

Appendix G

Table 7. Historical Chart of Clinical Studies Involving Potassium and its Role in Blood Pressure and Stroke

Appendix G

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Title	Author(s), Journal	Year	Does potassium benefit? Yes or No
Observations on the management of hypertension.	Priddle, W. W., Canadian Medical Association	1931	Yes
Effect of potassium loading on blood pressure, sodium excretion and plasma rennin activity in hypertensive patients.	Morino, T., R. McCaa and H. G. Langford, Clinical Research	1978	Yes
Relation between blood pressure and rennin, rennin substrate, angiotension II, aldosterone and urinary sodium and potassium in 574 ambulatory subjects.	Walker, W. G., P. K. Whelton, H. Saito, R. P. Russel and J. Hermann, Hypertension	1979	Yes
Studies on the hypotensive effects of high potassium intake in patients with essential hypertension.	Iimura, C. P., T. Kijima, A. Miyama, T. Ando, T. Nakao and Y. Takigama, Clinical Science	1981	Yes
Population study of blood pressure and associated factors in St. Lucia, West Indies.	Khaw, K. T. and G. Rose	1982	Yes
Randomized double-blind cross-over trial of potassium on blood pressure in normal subjects.	Khaw, K.T. and S. Thom, Lancet	1982	Yes
Moderate potassium supplementation in essential hypertension.	MacGregor, G.A., S. J. Smith, N. D. Markandu, R. A. Banks and G.A. Sagnella, Lancet	1982	Yes
Dietary potassium and blood pressure in a population.	Khaw, K. T. and E. Barret-Connor, American Journal of Clinical Nutrition	1984	Yes
Potassium supplementation in hypertensive patients with diuretic-induced hypokalemia.	Kaplan, N. M., A. Carnegie, P. Raskin, J. A. Heller and M. Simmons, New England Journal of Medicine	1985	Yes

Appendix G

Table 7. Historical Chart of Clinical Studies Involving Potassium and its Role in Blood Pressure and Stroke (Cont.)

Dietary potassium and hypertension.	Langford, H. O., Proceedings of NIH Workshop	1985	Yes
Potassium supplementation in blacks with mild to moderate essential hypertension.	Matlou, S.M., C. G. Isles, A. Higgs, F. J. Milne, G. D. Murray, E. Schultz and I. F. Starke, Journal of Hypertension	1986	Yes
Placebo-controlled trial of oral potassium in the treatment of mild hypertension.	Svetkey, L. P., W. E. Yarger, J. R. Feussner, E. DeLong and P. E. Klotman, Clinical Research	1986	Yes
Dietary potassium and stroke-associated mortality. A 12- year prospective population study.	Khaw, K. T. and E. Barret-Connor, New England Journal of Medicine	1987	Yes
Effects of moderate low sodium/high potassium diet on essential hypertension: Results of a comparative study.	Bompiani, G. D., G. Cerasola, M. L. Morici, M. Condorelli, B. Trimarco, N. DeLuca, G. Leonetti, L. Sampieri, C. Cuspidi, S. Cottone and G. D'Ignoto, International Journal of Clinical Pharmacology, Therapy, and Toxicology	1988	Yes
Calcium intake and the relationship of dietary sodium and potassium to blood pressure.	Gruchow, H.W., K. A. Sobocinski and J. J. Barboriak, American Journal of Clinical Nutrition	1988	Yes
The association between blood pressure, age, and dietary sodium and potassium: A population study.	Khaw, K. T. and E. Barrett-Connor, Circulation	1988	Yes
Intersalt: An international study of electrolyte excretion and blood pressure. Results for 24- hour urinary sodium and excretion.	Intersalt Cooperative Research Group, British Medical Journal	1988	Yes

Appendix G

**Table 7. Historical Chart of Clinical Studies Involving Potassium and its Role in Blood Pressure and Stroke
(Cont.)**

Relationship of dietary sodium, potassium, calcium, and magnesium with blood pressure: Belgian interuniversity research on nutrition and health.	Kesteloot, H. and J. V. Joossens, Hypertension	1988	No, authors suggest Yes
Change in blood pressure in relation to change in nutrients affected by manipulation of dietary sodium and potassium.	Nowson, C.A. and T. O. Morgan, Clinical Experimental Pharmacology and Physiology	1988	Yes
Urinary electrolyte excretion, alcohol consumption, and blood pressure in the Scottish heart health study.	Smith, W .C. S., I. K. Crombie, R. T. Tavendale, S. K. Gulland and H. D. Tunstall-Pedoe, British Medical Journal	1988	Yes
Increased blood pressure during potassium depletion in normotensive men.	Krishna, G. G., E. Miller and S. Kapoor, New England Journal of Medicine	1989	Yes

