

Docket No. 00Q-1582

Tab 1

**NOTIFICATION FOR A HEALTH CLAIM BASED ON
AN AUTHORITATIVE STATEMENT FOR
POTASSIUM CONTAINING FOODS**

Before the
Office of Nutritional Products,
Labeling, and Dietary Supplements
Food and Drug Administration
200 C Street, SW
Washington, DC 20204

Submitted by
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Notification for a Health Claim Based on an Authoritative Statement
Pursuant to 21 U. S. C. 343(r)(3)

I. Executive Summary

A. Proposed Authoritative Statement Claim

Tropicana Products, Inc. (Tropicana) proposes to use the following claims relating diets rich in potassium containing foods to lower blood pressure and reduced risk of stroke:

- 1. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke as part of a healthy lifestyle.**
- 2. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke.**

These claims are all based on authoritative statements of the National Academy of Sciences and in particular from the *Diet and Health: Implications for Reducing Chronic Disease Risk* report.

This notification also sets forth appropriate criteria to ensure that foods conveying this health information contain meaningful amounts of potassium.

B. Authoritative Claim is from the National Academy of Sciences Report on *Diet and Health: Implications for Reducing Chronic Disease Risk*

The following statements can be found in the *Diet and Health* report:

“In summary, evidence from epidemiological studies suggest that a diet with high levels of potassium and low levels of sodium may be beneficial in lowering blood pressure and that a high potassium intake may be independently protective against death from stroke. An intake of ≥ 3.5 g/day of elemental potassium is associated with a beneficial effect, no threshold for this effect is known.”

And from the Recommendation section of the Report:

“A diet containing 75 mEq (i.e. approximately 3.5 g of elemental potassium) daily may contribute to reduced risk of stroke, which is especially common among blacks and older people of all races.”

The proposed authoritative statement indicates the importance of food sources of potassium and states the disease at hand, namely high blood pressure and stroke. The *Diet and Health* report is the most comprehensive and authoritative review conducted on the topic by the National Academy of Sciences (NAS). The Committee considered scientific evidence available at the time, including epidemiological, animal and human studies relating various dietary variables to

health. Publications after this report continue to support the relationship of diets containing potassium rich foods to health.

C. Proposed Claim will Lead to Increased Consumption of Foods Containing Potassium

Mean intake of potassium for various age-sex-race groups are below the Daily Value (DV) of 3,500 mg/d and the level of potassium NAS reports to decrease risk of stroke (75 mEq or about 3,500 mg/d). **Only about 18% of the American population consumes the recommended level of potassium.** Foods containing potassium (certain fruits and fruit juices, some vegetables, certain grain products and low-fat dairy products) are recommended as components of a healthy diet. Potassium containing foods are especially important in diets designed to decrease or moderate sodium intake. This authoritative statement claim would help encourage consumption of foods containing potassium. The claim would also increase the number of foods that carry labeling for potassium. Today, very few foods provide potassium content of foods on the Nutrition Facts panel. This is not unexpected as potassium is not required as part of mandatory nutrition labeling. With the opportunity to provide meaningful information to consumers on the benefits of potassium containing foods, it is likely that more foods will provide labeling of potassium content.

D. Proposed Claim Will Increase Consumption of Foods Promoted in Other Health Claims

Foods high in potassium or at least high enough to qualify for the proposed claim are typically fruits, fruit juices, vegetables, bran cereals and other foods consistent with the U. S. Dietary Guidelines. These foods are also consistent with many other FDA approved health claims. In

particular, these foods would be consistent with health claims for heart disease (low saturated fat and low cholesterol; fruit, vegetables and grain products that contain fiber); cancer (low fat; fiber containing grain products, fruit and vegetables), and hypertension (low sodium).

E. Conclusion

The proposed claim reflects an authoritative statement of a scientific body that addresses the relationship between diets high in potassium and lowered blood pressure and reduced risk of stroke. As indicated in the *Diet and Health* report and subsequent scientific evidence summarized in section VI, the benefits of eating a diet high in potassium containing foods may have significant public health ramifications, namely reducing high blood pressure and the risk of stroke, the number three cause of death for Americans. Consumers will benefit by learning about the relationship of diets high in potassium containing foods and the risk of stroke. Additionally, it is very likely that this information will lead manufacturers of potassium containing foods to provide voluntary potassium content information on the Nutrition Facts panel to further educate consumers.

