

# Le sel ... où en sommes nous ?

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# Disclosures



## **Consultant, Lectures, research grants, clinical trials :**

Astra-Zeneca, Abbot, BMS, Bayer pharma, MSD, Shering-Plough, Sanofi-Aventis, Novo Nordisk, Lilly, Pierre Fabre, GSK, Takeda, Pfizer, Novartis, Roche, FCIT, Danone, Nestlé, Unilever, Lesieur

# **Le sel**

## **En quelques chiffres ...**

**1 gramme de sodium (42,5 mmol) = 2,5 grammes de chlorure de sodium**

**1 gramme de chlorure de sodium = 400 mg de sodium (17 mmol)**

**Une cuillère à café correspond environ à 6 g de sel**

**Français et Européens consomment environ 9 à 10 g/j de sel**



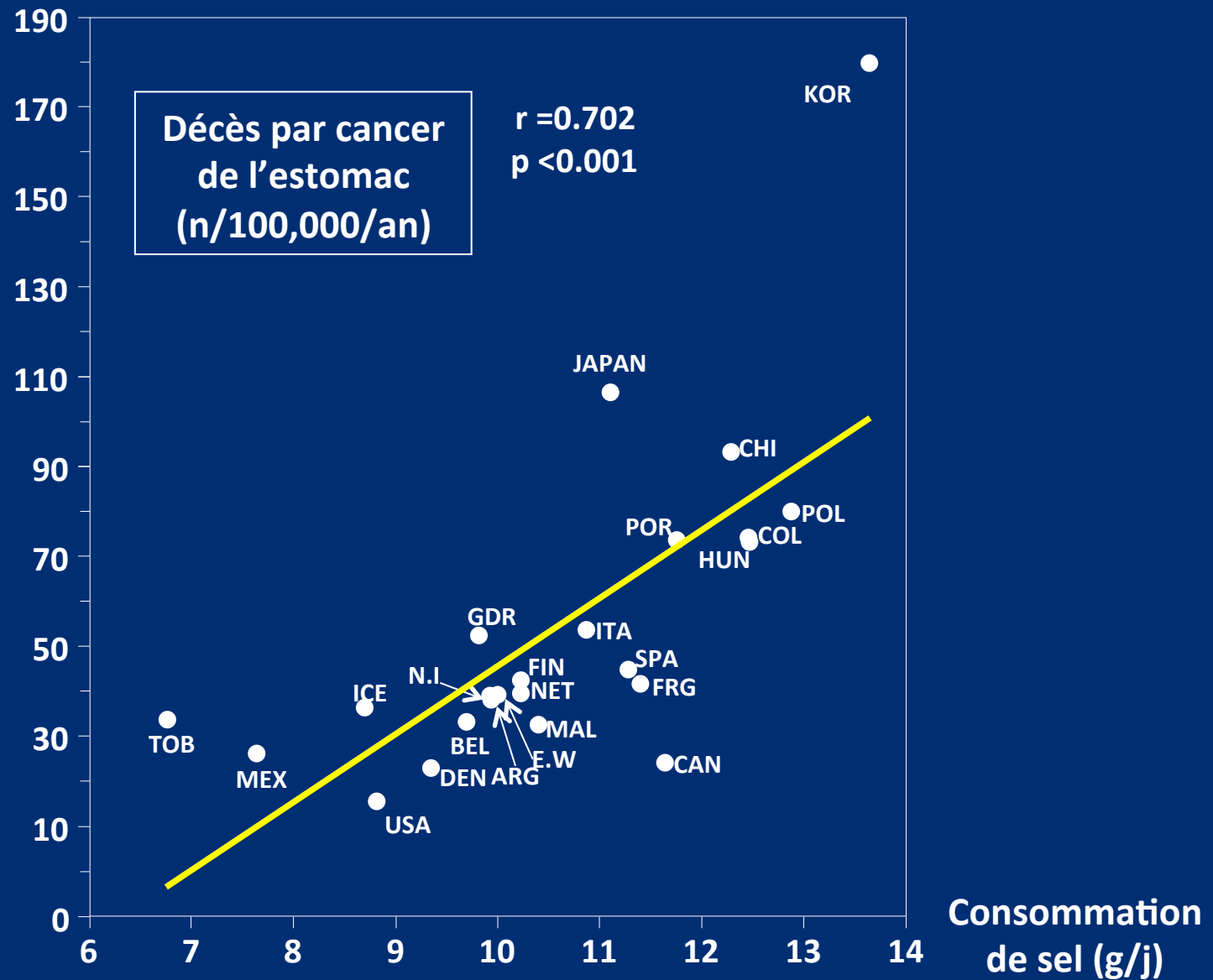
### **Policy implementation steps**

- Protect people from tobacco smoke, warn and enforce bans on tobacco advertising, promotion and sponsorship
- Raise taxes on tobacco and alcohol
- Restrict access to retailed alcohol and enforcing bans on advertising
- **Reduce salt intake and salt content of food**
- Replace trans-fat in food with polyunsaturated fat
- Promote public awareness about diet and physical activity

## Autres effets délétères du sel

- ostéoporose
  - lithiase urinaire
- } ← *Fuite urinaire de calcium*
- insuffisance rénale
  - insuffisance cardiaque
- } ← *Surcharge volémique  
Dysfonction endothéliale  
Stimulation des systèmes  
rénine et catécholamines*
- obésité infantile
- ← *Hyperphagie / Polydipsie (± énurésie)  
Altération de la sécrétion insulinaire*
- cancers digestifs
- ← *Irritation muqueuse / H pylori*
- asthme, œdèmes cyliques idiopathiques, vertige de Ménière

# Sel et cancer de l'estomac

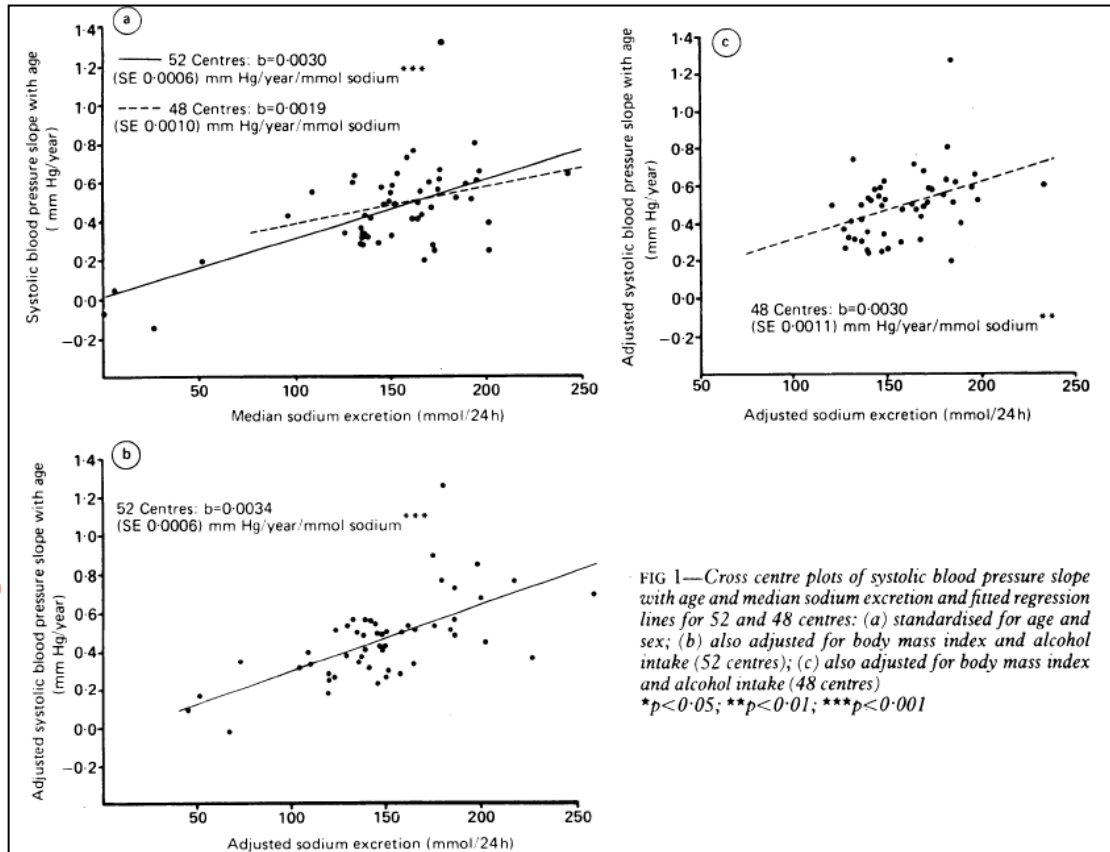


# Intersalt: an international study of electrolyte excretion and blood pressure. Results for 24 hour urinary sodium and potassium excretion

Intersalt Cooperative Research Group

## Key messages

- Intersalt previously reported strong positive associations of 24 hour urinary sodium excretion to blood pressure of individuals, to median blood pressure across its 52 population samples, and to differences in blood pressure with age
- The within population findings were previously underestimated because of incomplete correction for the regression dilution problem
- Revised estimates of the within population association of sodium to blood pressure in Intersalt are concordant with the cross population findings for 52 samples
- Estimates of the effect of median sodium excretion higher by 100 mmol/day over a 30 year period (age 55 minus age 25) were a greater difference of 10-11 mm Hg in systolic blood pressure and 6 mm Hg in diastolic blood pressure
- These results lend further support to recommendations for mass reduction of high salt intake for the prevention and control of adverse blood pressure levels and high blood pressure in populations