Appendix G

**Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after
1989**

Appendix G

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BP = blood pressure

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Reduction in blood pressure with a low sodium, high potassium, high magnesium salt in older subjects with mild to moderate hypertension. <i>Geleijnse, J.M., Witteman, J.C.M., Bak, A.A.A., den Breijen, J.H., & Grobbee, D.E. (1994, BMJ)</i></p>	<p>To examine the effect of a reduced sodium and increased potassium and magnesium intake on blood pressure.</p>	<ul style="list-style-type: none"> ▪ Randomized double-blind placebo controlled trial ▪ Intervention group received a mineral salt (sodium: potassium: magnesium, 8:6:1) and foods prepared with the mineral salt ▪ Controls received common salt and foods 	<ul style="list-style-type: none"> ▪ 100 subjects (51 males and 49 females) from the suburb of Rotterdam (taken from the Rotterdam Cohort Study) ▪ age was between 55 and 75 years (mean age for control group was 67.1 and 65.7 for mineral salt group) ▪ untreated mild to moderate hypertension ▪ subject BP had to be between 140 to 200 mm Hg for systolic and 85 to 110 mmHg for diastolic 	<p>24 weeks</p>	<ul style="list-style-type: none"> ▪ systolic and diastolic BP fell 7.6 mmHg and 3.3 mmHg, respectively, in the intervention group ▪ No differences seen between two groups 25 weeks after the study 	<p>Replacing common sodium salt could offer a valuable non-pharmacological approach to lowering BP in older people with mild to moderate hypertension</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Sodium and potassium intake and blood pressure change in childhood. <i>Geleijnse, J.M., Grobbee, D.E., & Hofman, A. 1990. Br Med J.</i></p>	<p>To assess the association between sodium and potassium intake and the rise in blood pressure in childhood.</p>	<ul style="list-style-type: none"> ▪ Longitudinal study of a cohort of children with annual measurements of blood pressure 	<ul style="list-style-type: none"> ▪ 233 children (108 boys and 125 girls) from two districts of the Netherlands ▪ aged 5 to 17 years (mean age was 13.2) ▪ range of BP was as follows: systolic was 81 to 153 mmHg; diastolic was 44 to 97 mmHg 	<p>an average follow-up period of 7 years</p>	<ul style="list-style-type: none"> ▪ mean systolic BP were lower when potassium intake was higher ▪ mean yearly change in systolic BP was 1.4 mmHg in the high potassium group and 2.4 mmHg in the group with a low potassium intake 	<p>Dietary potassium and the dietary sodium to potassium ratio are related to the rise in blood pressure in childhood and may be important in the early pathogenesis of primary hypertension.</p>
<p>Dietary sodium, potassium, saturated fat, alcohol, and stroke mortality. <i>Sasaki, S., Zhang, X., & Kesteloot, H. 1995, Stroke</i></p>	<p>The purpose of this study was to examine the relationship between dietary sodium and saturated fatty acids together with dietary potassium, alcohol, and stroke risk.</p>	<ul style="list-style-type: none"> ▪ Meta-analysis ▪ Data was obtained from World Health Organization 24 hour urinary excretion levels of sodium and potassium were collected from 24 published articles (17 countries) 	<ul style="list-style-type: none"> ▪ studies with populations of a mean age around 40 years were selected 		<ul style="list-style-type: none"> ▪ highest degree of correlation was found between urinary sodium and stroke mortality 	<p>Dietary factors, especially sodium and saturated fatty acids, are of primary importance as determinants of stroke mortality at the population level.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
Dietary electrolyte intake and blood pressure in older subjects: The Rotterdam Study. Geleijnse, J.M., Witteman, J.C.M., den Breeijen, J.H., Hofman, A., de Jong, P.T.V.M., Pols, H.A.P., & Grobbee, D.E. 1996, <i>J Hypertension</i> .	To examine the relation between dietary electrolyte intake and blood pressure in older people.	<ul style="list-style-type: none"> ▪ Study included participants from a cohort study (Rotterdam Study-a population-based study) ▪ Subjects completed a food checklist and then interviewed by a dietitian ▪ Subjects were free of hypertensive medication 	<ul style="list-style-type: none"> ▪ 3239 subjects (1392 males, 1847 females) ▪ mean age was 66.8 years ▪ mean systolic and diastolic BP was 136.3 and 73.0 mmHg, respectively. ▪ Mean potassium intake was 3700 mg/day; magnesium was 311 mg/day; calcium was 1127 mg/day 		An increase in potassium intake of 1g/day was associated with a 0.9 mmHg lower systolic and a 0.8 mmHg lower diastolic BP. An increase in magnesium intake of 100 mg was associated with a 1.2 mmHg lower systolic and a 1.1 mmHg lower diastolic BP.	An increase in the intake of foods rich in potassium and magnesium could lower blood pressure at older age.
Increased blood pressure during potassium depletion in normotensive men. Krishna, G.G., Miller, E., & Kapoor, S. 1989, <i>N Engl J Med</i> .	To investigate the effect of dietary potassium restriction on blood pressure.	<ul style="list-style-type: none"> ▪ Randomized, cross-over study ▪ Subjects received isocaloric diets providing either low or normal amounts of potassium, while sodium intake was maintained at the subjects' usual levels 	<ul style="list-style-type: none"> ▪ 10 healthy normotensive men 	9 days	With the low potassium diet, plasma potassium levels declined, but plasma sodium and chloride levels were unchanged. Mean arterial and diastolic BP were higher after the low potassium diet as compared to the normal potassium diet.	Short-term potassium depletion increases BP in healthy, normotensive men and permits further increases in BP after saline loading.

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Potassium depletion exacerbates essential hypertension. <i>Krishna, G.G., & Kapoor, S.C. 1991, Ann Intern Med.</i></p>	<p>To determine the effect of potassium depletion on blood pressure in patients with essential hypertension.</p>	<ul style="list-style-type: none"> ▪ Double-blind, randomized, cross-over design with each patient serving as his or her own control ▪ Intervention included patients being placed on a 10 day isocaloric diet either high or low in potassium Sodium was kept constant 	<p>12 patients with hypertension from a clinical research center at Temple University</p>	<p>11 days</p>	<ul style="list-style-type: none"> ▪ Low potassium intake resulted in elevated systolic and diastolic BP (7 and 6 mmHg, respectively) ▪ In a 2 L saline infusion, mean arterial BP increased similarly on both diets, but reach higher levels with the low potassium diet 	<p>Dietary potassium restriction increases BP in patients with essential hypertension. In addition, both sodium retention and calcium depletion may contribute to the increase in BP during potassium depletion.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Increasing the dietary potassium intake reduces the need for antihypertensive medication. Siani, A., Strazzullo, P., Giacco, A., Pacioni, D., Celentano, E., & Mancini, M., 1991. <i>Ann Intern Med.</i></p>	<p>To determine whether an increase in dietary potassium intake from natural foods reduces the need for anti-hypertensive medication in patients with essential hypertension.</p>	<ul style="list-style-type: none"> ▪ randomized, controlled trial ▪ patients were seen monthly ▪ 3 day food records used as well as 24-hour urinary potassium excretion ▪ patients were randomly assigned to one of two groups: high potassium diet or customary diet ▪ all patients were receiving medication for blood pressure ▪ inclusion criteria required a blood pressure value below 160 mmHg for systolic and 95 mmHg for diastolic 	<ul style="list-style-type: none"> ▪ 47 patients (26 in high potassium diet and 21 in customary diet group (Naples, Italy)) ▪ baseline data: mean age in high potassium group was 48.8 years old; mean systolic BP was 138.2 mmHg; mean diastolic BP was 81.1 mmHg; no. of pills per day was 2.24 ▪ baseline data: mean age in customary diet group was 49.3 years old; mean systolic BP was 138.3 mmHg; mean diastolic BP was 80.1 mmHg; no. of pills per day was 2.09 	<p>1 year</p>	<p>After 1 year, the average drug consumption (no. of pill per day) relative to that at baseline was 24% in the high potassium group and 60% in the customary diet group. By the end of the study, BP could be controlled using less than 50% of the initial therapy in 81% of the patients in the high potassium group compared with 29% of the patients in the customary group. Further, patients in the high potassium group finished the study with a lower number of reported symptoms compared with patients in the other group.</p>	<p>Increasing the dietary potassium intake from natural foods is a feasible and effective measure to reduce antihypertensive drug treatment.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
Effects of dietary potassium on blood pressure, renal function, muscle sympathetic nerve activity, and forearm vascular resistance and flow in normotensive and borderline hypertensive humans. <i>Lawton, W.J., Fitz, A.E., Anderson, E.A., Sinkey, C.A., & Coleman, R.A., 1990, Circulation</i>	To evaluate the effect of a low potassium diet on blood pressure in normotensive and in borderline hypertensive subjects.	<ul style="list-style-type: none"> ▪ Randomized, controlled trial ▪ Subjects were studied while on both low potassium, high sodium diets and high potassium, high sodium diets ▪ Normotensive individuals were defined as those who consistently had a systolic and diastolic BP less than 140 and 85 mmHg, respectively ▪ Borderline hypertensive men were described as intermittently had a sitting diastolic BP of 90 mmHg or above 	<ul style="list-style-type: none"> ▪ 21 subjects (11 borderline hypertensive men, 10 normotensive men) ▪ mean age was 24.6 years old; range, 20-31 years old ▪ recruited from clinics at the University of Iowa Hospitals ▪ all subjects were Caucasian 	6 days	<ul style="list-style-type: none"> ▪ during the low potassium diet, daytime ambulatory systolic BP increased in both borderline and normotensive subjects ▪ mean BP was not different in normotensive men during the 2 diets, but was significantly higher during the low potassium diet in borderline hypertensive men ▪ low potassium diet increased the postural rise in diastolic BP when the men changed from lying to quiet standing 	We conclude that a low potassium diet is associated with elevation in BP and disturbances in several electrolytes in borderline and normotensive hypertensive subjects.
Title, Author(s),	Purpose of	Research Design	Subjects	Study	Results	Conclusion