II. Introduction

Tropicana plans to make one or more claims regarding the relationship of diets rich in potassium containing foods and lowered blood pressure and reduced risk of stroke. The claim is an authoritative statement claim as described in the Food and Drug Administration Modernization Act (FADMA) of 1997 since the claim derives from statements of an expert panel of the National Research Council (NRC), a subdivision of NAS in their report entitled *Diet and Health: Implications for Reducing Chronic Disease Risk*. Foods rich in potassium are typical

foods that are consistent with dietary recommendations from several sources. These foods are typically fruits, fruit juices, vegetables, bran cereals and low fat dairy products. It is well known that diets high in potassium tend to be low in sodium, whereas diets high in sodium are typically low in potassium. (NRC, 1989). Thus, increased consumption of foods that contain potassium will help Americans achieve one of the dietary recommendations, namely to moderate salt/sodium intake and according to the NRC/NAS to independently decrease the risk for stroke.

III. Background

A. Stroke Statistics

According to the American Stroke Association, a division of the American Heart Association, stroke occurs every 53 seconds to someone in America. About 600,000 Americans will have a stroke this year. Stroke is the third leading cause of death in America with 160,000 deaths a year (American Stroke Association, 1999). While over 58 million Americans have one or more types of cardiovascular disease, it is estimated that 4.4 million Americans have had a stroke and 16% of cardiovascular disease deaths are attributable to stroke. The 1996 stroke death rates (per 100,000 population) were 26.3 for white males and 50.9 for black males; and 22.9 for white females and 39.2 for black females. For people over age 55, the incidence of stroke more than doubles in each successive decade (American Heart Association, 1999).

Compared with whites, young African Americans have 2-3 fold-increased risk of ischemic stroke. African men and women are 2.5 times more likely to die of a stroke. Blacks develop high blood pressure at an earlier age and it is more severe compared to whites. Blacks have a 1.3

times greater rate of nonfatal stroke and a 1.8 times greater rate of fatal stroke, as compared to whites. (American Heart Association, 1999).

The direct and indirect cost of stroke in the United States has been estimated at \$45.3 billion dollars. This cost includes health expenditures and lost productivity from morbidity and mortality. This amounts to over 15% of the costs for all cardiovascular diseases (American Heart Association, 1999).

B. Statutory Basis for Authoritative Statement Claims

The Food and Drug Administration Modernization Act (FDAMA) of 1997 permits health claims without prior FDA approval under the following conditions:

- 1) A scientific body of the United States Government with official responsibility for public health protection or research relating to human nutrition (such as the National Institutes of Health or the Centers for Disease Control and Prevention), or the National Academy of Sciences or any of its subdivisions has published an authoritative statement about the relationship between a nutrient and a disease or health related condition;
- 2) The authoritative statement is published and is currently in effect;
- 3) The claim based on the authoritative statement accurately represents the authoritative statement and is presented in a manner that the public can comprehend the information in the claim and the relative significance of the information in the context of the total diet;
- 4) The claim and foods eligible to bear the claim meet existing regulations;

- 5) A submission has been made, at least 120 days before introduction into interstate commerce of the food with a label containing the claim, which includes:
- A) a notice of the exact wording of the claim;
 - B) a copy of the authoritative statement that forms the basis of the claim;
 - C) A balanced representation of the scientific literature, including bibliography, relating to the relationship between a nutrient and a disease or health related condition to which the claim refers.

Tropicana proposes to use one of the following claims relating diets rich in potassium containing foods to lower blood pressure and reduced risk of stroke:

- 1. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke as part of a healthy lifestyle.**
- 2. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke.**

The authoritative statement for the proposed claim comes from various statements made in the report from NAS entitled *Diet and Health: Implications for Reducing Chronic Disease Risk*.

The following are excerpts from that Report. The full text regarding these statements is included in Appendix A.

From the section on Recommendations and repeated in the Executive Summary:

“Vegetables and fruits are also good sources of potassium. A diet containing approximately 75 mEq (i.e., approximately 3.5 g of elemental potassium) daily may contribute to reduced risk of stroke, which is especially common among blacks and older people of all races. Potassium supplements are neither necessary nor recommended for the general population.” (page 15 and 672)

Other excerpts from the text include:

“A substantial body of evidence in humans and animals indicates that dietary potassium exerts a beneficial effect on hypertension. This is partly because of its effect on lowering blood pressure and partly because of its separate, protective effect against vascular damage and stroke.” (page 422)

“Populations with habitually low-potassium diets appear to have an increased incidence of various cardiovascular morbid events.” (page 422)

“Khaw and Barret-Connor (1987) showed that over a period of 12 years the incidence of stroke-related deaths in people over 50 years of age in a retirement community was negatively correlated with daily intake of potassium.” “... data suggest that an increase of 10 mEq (400 mg) of elemental potassium per day would lead to an approximately 40% decrease in the incidence of stroke-related deaths over the 12 years of the study; this amounts to only one or two servings of fruit, fruit juices, vegetables or potatoes per day.” (page 422)

