine*. 292 1148-1151.
5. Sacks, F. M. et al. (1974) Blood Pressure in Vegetarians. *American Journal of Epidemiology*. 100 (5), 390-398.
6. Sacks, F. M. et al. (1981) Effect of Ingestion of Meat on Plasma Cholesterol of Vegetarians. *Journal of American Medical Association*. 246 (6), 640-646.
7. Appel, L. J. et al. (1997) A clinical trial of the effects of dietary patterns on blood pressure. *New England Journal of Medicine*. 336 (16), 1117-1124.
8. National Heart Blood and Lung Institute (2014) *What Is the DASH Eating Plan?* [online]. Available from: [www.nhlbi.nih.gov/health-topics/dash-eating-plan](http://www.nhlbi.nih.gov/health-topics/dash-eating-plan) (Accessed 17 September 2015).
9. Vogt, T. M. et al. (1999) Dietary Approaches to Stop Hypertension: Rationale, Design, and Methods. *Journal of the American Dietetic Association*. 99 (8S), pS12
10. Sacks, F. & Kass, H. (1988) Low blood pressure in vegetarians: effects of specific foods and nutrients. *American Journal of Clinical Nutrition*. 48 p795
11. Karanja, N. et al. (1999) Descriptive Characteristics of the Dietary Patterns Used in the Dietary Approaches to Stop Hypertension Trial. *Journal of the American Dietetic Association*. 99 (8), pS21
12. Karanja, N. et al. (1999) Descriptive Characteristics of the Dietary Patterns Used in the Dietary Approaches to Stop Hypertension Trial. *Journal of the American Dietetic Association*

- Association*. 99 (8), S19-S27.
13. Sacks, F. M. et al. (1975) Plasma Lipids and Lipoproteins in Vegetarians and Controls. *New England Journal of Medicine*. 292 1148-1151.
  14. Harvard Health Publications (n.d.) OmniHeart Diets Provide More Options for Heart Health. [online]. Available from: [www.health.harvard.edu/PDFs/OmniDiets.pdf](http://www.health.harvard.edu/PDFs/OmniDiets.pdf)
  15. Swain, J. F. et al. (2008) Characteristics of the Diet Patterns Tested in the Optimal Macronutrient Intake Trial to Prevent Heart Disease (OmniHeart): Options for a Heart-Healthy Diet. *Journal of the Academy of Nutrition and Dietetics*. 108 (2), 257-265.
  16. Carey, V. J. et al. (2005) Rationale and design of the Optimal Macro-Nutrient Intake Heart Trial to Prevent Heart Disease (OMNI-Heart). *Clinical Trials*. 2 (6), 529-537.
  17. National Institutes of Health (2018) *DASH ranked Best Diet Overall for eighth year in a row by U.S. News and World Report*.
  18. Pettersen, B. J. et al. (2012) Vegetarian diets and blood pressure among white subjects: results from the Adventist Health Study-2 (AHS-2). *Public Health Nutrition*. 15 (10), 1909-1916.
  19. Yokoyama, Y. et al. (2014) Vegetarian diets and blood pressure: a meta-analysis. *JAMA Internal Medicine*. 174 (4), 577-587.
  20. Karanja, N. et al. (1999) Descriptive Characteristics of the Dietary Patterns Used in the Dietary Approaches to Stop Hypertension Trial. *Journal of the American Dietetic Association*. 99 (8), S19-S27.