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Year, Journal	Study			Duration		
<p>Effect of drug and diet treatment of mild hypertension on diastolic blood pressure. <i>Langford, H.G., Davis, B.R., Blaufox, D., Oberman, A., Wassertheil-Smoller, S., Hawkins, M., & Zimbaldi, N., 1991, Hypertension</i></p>	<p>To examine the diastolic blood pressure response of various combinations of pharmacological and dietary interventions in the treatment of mild hypertension.</p>	<ul style="list-style-type: none"> ▪ Multicenter, randomized trial ▪ Subjects allocated to 9 drug/diet treatment groups receiving either a placebo, chlorthalidone (25mg), or atenolol (50mg), combined with a usual, a weight loss, or a low sodium/high potassium diet 	<ul style="list-style-type: none"> ▪ 878 participants (55.9% males) ▪ 	6 months	<ul style="list-style-type: none"> ▪ mean baseline diastolic BP was 93.8 mmHg ▪ a significant lower diastolic BP (12.4 mmHg) was seen in the atenolol group compared with either the low sodium/high potassium diet group (7.9 mmHg) or weight loss group (8.8 mmHg) 	<p>In the short-term, treatment of mild hypertension where diastolic BP is the sole consideration, drugs outperform diet. A diet that yielded a modest reduction in sodium intake and a minimal increase in potassium intake resulted in little additional BP reduction compared with diet plus drug.</p>
<p>A prospective study of nutritional factors and hypertension among US men. <i>Ascherio, A., Rimm, E.B., Giovannucci, E.L., Colditz, G.A., Rosner, B., Willet, W.C., Sacks, F., & Stampfer, M.J. 1992, Circulation.</i></p>	<p>To examine the relation of various nutritional factors with hypertension.</p>	<ul style="list-style-type: none"> ▪ Prospective study ▪ Sample taken from Health Professionals Follow-up Study (dietary etiologies of heart disease and cancer among 51,529 health professionals) 	<ul style="list-style-type: none"> ▪ 30,681 predominantly white US male health professionals ▪ 40-75 years of age 	4 years (follow-up)	<ul style="list-style-type: none"> ▪ when fiber was considered, the inverse associations of potassium and magnesium with BP were weakened 	<p>Fruit fiber, but not vegetable or cereal fiber was inversely associated with incidence of hypertension. Despite their small effect, dietary changes may be the an effective BP lowering mechanism.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Combinations of potassium, calcium, and magnesium supplements in hypertension. <i>Sacks, F.M., Brown, L.E., Appel, L., Borhani, N.O., Evans, D., & Whelton, P. 1995, Hypertension.</i></p>	<p>To investigate whether the combination of potassium, calcium and magnesium lowers blood pressure greater than each cation does independently.</p>	<ul style="list-style-type: none"> ▪ Randomized, parallel-group, double-blind study ▪ one of four dietary groups; 1) 60 mmol potassium and 25 mmol (1000mg) calcium, 2) 60 mmol potassium and 15 mmol (360mg) magnesium, 3) calcium and magnesium, or 4) placebo ▪ Standardized clinic BP measurements were obtained on 3 days at baseline and after 3 and 6 months of treatment ▪ Average diastolic blood pressure was 85 to 99 mmHg 	<ul style="list-style-type: none"> ▪ 125 patients (82 men, 43 women) with untreated mild or borderline hypertension ▪ 81 were white, 34 were black, 4 were Hispanic, and 6 were Asian ▪ age range was 26-66 years old (mean age was 53 years old) ▪ subjects enrolled at Johns Hopkins University and University of California, Davis 	<p>6 months</p>	<ul style="list-style-type: none"> ▪ mean differences of the changes in systolic and diastolic BP between the treatment and placebo groups were not significant ▪ BP decreased significantly by 3 to 5 mmHg in the groups assigned to placebo, potassium and magnesium, and calcium and potassium, whereas the BP reduction in the calcium and magnesium group (1mmHg), was non-significant 	<p>Combinations of the dietary cations potassium, magnesium, or calcium did not significantly lower BP in patients with mild or borderline hypertension.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Prospective study of nutritional factors, blood pressure, and hypertension among US women. <i>Ascherio, A., Hennekens, C., Willet, W.C., Sacks, F., Rosner, B., Manson, J., Witteman, J., & Stampfer, M.J., 1996, Hypertension.</i></p>	<p>To examine the relation of nutritional factors with hypertension and blood pressure.</p>	<ul style="list-style-type: none"> ▪ Prospective cohort study (Nurses' Health Study) ▪ Participants completed a detailed semi-quantitative food frequency questionnaire ▪ Subjects had no diagnosis of hypertension, cancer, or cardiovascular disease 	<ul style="list-style-type: none"> ▪ 41,541 predominantly white US female nurses aged 38 to 63 years 	<p>4 years of follow-up</p>	<ul style="list-style-type: none"> ▪ dietary calcium, magnesium, potassium, and fiber were not significantly associated with risk of hypertension ▪ fruit and vegetable intakes were inversely and significantly related with systolic and diastolic BP 	<p>Age, body weight, and alcohol consumption are strong determinants of risk of hypertension in middle-aged women. Further, magnesium and fiber, as well as a diet rich in fruits and vegetables may reduce BP levels.</p>
<p>Effect on blood pressure of potassium, calcium, and magnesium in women with low habitual intake. <i>Sacks, F.M., Willet, W.C., Smith, A., Brown, L.E., Rosner, B., & Moore, T.J. 1998, Hypertension.</i></p>	<p>To evaluate the hypothesis that normotensive persons who have low habitual intake of potassium, calcium, and magnesium would be particularly responsive to supplementation.</p>	<ul style="list-style-type: none"> ▪ Epidemiological, prospective, cohort study (Nurses' Health Study II) ▪ Randomized, parallel trial ▪ 4 groups; 1)potassium and calcium, 2)magnesium, 3) all 3 minerals together, and 4)placebo 	<ul style="list-style-type: none"> ▪ 290 female nurses 	<p>16 week supplement intervention</p>	<ul style="list-style-type: none"> ▪ mean differences of the changes in systolic and diastolic BP between the treatment and placebo groups were significant for potassium (-2.0 and -1.7 mmHg) 	<p>Potassium, but not calcium or magnesium supplements, has a modest BP lowering effect in normotensive persons with low dietary intake.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Normotensive salt-sensitivity: Effects of race and dietary potassium. <i>Morris, R.C., Sebastian, A., Forman, A., Tanaka, M., & Schmidlin, O., 1999, Hypertension.</i></p>	<p>To evaluate whether normotensive salt-sensitivity (a precursor of hypertension) is more common in African Americans and less frequent in Caucasian Americans, but only when dietary potassium is deficient.</p>	<ul style="list-style-type: none"> ▪ metabolically controlled study ▪ subjects ate a basal diet low in sodium (15mmol/day) and marginally deficient in potassium (30mmol/day) ▪ last 4 weeks, sodium chloride was loaded (250 mmol/day); throughout the last 3 weeks, potassium (as potassium bicarbonate) was supplemented to either mid- or high-normal-levels (70 and 120 mmol/day) 	<ul style="list-style-type: none"> ▪ 38 healthy normotensive men (24 blacks, 14 whites) ▪ ages 31 to 65 years ▪ 41 studies conducted in the General Clinical Research Center at University of California San Francisco Moffitt Hospital 	<p>Diet duration was 6 weeks in all studies</p>	<ul style="list-style-type: none"> ▪ when dietary potassium was 30 mmol/day, salt loading induced a mean increase in BP only in blacks, and salt-sensitivity occurred in most blacks but not whites (79% vs 36%) ▪ supplemented potassium only to 70 mmol/day attenuated moderate salt-sensitivity, which occurred in a quarter of affected blacks, and suppressed the frequency and severity of salt-sensitivity in blacks to levels observed in 	<p>In normotensive black men (not white men) salt-sensitivity occurs when dietary potassium is even marginally deficient, but is dose-dependently suppressed when dietary potassium is increased within its normal range. Such suppression might prevent or delay the occurrence of hypertension.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	whites. Results	Conclusion