“In summary, evidence from epidemiological studies suggests that a diet with high levels of potassium and low levels of sodium may be beneficial in lowering blood pressure and that a high potassium intake may be independently protective against death from stroke. An intake of ≥ 3.5 g/day of elemental potassium is associated with a beneficial effect, no threshold for this effect is known.” (page 423)

“Although the mechanism by which additional dietary potassium reduces deaths is not known, the evidence suggest that it exerts protective effect partly through reducing blood pressure and partly through an effect on the vascular system independent of blood pressure.” (page 423)

“Diets with a high sodium content tend to be low in potassium, whereas those with high potassium levels have a low sodium content. An important role for potassium in regulation of blood pressure and in modification of the sequelae of hypertension has been documented in humans and animals. Data strongly indicate that a high potassium intake is protective against fatal stroke in humans and in SHRSP and DS rats. It also protects against arterial hypertrophy and injury in animals. This effect is exerted partly through modulation or reduction of blood pressure...”(page 424)

“Epidemiologic studies suggest that dietary potassium protects against death from strokes in humans. Some studies have shown that potassium supplements lower blood pressure, but others—in human populations and in animal models—suggest that potassium exerts a protective effect against stroke that is unrelated to blood pressure.” (page 424)

“Epidemiologic and animal studies indicate that the risk of stroke-related deaths is inversely related to potassium intake over the entire range of blood pressures, and the relationship appears to be dose dependent. The combination of a low-sodium, high-potassium intake is associated with the lowest blood pressure levels and the lowest frequency of stroke in individuals and populations. Although the effects of reducing sodium intake and increasing potassium intake would vary and may be small in some individuals, the estimated reduction in stroke-related mortality for the population is large.” (page 660)

FDA has recognized these statements from the *Diet and Health* report in previous rulemakings. In a response to a comment questioning the establishment of a Daily Reference Value (DRV) for potassium during rulemaking in response to the Nutrition and Labeling Education Act, FDA acknowledged the conclusions of the *Diet and Health* report stating:

“FDA has used major consensus reports in developing DRV’s. Among these is the well recognized and accepted Diet and Health (Ref. 3), published by NAS. This

report specifically recommends a quantitative intake of potassium to assist in reducing the risk of stroke. (58 FR 2224) (emphasis added).

Additionally, statements from the National Institutes of Health (NIH), National Heart, Lung, and Blood Institute and in particular the National High Blood Pressure Education Program are also supportive of increasing potassium as a way to manage high blood pressure and risk of stroke:

“In summary, potassium supplementation may have a role in the prevention of high BP. It is unlikely to be as important as weight control and a reduction in sodium intake. None of these interventions is mutually exclusive, however, and potassium supplementation in combination with other nonpharmacologic approaches may provide an optimal strategy for the prevention of high BP. Potassium supplementation may play a particularly important role in the prevention of hypertension among subgroups of the population, such as the African-American community and others with a diet that is deficient in potassium intake.” (NIH Publication No. 93-2669, May 1993).

C. Potassium Intake in the US Adult Population

Recently, the Food Surveys Research Group (FRSG) of the United States Department of Agriculture (USDA) determined potassium intake in the US adult population. (USDA, 1999) From the 1994-96 Continuing Survey of Food Intakes by Individuals (CSFII) FRSG determined mean intake of potassium for various age and gender groups of Americans (Appendix B). The highest intake was in 30-39 year old males with an average intake of 3,380 mg/d. The highest

mean intake in females was 2,450 mg/d in 50-59 year olds. Potassium intake decreases as both genders age with an intake of 2,822 mg/day in males 70 and over and 2,332 mg/d in females 70 and older.

Appendix C contains potassium intake by race, gender and age (USDA, 1998). For every age and gender group examined, blacks had a lower mean intake of potassium. White males, aged 40-59 years, consume on average 3,268 mg of potassium per day; black males of the same age group consume only 2,831 mg of potassium per day. Black males, 60 and over, consume an average of 2,328 mg of potassium per day while white men of the same age consume an average of 3,024 mg potassium per day. White females, aged 40-59 years, consume an average of 2,442 mg/d potassium; black females of the same age consume on average 2,098 mg/d potassium. Black females, 60 years and older, had an average potassium intake of 1,918 mg/d while white females of the same age had an average intake of 2,371 mg/d potassium.