# Réduire l'apport alimentaire de sodium diminue la pression artérielle

***Adultes***

***Hypertendus***

***Normotendus***

*20 études, 802 sujets*

*11 études, 2 220 sujets*

**↓ Na (g/jour)**

**- 1,8**

**- 1,7**

*[2,8 /4,4 - 1,3 /2,9]*

*[2,9 /4,6 - 1,3 /3,1]*

**↓ PAS / PAD (mmHg) - 5,1 / - 2,7**

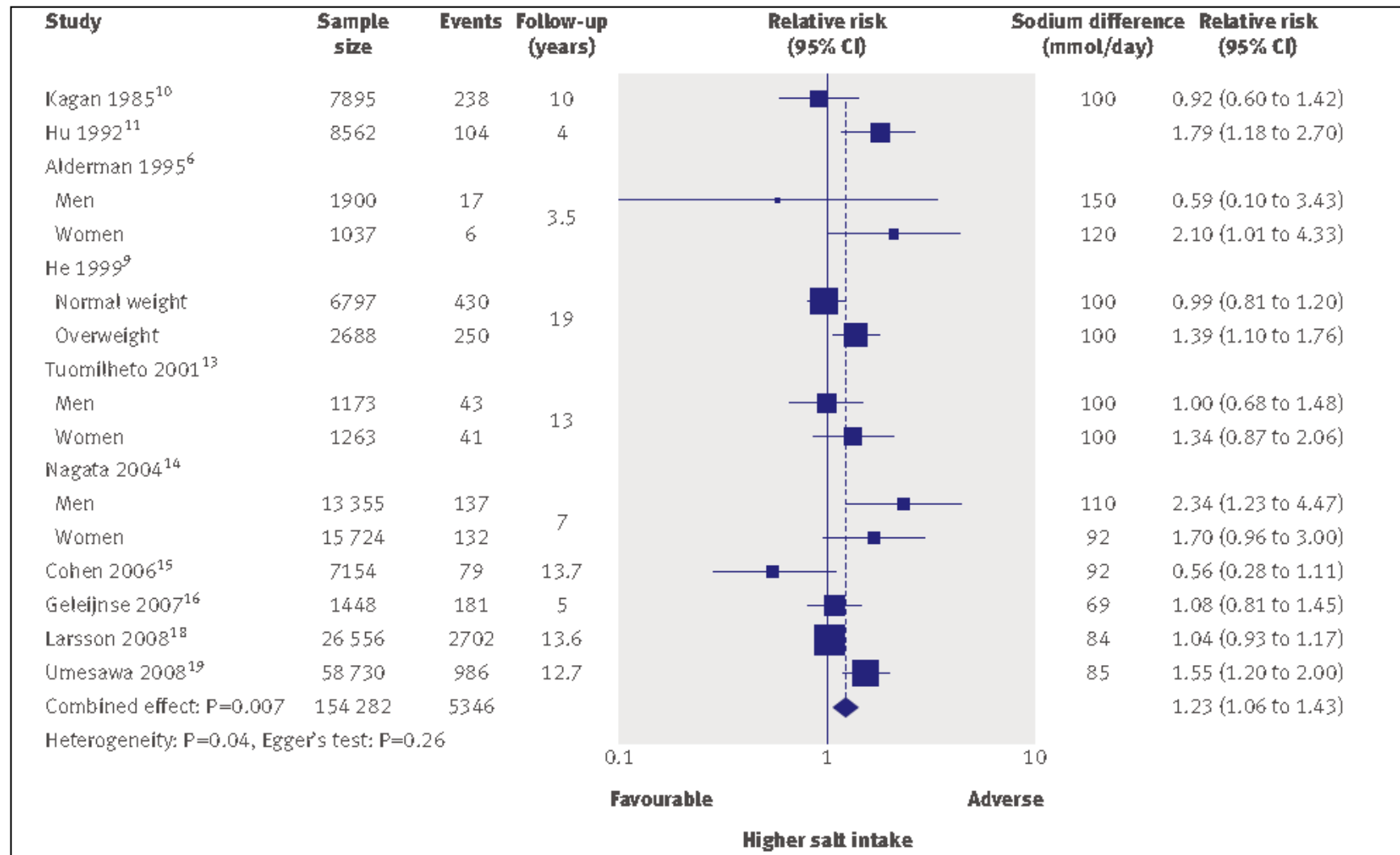
**- 2,0 / - 1,0**



**Meta-analyse de 19 cohortes  
avec un total de 177 025 participants  
et 11 000 accidents CV  
(suivi 3.5 à 19 ans)**

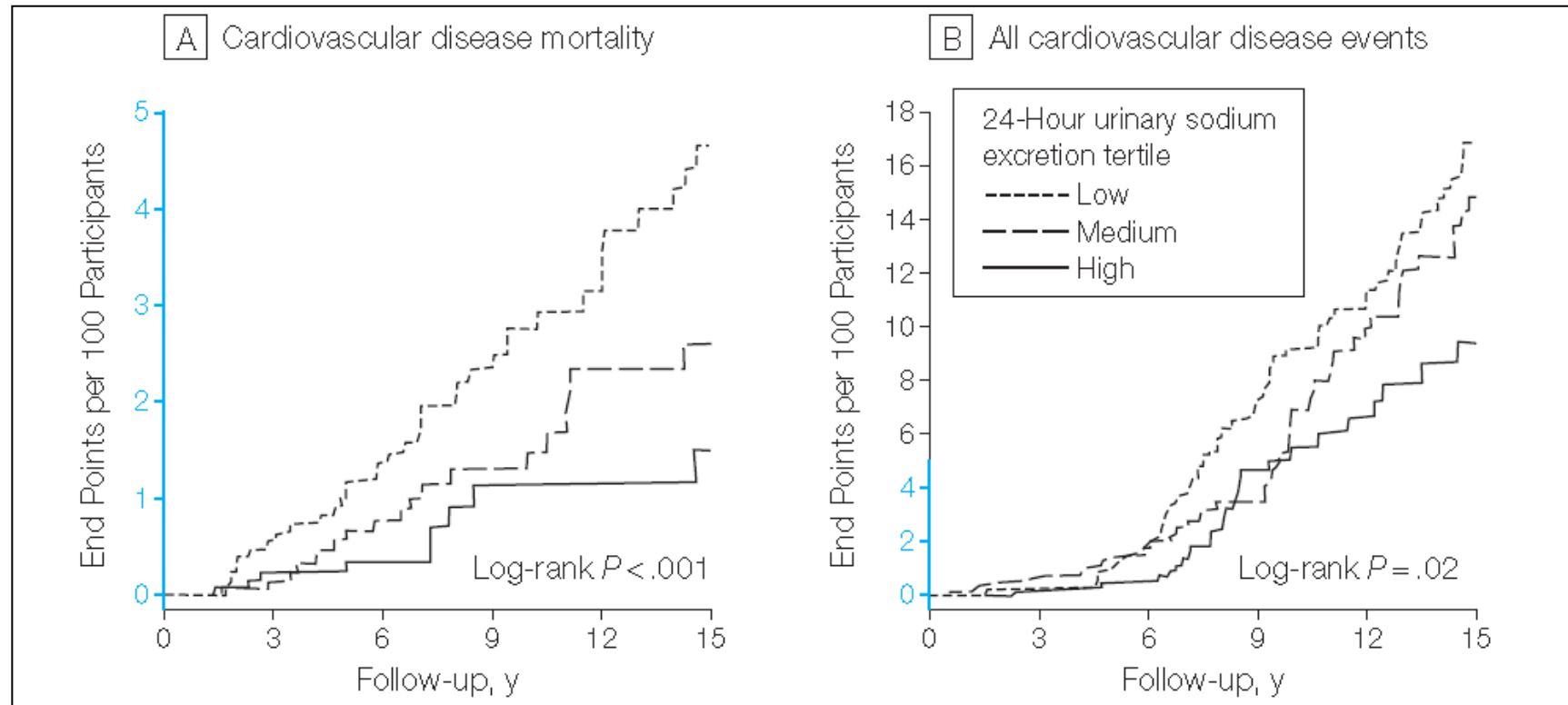
**Effet de la consommation du sel  
sur les accidents CV**

# Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies



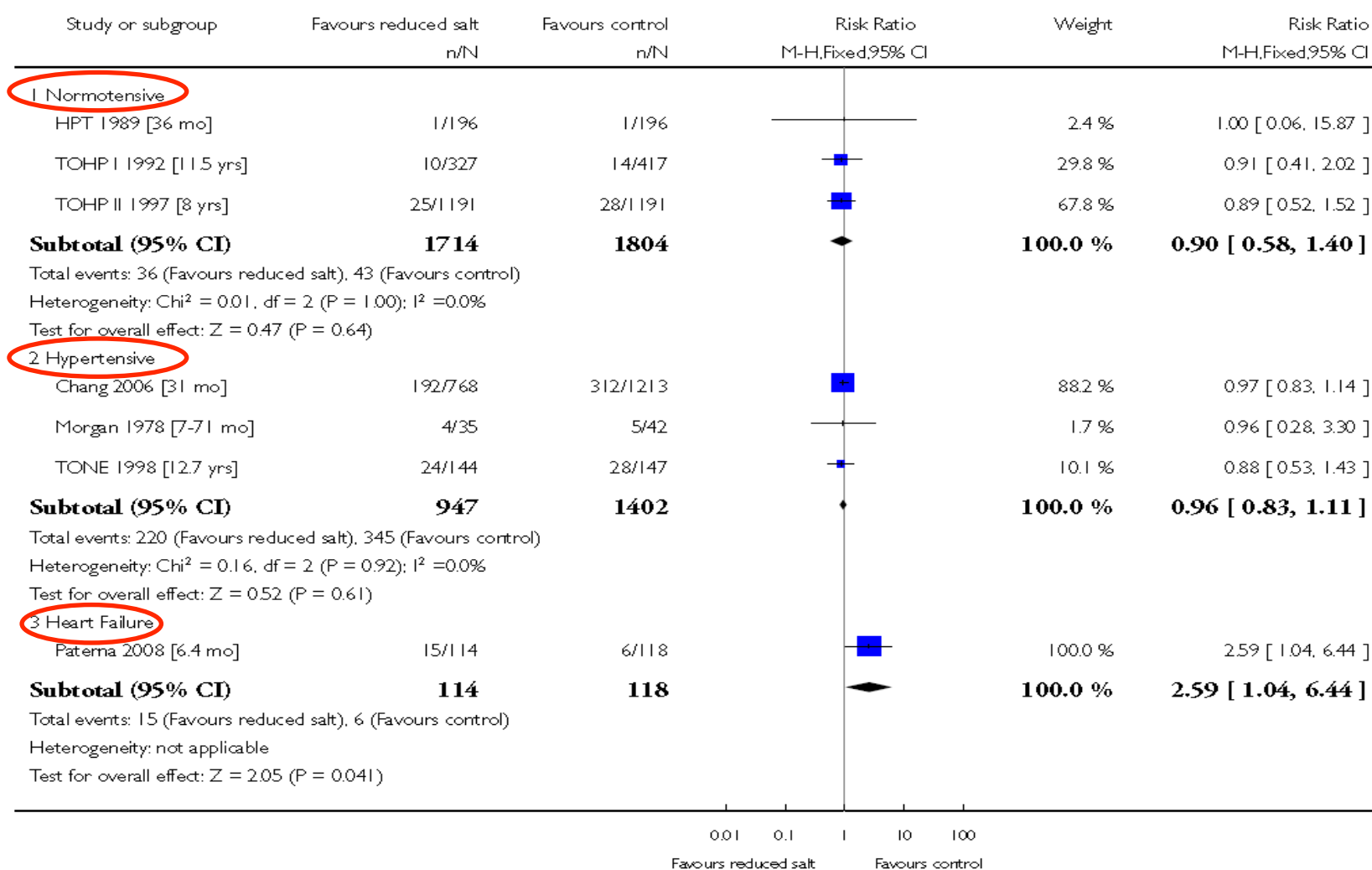
Strazzullo P et al BMJ 2009

# Fatal and Nonfatal Outcomes, Incidence of Hypertension, and Blood Pressure Changes in Relation to Urinary Sodium Excretion



# Reduced dietary salt for the prevention of cardiovascular disease (Review)

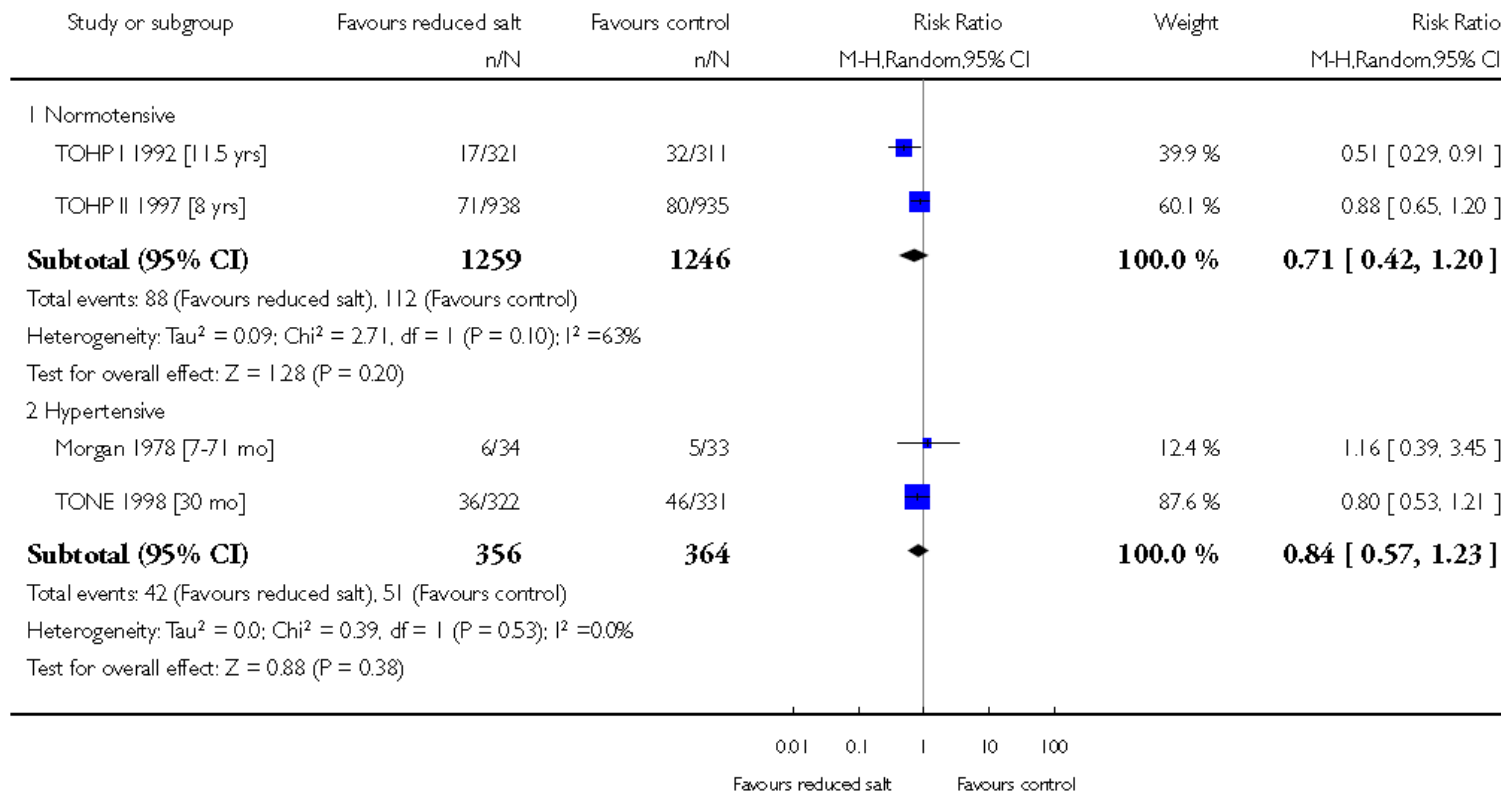
## Mortality



**Citation:** Taylor RS, Ashton KE, Moxham T, Hooper L, Ebrahim S. Reduced dietary salt for the prevention of cardiovascular disease. *Cochrane Database of Systematic Reviews* 2011, Issue 7. Art. No.: CD009217. DOI: 10.1002/14651858.CD009217.

# Reduced dietary salt for the prevention of cardiovascular disease (Review)

## Morbidity



**Citation:** Taylor RS, Ashton KE, Moxham T, Hooper L, Ebrahim S. Reduced dietary salt for the prevention of cardiovascular disease. *Cochrane Database of Systematic Reviews* 2011, Issue 7. Art. No.: CD009217. DOI: 10.1002/14651858.CD009217.

# Salt reduction lowers cardiovascular risk: meta-analysis of outcome trials

From the same data (Taylor's Cochrane meta-analysis) but pooling all the patients with the exception of CHF

