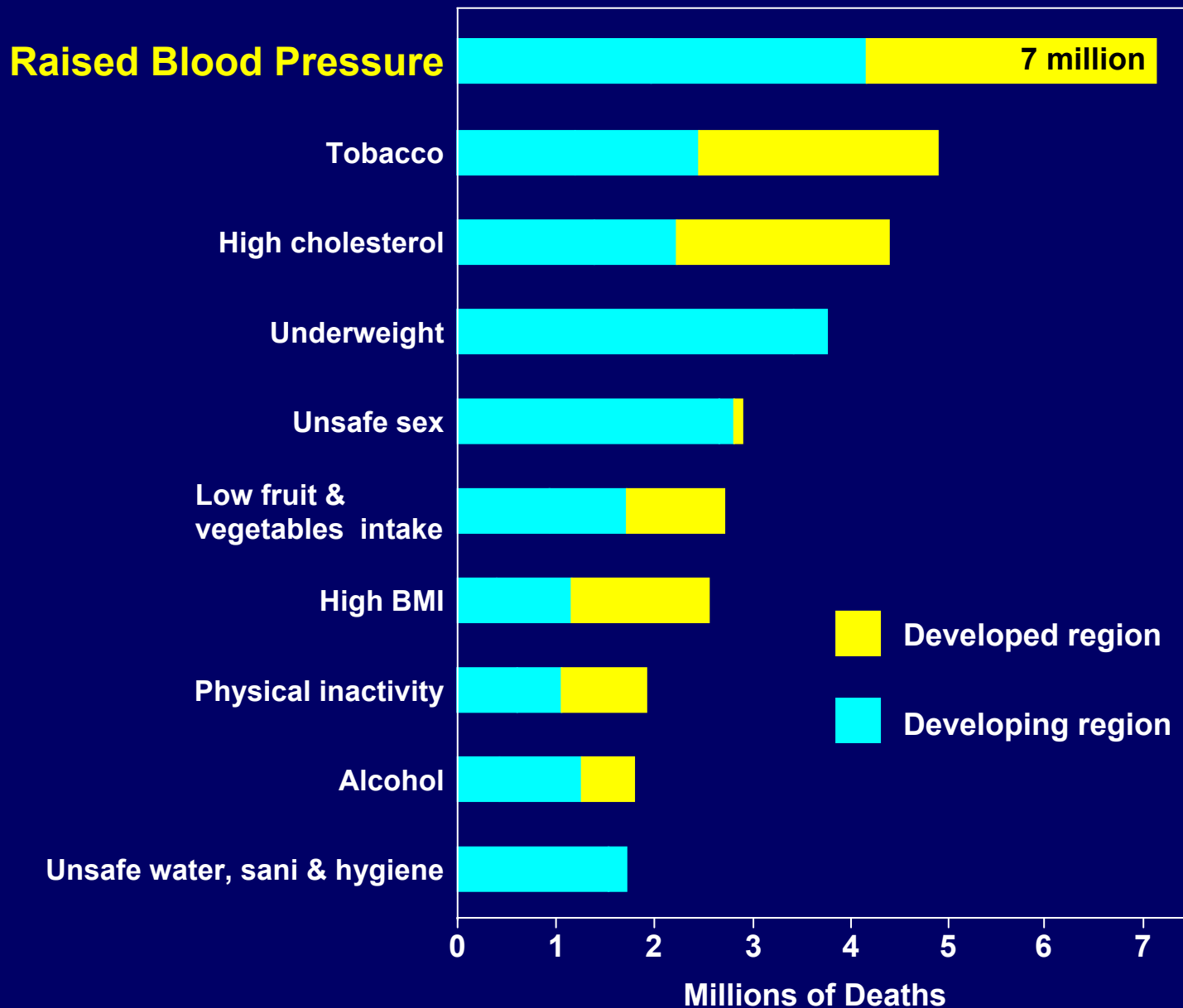


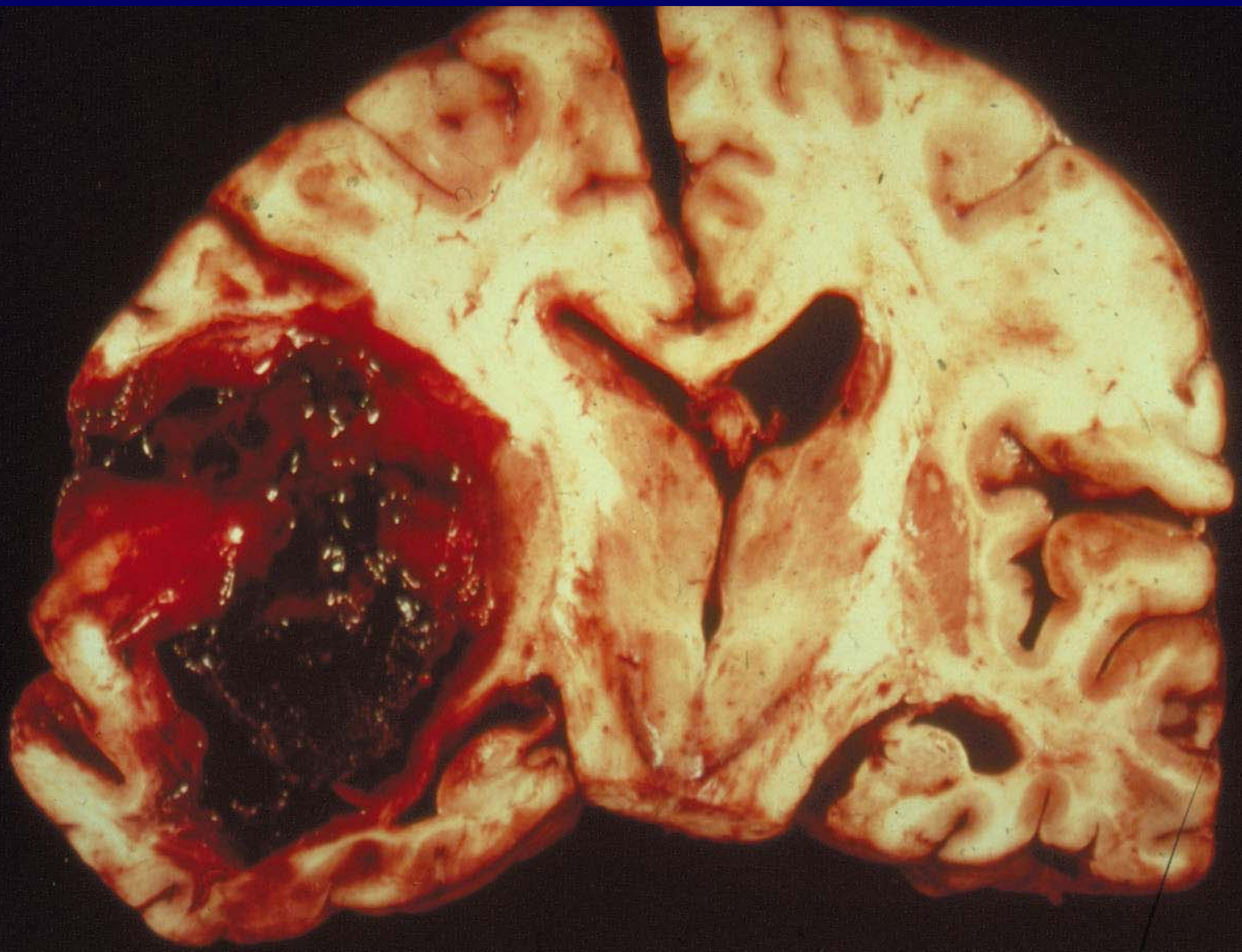
