

IL TRATTAMENTO NUTRIZIONALE DELL'IPERTENSIONE ARTERIOSA

Giorgio Bedogni

Obiettivo

- Discutere la base di evidenza disponibile per il trattamento nutrizionale dell'ipertensione arteriosa e la sua implementazione in forma di linee guida per la pratica professionale (Academy of Nutrition and Dietetics, AND ex American Dietetic Association, ADA)

Hypertension evidence-based nutrition practice guidelines

The screenshot displays the 'Evidence Analysis Library' website. At the top, the logo for the Academy of Nutrition and Dietetics (eatright.org) is visible. A search bar is located in the top right corner. Below the header, a navigation menu includes 'Library', 'Guidelines', 'Methodology', 'Resources', 'Contributors', 'A-Z Index', 'Store', and 'About'. A secondary menu lists categories: 'Diseases/Health Conditions', 'Nutrients', 'Foods', 'Life Cycle & Nutrition', and 'Nutrition Care Process'. The left sidebar, titled 'Topics', lists 'Hypertension Guideline', 'Executive Summary of Recommendations', and 'Introduction'. The main content area is titled 'Hypertension Evidence-Based Nutrition Practice Guideline' and includes a green arrow pointing left with the text: 'Select a category from the menu list on the left and follow the links. Within each category, hyperlinks to additional information are provided to allow you access to more information.' Below this, four sections are detailed: 'Organization of the Guideline', 'Definitions and Abbreviations', 'Printing Guideline Materials', and 'General Information and Disclaimer'. The footer contains copyright information for 2012 and a link to the disclaimer.

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Topics

- Hypertension Guideline
 - Executive Summary of Recommendations
 - Introduction

Nutrition Guidelines List > Hypertension Guideline

Hypertension Evidence-Based Nutrition Practice Guideline

Select a category from the menu list on the left and follow the links. Within each category, hyperlinks to additional information are provided to allow you access to more information.

Organization of the Guideline
This guideline is designed so that you can access key information quickly and easily. The information is organized into the following categories: Introduction, Major Recommendations, Algorithms, Background Information and Reference List.

Definitions and Abbreviations
Throughout the guideline there is some terminology that is underlined. When placing your mouse arrow over these underlined words, a text box will appear that will provide the definition of the word or the full terminology for abbreviated words. This additional information is a web-based feature and will not appear in a printed version of the guideline.

Printing Guideline Materials
Each page of the guideline has several options for printing at the top right corner of the page. You may also print entire sections of the guideline (i.e. Introduction, Recommendations, Algorithms) under **Print Reports**.

General Information and Disclaimer
This nutrition practice guideline is meant to serve as a general framework for handling clients with particular health problems. It may not always be appropriate to use these nutrition practice guidelines to manage clients because individual circumstances may vary. For example, different treatments may be appropriate for clients who are severely ill or who have co-morbid, socioeconomic, or other complicating conditions. The independent skill and judgment of the health care provider must always dictate treatment decisions. These nutrition practice guidelines are provided with the express understanding that they do not establish or specify particular standards of care, whether legal, medical, or other.

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Blood Pressure Measurement

Blood pressure measurement should be used to classify blood pressure as Normal, Prehypertension, or Hypertension (Stage 1 or Stage 2), to estimate risk for disease, and to identify treatment options. Elevated blood pressure is associated with risk of damage to the heart (LVH, angina, MI, coronary artery disease, heart failure), brain (TIA, stroke, dementia), kidney (CKD), peripheral arteries, and eyes (retinopathy).

Consensus, Imperative

Blood Pressure Measurement in Monitoring and Evaluation

Blood pressure measurement should be used to monitor and evaluate the effectiveness of therapy. Elevated blood pressure is associated with risk of damage to the heart (LVH, angina, MI, coronary artery disease, heart failure), brain (TIA, stroke, dementia), kidney (CKD), peripheral arteries, and eyes (retinopathy).

Consensus, Imperative



Reference Card From the

Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7)

EVALUATION

CLASSIFICATION OF BLOOD PRESSURE (BP)*

CATEGORY	SBP mmHg		DBP mmHg
Normal	<120	and	<80
Prehypertension	120–139	or	80–89
Hypertension, Stage 1	140–159	or	90–99
Hypertension, Stage 2	≥160	or	≥100

* See *Blood Pressure Measurement Techniques* (reverse side)

Key: SBP = systolic blood pressure DBP = diastolic blood pressure

DIAGNOSTIC WORKUP OF HYPERTENSION

- Assess risk factors and comorbidities.
- Reveal identifiable causes of hypertension.
- Assess presence of target organ damage.
- Conduct history and physical examination.
- Obtain laboratory tests: urinalysis, blood glucose, hematocrit and lipid panel, serum potassium, creatinine, and calcium. Optional: urinary albumin/creatinine ratio.
- Obtain electrocardiogram.

ASSESS FOR MAJOR CARDIOVASCULAR DISEASE (CVD) RISK FACTORS

- Hypertension
- Obesity (body mass index ≥ 30 kg/m²)
- Dyslipidemia
- Diabetes mellitus
- Cigarette smoking
- Physical inactivity
- Microalbuminuria, estimated glomerular filtration rate < 60 mL/min
- Age (> 55 for men, > 65 for women)
- Family history of premature CVD (men age < 55 , women age < 65)

ASSESS FOR IDENTIFIABLE CAUSES OF HYPERTENSION

- Sleep apnea
- Drug induced/related
- Chronic kidney disease
- Primary aldosteronism
- Renovascular disease
- Cushing's syndrome or steroid therapy
- Pheochromocytoma
- Coarctation of aorta
- Thyroid/parathyroid disease