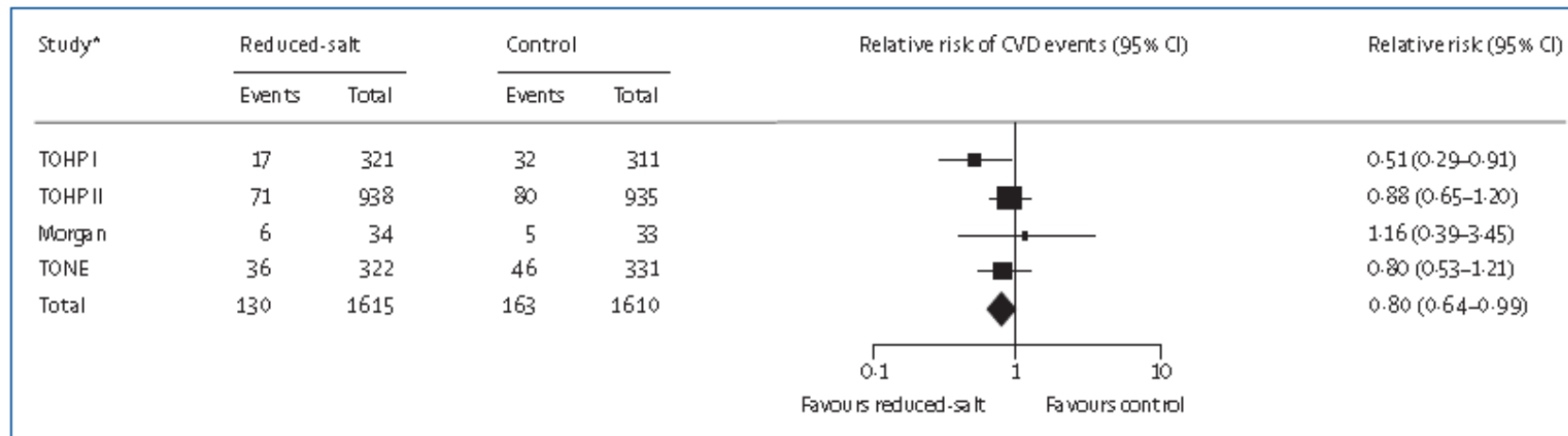
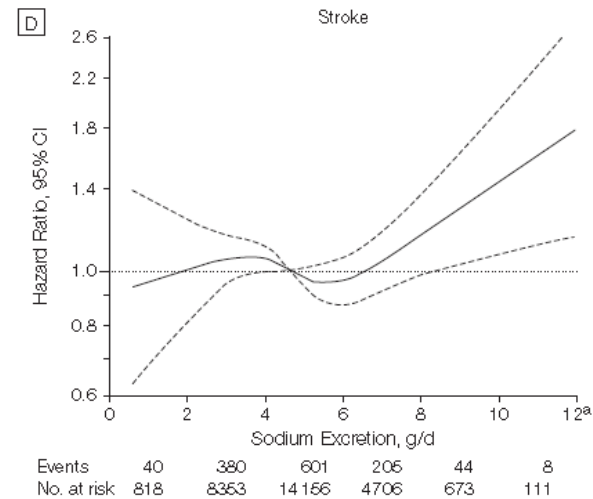
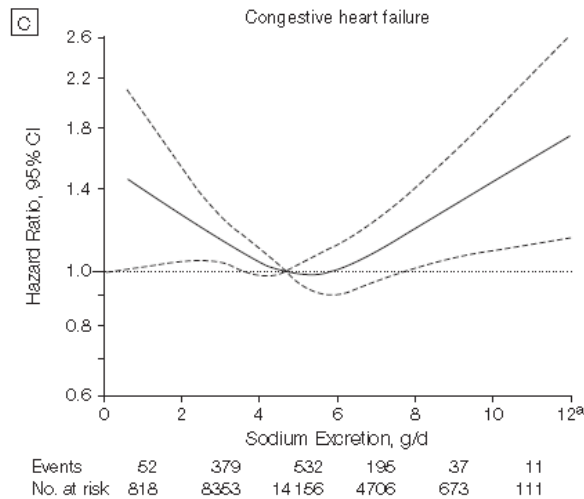
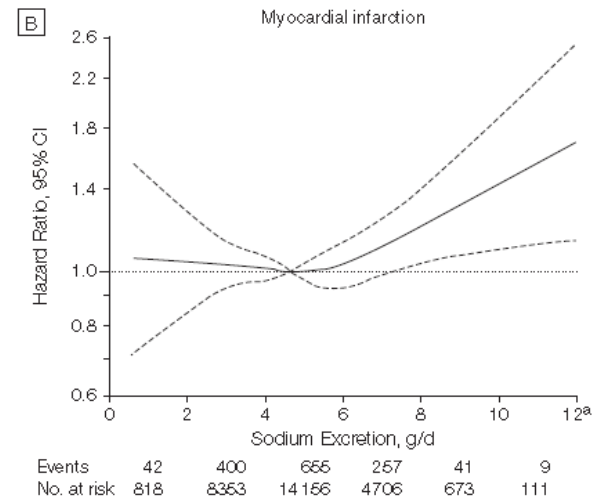
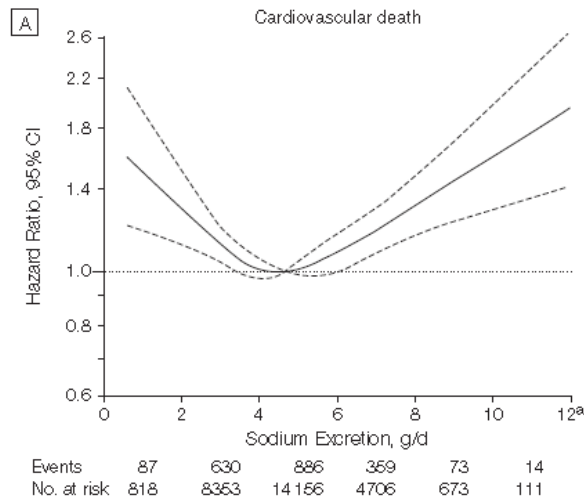
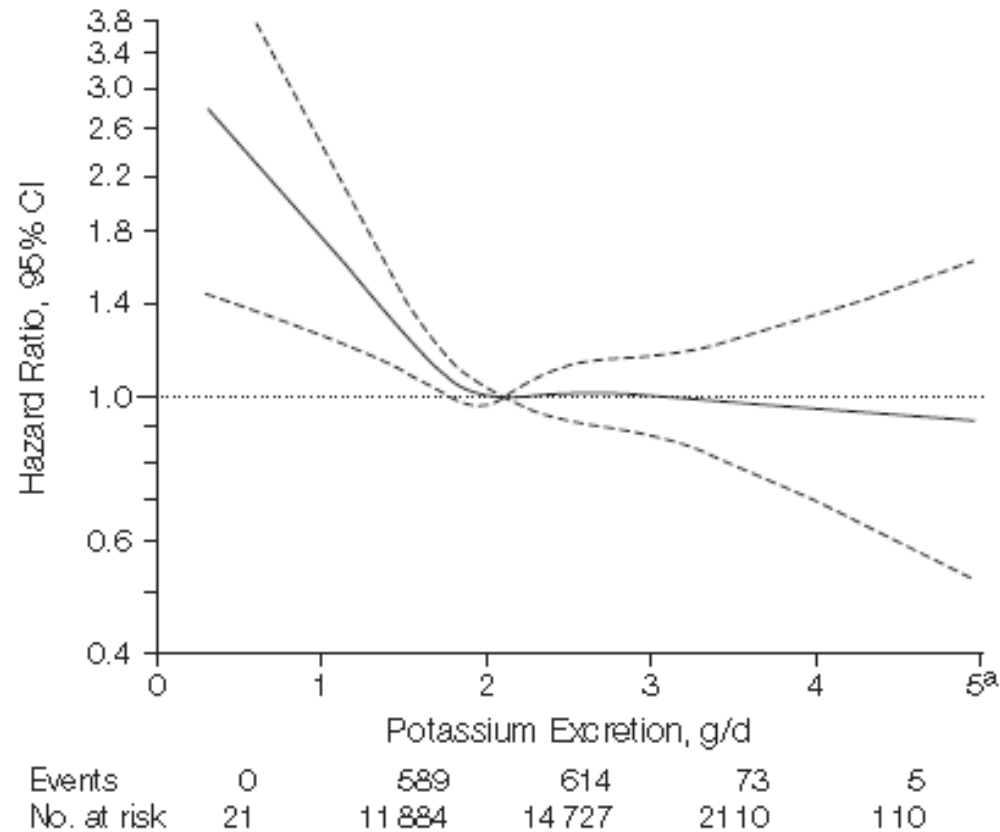


Figure: Relative risk of cardiovascular disease (CVD) events in our meta-analysis of outcome trials of salt reduction at longest follow-up combining hypertensive and normotensive individuals

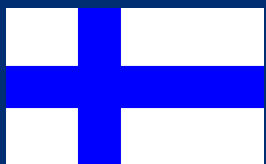
# Urinary Sodium and Potassium Excretion and Risk of Cardiovascular Events