Salt

From Evidence to Implementation

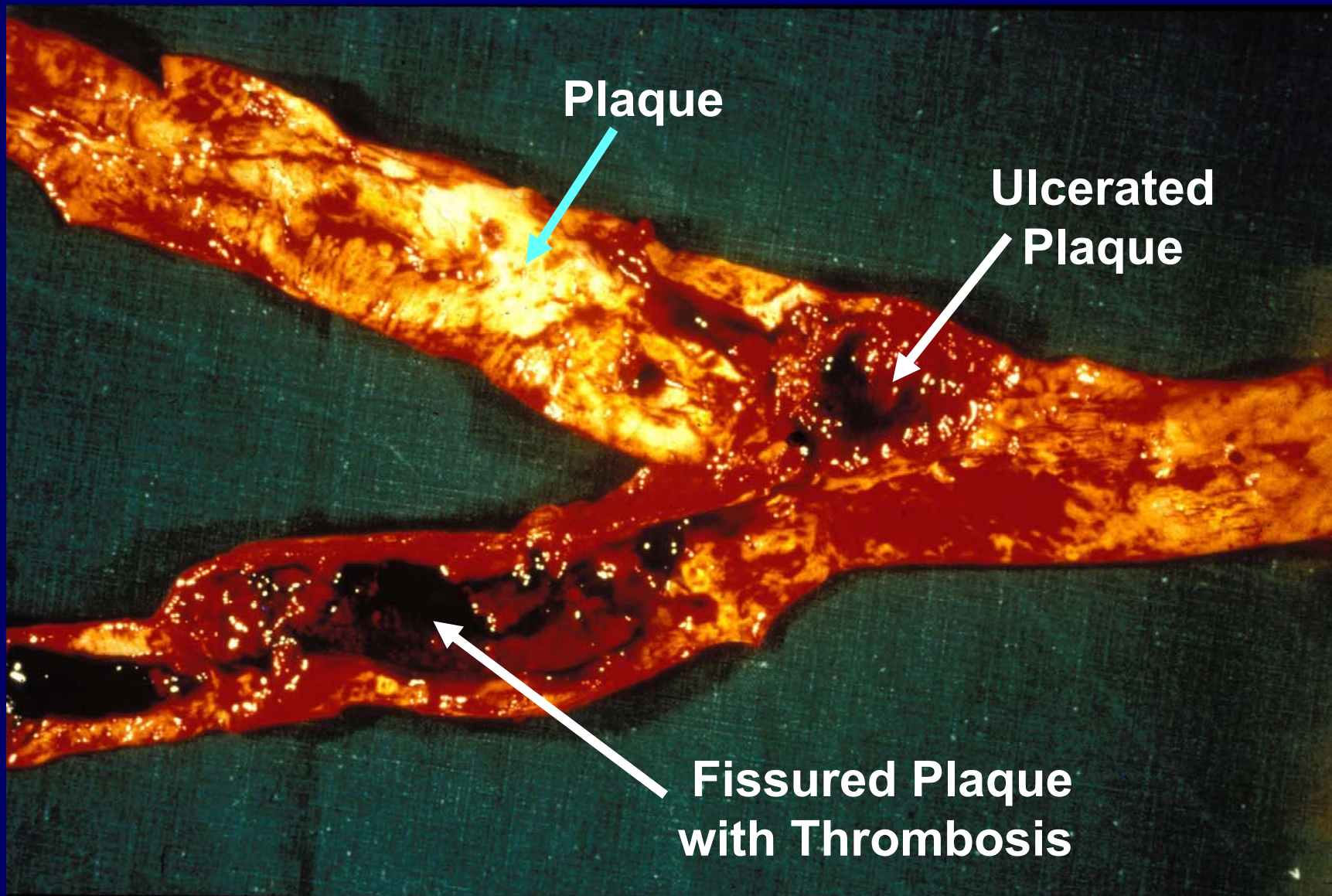
Graham A MacGregor
St. George's Hospital
London