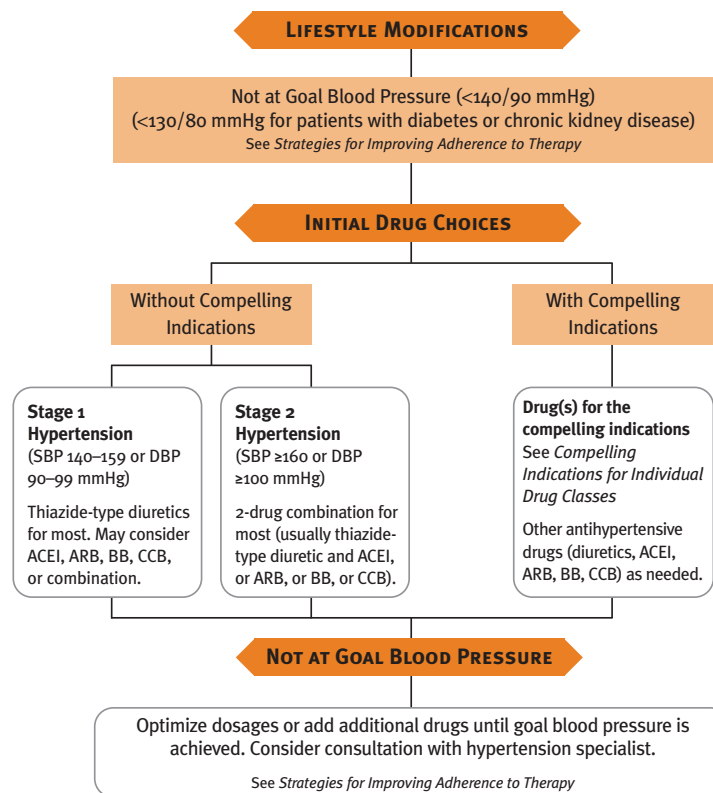
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health
National Heart, Lung, and Blood Institute

TREATMENT

PRINCIPLES OF HYPERTENSION TREATMENT

- Treat to BP $< 140/90$ mmHg or BP $< 130/80$ mmHg in patients with diabetes or chronic kidney disease.
- Majority of patients will require two medications to reach goal.

ALGORITHM FOR TREATMENT OF HYPERTENSION



BLOOD PRESSURE MEASUREMENT TECHNIQUES

METHOD	NOTES
In-office	Two readings, 5 minutes apart, sitting in chair. Confirm elevated reading in contralateral arm.
Ambulatory BP monitoring	Indicated for evaluation of "white coat hypertension." Absence of 10–20 percent BP decrease during sleep may indicate increased CVD risk.
Patient self-check	Provides information on response to therapy. May help improve adherence to therapy and is useful for evaluating "white coat hypertension."

CAUSES OF RESISTANT HYPERTENSION

- Improper BP measurement
- Excess sodium intake
- Inadequate diuretic therapy
- Medication
 - Inadequate doses
 - Drug actions and interactions (e.g., nonsteroidal anti-inflammatory drugs (NSAIDs), illicit drugs, sympathomimetics, oral contraceptives)
 - Over-the-counter (OTC) drugs and herbal supplements
- Excess alcohol intake
- Identifiable causes of hypertension (see reverse side)

COMPELLING INDICATIONS FOR INDIVIDUAL DRUG CLASSES

COMPELLING INDICATION	INITIAL THERAPY OPTIONS
• Heart failure	THIAZ, BB, ACEI, ARB, ALDO ANT
• Post myocardial infarction	BB, ACEI, ALDO ANT
• High CVD risk	THIAZ, BB, ACEI, CCB
• Diabetes	THIAZ, BB, ACEI, ARB, CCB
• Chronic kidney disease	ACEI, ARB
• Recurrent stroke prevention	THIAZ, ACEI

Key: THIAZ = thiazide diuretic, ACEI = angiotensin converting enzyme inhibitor, ARB = angiotensin receptor blocker, BB = beta blocker, CCB = calcium channel blocker, ALDO ANT = aldosterone antagonist

STRATEGIES FOR IMPROVING ADHERENCE TO THERAPY

- Clinician empathy increases patient trust, motivation, and adherence to therapy.
- Physicians should consider their patients' cultural beliefs and individual attitudes in formulating therapy.

The National High Blood Pressure Education Program is coordinated by the National Heart, Lung, and Blood Institute (NHLBI) at the National Institutes of Health. Copies of the JNC 7 Report are available on the NHLBI Web site at <http://www.nhlbi.nih.gov> or from the NHLBI Health Information Center, P.O. Box 30105, Bethesda, MD 20824-0105; Phone: 301-592-8573 or 240-629-3255 (TTY); Fax: 301-592-8563.

PRINCIPLES OF LIFESTYLE MODIFICATION

- Encourage healthy lifestyles for all individuals.
- Prescribe lifestyle modifications for all patients with prehypertension and hypertension.
- Components of lifestyle modifications include weight reduction, DASH eating plan, dietary sodium reduction, aerobic physical activity, and moderation of alcohol consumption.

LIFESTYLE MODIFICATION RECOMMENDATIONS

MODIFICATION	RECOMMENDATION	AVG. SBP REDUCTION RANGE [†]
Weight reduction	Maintain normal body weight (body mass index 18.5–24.9 kg/m ²).	5–20 mmHg/10 kg
DASH eating plan	Adopt a diet rich in fruits, vegetables, and lowfat dairy products with reduced content of saturated and total fat.	8–14 mmHg
Dietary sodium reduction	Reduce dietary sodium intake to ≤100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mmHg
Aerobic physical activity	Regular aerobic physical activity (e.g., brisk walking) at least 30 minutes per day, most days of the week.	4–9 mmHg
Moderation of alcohol consumption	Men: limit to ≤2 drinks* per day. Women and lighter weight persons: limit to ≤1 drink* per day.	2–4 mmHg

* 1 drink = 1/2 oz or 15 mL ethanol (e.g., 12 oz beer, 5 oz wine, 1.5 oz 80-proof whiskey).

† Effects are dose and time dependent.



U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
National Institutes of Health
National Heart, Lung, and Blood Institute
National High Blood Pressure Education Program

NIH Publication No. 03-5231

May 2003

Food/Nutrient and Medication Interaction Assessment

Dietitians should assess food/nutrient-medication interactions in patients that are on pharmacologic therapy for hypertension, as many antihypertensive medications interact with food and nutrients.

Consensus, Imperative

DASH Diet

Individuals should adopt the Dietary Approaches to Stop Hypertension (DASH) dietary pattern which is rich in fruits, vegetables, low-fat dairy, and nuts; low in sodium, total fat, and saturated fat; and adequate in calories for weight management. The DASH dietary pattern reduces systolic blood pressure by 8-14 mmHg.

Consensus, Imperative

(Tra poco vedremo la dieta DASH in dettaglio)

Physical Activity

Dietitians should encourage individuals to engage in aerobic physical activity for at least 30 minutes per day on most days of the week, as it reduces systolic blood pressure by approximately 4 - 9 mmHg.

Consensus, Imperative

Dietary Sodium

Dietary sodium intake should be limited to no more than 2300 mg sodium (100 mmol) per day. Reduction of dietary sodium to recommended levels lowers systolic blood pressure by approximately 2 - 8 mmHg.