<p>Effects of potassium on blood pressure in salt-sensitive and salt-resistant black adolescents. <i>Wilson, D.K., Sica, D.A., & Miller, S.B., 1999, Hypertension.</i></p>	<p>To examine the effects of increasing dietary potassium on ambulatory blood pressure nondipping status (<10% decrease in blood pressure from awake to asleep) and cardiovascular reactivity in salt-sensitive and salt-resistant black adolescents.</p>	<ul style="list-style-type: none"> ▪ Randomized, controlled study ▪ Subjects participated in a 5-day low sodium diet (50mmol/day) followed by a 10-day high sodium (150 mmol/day—sodium chloride supplement) diet to determine salt-sensitivity → 16 salt-sensitive and 42 salt resistant subjects were then randomly assigned to either a 3week high potassium diet (80mmol/day) or a usual diet control group ▪ Treatment group ate high potassium foods (6 to 8 serv/day) 	<ul style="list-style-type: none"> ▪ 58 normotensive black adolescents aged 13 to 16 years ▪ recruited from schools and churches in Virginia 	<p>3 week diet/control intervention</p>	<ul style="list-style-type: none"> ▪ after the dietary intervention, all of the salt-sensitive subjects in the high potassium group achieved dipper status as a result of a drop in nocturnal diastolic BP ▪ no significant group differences in cardiovascular reactivity 	<p>A positive relationship between dietary potassium intake and BP modulation can still exist even when daytime BP is unchanged by a high potassium diet.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Reduced dietary potassium reversibly enhances vasopressor response to stress in African Americans. <i>Sudhir, K., Forman, A., Yi, S., Sorof, J., Schmidlin, O., Sebastian, A., & Morris, R.C., 1997, Hypertension.</i></p>	<p>To compare acute vasopressor responses to cold and mental stress in black and white normotensive men.</p>	<ul style="list-style-type: none"> ▪ randomized, controlled study ▪ 3 successive dietary periods: 1) while dietary potassium was reduced and salt was restricted (10 to 14 days), 2) while salt was loaded (7 days), and 3) while salt loading was continued and potassium was either supplemented (7 to 21 days) or continued reduced (28 days) 	<ul style="list-style-type: none"> ▪ total of 18 normotensive males ▪ healthy volunteers from General Clinic Research Center at Moffitt Hospital, University of California, San Francisco 	<p>Up to 42 days</p>	<ul style="list-style-type: none"> ▪ at lower potassium intakes, cold-induced increase in forearm vascular resistance in blacks was twice that in whites during both salt restriction and salt loading ▪ normalization of dietary potassium attenuated cold-induced increases in both vascular resistance and systolic and diastolic BP in blacks, but only systolic BP in whites 	<p>In normotensive blacks, but not whites, a marginally reduced dietary intake of potassium reversibly enhances adrenergically mediated vasopressor responsiveness to stress, which with time, may promote the pathogenesis of hypertension.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>The influence of oral potassium chloride on blood pressure in hypertensive men on a low-sodium diet. <i>Grimm, R.H., Neaton, J.D., Elmer, P.J., Svendsen, K.H., Levin, J., Segal, M., Holland, L., Witte, L.J., Clearman, D.R., Kofron, P., LaBounty, R.K., Crow, R., & Prineas, R.J., 1990, N Engl J Med.</i></p>	<p>To investigate whether supplemental potassium chloride reduced the need for anti-hypertensive medication in hypertensive men on a restricted sodium diet.</p>	<ul style="list-style-type: none"> ▪ Randomized, placebo-controlled, double-blind clinical trial ▪ Potassium source was oral potassium chloride ▪ Men in both groups received instructions on how to follow a low-sodium diet ▪ Potassium content was 96 mmol/day ▪ Withdrawal of anti-hypertensive medication after 12 weeks of following low-sodium diet → then monitored closely for 6 weeks and then seen bimonthly for at least 2 years 	<ul style="list-style-type: none"> ▪ 287 men 45 to 68 years of age ▪ 142 given potassium chloride and 145 given placebo ▪ subjects recruited from Minneapolis area 	<p>Men were followed for an average of 2.2 years after the withdrawal of their antihypertensive medication</p>	<ul style="list-style-type: none"> ▪ participants in the oral potassium chloride group had significantly higher serum potassium levels and urinary potassium excretion during follow-up than placebo participants ▪ 79 participants in each group required re-institution of anti-hypertensive medication ▪ no significant differences in systolic or diastolic BP were observed between the two groups 	<p>The supplemental potassium chloride does not reduce the need for anti-hypertensive medication in hypertensive men on a restricted sodium diet.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Fruit and vegetable intake in relation to risk of ischemic stroke. <i>Joshipura, K.J., Ascherio, A., Manson, J.E., Stampfer, M.J., Rimm, E.B., Speizer, F.E., Hennekens, C.H., Spiegelman, D., & Willet, W.C. 1999, JAMA.</i></p>	<p>To examine the associations between fruit and vegetable intake and ischemic stroke.</p>	<ul style="list-style-type: none"> ▪ Prospective cohort study from 2 databases—Nurses' Health Study (NHS) & Health Professionals' Follow-up Study (HPFS) ▪ Inclusion criteria included that participants were free of cardiovascular disease, cancer, and diabetes at baseline 	<ul style="list-style-type: none"> ▪ 75,596 women aged 34 to 59 years from the NHS ▪ 38,683 men aged 40 to 75 years from the HPFS 	<ul style="list-style-type: none"> ▪ NHS had 14 years of follow-up (1980-1994) ▪ HPFS had 8 years of follow-up (1986-1994) 	<ul style="list-style-type: none"> ▪ Overall fruit and vegetable intake was inversely related to risk of ischemic stroke ▪ 1 serving per day was associated with a 7% lower risk among females and 4% lower risk among males—for total population, 1 serving per day was associated with a 6% lower risk for ischemic stroke ▪ high consumption of citrus fruits, cruciferous vegetables, green leafy 	<p>Analysis of the two large cohorts revealed that a protective effect exists between fruit and vegetable intake and risk of ischemic stroke in both men and women. Further emphasis is placed on intake of cruciferous and green leafy vegetables, citrus fruits, and citrus juices (i.e. orange juice). Potassium, folate, and fiber are thought to be responsible for the inverse association with stroke risk.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>vegetables, and vitamin-C rich fruit and vegetables reported the lowest stroke risk</p> <ul style="list-style-type: none"> ▪ 670 total strokes among women ▪ 317 total strokes among men ▪ individuals who consumed higher quantities of fruits and vegetables were older and had healthier lifestyles as suggested by lower rates of smoking and higher incidence of physical activity ▪ smoking and physical activity were more strongly 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>related to fruit intake compared with vegetables</p> <ul style="list-style-type: none"> ▪ 1986 results showed that median consumption of total fruits and vegetables were 5.8 and 5.1 servings per day for women and men, respectively ▪ data suggested that an inverse relationship existed between fruits, citrus fruits, and cruciferous vegetables and risk of stroke (strongest in the non- vitamin & mineral supplement users as compared with the supplement user group) 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Dietary approaches to stop hypertension (DASH Collaborative Research Group): A summary of study results. Harsha, D., Lin, P-H., Obarzanek, E., Karanja, N.M., Moore, T.J., & Caballero, B. 1999, <i>JADA</i>, 99 (suppl); S35-9.</p>	<p>To test the effects on blood pressure of 3 dietary patterns.</p>	<ul style="list-style-type: none"> ▪ Randomized controlled study ▪ 3 groups: control group, fruit and vegetable diet, and a combination diet ▪ control diet was low in fruits, vegetables, and dairy products, with a fat content typical for Americans ▪ fruit and vegetable diet was high in fruits and vegetables, but otherwise similar to control ▪ combination diet focused on fruits, vegetables, and low-fat dairy products— included whole grains, poultry, fish, nuts and was reduced in fats, red meat, 	<ul style="list-style-type: none"> ▪ > 22 years of age ▪ systolic blood BP <160 mmHg and diastolic BP 80-95 mmHg ▪ study goal to include 66% minorities; 60% were African American ▪ 459 total participants (154 in control group, 154 in fruit and vegetable group, 151 in combination diet) 	<p>3 week run-in period with 8 weeks in one of three groups</p>	<ul style="list-style-type: none"> ▪ urinary excretion of potassium was greater for fruit and vegetable group and the combination group than the control group ▪ mean sodium excretion was similar across the three diet groups from baseline the end of the intervention ▪ combination diet reduced BP by 5.5 mmHg systolic and 3.0 mmHg diastolic more than the control group (p<0.001) ▪ systolic BP was 2.8 mmHg (p<0.001) lower and 	<p>This study showed:</p> <ol style="list-style-type: none"> 1) a diet rich in fruits and vegetables lowered BP compared with a diet similar to what many Americans eat, 2) the combination diet almost doubled the BP reduction of a diet simply high in fruits and vegetables 3) BP reductions occurred within 2 weeks and, 4) the combination diet reduced BP in men and women, younger and older persons, minorities and