All of the mean intakes reported above are below the Daily Value (DV) of 3,500 mg of potassium and the level of potassium NAS reports to decrease risk of stroke (75 mEq or about 3,500 mg/d). The percent of the population with less than 100 % of the DV is presented in Appendix D. This analysis, conducted by the Food and Nutrition Database Research Center at Michigan State University, shows the large number of people that are not getting the recommended levels of potassium. **Only about 18% of the American population is consuming the recommended level of potassium (3,500 mg/d). Thus more than three-quarters of the population is not consuming the recommended level of potassium (Table 1).** Only 18.7% of the non-Hispanic whites are consuming at least 3,500 mg/d (Table 2). Only

11.1% of non-Hispanic blacks (Table 3) and only 16.3% of Hispanic Americans (Table 4) are consuming 3,500 mg potassium or more per day. Certain gender and age groups consume even less potassium. **Less than 10% of females older than 25 years consume the recommended level of potassium, regardless of race.** About 35% of males of this age group obtain the recommended level of potassium.

Regardless of how you look at the data in appendix D it is obvious that very large numbers of the American population (greater than 80% of the entire population) are not consuming the recommended level of potassium. It is also notable that those groups at greatest risk for stroke (older Americans and non-Hispanic blacks) are less likely to be consuming the recommended level of potassium. Clearly, allowing communication of the important relationship of potassium intake to risk of stroke will help make Americans aware of the importance of potassium in their diets and help them find foods that can help increase potassium in their diet.

The 1989 edition of the Recommended Dietary Allowances (NRC, 1989) set the minimum potassium requirements of healthy adults at 2,000 mg/day. A statement that “desirable intakes of potassium may considerably exceed these values (~3,500 mg for adults)” was included. There is not currently a Tolerable Upper Intake Level set for potassium. Acute intoxication results from sudden increases in potassium intake to levels of about 18 g/day for an adult (NRC, 1989). This level of intake is difficult to achieve with whole foods.

IV. Proposed Claim Qualifies as an Authoritative Statement Claim

This section explains why this claim meets all of the conditions of the statutory requirements of FDAMA of 1997.

As previously mentioned, Tropicana proposes to use the following claims relating diets rich in potassium containing foods to lower blood pressure and reduced risk of stroke:

- 1. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke as part of a healthy lifestyle.**
- 2. Diets rich in potassium containing foods may lower blood pressure and reduce the risk of stroke.**

These claims qualify as being based on an authoritative statement since it refers to a relationship, between a nutrient and a disease, about which a qualified scientific body has published an authoritative statement. The claim refers to potassium (a nutrient) and the risk of stroke (a disease) and high blood pressure (a disease or health related condition). The claim is based on authoritative statement made by NRC, a subdivision of NAS and published by NAS in the *Diet and Health* report. NAS "or any of its subdivisions" was specifically mentioned as an authorized "scientific body of the United States" in FDAMA. The *Diet and Health* report is a comprehensive analysis of the scientific literature examining the effects of diet on various chronic diseases affecting the American population. The nineteen members of the *Diet and Health* Committee are eminently qualified and possessed the necessary expertise to evaluate the

relationships among diet and chronic disease. Clearly, the statements in the *Diet and Health* report, and thus those reproduced in this petition, qualify as being from an authoritative source.

The *Diet and Health* report, published in 1989, is still the most current document published by NAS on the topic and is thus currently in effect. Furthermore, the authoritative statement is found in the sections on Recommendations and the Executive Summary and not merely mentioned as preliminary results, inconclusive research or as guidance for future research. Current scientific literature also continues to support the conclusions of the *Diet and Health* report. The available published literature after release of the *Diet and Health* report is summarized in Appendix G (Table 8).

The proposed claim accurately represents the authoritative statement. NAS specifically states a diet containing about 3,500 mg of potassium per day may contribute to reduced risk of stroke (NAS at page 672) and mentions vegetables and fruits as good sources of potassium. The claim enables the public to comprehend the information and to understand the relative significance in the context of the total daily diet. The claim specifically mentions “diets” and informs consumers to look for potassium containing foods. In one version of the claim “as part of a healthy lifestyle” is included to help indicate that there are other factors that affect high blood pressure and/or the risk of stroke. Foods carrying the proposed claims will have to provide a meaningful amount of potassium per RACC and will have to provide information on potassium content on the Nutrition Facts panel. Thus, consumers will have more information available to them regarding the relationship of potassium to blood pressure and the risk of stroke and more information on where to find foods that are good sources of potassium. Including information on

potassium content on the Nutrition Facts panel will allow consumers to monitor their dietary potassium intake.