Strong, Imperative

(Tra poco vedremo la questione del sodio in maggior dettaglio)

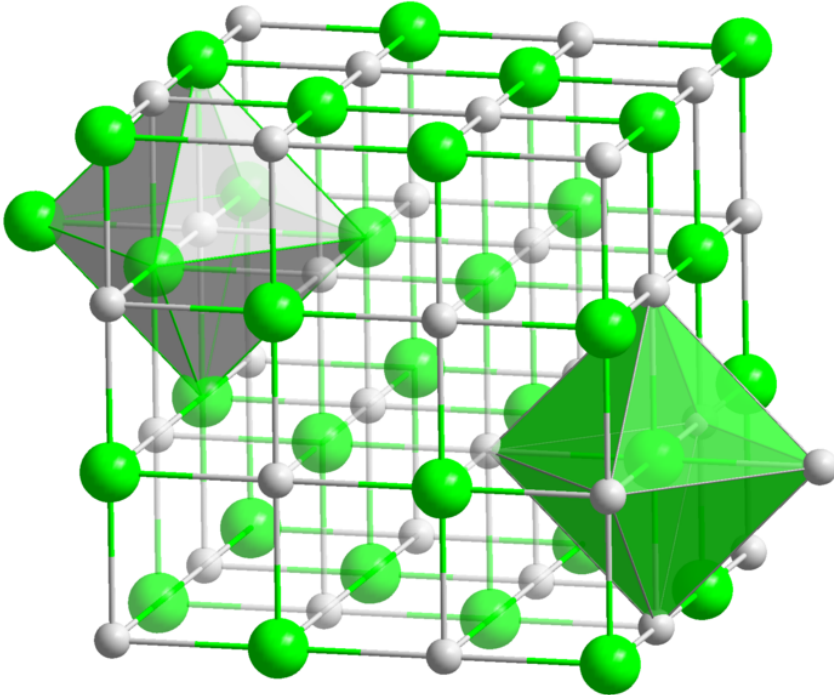
Sodium Intake Monitoring and Evaluation

If the patient demonstrates adherence to a 2300 mg sodium diet but has not achieved the treatment goal, then the dietitian should recommend the DASH dietary pattern and/or reduction in sodium to 1600 mg to further reduce blood pressure.

Strong, Conditional

*Sodio

- Il sodio rappresenta il 30% del (peso molecolare) del cloruro di sodio



<http://en.wikipedia.org>

Weight Management

Optimal body weight should be achieved and maintained (BMI 18.5 - 24.9) to reduce blood pressure. Weight reduction lowers systolic blood pressure by 5 - 20 mmHg per 22 lbs (10 kg) body weight loss.

Consensus, Imperative

Omega-3 Fatty Acids

Advise that the consumption of omega-3 fatty acids may not be beneficial for the management of hypertension, since their consumption does not appear to lower blood pressure.

Fair, Imperative

Dietary Protein

Advise that the consumption of protein may or may not be beneficial for the reduction of blood pressure, since the effect of increased protein intake on blood pressure is unclear.

Weak, Imperative

Soluble Fiber

Advise that the consumption of soluble fiber may or may not be beneficial for the reduction of blood pressure, since the effect of increased soluble fiber intake on blood pressure is unclear.

Weak, Imperative

Vitamin C

Advise that the consumption of vitamin C may or may not be beneficial for the reduction of blood pressure, since the effect of increased vitamin C intake on blood pressure is unclear.

Weak, Imperative

Magnesium

If magnesium is proposed as a therapy to reduce blood pressure, advise that the effect of magnesium as a single nutrient on blood pressure in healthy or hypertensive adults is unknown. The effect of dietary patterns with magnesium intake above the DRI on blood pressure in healthy or hypertensive adults is minimal. However, some dietary patterns that contain magnesium lower than recommended levels (DRI) may be associated with elevated blood pressure.

Fair, Conditional

Calcium

If calcium is proposed as a therapy to reduce blood pressure, advise that the effect of calcium as a single nutrient on blood pressure in healthy or hypertensive adults is unclear.

Epidemiological studies report that dietary patterns containing calcium lower than recommended levels (DRI) may be associated with elevated blood pressure. The effect of dietary patterns with calcium intake above the DRI on blood pressure in healthy or hypertensive adults is minimal.

Fair, Conditional

Fruits and Vegetables

Advise the consumption of at least five to ten servings of fruits and vegetables per day, based on research reporting significant reductions in blood pressure after consumption of either the DASH dietary pattern or a diet rich in fruits and vegetables.

Soy Foods

Advise that the consumption of soy foods may or may not be beneficial for the reduction of blood pressure, since the effect of increased soy food intake on blood pressure is unclear.

Weak, Imperative

Garlic

Consumption of garlic may or may not be beneficial for the reduction of blood pressure, since the current evidence is inconclusive regarding its effect on blood pressure.

Weak, Imperative

Cocoa and Chocolate

Consumption of cocoa or chocolate may or may not be beneficial for the reduction of blood pressure, since the current evidence is inconclusive regarding its effect on blood pressure.

Weak, Imperative

Caffeine Intake

For those who consume caffeine, advise blood pressure monitoring; while acute intake of caffeine increases blood pressure, the effect of chronic caffeine intake is unclear.

Weak, Conditional

Alcohol Consumption

- For individuals who can safely consume alcohol, consumption should be limited to no more than 2 drinks (24 oz beer, 10 oz wine, or 3 oz of 80-proof liquor) per day in most men and to no more than 1 drink per day in women. A reduction in alcohol consumption may reduce systolic blood pressure by approximately 2 - 4 mmHg.
- Consensus, Conditional

Comprehensive Program for Blood Pressure Management

Management of elevated blood pressure should be based on a comprehensive program including lifestyle modification (weight reduction, medical nutrition therapy and physical activity) and pharmacologic therapy. Research indicates that a comprehensive program can prevent target organ damage and improve cardiovascular outcomes.

Consensus, Imperative

Blood Pressure Treatment Goal

A treatment goal of $<140/90$ mmHg is recommended for individuals without comorbidities. This level is associated with preventing target organ damage and decreasing cardiovascular risk factors and complications.

Consensus, Imperative

Blood Pressure Treatment Goal for Individuals with Diabetes or Renal Disease

For individuals with hypertension and diabetes or renal disease, a treatment goal of <130/80 mmHg is recommended. These individuals are at an increased risk for cardiovascular and renal morbidity and mortality.