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

		<p>sweets, and sugary beverages—diet was increased in potassium, magnesium, calcium and fiber</p> <ul style="list-style-type: none"> ▪ primary outcome of study was change in diastolic blood pressure ▪ physical activity level was unaltered 			<p>diastolic BP was 1.1 mmHg ($p < 0.07$) lower in participants on the fruits and vegetables diet than in those on the control diet</p> <ul style="list-style-type: none"> ▪ combination diet reduced BP by 2.7 mmHg systolic ($p < 0.001$) and 1.9 mmHg diastolic ($p < 0.002$), respectively, more than the fruits and vegetable diet ▪ significant decreases in BP were noted in the group without hypertension ▪ hypertensive participants had greater BP reduction as compared to those without hypertension 	<p>nonminorities, and persons with and without hypertension, but was particularly effective in the minority and hypertensive groups</p> <p>The magnitude of the effect on BP of the combination diet among persons with stage 1 hypertension was similar to that observed in single drug antihypertensive therapy.</p>
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Intake of potassium, magnesium, calcium, and fiber and risk of stroke among US men. Ascherio, A., Rimm, E.B., Hernan, M.A., Giovannucci, E.L., Kawachi, I., Stampfer, M.J., & Willet, W.C. 1998, <i>Circulation</i>, 98; 1198-1204.</p>	<p>To investigate the role of potassium and other related nutrients (i.e., fiber, magnesium, and calcium) with risk of stroke.</p>	<ul style="list-style-type: none"> ▪ Large prospective cohort study ▪ Sample taken from Health Professionals Follow-up Study ▪ 1986 questionnaire asked about average frequency of intake of 131 foods and use of vitamin/mineral supplements ▪ nutrient calculations took into account the specific brand of breakfast cereal and multivitamins reported by each participant 	<ul style="list-style-type: none"> ▪ Total of 43,738 male participants ▪ Aged 40-75 years old 	<p>8 years follow-up</p>	<ul style="list-style-type: none"> ▪ during 323,394 person-years of follow-up, the researchers documented 328 cases of cerebrovascular accidents, including 210 ischemic; 70 hemorrhagic, and 48 unclassified strokes ▪ men in the top fifth of potassium intake (including potassium supplements) were less likely to smoke, were more physically active, and consumed less alcohol, less fat, more protein, and more micronutrients 	<p>Men with diets higher in potassium, cereal fiber, and magnesium had a substantially reduced risk of stroke. The inverse associations were only partly explained by non-dietary risk factors, but were strong and significant only among men with diagnosed hypertension. No significant associations were found between intakes of sodium and calcium and risk of stroke.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>than men in the bottom fifth— similar relations were found for magnesium, fiber and calcium</p> <ul style="list-style-type: none"> ▪ the age-adjusted relative risk of total stroke for men in the top fifth of potassium intake compared with those in the bottom fifth was 0.59 ▪ intakes of dietary fiber and magnesium were both inversely associated with risk of total stroke in age-adjusted analyses ▪ Pearson correlation coefficients were 0.65 for magnesium and 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>potassium, 0.62 for magnesium and fiber, and 0.58 for potassium and fiber</p> <ul style="list-style-type: none"> ▪ neither calcium nor sodium intake was significantly associated with risk of total, ischemic, or hemorrhagic stroke—sodium intake was also unrelated to intake of potassium ▪ relative risk for men who took ≥ 400 mg/d of supplemental calcium compared with non-users was 0.88 for total stroke ▪ when intakes of dietary fiber from different sources were considered separately, only 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>cereal fiber was inversely associated with risk of stroke—both potassium and cereal fiber intake appeared to be independently inversely associated with risk of total stroke</p> <ul style="list-style-type: none"> ▪ intakes of fruits, vegetables, and cereal products were each inversely associated with risk of total stroke, but none of these associations were significant ▪ neither use of potassium supplements nor use of magnesium supplements was associated with risk of total or 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					ischemic stroke, but use of potassium supplements became strongly inversely associated after adjustment for history of hypertension— history of hypertension was a strong independent risk factor for stroke (relative risk=2.8) and was associated with use of potassium supplements	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Protective effects of fruits and vegetables on development of stroke in men. Gillman, M.W., Cupples, A., Gagnon, D., Posner, B.M., Ellison, R.C., Castelli, W.P., & Wolf, P.A., 1995, <i>JAMA</i>, 273; 1113-7.</p>	<p>To examine the effect of fruit and vegetable intake on risk of stroke among middle-aged men over 20 years of follow-up.</p>	<ul style="list-style-type: none"> ▪ Large cohort (Framingham Study-longitudinal study started in 1948) ▪ 5 quintiles for fruit and vegetable intake ▪ 3 categories of fruits and 10 categories of vegetables used in study 	<ul style="list-style-type: none"> ▪ 832 male participants ▪ age range was 45 to 65 years old ▪ all subjects were free of cardiovascular disease at baseline 	<p>20 years of follow-up</p>	<ul style="list-style-type: none"> ▪ mean number of daily servings of fruits and vegetables was 5.1 servings and mean total energy intake was 2613 kcal ▪ participants in the 1st quintile had 0-2 servings of fruits and vegetable intake/d; 3-4 servings/d in 2nd quintile; 5 servings in 3rd quintile; 6-7 servings in 4th quintile; 8-19 servings in last quintile ▪ during 20 year follow-up, there were 97 incident cerebrovascular accidents 	<p>The authors concluded that there exists an inverse relationship between fruit and vegetable intake and the development of stroke.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<ul style="list-style-type: none"> ▪ there was a substantial trend of protection against stroke from lowest (1st quintile) to highest (5th quintile) fruit and vegetable intake ($p < 0.01$) ▪ for each increment of 3 daily servings of fruits and vegetables, there was a 22% decrease in the risk of all stroke ▪ mean number of servings of fruit per/d was 1.8, and mean number of vegetables servings was 3.3 ▪ researchers also observed a reduced risk for stroke mortality 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Does potassium supplementation lower blood pressure? A meta-analysis of published trials. Cappuccio, F.P & MacGregor, G.A. 1991. <i>J Hypertension</i>, 9; 465-73.</p>	<p>To review several clinical trials examining the same endpoint—increasing potassium intake to lower blood pressure.</p>	<ul style="list-style-type: none"> ▪ Meta-analysis of 19 clinical trials ▪ 11/19 studies were double-blind, 10 were crossover design and 4 included a parallel-group comparison ▪ 13 trials were carried out in patients with a variable degree of essential hypertension—2 of which were in hypertensive patients on drug therapy while 6 were on normal subjects ▪ average amount of potassium given was 86 mmol/day ▪ average blood pressure of the pooled sample in all trials was 140/87 mmHg 	<ul style="list-style-type: none"> ▪ a total of 586 participants (412 of whom suffered essential hypertension) ▪ 586 participants in treatment groups while 240 were in placebo groups ▪ males represented approx. 76% and white participants represented approx. 69% ▪ mean age was 39.6 years old (range of 21-58) 	<p>The average duration of supplementation was 39 days (range of 5-112 days).</p>	<ul style="list-style-type: none"> ▪ In all trials, supine BP was reduced as follows—5.9 and 3.4 mmHg for systolic and diastolic, respectively (ranges: 5.2 to 6.6 mmHg for systolic and 2.8 to 4.0 for diastolic) ▪ Standing BP in all trials was reduced by 10.1 and 4.7 mmHg for systolic and diastolic, respectively (ranges: 8.9 to 11.3 mmHg for systolic and 3.8 to 5.6 mmHg for diastolic) ▪ In hypertensive trials e, a supine BP 	<p>The results indicate that an oral potassium supplement produced a significant reduction in supine BP in the subjects treated overall. A larger significant reduction in BP in patients with high BP was documented.