# Urinary Sodium and Potassium Excretion and Risk of Cardiovascular Events

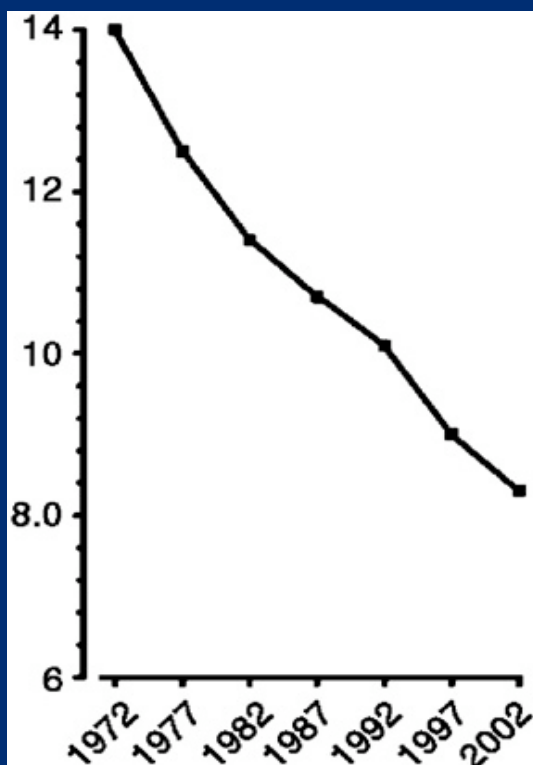




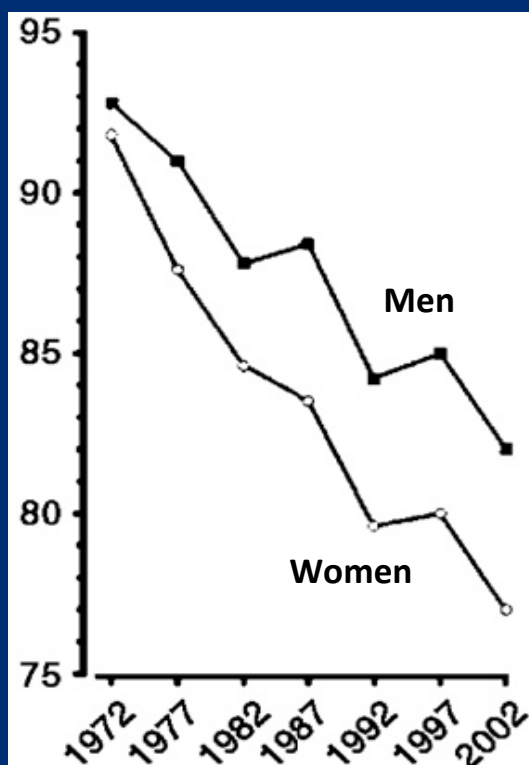


# Finlande

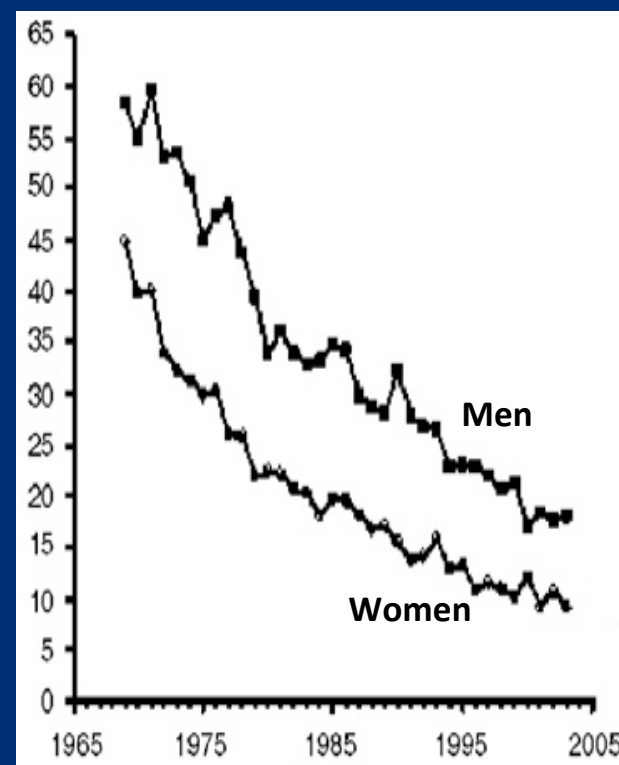
**Consommation de sel  
(g/j)**



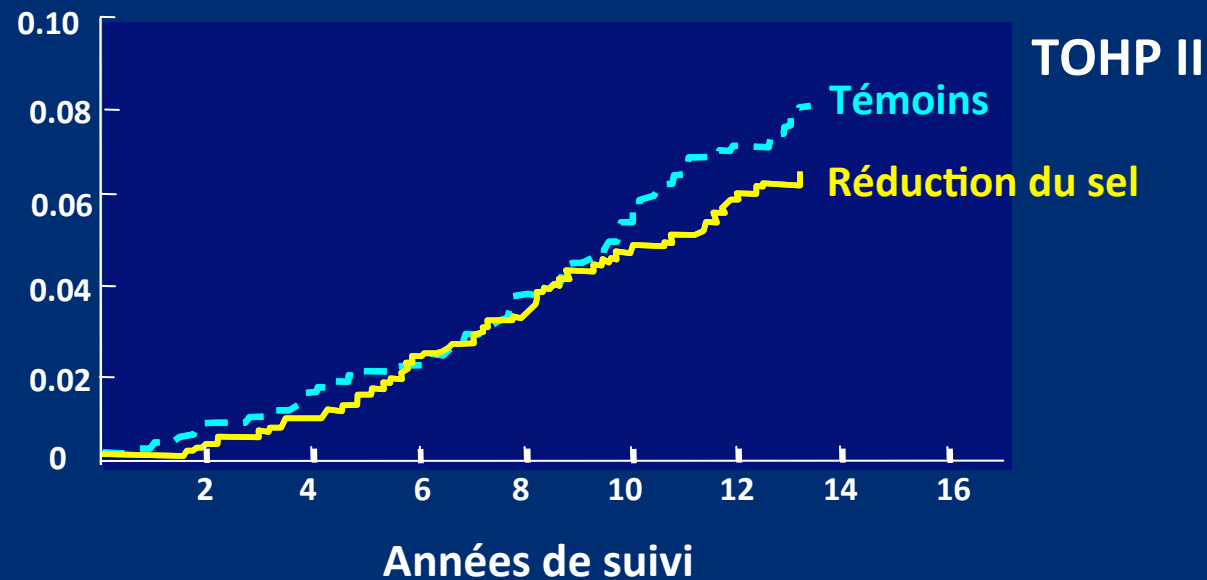
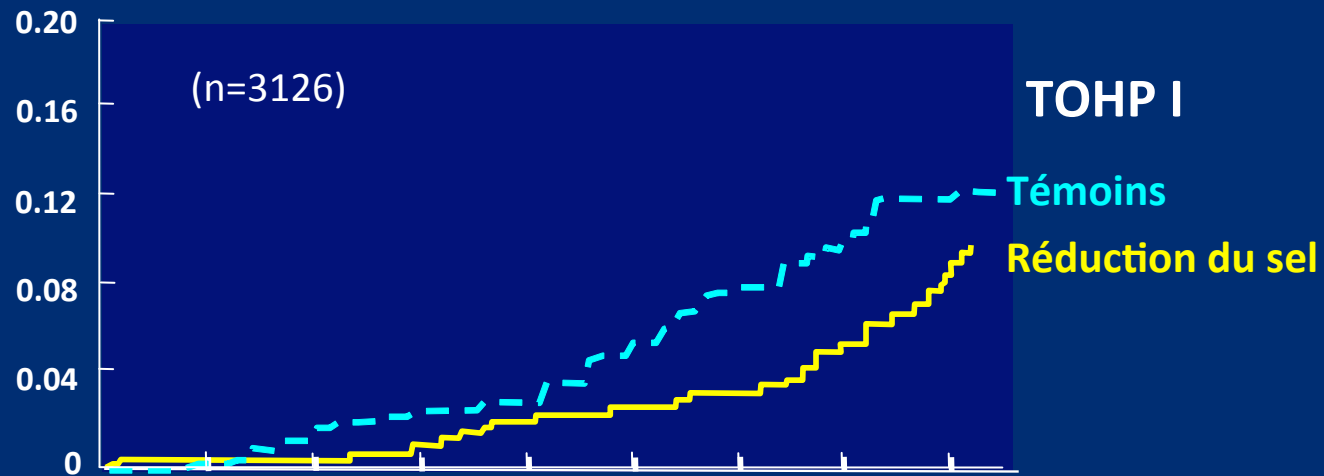
**PA diastolique  
(mmHg)**



**Mortalité par AVC  
(1/100 000)**



# Réduire l'apport alimentaire de sodium diminue de 25% les accidents cardiovasculaires



# L'essai qui permettrait peut-être de clore le débat ...

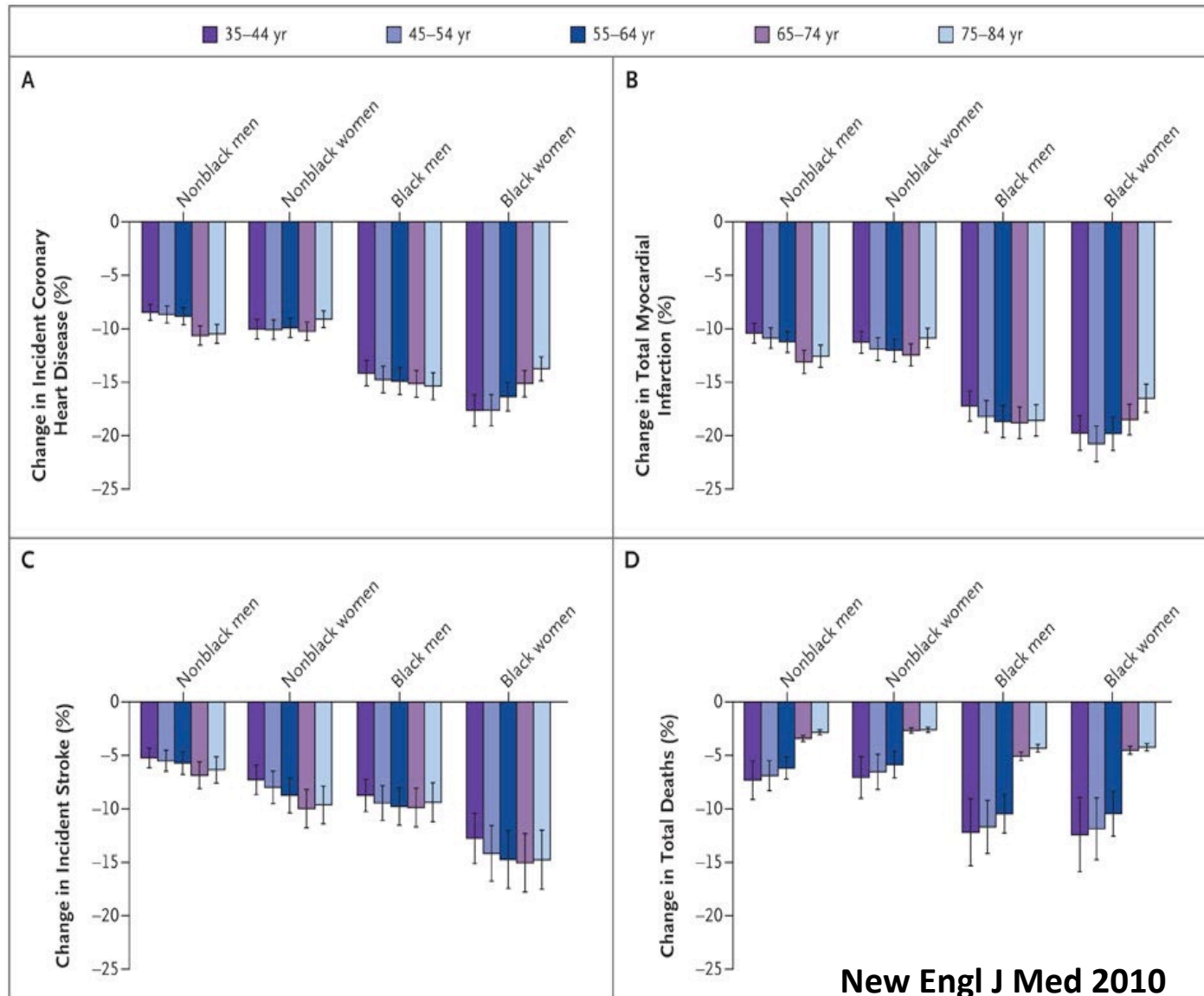
- Essai de morbidité cardiovasculaire
- 28 000 patients sur 5 ans
- 2500 évènements
- Différence de 3g/J sel
- Hypothèse d'une réduction significative de 10 % des évènements

# Projected Effect of Dietary Salt Reductions on Future Cardiovascular Disease

Kirsten Bibbins-Domingo, Ph.D., M.D., Glenn M. Chertow, M.D., M.P.H.,  
Pamela G. Coxson, Ph.D., Andrew Moran, M.D., James M. Lightwood, Ph.D.,  
Mark J. Pletcher, M.D., M.P.H., and Lee Goldman, M.D., M.P.H.