Consensus, Conditional

La “guerra del sodio”: l’ultimo decennio

Antefatto: DASH

The New England Journal of Medicine

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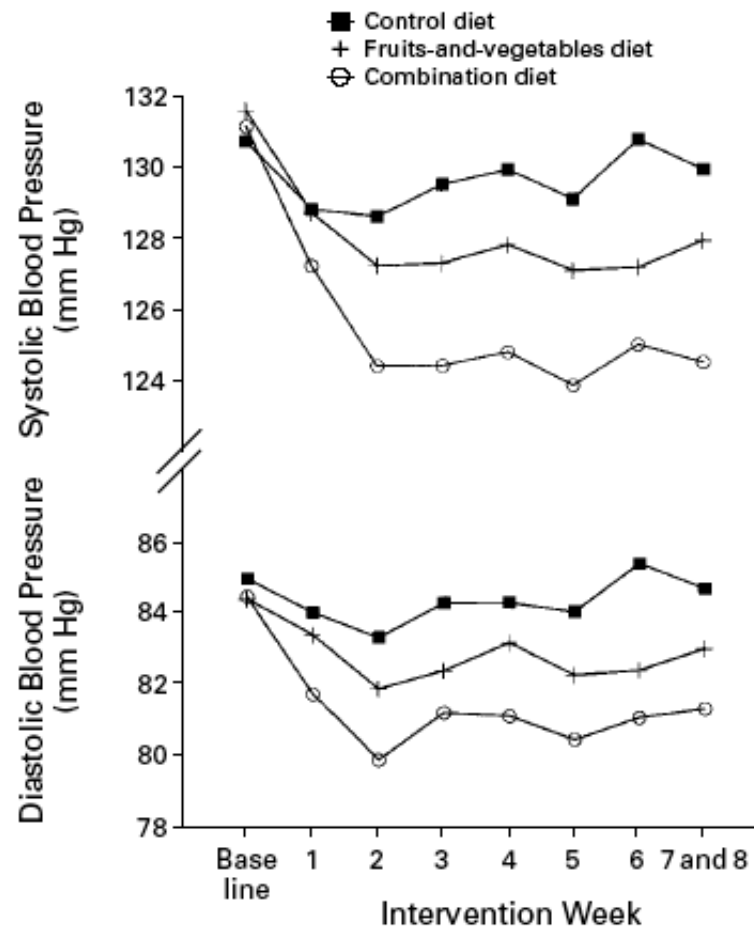
A CLINICAL TRIAL OF THE EFFECTS OF DIETARY PATTERNS ON BLOOD PRESSURE

LAWRENCE J. APPEL, M.D., M.P.H., THOMAS J. MOORE, M.D., EVA OBARZANEK, PH.D., WILLIAM M. VOLLMER, PH.D.,
LAURA P. SVETKEY, M.D., M.H.S., FRANK M. SACKS, M.D., GEORGE A. BRAY, M.D., THOMAS M. VOGT, M.D., M.P.H.,
JEFFREY A. CUTLER, M.D., MARLENE M. WINDHAUSER, PH.D., R.D., PAO-HWA LIN, PH.D., AND NJERI KARANJA, PH.D.,
FOR THE DASH COLLABORATIVE RESEARCH GROUP*

Antefatto: DASH

ITEM	CONTROL DIET		FRUITS-AND-VEGETABLES DIET		COMBINATION DIET	
	NUTRIENT	MENU	NUTRIENT	MENU	NUTRIENT	MENU
	TARGET	ANALYSIS†	TARGET	ANALYSIS†	TARGET	ANALYSIS†
Nutrients						
Fat (% of total kcal)	37	35.7	37	35.7	27	25.6
Saturated	16	14.1	16	12.7	6	7.0
Monounsaturated	13	12.4	13	13.9	13	9.9
Polyunsaturated	8	6.2	8	7.3	8	6.8
Carbohydrates (% of total kcal)	48	50.5	48	49.2	55	56.5
Protein (% of total kcal)	15	13.8	15	15.1	18	17.9
Cholesterol (mg/day)	300	233	300	184	150	151
Fiber (g/day)	9	NA	31	NA	31	NA
Potassium (mg/day)	1700	1752	4700	4101	4700	4415
Magnesium (mg/day)	165	176	500	423	500	480
Calcium (mg/day)	450	443	450	534	1240	1265
Sodium (mg/day)	3000	3028	3000	2816	3000	2859
Food groups (no. of servings/day)						
Fruits and juices	1.6		5.2		5.2	
Vegetables	2.0		3.3		4.4	
Grains	8.2		6.9		7.5	
Low-fat dairy	0.1		0.0		2.0	
Regular-fat dairy	0.4		0.3		0.7	
Nuts, seeds, and legumes	0.0		0.6		0.7	
Beef, pork, and ham	1.5		1.8		0.5	
Poultry	0.8		0.4		0.6	
Fish	0.2		0.3		0.5	
Fat, oils, and salad dressing	5.8		5.3		2.5	
Snacks and sweets	4.1		1.4		0.7	

Antefatto: DASH



DASH

“Nonetheless, sodium chloride, body and alcohol could not have accounted for the reductions in blood pressure, because changes in these potential confounders were small and similar for all the diets.”