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>reduction of 8.2 and 4.5 mmHg for systolic and diastolic, respectively (ranges: 7.3 to 9.1 mmHg for systolic and 3.8 to 5.2 mmHg for diastolic)</p> <ul style="list-style-type: none"> ▪ In hypertensive subjects, standing BP was reduced by 11.9 and 5.4 for systolic and diastolic, respectively (ranges: 10.5 to 13.3mmHg for systolic and 4.4 to 6.4 mmHg for diastolic ▪ BP reduction was more pronounced the longer the duration of supplementation 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Associations between blood pressure and dietary intake and urinary excretion of electrolytes in a Chinese population. Tian, H., Nan, Y., Shao, R., Dong, Q., Hu, G., Pietinen, P., Nissinen, A. 1995, <i>J Hypertension</i>, 13; 49-56.</p>	<p>To examine the associations between blood pressure and sodium, potassium, calcium and magnesium in a cross-sectional study.</p>	<ul style="list-style-type: none"> ▪ Cross-sectional study of a Chinese population by 24 hour urine collections and food weighing with 3 day food records ▪ Intakes of dietary electrolytes were calculated using the Chinese Food Composition Table 	<ul style="list-style-type: none"> ▪ 663 total participants—328 males and 335 females from Tiannin, People's Republic of China ▪ mean age of males was 43.6 years ▪ mean age of females was 43.5 years ▪ mean systolic and diastolic BP for males was 126 and 81 mmHg and 121 and 78 mmHg for females 	<p>4 days</p>	<ul style="list-style-type: none"> ▪ the slope of systolic BP with age was greater than slope of diastolic BP with age in both sexes—thus, percentage of hypertensives was higher for subjects aged 50-64 years than in those aged 20-49 years ▪ the prevalence was 5.7-fold higher for males and 9.5-fold higher for females aged 50-64 years than for those aged 20-49 years ▪ analysis revealed a significant 	<p>Present results indicate that factors contributing to high BP in Tianjin, are related to age, body mass index, high sodium intake and sodium to potassium ratio. Subjects with higher intakes of sodium and alcohol, higher body mass index and lower intake of potassium had higher average BP.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>positive correlation between dietary sodium and both systolic and diastolic BP</p> <ul style="list-style-type: none"> ▪ in males, the dietary sodium to potassium ratio was positively correlated with with both systolic and diastolic BP (same true when both sexes combined) ▪ a positive association was also seen between BP and urinary sodium to potassium ratio in females and when both sexes were combined ▪ no independent 	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>effect of dietary potassium, magnesium or calcium intake on BP could be established</p> <ul style="list-style-type: none">▪ age and body mass index were strongly and positively associated with both systolic and diastolic BP in both sexes▪ positive correlation was noted between risk factor score and BP in both sexes: mean systolic BP in subjects with 3 or 4 risk factors was 7.2 mmHg higher in males and 6.7 mmHg in females than in males and females, respectively, with no risk factors	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Long-term potassium supplementation lowers blood pressure in elderly hypertensive subjects. Fotherby, M.D., & Potter, J.F. 1997. <i>Int J Clin Pract.</i>, 51; 219-22.</p>	<p>To examine the effect of a moderate increase in potassium intake in the long-term on ambulatory blood pressure levels in elderly untreated hypertensives.</p>	<ul style="list-style-type: none"> ▪ Following a double-blind randomized cross-over trial of the effect of a 4 week 60 mmol/day potassium supplement versus placebo on BP, 8 of the original hypertensive subjects continued with a 48 mmol/day potassium supplement for 4 months ▪ 	<ul style="list-style-type: none"> ▪ 8 of the original 18 untreated hypertensive subjects (clinic systolic BP of 160 mmHg and diastolic BP of 90 mmHg) ▪ 7 females, 1 male ▪ mean age was 77 years old (range of 68-79) ▪ all subjects free of cardiac and renal failure 	<p>1st study was 4 weeks; 2nd study was 4 months</p>	<ul style="list-style-type: none"> ▪ at run-in 24 hour systolic and diastolic BP were 162 and 90 mmHg: placebo values were 160 and 89 mmHg, respectively ▪ at 4 weeks systolic and diastolic BP were 147 and 83 mmHg, respectively ▪ at 4 months, systolic and diastolic BP were 145 and 81 mmHg, respectively ▪ there was a significant fall in weight of 1.9 kg from the end of the cross-over period to the completion of the 4th month 	<p>A modest potassium supplement in the long-term can significantly lower high systolic BP in elderly hypertensive subjects.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>The influence of oral potassium citrate/bicarbonate on blood pressure in essential hypertension during unrestricted salt intake. Overlack, A., Conrad, H., & Stumpe, K.O. 1991. <i>Klin Wochenschr.</i>, 69; 79-83.</p>	<p>To investigate if potassium, when given with anions other than chloride, is effective in lowering blood pressure in essential hypertension.</p>	<ul style="list-style-type: none"> ▪ Randomized-cross-over study ▪ Exclusion criteria included subjects being free of cardiovascular, gastrointestinal and renal disease, and diabetes mellitus ▪ After run-in period, subjects received either a placebo or 120 mmol of potassium per day ▪ After 8 weeks, subjects switched to the other treatment ▪ Potassium was given together with 50% citrate and 50% bicarbonate as anions in tablets containing 40 mmol potassium 	<ul style="list-style-type: none"> ▪ 12 patients with untreated mild to moderate essential hypertension (8 males, 4 females) ▪ ranged in age from 25 to 59 years with a mean age of 36.5 	<p>Two 8 week trials (crossover)</p>	<ul style="list-style-type: none"> ▪ at the end of the potassium supplementation period, mean arterial BP was even slightly higher than during placebo ▪ body weight remained unchanged ▪ urinary potassium excretion increased significantly during placebo to potassium supplementation ▪ urinary sodium excretion remain unchanged ▪ serum potassium increased during supplementation 	<p>Potassium supplementation for 8 weeks with 120 mmol of potassium citrate/bicarbonate failed to lower blood pressure during unrestricted sodium intake in patients with essential hypertension. Since potassium rich foods like fruits and vegetables contain potassium mostly as non-chloride salts, it appears to be premature to recommend a high dietary potassium intake as a mean to treat elevated blood pressure.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Community-based prevention of stroke: Nutritional improvement in Japan. Yamori, Y., & Horie, R. 1994, <i>Health Reports</i>, 6; 181-8.</p>	<p>To show the importance of nutrition, especially sodium restriction and increased potassium and protein intakes, in the prevention of hypertension and stroke in a pilot study involving senior citizens. Also, to design a population-based intervention concerning dietary factors such as low sodium/high potassium, protein, magnesium, calcium and dietary fiber in stroke prevention.</p>	<ul style="list-style-type: none"> ▪ Study included general health education along with a reduction of dietary salt intake and increases in vegetable and protein, especially from seafood ▪ Subject's diet were modified to a low sodium to potassium ratio without their knowledge ▪ Blood pressure was measured with the patient in the sitting position ▪ 24-hour urine collections used 	<ul style="list-style-type: none"> ▪ senior citizens residence—63 healthy seniors with an average age of 74.8 	<p>4 week intervention with mortality from stroke monitored 10 years</p>	<ul style="list-style-type: none"> ▪ mortality rates for stroke in the middle-aged population during the 10 years after the introduction of dietary improvement had a steeper decline in hemorrhagic, ischemic, and all strokes than the average for Japan 	<p>Intervention trials to promote low sodium, high potassium diets and high protein diets in Japan and information from other epidemiological community studies have accelerated the reduction of stroke incidence and mortality reduction.</p>