**N Engl J Med 2010;362:590-9.**

# Réduction estimée des accidents CV pour une diminution de 3g de sel



**Table 3. Projected Estimates of Comparative Effect of Various Population Interventions on Annual Reductions in Cardiovascular Events.\***

Intervention	Incidence of CHD	Total MI†	Incidence of Stroke	Death from Any Cause
	<i>reduction in absolute number of events per 100,000 persons per year</i>			
Salt reduction				
1 g/day				
Low estimate	66,000±5800 (5.9)	58,000±5100 (7.6)	59,000±8100 (7.8)	81,000±11,000 (4.1)
High estimate	110,000±9200 (9.6)	92,000±7800 (12.0)	59,000±8100 (7.8)	81,000±11,000 (4.1)
2 g/day				
Low estimate	66,000±5800 (5.9)	58,000±5100 (7.6)	59,000±8100 (7.8)	81,000±11,000 (4.1)
High estimate	110,000±9200 (9.6)	92,000±7800 (12.0)	59,000±8100 (7.8)	81,000±11,000 (4.1)
3 g/day				
Low estimate	66,000±5800 (5.9)	58,000±5100 (7.6)	59,000±8100 (7.8)	81,000±11,000 (4.1)
High estimate	110,000±9200 (9.6)	92,000±7800 (12.0)	59,000±8100 (7.8)	81,000±11,000 (4.1)
Smoking cessation‡	41,000±10,000 (3.7)	40,000±14,000 (11.9)	32,000±13,000 (4.4)	84,000±9300 (4.3)
Weight loss§	3,000±3200 (8.0)	3,000±3200 (8.0)	5600±600 (0.7)	36,000±2000 (2.0)
Statin therapy¶	3,000±3200 (8.0)	3,000±3200 (8.0)	6600±200 (0.9)	5400±540 (0.3)
Pharmacologic treatment of hypertension	3,000±3200 (8.0)	3,000±3200 (8.0)	69,000±11,000 (9.3)	80,000±10,000 (4.1)

**Entre 56 et 95 billions de dollars économisés**

**Entre 37000 et 59000 accidents vasculaires cérébraux évités aux USA pour une réduction de 3 g/j de sel**

**Entre 58000 et 92000 infarctus du myocarde évités aux USA pour une réduction de 3 g/J de sel**

\* Plus-minus values are standard errors. † Total myocardial infarction, including both fatal and nonfatal. ‡ Smoking cessation was defined as the cessation of all tobacco. § Weight loss was defined as a loss of 10% of body weight in an adult. ¶ Cholesterol treatment for primary prevention according to the National Cholesterol Education Program Adult Treatment Panel III guidelines as treatment with statins in persons with a 10-year risk of CHD of less than 20%. || Pharmacologic treatment of hypertension was defined on the basis of treatment of all persons with hypertension to the degree described in the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial.<sup>24</sup>

# Le bon sens: la sensibilité au sodium

- Certains sujets augmentent leur pression artérielle sous l'effet d'une charge sodée, d'autres pas.
- Sensibilité au sodium: 26% dans la population générale, 51% chez les hypertendus.

## Une question

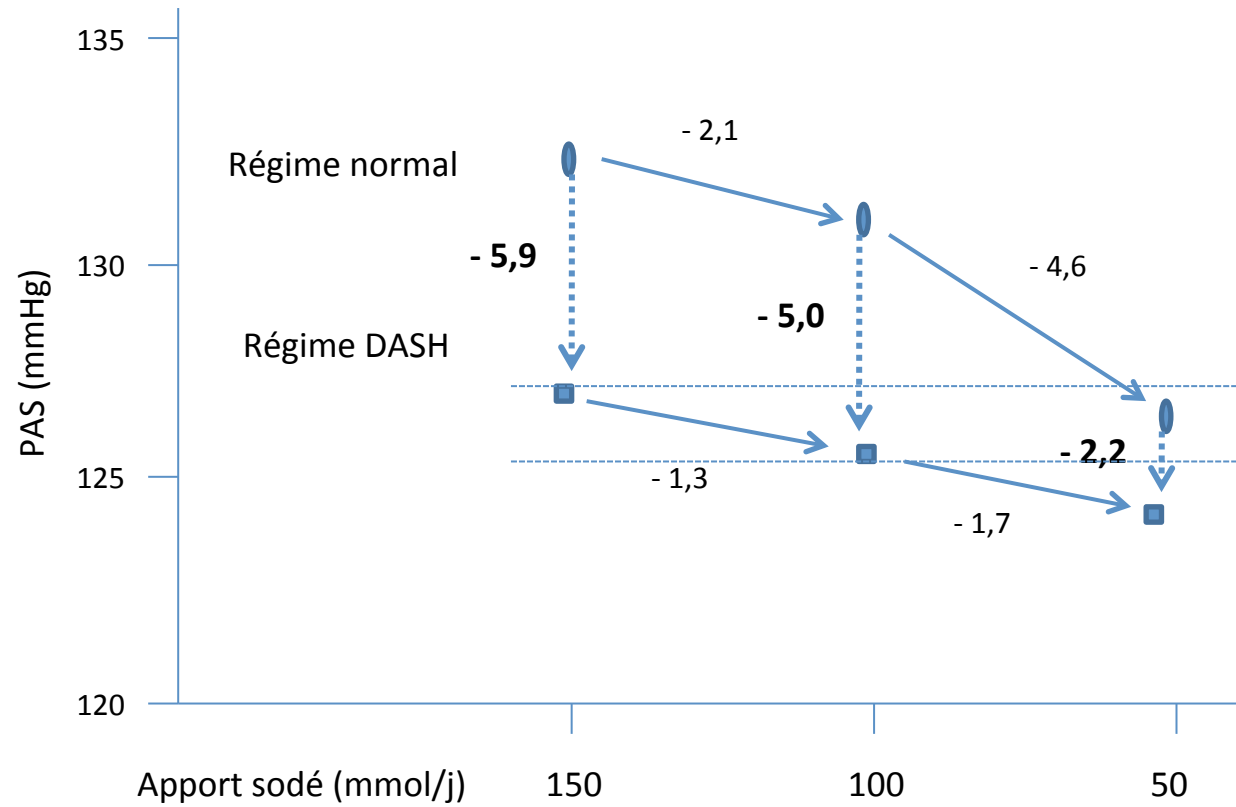
Quel est le rôle du chlore ( $\text{Na}^+\text{Cl}^-$ ) ?

# **La restriction sodée est-elle utile ?**

- **Effet modeste, mais intéressant chez les hypertendus, minime chez les normotendus.**
- **Population ciblée (malades, origine, âge, obésité et syndrome métabolique, gros consommateurs de sel ...)**
- **Dans la population générale ?**