DASH-sodium

The New England Journal of Medicine

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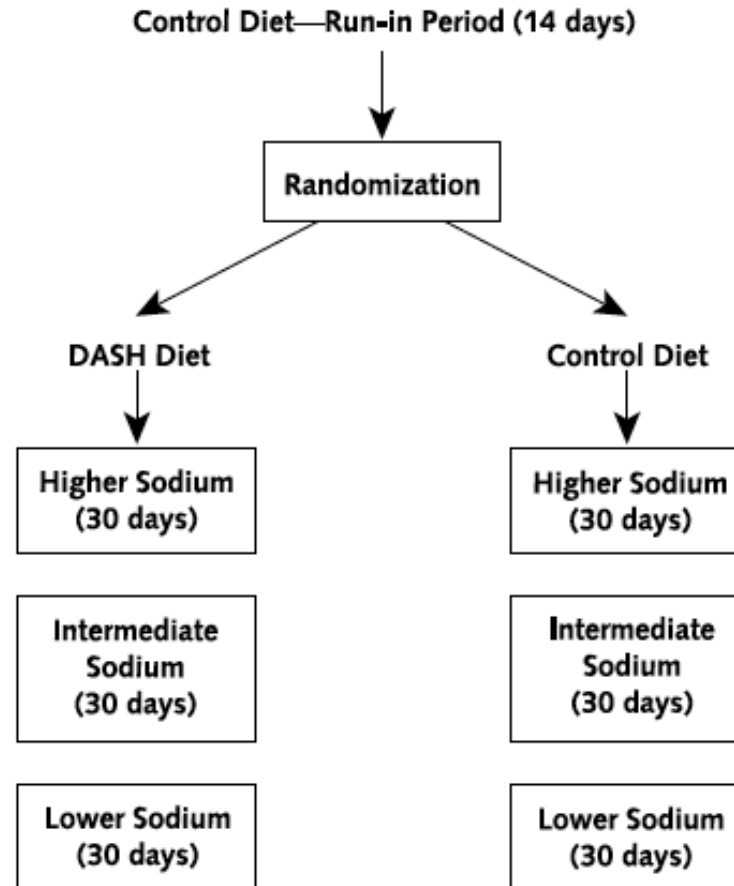
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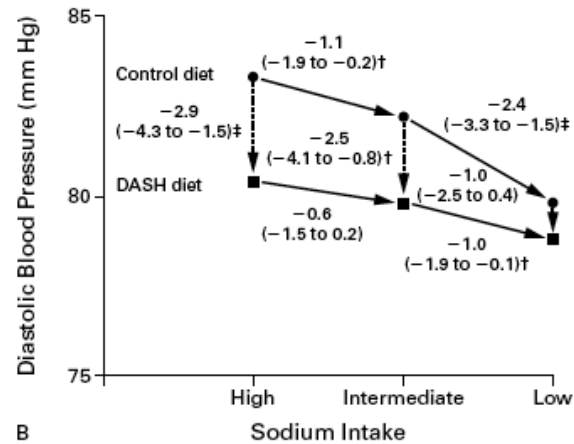
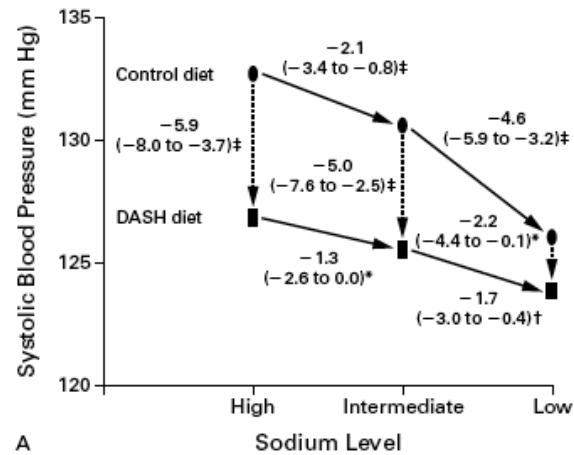
EFFECTS ON BLOOD PRESSURE OF REDUCED DIETARY SODIUM AND THE DIETARY APPROACHES TO STOP HYPERTENSION (DASH) DIET

FRANK M. SACKS, M.D., LAURA P. SVETKEY, M.D., WILLIAM M. VOLLMER, PH.D., LAWRENCE J. APPEL, M.D.,
GEORGE A. BRAY, M.D., DAVID HARSHA, PH.D., EVA OBARZANEK, PH.D., PAUL R. CONLIN, M.D.,
EDGAR R. MILLER III, M.D., PH.D., DENISE G. SIMONS-MORTON, M.D., PH.D., NJERI KARANJA, PH.D., AND PAO-HWA LIN, PH.D.
FOR THE DASH-SODIUM COLLABORATIVE RESEARCH GROUP

DASH-sodium



DASH-sodium



Quale efficacia?

Reduced Dietary Salt for the Prevention of Cardiovascular Disease: A Meta-Analysis of Randomized Controlled Trials (Cochrane Review)

Rod S. Taylor¹, Kate E. Ashton², Tiffany Moxham³, Lee Hooper⁴ and Shah Ebrahim⁵

American Journal of Hypertension, advance online publication 25 May 2012;
doi:[10.1038/ajh.2012.52](https://doi.org/10.1038/ajh.2012.52)

Quale efficacia?

BACKGROUND

Although meta-analyses of randomized controlled trials (RCTs) of salt reduction report a reduction in the level of blood pressure (BP), the effect of reduced dietary salt on cardiovascular disease (CVD) events remains unclear.

METHODS

We searched for RCTs with follow-up of at least 6 months that compared dietary salt reduction (restricted salt dietary intervention or advice to reduce salt intake) to control/no intervention in adults, and reported mortality or CVD morbidity data. Outcomes were pooled at end of trial or longest follow-up point.

RESULTS

Seven studies were identified, three in normotensives, two in hypertensives, one in a mixed population of normo- and hypertensives and one in heart failure. Salt reduction was associated with reductions in urinary salt excretion of between 27 and 39 mmol/24h and reductions in systolic BP between 1 and 4 mm Hg. Relative risks (RRs) for all-cause mortality in normotensives (longest follow-up—RR: 0.90, 95% confidence interval (CI): 0.58–1.40, 79 deaths) and hypertensives (longest follow-up RR 0.96, 0.83–1.11, 565 deaths) showed no strong evidence of any effect of salt reduction. CVD morbidity in people with normal BP (longest follow-up: RR 0.71, 0.42–1.20, 200 events) and raised BP at baseline (end of trial: RR 0.84, 0.57–1.23, 93 events) also showed no strong evidence of benefit. Salt restriction increased the risk of all-cause mortality in those with heart failure (end of trial RR 2.59, 1.04–6.44, 21 deaths). We found no information on participant's health-related quality of life.

CONCLUSIONS

Despite collating more event data than previous systematic reviews of RCTs (665 deaths in some 6,250 participants) there is still insufficient power to exclude clinically important effects of reduced dietary salt on mortality or CVD morbidity. Our estimates of benefits from dietary salt restriction are consistent with the predicted small effects on clinical events attributable to the small BP reduction achieved.

Keywords: blood pressure; cardiovascular disease; diet; hypertension; meta-analysis; salt; sodium; systematic review

This article is based on a Cochrane Review published in the *Cochrane Database of Systematic Reviews (CDSR)* YYYY, Issue X, DOI: 10.1002/14651858.CD00xxxx (see www.thecochranelibrary.com for information). Cochrane Reviews are regularly updated as new evidence emerges and in response to feedback, and the *CDSR* should be consulted for the most recent version of the review.