V. Foods Eligible to Make the Claim

The Daily Value for potassium is 3500 mg/day, the same amount indicated by NAS to independently decrease the risk of stroke. Using the standard approach by FDA, foods with 20% or more of the DV of potassium could claim to be “high in” or an “excellent source” of potassium. However, as can be seen in Table 6 of Appendix E, no foods contain 20% of the DV or 700 mg/serving or reference amount customarily consumed (RACC). FDA has indicated “[I]f the claim is about the effects of consuming the substance at other than decreasing dietary levels, the level of the substance is sufficiently high and in an appropriate form to justify the claim. To meet this requirement, if a definition for use of the term ‘high’ for that substance has been established under this part, the substance must be present at a level that meets the requirements of that term, **unless a specific alternative level has been established for the substance...**” 21 C.F.R. 101.14 (d)(2)(vii) (emphasis added). Since no foods contain 20% of the DV for potassium “a specific alternative level” should be established.

Many foods do provide more than 10% DV of potassium (Table 6 taken from USDA). Foods that are often cited as sources of potassium, namely orange juice and bananas, contain about 13-14 % DV per RACC. Thus, since no foods contain 20% DV of potassium and many contain more than 10% DV but less than 20% DV, we suggest the level of potassium necessary to provide information regarding potassium, blood pressure and risk of stroke should be greater than 10% of the daily value (more than 350 mg/RACC). In support of determining “a specific alternative level” of greater than 10% of the DV for potassium to be eligible to carry a health

claim regarding the relationship of diets rich in potassium containing foods and decreased risk of stroke, NAS reported:

“... data suggest that an increase of 10 mEq (400 mg) of elemental potassium per day would lead to an approximately 40% decrease in the incidence of stroke-related deaths over the 12 years of the study; this amounts to only one or two servings of fruit, fruit juices, vegetables or potatoes per day.” (NAS at page 422)

This level of potassium (400 mg) equates to about 11% of the DV. Thus NAS was contemplating encouraging consumption of foods with slightly more than 10% of the DV to help decrease the risk of stroke. Additionally, FDA has recognized that foods with at least 10% of the DV of another nutrient would be eligible to display a health claim. In 21 C.F.R. 101.79, FDA states that foods that “meet or exceed the requirements for a “good source” of folate” (at least 10% of the DV) are eligible to display the health claim regarding folate and the reduced risk of neural tube defects.

Given the eligibility standard of greater than 10% DV the following foods would be eligible to provide information on the relationship of potassium and risk reduction of stroke, assuming these foods also meet requirements of the other section of health claim regulations (Table 5).

Foods eligible to display the potassium health claim would have to meet all other regulatory requirements for health claims and would also have to meet all other applicable labeling requirements. One additional requirement should also be included. Given the relationship of

sodium intake and blood pressure, at least in a portion of the population, we suggest that foods allowed to display the health claim regarding potassium and stroke/blood pressure should also be low in sodium as defined in 21 C.F.R. 101.61. Thus, only foods with greater than 350 mg potassium and less than 140 mg sodium per RACC would be eligible to display the potassium health claim on product labels. However, as defined in the regulation defining “low sodium” foods with a RACC of 30 g or less or 2 tablespoons or less would also have to contain 140 mg of sodium or less per 50 g. This approach is analogous to the requirement that all foods displaying health claims regarding heart disease must be low in saturated fat and cholesterol as these nutrients have a specific effect on heart disease risk factors. [e.g. 21 C.F. R. 101.77(c)(2)(ii)(B); 21 C.F.R. 101.82(c)(2)(iii)(B)]

Appendix F contains sample menu plans that provide over 3,500 mg potassium/day using typical servings of everyday foods which provide more than 10% DV for potassium/RACC or serving. Thus, it is relatively easy to select foods that contain meaningful mounts of potassium to achieve the DV and the amount recognized by NAS as decreasing the risk of stroke.

Potassium in fruits and fruit products is measured by the Association of Official Analytical Chemists (AOAC) Official Method 965.30 by rapid flame photometric method (AOAC), 1997).

Table 5. Partial list of foods containing more than 10% DV for Potassium per RACC.

Description	Amount	Potassium (mg)	*DV (%)
Apricots, dried, uncooked	40 g	740	21
Yam, ckd	110 g	737	21
Prune juice	240 mL	663	19
Tomato juice	240 mL	535	15
Clams, ckd	85 g	536	15
Banana	140 g	554	15
Orange juice, fresh	240 mL	480	14
Chard, swiss, raw	85 g	467	13
Kiwi	140 g	465	13
Banana chips	30 g	460	13
Cod, ckd	85g	439	12
Potato flesh, baked	110 g	430	12
Spinach, ckd	85 g	396	11
Grapefruit juice, fresh	240 mL	389	11
Orange-grapefruit juice	240 mL	379	11
Trout, ckd	85 g	380	11

As outlined in the notification, foods that bear the proposed health claim must meet regulatory requirements of 21 C.F.R. 101.14 and qualify as low sodium as outlined in 21 C.F.R. 101.61.