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Potassium supplementation reduces clinic and ambulatory blood pressure in elderly hypertensive patients. Fotherby, M.D., & Potter, J.F. 1992, <i>J Hypertension</i>, 10; 1403-8.</p>	<p>To determine the effects of potassium chloride supplementation on clinic and 24-hour ambulatory blood pressure values in elderly untreated hypertensive patients.</p>	<ul style="list-style-type: none"> ▪ double-blind randomized placebo-controlled cross-over study ▪ outpatient clinic in a district general hospital ▪ patients did not receive any form of antihypertensive medication for at least 4 weeks before study entry ▪ patients received potassium chloride supplement of 60 mmol/day or flavored placebo 	<ul style="list-style-type: none"> ▪ 18 untreated elderly hypertensive patients (mean age of 75 with a range of 66-79 years) ▪ 5 men and 13 women with a systolic BP >160 mmHg and diastolic BP > 95 mmHg 	<p>8 weeks following a 4 week run-in period</p>	<ul style="list-style-type: none"> ▪ a significant fall in clinic supine systolic BP (10 mmHg, $p < 0.013$) and diastolic BP (6 mmHg, $p < 0.03$) and in standing systolic BP (8 mmHg, $p < 0.03$) after 4 weeks potassium supplementation compared with placebo ▪ no significant change in clinic standing diastolic BP, 24-hour ambulatory diastolic BP or pulse rate ▪ 24-hour urinary potassium increased significantly 	<p>A 60 mmol daily supplement of potassium chloride reduces clinic and 24-hour systolic ambulatory BP (but not diastolic BP) in elderly hypertensive patients.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Prospective study of calcium, potassium, and magnesium intake and risk of stroke in women. Hiroyasu, I., Stampfer, M.J., Manson, J.E., Rexrode, K., Hennekens, C.H., Colditz, G.A., Speizer, F.E., & Willet, W.C. 1999, <i>Stroke</i>, 30; 1772-79.</p>	<p>To investigate the relation between intake of potassium, calcium, and magnesium and the incidence of stroke among US women followed prospectively for 14 years.</p>	<ul style="list-style-type: none"> ▪ prospective cohort study involving women from the Nurses' Health Study (NHS-began in 1976) ▪ <i>see previous chart sections for more information on NHS</i> 	<ul style="list-style-type: none"> ▪ in 1980, 85,764 women in the NHS, aged 34 to 59 years and free of diagnosed cardiovascular disease and cancer 	<p>1980 to 1994 (1.16 million person-years of follow-up)</p>	<ul style="list-style-type: none"> ▪ intakes of potassium, calcium and magnesium were each inversely associated with age- and smoking-adjusted relative risks of ischemic stroke ▪ further adjustments for calcium and potassium intake suggested an independent association for calcium intake <p>calcium intakes of > 600 mg/day did not appear to reduce risk of stroke further</p>	<p>Low calcium intake, and perhaps low potassium intake, may contribute to increased risk of ischemic stroke in middle-aged American women.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Efficacy of potassium and magnesium in essential hypertension. Patki, P.S., Singh, J., Gokhale, S.V., Bulakh, P.M., Shrotri, D.S., Patwardhan, B. 1990. <i>BMJ</i>, 301; 521-3.</p>	<p>To evaluate the antihypertensive activity of potassium given alone or in combination with magnesium in patients with mild hypertension.</p>	<ul style="list-style-type: none"> ▪ double-blind, placebo controlled, cross-over study ▪ Cardiology outpatient department, Sassoon General Hospital, Pune, India ▪ patients observed for one month with no treatment ▪ three groups used: 1) placebo, 2) potassium, 3) potassium + magnesium 	<ul style="list-style-type: none"> ▪ 37 adult subjects with mild hypertension (defined as a supine diastolic BP between 90 and 110 mmHg) 	<p>32 weeks (includes run-in period) – at the end of the trial, every patient had received all three preparations (groups) for 8 weeks each</p>	<ul style="list-style-type: none"> ▪ potassium alone or in combination with magnesium produced a significant reduction in systolic and diastolic BP ($p < 0.001$) and a significant reduction in serum cholesterol concentration ▪ magnesium did not have an additional effect ▪ urinary potassium excretion increased significantly in the groups who received potassium alone or combined with magnesium 	<p>Potassium supplementation of 60 mmol/day lowers arterial BP in patients with mild hypertension. Giving magnesium as well has no added advantage.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Increasing sensitivity of blood pressure to dietary sodium and potassium with increasing age. A population study using casual urine specimens. Khaw, K., & Barrett-Connor, E. 1990. <i>Am J Hypertens.</i>, 3; 505-11.</p>	<p>To investigate the relationship between blood pressure, sodium and potassium in a population.</p>	<ul style="list-style-type: none"> ▪ cohort study ▪ a urine specimen was analyzed for sodium, potassium and creatinine levels as well as sodium/potassium ratios, sodium/creatinine ratios and potassium/creatinine ratios 	<ul style="list-style-type: none"> ▪ 887 men and 1159 women aged 40 to 89 years old ▪ subjects from southern California (predominantly white population) ▪ a substantial portion of the subjects were already on antihypertensive medication or diuretics 	<p>1984-87</p>	<ul style="list-style-type: none"> ▪ in men, both systolic and diastolic BP significantly correlated with the sodium/creatinine ratio; only diastolic BP was inversely related to potassium/creatinine ratio ▪ in women, systolic BP was related to the sodium/creatinine ratio while diastolic BP was inversely related to the potassium/creatinine ratio ▪ in both sexes, both systolic and diastolic BP was correlated with 	<p>Intervention to reduce dietary sodium or increase potassium may be particularly effective in the old, not only in terms of magnitude of BP reduction, but more predominantly, in the prevention of cardiovascular events.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>the urinary sodium/potassium ratio</p> <ul style="list-style-type: none">▪ in both sexes, the regression slope of systolic BP with the sodium/potassium ratio was steeper in those 60 years of age and over compared to those under 60 years of age; diastolic pressure showed a similar trend in men, but not women – there was an approx. 3-4 mmHg and 1-2 mmHg increase in systolic and diastolic BP, respectively per unit increase in the sodium/potassium ratio	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Placebo-controlled trial of potassium supplements in black patients with mild essential hypertension. Obel, A.O. 1989. <i>J Cardiovasc Pharmacol.</i>, 14; 294-96.</p>	<p>To study the role of potassium supplements as a possible effective alternative regimen to thiazide diuretics in mild hypertension in blacks.</p>	<ul style="list-style-type: none"> ▪ randomized double-blind placebo controlled trial ▪ patients were randomly allocated to receive either potassium supplements (8 tablets containing 64 mmol potassium daily) or identical placebo tablets (8 daily) 	<ul style="list-style-type: none"> ▪ 48 black patients with newly discovered mild hypertension—no medical treatment ▪ subjects were from outpatients in Nairobi hospital ▪ aged 20 to 60 years ▪ systolic BP >160 mmHg; diastolic BP >90 but <109 mmHg 	<p>16 weeks</p>	<ul style="list-style-type: none"> ▪ treatment groups were comparable at baseline measurements ▪ potassium supplements produced a steady and significant decrease in BP during the progress of the trial ▪ no significant change in body weights and pulse rates in the two groups 	<p>These results are consistent with the premise that oral potassium supplements may exert hypotensive effects of a clinically significant degree in patients with mild hypertension.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