A more detailed review has been published and will be updated in the *Cochrane Database of Systematic Reviews* [Taylor RS, Ashton KE, Moxham T, Hooper L, Ebrahim S. Reduced dietary salt for the prevention Of cardiovascular disease. *Cochrane Database of Systematic Reviews (CDSR)* 2011, Issue X, DOI: 10.1002/14651858.CD00xxxx (see www.thecochranelibrary.com for information). This is a version of a Cochrane review, which is available in The Cochrane Library. Cochrane systematic reviews are regularly updated to include new research, and in response to feedback from readers. The results of a Cochrane review can be interpreted differently, depending on people's perspectives and circumstances. Please consider the conclusions presented carefully. They are the opinions of review authors, and are not necessarily shared by The Cochrane Collaboration.

American Journal of Hypertension, advance online publication 6 July 2011; doi:10.1038/ajh.2011.115

Effetti collaterali della dieta iposodica

- La dieta iposodica può produrre un'attivazione compensatoria del sistema nervoso simpatico e del sistema renina-angiotensina pericolosa negli individui ad “ad alto rischio”.
- La dieta iposodica potenzia la nefrotossicità dei FANS, dell'amfotericina B, dei mezzi di contrasto, degli aminoglicosidici, del cisplatino, della ciclosporina.

Egan BM et al. Am J Clin Nutr 1997;65 (Supl):671S

Missione (fisiologicamente) impossibile?

Special Feature

Can Dietary Sodium Intake Be Modified by Public Policy?

David A. McCarron,* Joel C. Geerling,[†] Alexandra G. Kazaks,* and Judith S. Stern*

**Department of Nutrition, University of California at Davis, Davis, California; and [†]Department of Anatomy and Neurobiology, Washington University, St. Louis, Missouri*

Clin J Am Soc Nephrol 4: 1878–1882, 2009. doi: 10.2215/CJN.04660709

Missione (fisiologicamente) impossibile?

- As increasingly more restrictive guidelines have been introduced over the past 30 yr, scientific research has continued to provide new insights regarding the effectiveness and safety of lowering sodium intake.
- Some, but certainly not all, of the newer data have supported the sodium guidelines, although the feasibility of their implementation remains in question.

Missione (fisiologicamente) impossibile?

- It has been assumed that if adults better understood how to reduce sodium in their diets and if more low-sodium foods were available, more individuals would be able to achieve these levels.
- Public health experts throughout the world have devised strategies targeting greater compliance with the lower sodium recommendations.

Missione (fisiologicamente) impossibile?

- Measurements of salt intake in humans have accumulated over the past two to three decades.
- Those data provide an opportunity to determine whether a “normal range” of sodium intake can be defined in humans, consistent with the neuroscience research suggesting that salt consumption is a homeostatically regulated variable with a relatively narrow range.

Missione (fisiologicamente) impossibile?

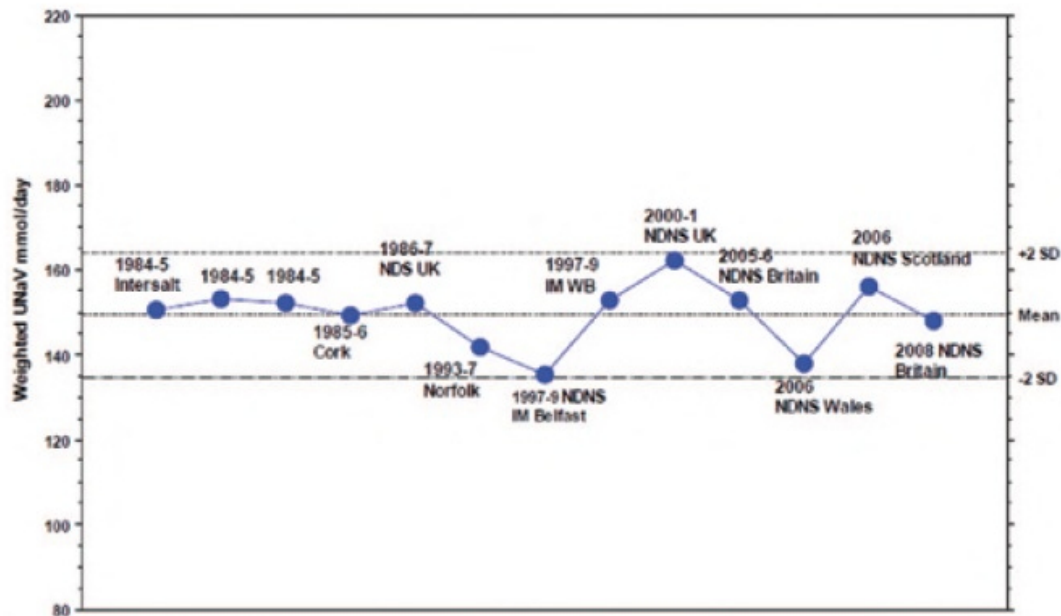


Figure 2. Mean and \pm SD 24-h UNaV from 13 published surveys in the UK between 1984 and 2008 with essentially equal representation of women and men ($n = 6343$). Trend line equation $y = -0.097x + 150.4$; $R^2 = 0.0026$; UNaV, urinary sodium excretion; UK, United Kingdom; NDS, National Diet Survey; NDNS, National Diet and Nutrition Survey.

Missione (fisiologicamente) impossibile?