VI. Scientific Literature on the Relationship of Potassium and Risk of Stroke

A. Historical Perspective:

The relationship between potassium and regulation of hypertension has been discussed and documented for over seventy years. In 1928, a physician named Addison was the first to suggest that potassium supplementation could reduce blood pressure. Addison's results on the health benefits of potassium, with relation to hypertension, were reported in the *Canadian Medical Association Journal*. Addison concluded the following:

“The giving of potassium chloride, potassium bromide and citrate is associated with a drop in blood pressure below the current one with a decrease in the symptoms of hypertension, and that the giving of sodium chloride and bromide is associated with a rise of blood pressure and an increase in the symptoms of hypertension.”

At the end of the 20th century, hypertension and risk of stroke still represent major public health concerns worldwide. The medical and nutrition literature presents overwhelming evidence for the use of potassium to decrease the symptoms of hypertension, and further prevent the onset of cerebrovascular trauma.

Hypertension can be a precursor to cerebrovascular trauma (i.e., stroke). It is well accepted that a modest decrease in hypertension throughout a large population could be expected to substantially reduce the incidence of renal dysfunction and cerebrovascular accidents (NRC, 1989).

Dietary potassium deficiency is usually accompanied by sodium excess, and dietary sodium should be limited in some aspect while increasing dietary potassium. (NRC, 1989). NRC (1989) also recommends natural sources for potassium. Foods rich in potassium, such as many fruits, fruit juices and vegetables are relatively free of fat and saturated fats, plus incorporate many other desirable components (i.e., fiber and phytochemicals), that help create a healthful diet.

The conclusions of the *Diet and Health* report have been presented in an earlier section of this report. However two statements can briefly summarize the conclusions of the report:

“In summary, evidence from epidemiological studies suggest that a diet with high levels of potassium and low levels of sodium may be beneficial in lowering blood pressure and that a high potassium intake may be independently protective against death from stroke. An intake of 3.5 g/day of elemental potassium is associated with a beneficial effect, no threshold for this effect is known.”

and

“Vegetables and fruits are also good sources of potassium. A diet containing approximately 75 mEq (i.e., approximately 3.5 g of elemental potassium) daily may contribute to reduced risk of stroke, which is especially common among blacks and older people of all races. Potassium supplements are neither necessary nor recommended for the general population.”

In 1989, a Consensus Conference convened under the joint sponsorship of several organizations, including the Canadian Coalition for High Blood Pressure Prevention and Control, Canadian Hypertension Society and the Department of National Health and Welfare Canada to attempt to further understand the issue on non-pharmacologic therapy with hypertension. Data presented from cross-sectional studies, randomized and non-randomized trials lead the panel to recommend consumption of potassium rich foods for normotensive individuals and hypertensive patients and further suggested that relevant information be distributed to health care professionals.

Table 7 of Appendix G contains thirty-five “historical” studies regarding the effects of potassium on blood pressure and/or risk of stroke. For the purposes of this petition we have defined “historical” as those studies published prior to the release of the *Diet and Health* report. Almost all of these “historical” studies support a relationship of potassium to risk of stroke or high blood pressure. Thus, the conclusions of the *Diet and Health* report regarding the role potassium may play in reducing blood pressure and/or the risk of stroke should be no surprise.

In the next section we discuss the scientific literature regarding potassium and blood pressure/risk of stroke that has been published since the publication of the *Diet and Health* report.

B. Current Literature Review

Of the thirty-six studies presented Table 8 of Appendix G, twenty-eight suggest that potassium supplementation (potassium sources may differ, i.e., dietary fruits, fruit juices and vegetables or dietary supplements such as tablets) is associated with a decline in blood pressure, thus helping to prevent or reduce symptoms of hypertension and reduce the risk of stroke (Krishna, et al,