Major Underlying Factors causing Death - Worldwide





Atheroma in carotid artery



Major modifiable risk factors

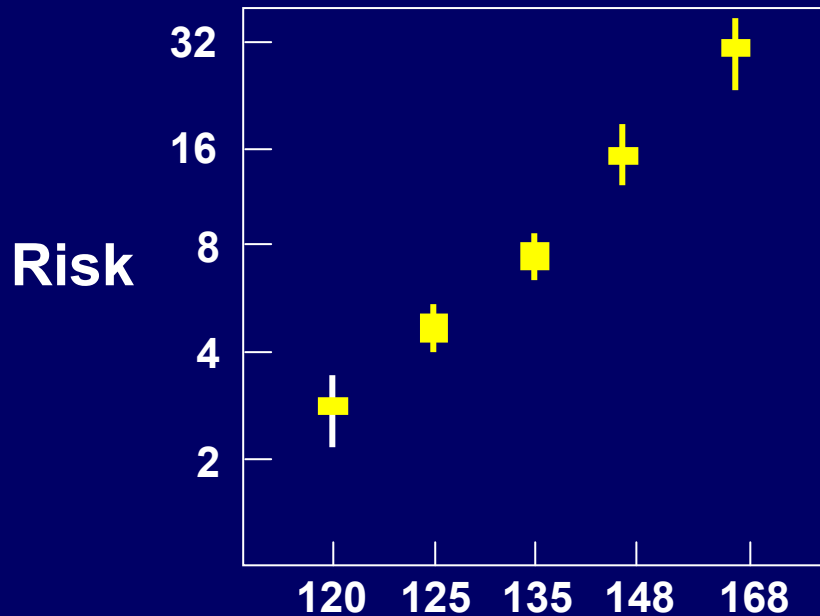
- ↑ Blood pressure
- ↑ Total & LDL cholesterol, ↓HDL
- Smoking
- Diabetes
- Lack of fruit and vegetables
- Lack of exercise
- Male pattern obesity

Unmodifiable

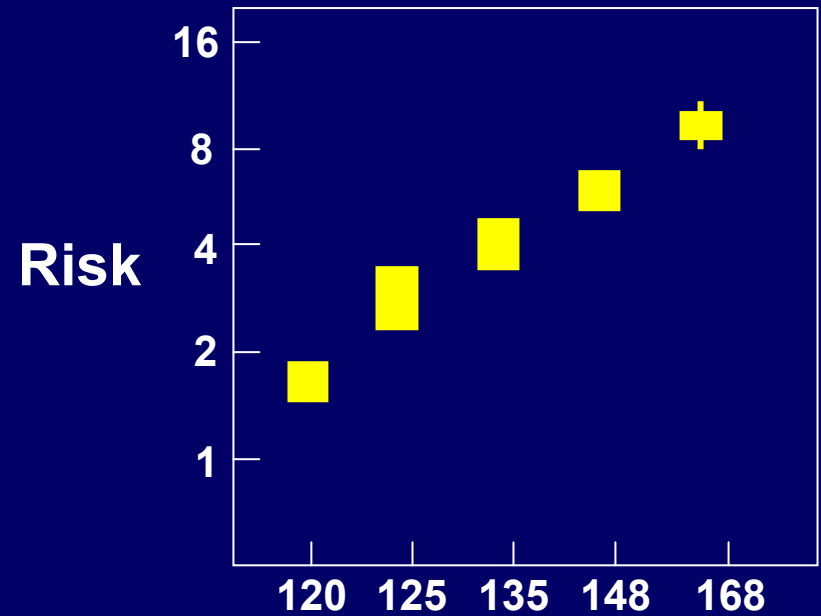
- Age
- Genetics

Systolic BP and Risk of Death

Stroke Deaths



Heart Deaths



Systolic Blood Pressure (mmHg)

The risk starts at systolic 115 mmHg (83% adults)



South American Indians

On Evolutionary Diet

i.e. no salt, very little fat, no refined carbohydrate, fruits & vegetables ⊕, but aggressive fit, stress ⊕⊕

Male adults: Average **BP: 96/61** mmHg
Average **Cholesterol: 3.1** mmol/l

No rise in either with age

No vascular disease

What puts up population BP?

- **Salt intake**
- **Lack of Fruit and vegetables**
- **Weight**
- **Lack of Exercise**
- **(Alcohol excess)**



Salt

Until 5000 yrs ago 0.1 grams of salt per day

Now 10 to 12 grams per day

Why this big increase?