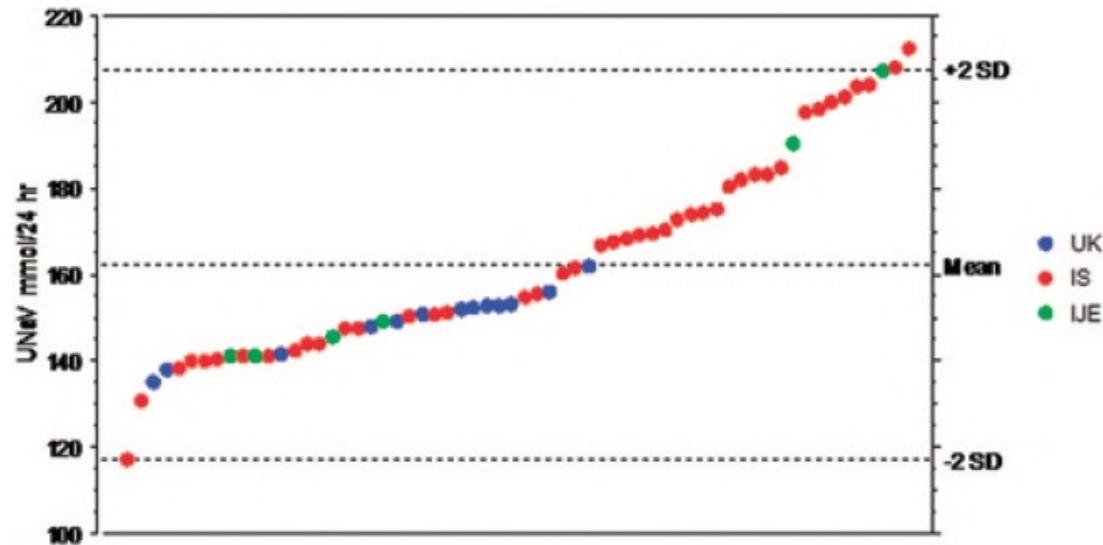


Figure 3. Mean (± 2 SD) 24-h urinary sodium excretion world-wide. Data from 62 survey sites in 33 countries; $n = 19,151$ subjects. Mean 24-h UNaV = 162.4 ± 22.4 mmol/person per day. Blue dots represent 13 UK sites including three Intersalt sites from the UK; red dots represent the remaining 43 Intersalt sites from outside the UK; and green dots represent six survey sites from ref. 21.

Missione (fisiologicamente) impossibile?

Trends in 24-h urinary sodium excretion in the United States, 1957–2003: a systematic review^{1–4}

Adam M Bernstein and Walter C Willett

Am J Clin Nutr 2010;92:1172–80.

24-h URINARY SODIUM EXCRETION TRENDS IN THE UNITED STATES

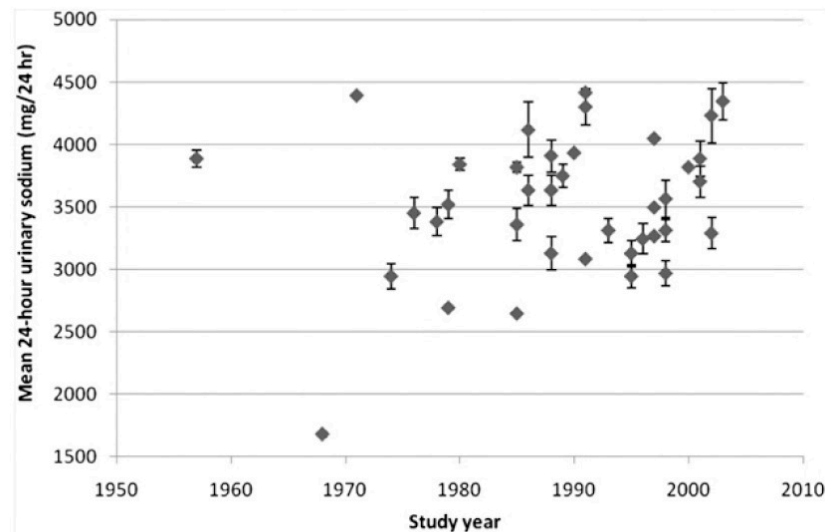


FIGURE 1. Mean (95% CI) 24-h urinary sodium excretion (mg/24 h) by study year.

In conclusion, on the basis of studies conducted over a 46-y period, the sodium intake in the United States appears well above recommended intakes and without evidence of a temporal decrease.

Missione (fisiologicamente) impossibile?

- I risultati di numerosi trial clinici sono coerenti con l'ipotesi che la sodiuria non possa essere stabilmente ridotta sotto 120 mmol/die.

McCarron DA Clin J Am Soc Nephrol 2009; 4:1878.

Missione (fisiologicamente) impossibile?

- That question is particularly appropriate as the current Dietary Guideline, set in 2005, of 2300 mg or 100 mmol/d is substantially below the lower limit of 117 mmol/d that this extensive body of data indicates is normal.
- If sodium intake or that of any other nutrient is physiologically determined, then our national nutrition policy must reflect that reality in its guidance.
- To do otherwise will expend valuable national and personal resources against unachievable goals.

Missione (fisiologicamente) impossibile?

Dietary Approaches to Prevent and Treat Hypertension A Scientific Statement From the American Heart Association

Lawrence J. Appel, MD, MPH; Michael W. Brands, PhD; Stephen R. Daniels, MD, PhD;
Njeri Karanja, PhD; Patricia J. Elmer, PhD; Frank M. Sacks, MD

(Hypertension. 2006;47:296-308.)

TABLE 1. Diet-Related Lifestyle Modifications That Effectively Lower BP

Lifestyle Modification	Recommendation
Weight loss	For overweight or obese persons, lose weight, ideally attaining a BMI <25 kg/m ² ; for nonoverweight persons, maintain desirable BMI <25 kg/m ²
Reduced salt intake	Lower salt (sodium chloride) intake as much as possible, ideally to ≈ 65 mmol/d sodium (corresponding to 1.5 g/d of sodium or 3.8 g/d sodium chloride)
DASH-type dietary patterns	Consume a diet rich in fruits and vegetables (8–10 servings/d), rich in low-fat dairy products (2–3 servings/d), and reduced in saturated fat and cholesterol
Increased potassium intake	Increase potassium intake to 120 mmol/d (4.7 g/d), which is also the level provided in DASH-type diets
Moderation of alcohol intake	For those who drink alcohol, consume ≤ 2 alcoholic drinks/d (men) and ≤ 1 alcoholic drink/d (women)

Dietary Sodium Intake and Cardiovascular Mortality: Controversy Resolved?

Michael H. Alderman¹ and Hillel W. Cohen¹

Universal reduction in sodium intake has long been recommended, largely because of its proven ability to lower blood pressure for some. However, multiple randomized trials have also demonstrated that similar reductions in sodium increase plasma renin activity and aldosterone secretion, insulin resistance, sympathetic nerve activity, serum cholesterol, and triglyceride levels. Thus, the health consequences of reducing sodium cannot be predicted by its impact on any single physiologic characteristic but will reflect the net of conflicting effects. Some 23 observational studies (>360,000 subjects and >26,000 end points) linking sodium intake to cardiovascular outcomes have yielded conflicting results. In subjects with average sodium intakes of less than 4.5 g/day, most have found an inverse association of intake with outcome; in subjects with average intakes greater than 4.5 g/day, most reported direct associations. Finally, in two, a "J-shaped" relation was detected. In addition, three randomized trials have

found that heart failure subjects allocated to 1.8 g of sodium have significantly increased morbidity and mortality compared with those at 2.8 g. At the same time, a randomized study in retired Taiwanese men found that allocation to an average intake of 3.8 g improved survival compared with 5.3 g. Taken together, these data provide strong support for a "J-shaped" relation of sodium to cardiovascular outcomes. Sodium intakes above and below the range of 2.5–6.0 g/day are associated with increased cardiovascular risk. This robust body of evidence does not support universal reduction of sodium intake.