1989; Obel, et al, 1989; Geleijnse, et al, 1990; Khaw and Barret-Connor, 1990; Lawton, et al, 1990; Patki, et al, 1990; Cappuccio and MacGregor, 1991; He, et al, 1991; Krishna and Kapoor, 1991; Siani, et al, 1991; Fotherby and Potter, 1992; Smith et al, 1992; Geleijnse, et al, 1994; Yamori, et al, 1994; Gillman, et al, 1995; Ascherio, et al, 1996; Brancati et al, 1996; Geleijnse, et al, 1996; Fotherby and Potter, 1997; Sudhir, et al, 1997; Whelton et al, 1997; Ascherio, et al, 1998; Sacks, et al, 1998; Harsha, et al, 1999; Hiroyasu, et al, 1999; Joshipura, et al, 1999; Morris, et al, 1999; Wilson, et al, 1999); one article suggests that dietary factors, especially sodium and saturated fatty acids are of primary importance as the determinants of stroke mortality (Sasaki, et al, 1995); one article discusses the importance of pharmacological treatment for mild hypertensive patients, but also discusses the importance of combining dietary considerations with medication (Langford, et al, 1991); five studies argue that fruit and vegetables or their components are an important determinant of hypertension and/or risk of stroke (Ascherio, et al, 1992; Gillman, et al, 1995; Ascherio, et al, 1996; Harsha, et al, 1999; Joshipura, et al, 1999); one article suggests that the combination of potassium, magnesium, and calcium does not significantly lower blood pressure (Sacks, et al, 1995) and lastly, several articles evaluate the effects of potassium supplements on blood pressure (Grimm, et al, 1990; Cappuccio and MacGregor, 1991; Overlack et al, 1991; Smith et al, 1992; Brancati, et al, 1996; Fotherby and Potter, 1997; Whelton et al, 1997). Several articles discuss the feasibility and economical benefits associated with potassium use and suggest that it may be a viable alternative for certain hypertensive patients on pharmacological therapy. Many of the authors of the articles suggest that an increase in consumption of foods rich in potassium would constitute a relatively low-cost, low-risk public health measure to decrease high blood pressure and to reduce the risk of stroke.

The Dietary Approaches to Stop Hypertension (DASH) trial, deserves special mention as it directly examined the impact of increasing either 1) fruits and vegetables (fruit and vegetable group) or 2) fruit, vegetables and low-fat dairy (combination group) products on blood pressure (Harsha, et al. 1999). The DASH trial examined the effects of these dietary changes in 459 adults with blood pressure <160 mm Hg systolic and 80-95 mm Hg diastolic. The control diets contained the following servings of food each day: 1.6 servings of fruit and fruit juices, 2.0 servings of vegetables, 8.2 servings of grains, 0.1 servings of low-fat dairy products and 0.4 servings of regular-fat dairy products per day. The fruit and vegetable group consumed 5.2 servings of fruit and fruit juices, 3.3 servings of vegetables, 6.9 servings of grains, 0 servings of low-fat dairy products and 0.3 servings of regular-fat dairy products per day. The combination group consumed 5.2 servings of fruit and fruit juices, 4.4 servings of vegetables, 7.5 servings of grains, 2.0 servings of low-fat dairy products and 0.7 servings of regular-fat dairy products per day. The control group had a target intake of 1,700 mg potassium, 165 mg magnesium, 450 mg calcium and 3,000 mg sodium per day. The intake targets (per day) for the fruit and vegetable group were 4,700 mg potassium, 500 mg magnesium, 450 mg calcium and 3,000 mg sodium. The intake targets (per day) for the combination group was 4,700 mg potassium, 500 mg magnesium, 1240 mg calcium and 3,000 mg sodium. As an assessment of dietary changes, it was reported that urinary excretion of potassium increased in the fruit and vegetable group (1,298 mg/d) and in the combination group (1,500 mg/d) as compared to the control group (146 mg/d).

The combination diet reduced blood pressure by 5.50 mm Hg systolic and 3.0 mm Hg diastolic compared to the control group ($p < .001$). The fruit and vegetable group had 2.8 mm Hg systolic

($p < .001$) and 1.1 mm Hg diastolic ($p = .07$) lower blood pressure than the control group. The drops in blood pressure were seen by two weeks and were sustained throughout the 8 weeks of the intervention. In a sub-analysis, it was reported that the combination diet lowered systolic blood pressure more in African Americans than in whites. The authors concluded that if the general population adopted the DASH combination diet, a 27% reduction of in stroke incidence could be expected.

A recently published large study also warrants special discussion. Late last year results from an analysis of two large cohorts, the Nurses' Health Study (NHS) and the Health Professionals' Follow-up Study (HPFS), were published regarding the relationship of fruit (including fruit juices) and vegetable intake and ischemic stroke (Joshipura, 1999). The objective of this study was to examine the association between fruit and vegetable intake and ischemic stroke. Both cohorts follow a similar protocol with participants completing mailed questionnaires every 2 years to provide data for medical history, health behaviors, and the occurrence of cardiovascular and other disease outcomes. Following inclusion and exclusion criteria, the total number of subjects included in the analysis was 75,596 females and 38,683 males.