Title, Author(s), Year, Journal	Purpose of Study	Research Design	Subjects	Study Duration	Results	Conclusion
<p>Relation of electrolytes to blood pressure in men. The Yi People Study. He, J., Tell, G.S., Tang, Y., Mo, P., He, G. 1991. <i>Hypertension</i>, 17; 378-85.</p>	<p>To investigate the relations of dietary, serum, urine sodium, potassium, calcium, and magnesium to blood pressure on both ecological and individual levels.</p>	<ul style="list-style-type: none"> ▪ Subjects recruited from part of a larger study on cardiovascular disease risk factors ▪ 24-hour dietary recalls used ▪ Electrolytes measured in diet, serum, and urine 	<ul style="list-style-type: none"> ▪ 119 high-mountain Yi farmers, 114 mountainside Yi farmers, 89 Yi migrants and 97 Han people (People's Republic of China) 		<ul style="list-style-type: none"> ▪ Ecological analysis revealed that dietary and urinary sodium were significantly and positively correlated with both systolic and diastolic BP, whereas serum sodium showed no relation to blood pressure in diet, serum, and urine, potassium was negatively related to systolic and diastolic BP, whereas sodium/potassium ratio showed a positive 	<p>These results are consistent with the view that a diet low in sodium and high in potassium, calcium, and magnesium may prevent the development of hypertension.</p>

Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<ul style="list-style-type: none">association▪ no relation between magnesium and BP▪ urinary calcium excretion was significantly and positively related to BP▪ Analysis at the individual level confirmed the result for sodium and potassium seen at the ecological level, but in addition, dietary calcium and magnesium were significantly and negatively correlated to both systolic and diastolic BP, and urinary	
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Appendix G

Table 8. A Review of Potassium, Blood Pressure and Stroke Literature published after 1989 (cont.)

					<p>magnesium was inversely related to diastolic BP— these relations continued after controlling for body mass index, age, heart rate, alcohol, and total energy intake</p> <ul style="list-style-type: none"> ▪ an increase in sodium intake of 100 mmol/day corresponded to an increase of 2.3 mmHg systolic BP and 1.8 mmHg diastolic BP ▪ an increase in potassium intake of 100 mmol/day corresponded to and 8.3 and 5.7 mmHg decrease in systolic and diastolic, respectively 	
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Appendix G

Table 9. Reviews Discussing Potassium and its Role in Blood Pressure Regulation and/or Stroke

Appendix G

Table 9. Reviews Discussing Potassium and its Role in Blood Pressure Regulation and/or Stroke

Review	Author(s), Journal	Year	Benefits of Potassium: Yes or No
Potassium: Weighing the evidence for supplementation.	Linas, S.L., Hospital Practice	1988	Yes
Potassium and hypertension.	Tobian, L., Nutrition Reviews	1988	Yes
The Canadian consensus report on non-pharmacological approaches to the management of high blood pressure.	Fodor, J. G. and A. Chockalingam Clinical and Experimental Hypertension. Part A, Theory and Practice	1990	Yes
Minerals and blood pressure.	Karppanen, H., Annals of Medicine	1991	Yes
Nutrition and hypertension prevention.	Kotchen, T. A., M. Kotchen and Boegehold, Hypertension	1991	Yes
Sodium-potassium interaction in hypertension and hypertensive cardiovascular disease.	Langford, H. G., Hypertension	1991	Undecided
The role of potassium in the pathogenesis and treatment of hypertension.	Linas, S. L., Kidney International	1991	Yes
Potassium supplements and potassium-sparing diuretics. A review and guide to appropriate use.	Saggar-Malik, A. K. and F. P. Cappuccio, F.P. Drugs	1993	Yes
Role of potassium in the pathogenesis of hypertension.	Krishna, G. G., American Journal of the Medical Sciences	1994	Yes
Potassium's cardiovascular protective mechanisms.	Young, D. B., H. Lin, and R. D. McCabe, American Journal of Physiology	1995	Yes
The effects of potassium depletion and supplementation on blood pressure: A clinical review.	Barri, Y. M. and C. S. Wingo, American Journal of the Medical Sciences	1997	Yes

Appendix G

Table 9. Reviews Discussing Potassium and its Role in Blood Pressure Regulation and/or Stroke (cont.)

Fruit and vegetables, and cardiovascular disease: A review.	Ness, A. R. and J. W. Powles, International Journal of Epidemiology	1997	Yes
Dietary sodium chloride and potassium have effects on the pathophysiology of hypertension in humans and animals.	Tobian, L., American Journal of Clinical Nutrition	1997	Yes
Lifestyle modifications to prevent and control hypertension. 6. Recommendations on potassium, magnesium and calcium. Canadian Hypertension Society, Canadian Coalition for High Blood Pressure Prevention and Control, Laboratory Center for Disease Control at Health Canada, Heart and Stroke Foundation of Canada.	Burgess, E., R. Lewanczuk, P. Bolli, A. Chockalingam, H. Cutler, G. Taylor and P. Hamet, Canadian Medical Association Journal	1999	Yes
The effects of potassium, magnesium, calcium, and fiber on risk of stroke.	Suter, P.M., Nutrition Reviews	1999	Yes