Keywords: blood pressure; cardiovascular disease; cardiovascular morbidity; cardiovascular risk; diabetes; dietary; hypertension; J-shaped relation; mortality; sodium intake; sodium reduction; sodium restriction

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Analisi retrospettiva di 2 RCT

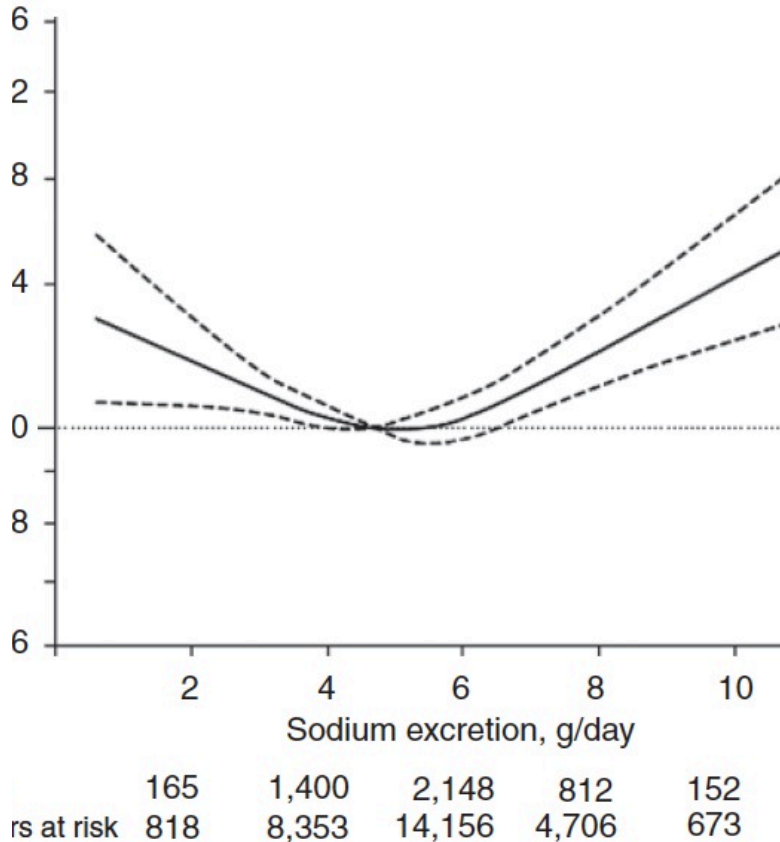


Figure 3 | Estimated 24-h urinary excretion of sodium and composite of cardiovascular death, stroke, myocardial infarction, and hospitalization for congestive heart failure. Spline plot for adjusted Cox models. Median intake is reference standard. Salt approximates $2.5 \times$ sodium g per day. Model was adjusted for age, sex, race/ethnicity (white vs. nonwhite); prior history of stroke or myocardial infarction; creatinine, body mass index; comorbid vascular risk factors (hypertension, diabetes mellitus, atrial fibrillation, smoking, low- and high-density lipoprotein); treatment allocation (ramipril, telmisartan, neither, or both); treatment with statins, β -blockers, diuretic therapy, calcium antagonist, and antithrombotic therapy; fruit and vegetable consumption, level of exercise; baseline blood pressure and change in systolic blood pressure from baseline to last follow-up; and urinary potassium. Dashed lines indicate 95% CIs. Events and numbers at risk are shown between values on x-axis because they indicate the numeric range between these values. ^aSpline curve truncated at 12 g per day (63 participants had sodium excretion >12 g/day, event rate 21/63). CI, confidence interval. O'Donnell MJ, Yusuf S, Mente A, Gao P, Mann JF, Teo K, McQueen M, Sleight P, Sharma AM, Dans A, Probstfield J, Schmierer RE. Urinary sodium and potassium excretion and risk of cardiovascular events. JAMA 2011; 306:2229–2238.

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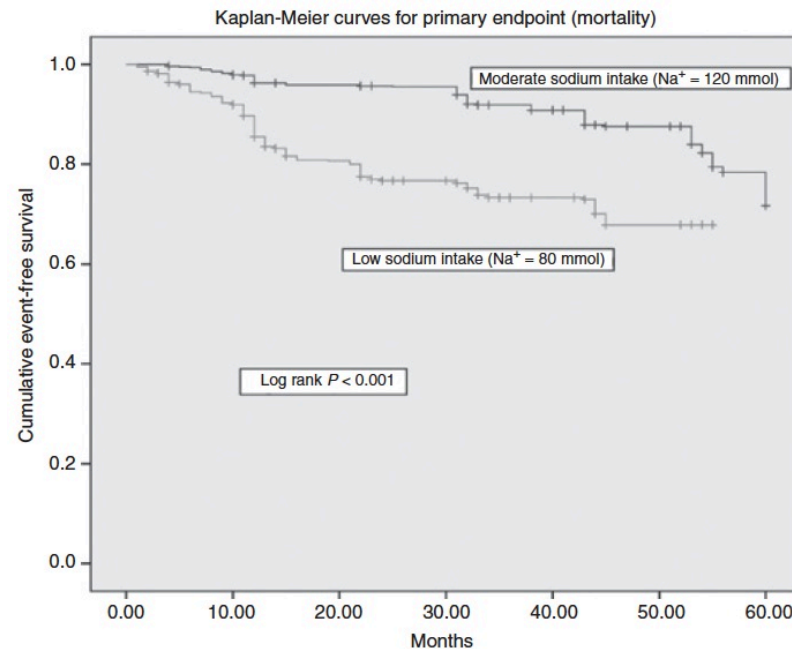


Figure 5 | Morbidity and mortality in heart failure patients at two randomized sodium levels. The Kaplan–Meier for mortality in the two groups during 57 ± 15 months follow-up. Paterna S, Fasullo S, Parrinello G, Cannizzaro S, Basile I, Vitrano G, Terrazzino G, Maringhini G, Ganci F, Scalzo S, Sarullo FM, Cice G, Di Pasquale P. Short-term effects of hypertonic saline solution in acute heart failure and long-term effects of a moderate sodium restriction in patients with compensated heart failure with New York Heart Association class III (Class C) (SMAC-HF Study). Am J Med Sci 2011; 342:27–37.

Grazie