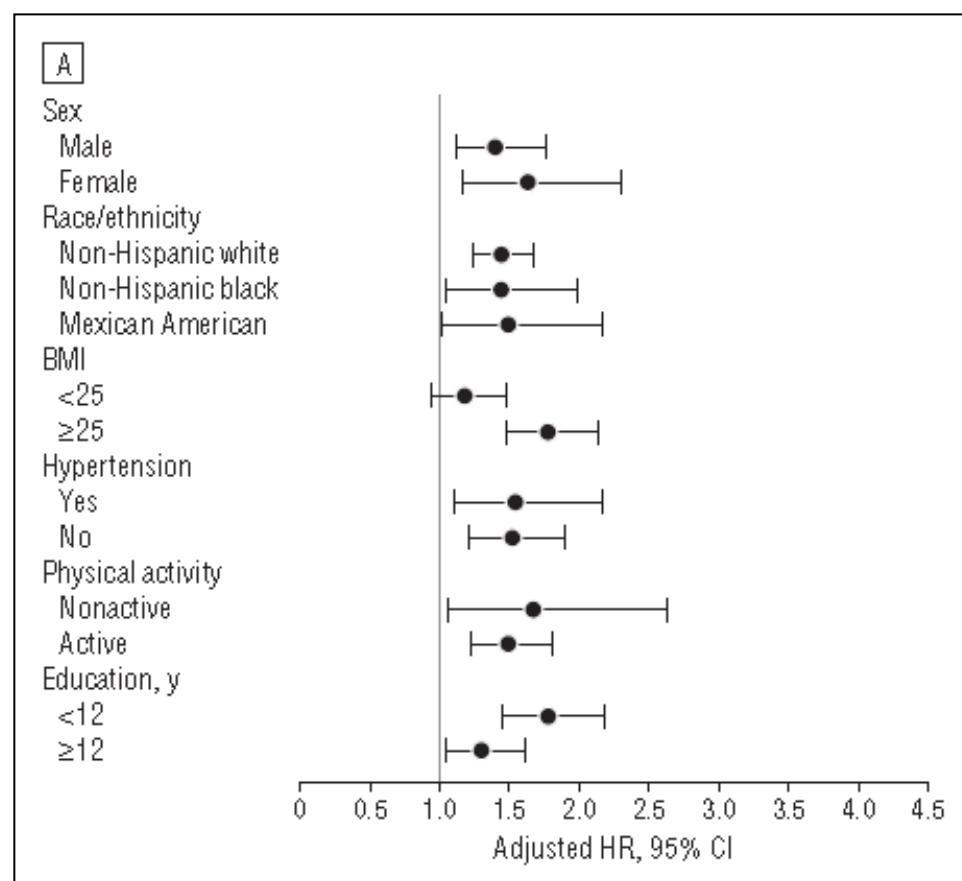


# Mieux vaut manger sainement ! L'étude DASH

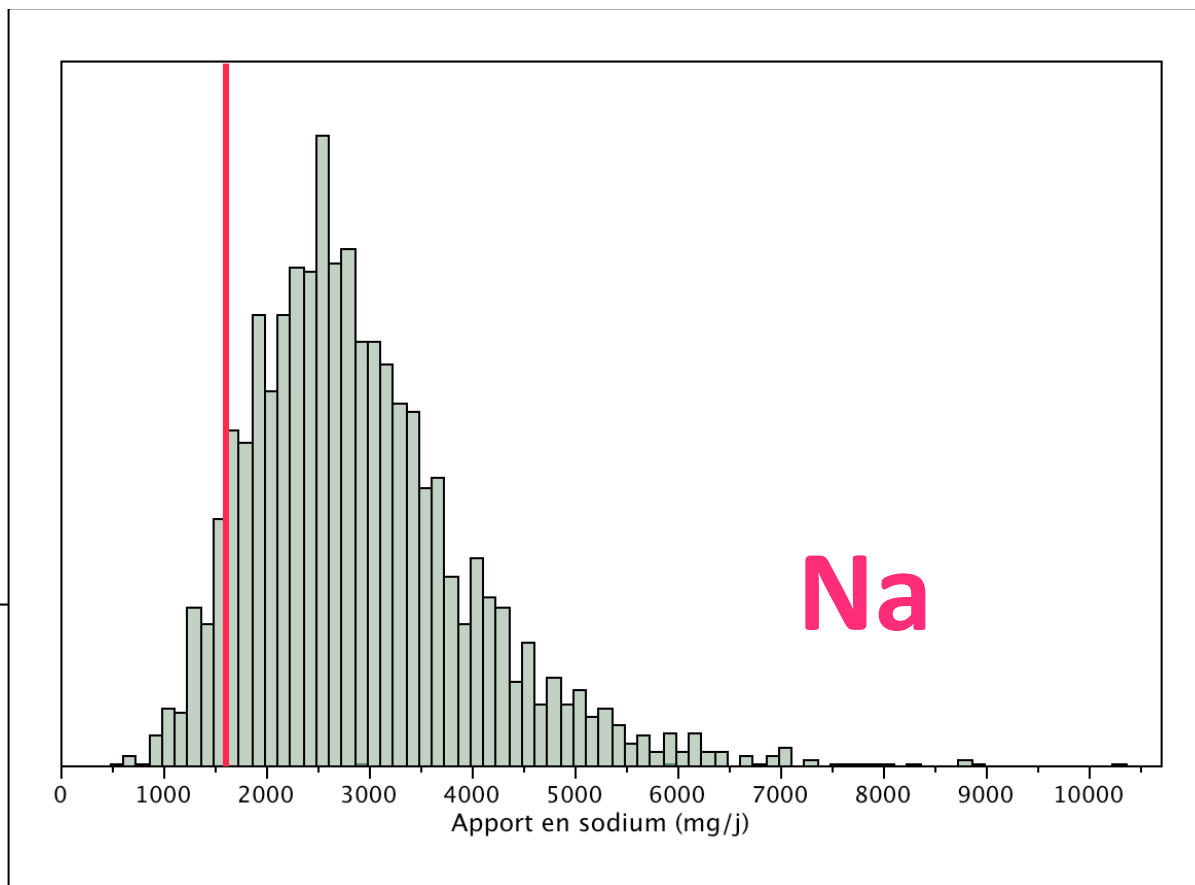
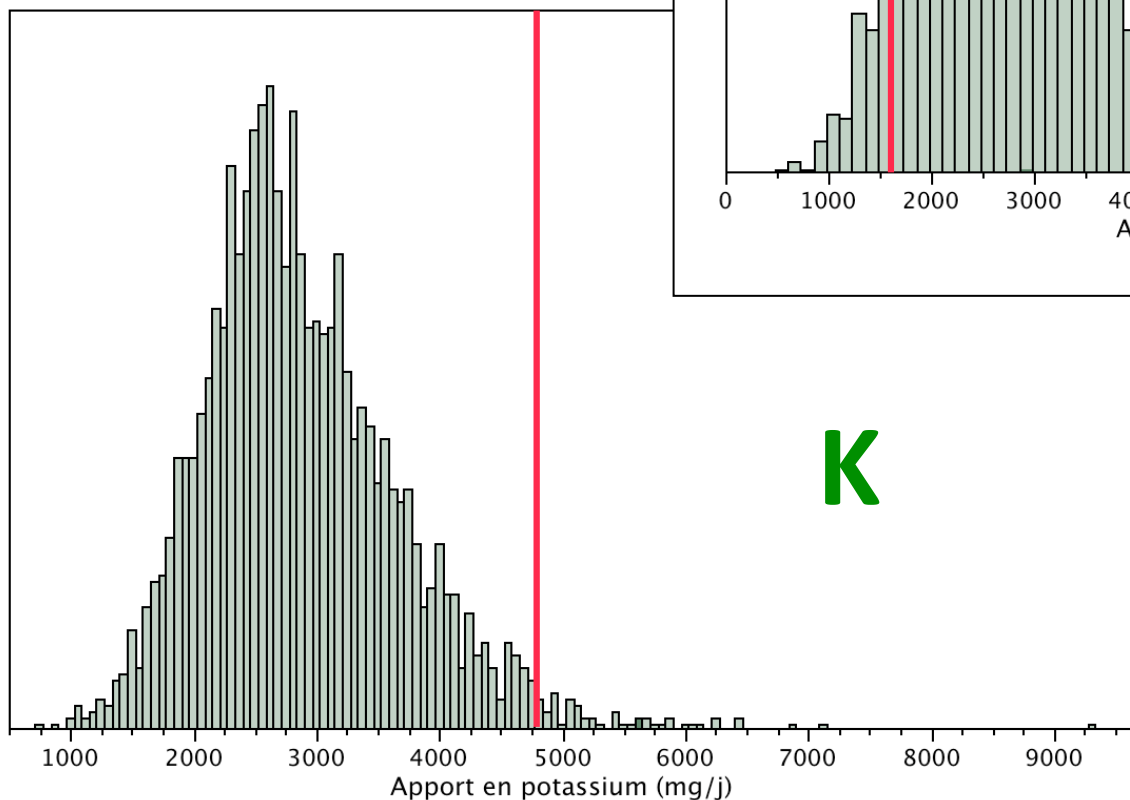


Sacks NEJM 2001;344:3-10

# Sodium and Potassium Intake and Mortality Among US Adults

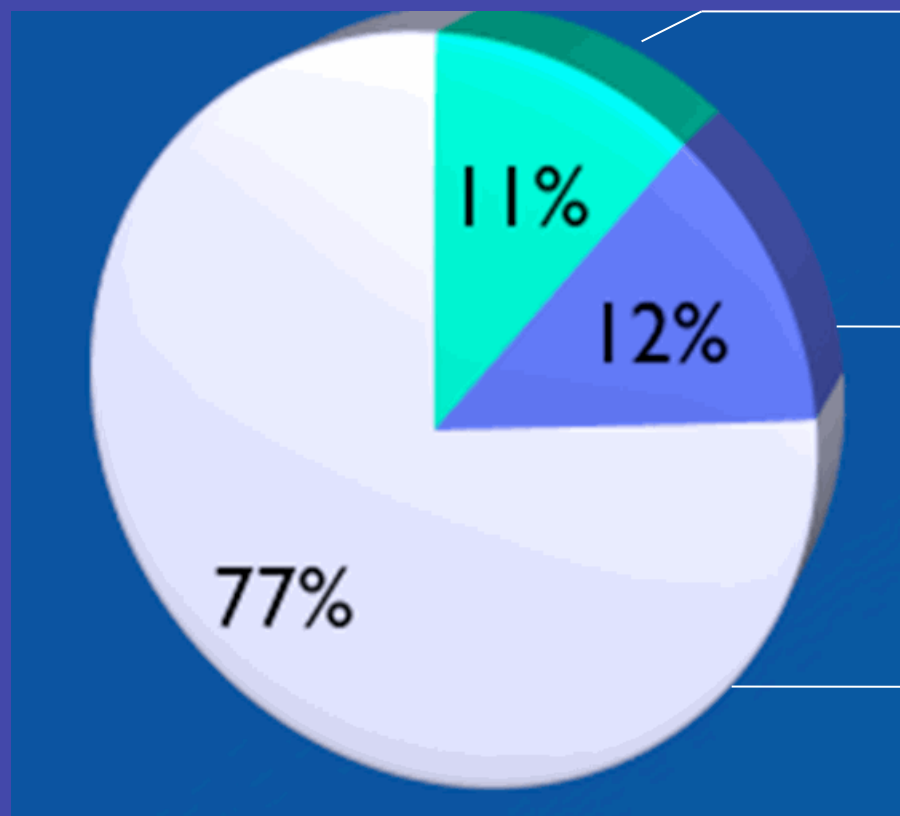


# Consommation de sodium et potassium en France



**PNNS :**  
**Sel : de 12 à 9 g/J (9 ans)**  
**Objectif : 6-5 g/J**

# Sources de chlorure de sodium



Présent naturellement  
dans les aliments

= 1 g/j (0,4 g de Na)