The dietary assessment procedure required that the participants report their average intake on the dietary questionnaire. Specified portion size for each food over the past year was recorded. The researchers converted responses of the individual food items to average daily intake of each fruit and vegetable item for each subject. The average daily intakes of individual food items were combined to provide data for total fruit and vegetable intake, as well as intakes of composite fruit and vegetable groups. Vitamin C-rich fruits and vegetables included items defined as having

greater than 30 mg of vitamin C per serving. For total vegetable intake, data on potatoes, tofu and soybeans, dried beans and lentils or items with small portion sizes (i.e., chili sauce and garlic) were not included.

Joshiyura and associates (1999) recorded 670 total strokes among women: 366 new cases of ischemic stroke, 198 new cases of hemorrhagic stroke, and 106 of unknown type. Of the male participants, 317 total strokes were reported: 204 new cases of ischemic stroke, 64 new cases of hemorrhagic stroke, and 49 of unknown type. Hemorrhagic stroke represented a small number of cases and thus, researchers decided to focus on ischemic stroke.

Results showed that median consumption of total fruits (including fruit juices) and vegetables were 5.8 and 5.1 servings per day for women and men, respectively. Overall, fruit and vegetable intake was inversely related to risk of ischemic stroke after statistical adjustments to eliminate confounding variables. **More specifically, one serving of fruits or vegetables a day was associated with a 7% lower risk among women and a 4% lower risk among men—for the combined population, it was determined that one serving per day translates to a 6% lower risk for ischemic stroke (p=0.01).** Similar statistical trends were noticed for total fruit and for total vegetables separately. Participants who were defined as having a high consumption of cruciferous vegetables (e.g., broccoli, cabbage, cauliflower, brussel sprouts), green leafy vegetables, citrus fruits, and vitamin-C rich fruit and vegetables reported the lowest risks for developing stroke conditions. Results remained similar even after adjustment for variables that could potentially alter the findings (i.e., protein, cereal fiber, saturated fat, trans fatty acids, polyunsaturated fat, cholesterol or meat intake; 95% CI).

Analysis of the NHS and HPFS population suggests that a protective effect exists between fruit (including fruit juices) and vegetable intake and risk of ischemic stroke in men and women. Furthermore, intake of cruciferous and green leafy vegetables, citrus fruits, and citrus juices demonstrated an inverse relationship with risk of ischemic stroke in both cohort populations. After controlling for cardiovascular risk factors, individuals with the highest fruit and vegetable consumption had a relative risk for stroke of 0.69 (95% CI). The researchers of this study suggest that potassium, folate, and fiber (all constituents of fruits and vegetables) may be responsible for the inverse association with risk of ischemic stroke.

Table 9 of Appendix G contains a list of nineteen recent review articles regarding the role of potassium in the regulation of blood pressure and risk of stroke. Almost all of the review articles conclude or suggest significant health benefits of increased potassium in the diet.

Taken as a whole, the data summarized here and in Appendix G (Tables 7, 8 and 9) support the conclusion of the *Diet and Health* report. Thus, there appears to be significant scientific agreement that increased potassium in the diet may reduce blood pressure and/or the risk of stroke.

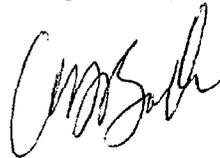
VII. Conclusions

The NRC/NAS, a scientific body qualified to make an authoritative statement under FDAMA, published an authoritative statement about the relationship of dietary potassium to lower blood pressure and reduced the risk of stroke in its *Diet and Health* report. This report is still in effect and represents a scientifically sound review of the evidence on diet and disease risk in the

American population. Current scientific literature supports the conclusion of the *Diet and Health* report regarding benefits of increased potassium in the diet to help reduce blood pressure and the risk of stroke.

The majority of adult Americans are not consuming the recommended levels of potassium (3,500 mg/day). Unfortunately, very few foods contain potassium information on the Nutrition Facts panel. The proposed authoritative statement claim about diets high in potassium containing foods and reduction of blood pressure and the risk of stroke will raise consumer awareness about the benefits of increasing potassium the diet. Making this claim available for foods that contain greater than 10% DV for potassium (>350 mg/RACC) will provide impetus for more food manufacturers to provide potassium information on food labels and will subsequently allow consumers to more easily find foods that provide meaningful levels of potassium. Additionally since foods eligible for the proposed claim are consistent with current dietary recommendations and with other approved health claims it is likely that increased consumption of foods high in potassium will further help Americans consume a healthier diet and help achieve important government goals to enhance public health.

Respectively submitted,



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