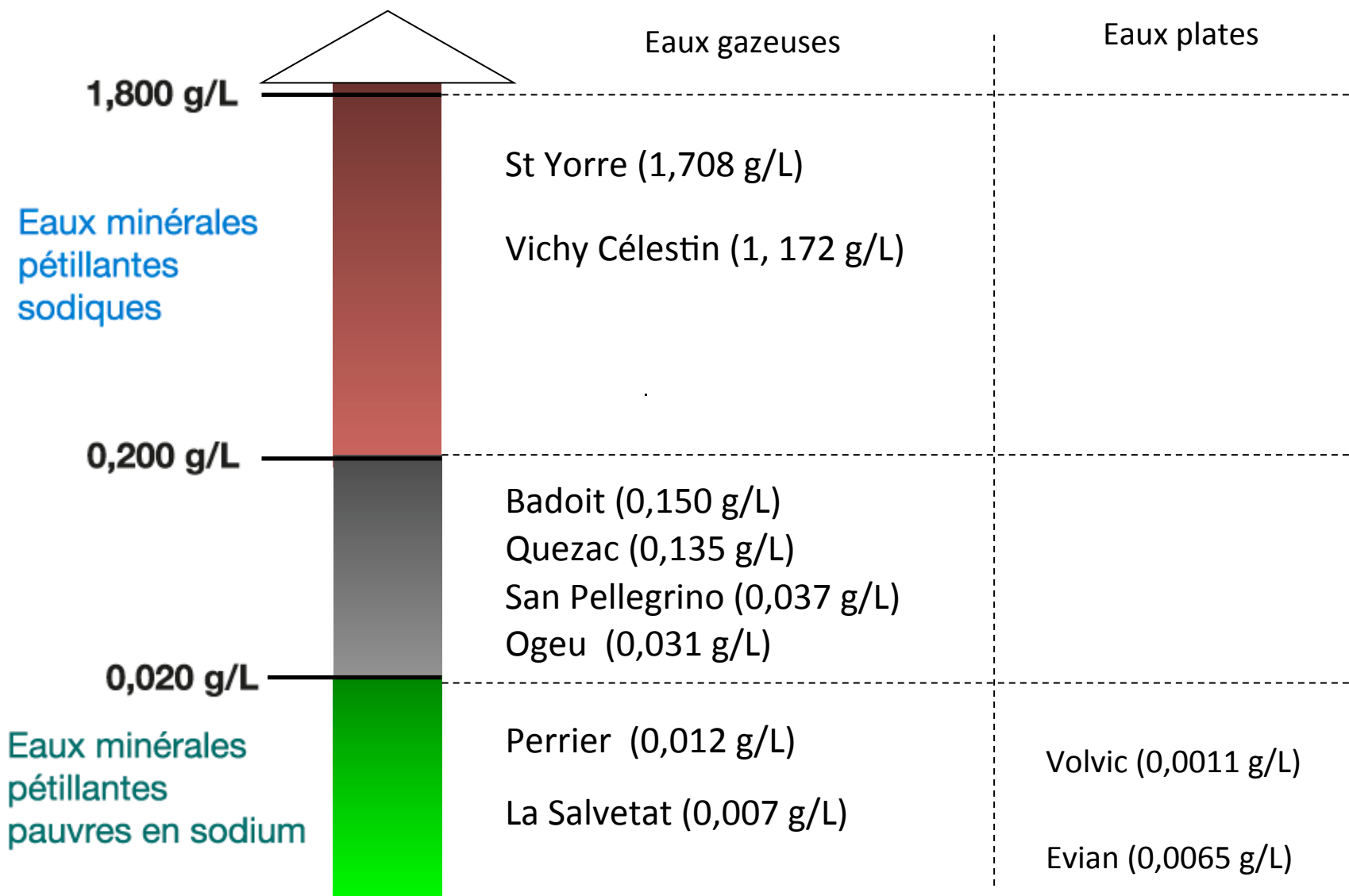
Ajouté en cuisine ou à table

= 1 g/j (0,4 g de Na)

Aliments transformés /  
servis au restaurant

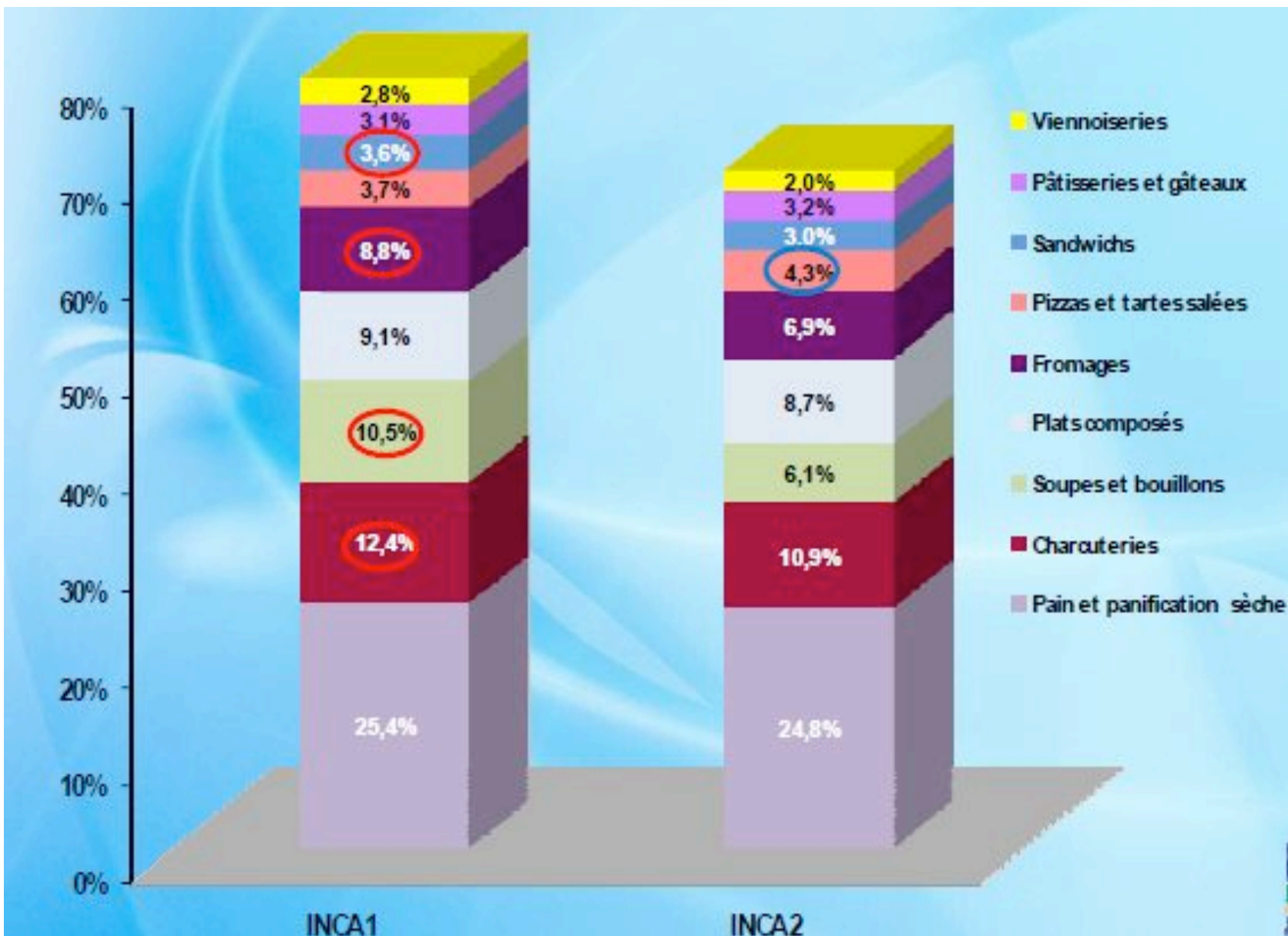
= 7 g/j (2,8 g de Na)

## Teneur en sodium des eaux minérales naturelles\*



\* D'après une directive européenne sur les Eaux Minérales Naturelles

# Evolution des groupes d'aliments vecteurs de sel chez les adultes Français (1998/1999 vs 2006/2007)



<http://www.hsph.harvard.edu/>

## **Salt, Perception, and Psychology**

### **5. Stealth health: The most delicious approach to sodium reduction.**

For many foods and preparations, the average person can't detect moderate to substantial differences in sodium levels, including reductions of up to as much as 25 percent. That's great news. In fact, many food manufacturers and restaurant companies have already made or are in the process of making substantial cuts in sodium—some all at once and some over time—that their customers will not be able to detect.

### **6. Retrain your taste buds: You can learn to savor foods with less salt.**

Studies have found that we can shift our sense of taste to enjoy foods with lower levels of sodium. One key to success: Make the changes gradually and consistently over a period of time, rather than trying to cut back by a large amount all at once (unless of course you find that an immediate 25 percent reduction in sodium doesn't undermine your enjoyment of a particular food). Try this trick: Combine a reduced sodium version of a favorite product (e.g., vegetable soup) with a regular version in proportions that gradually favor the reduced sodium version. As time goes on, you won't miss the salt.

### **7. Try a little romance: Sea salt and other secrets of the healthy kitchen.**

Most sea salt has about the same level of sodium as other salts, but who doesn't perk up with the mention of sea salt? It sounds like your favorite chef has taken charge of your dinner. You don't need to spend the money on sea salt, just remember that we eat with our eyes and ears, not just our mouths—and we make decisions about how much we are likely to enjoy a given food long before it gets to our mouths. So instead of calling something "low sodium," try language like "with a touch of sea salt," "citrus-infused" or "garlic-scented," and you'll likely entice more people to taste and enjoy reduced sodium dishes. Finally, for those who think "low sodium" is the exact opposite of a compelling, positive message, remember that there is a big difference between well-prepared low-sodium foods and badly executed low-sodium foods. Bad cooking is just bad cooking, independent of sodium levels.

# Conclusion

- **Le consommation de sel doit être limitée chez la majorité de vos patients (HTA, Insuffisance cardiaque...)**
- **Un objectif de moins de 6 g/J est à retenir**
- **L'environnement actuel du fait des politiques de santé publique rend cet objectif réaliste**
- **N'oubliez pas de rechercher les freins et en particulier dans l'environnement des patients**



Merci ....