(a) Magical property of preserving food

(b) Cleans up tainted and/or unpalatable food

Deep freeze refrigerator

Therefore now no need

But still eating 10 to 12 gram per day courtesy of the food industry

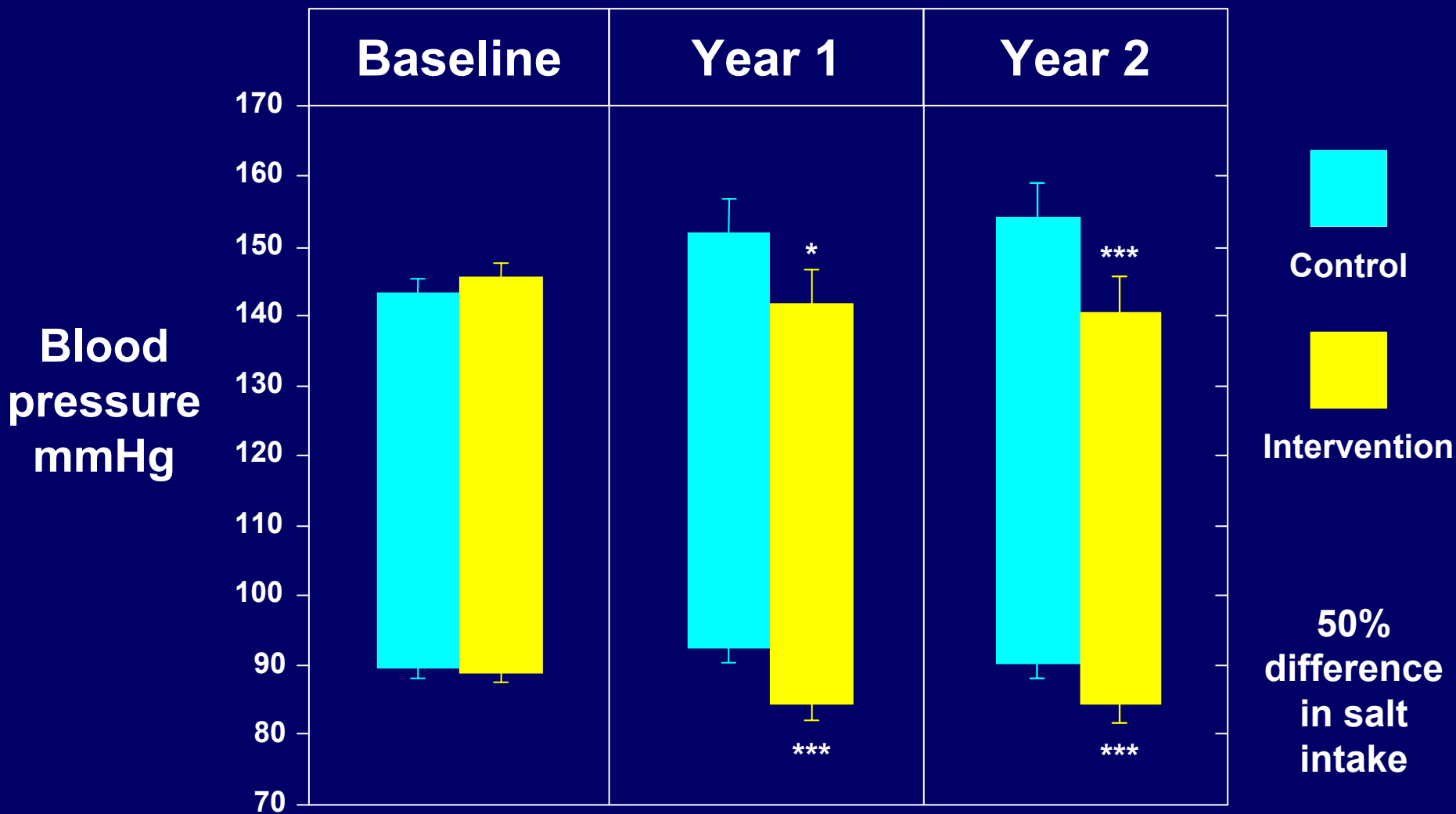


Only 15% (1.8 grams) added by consumer

Evidence

- **Epidemiology** Over 50 population studies and Intersalt
- **Migration** e.g. Kenya
- **Intervention** Portuguese villages. New born babies
- **Genetic** All defects identified so far impair the ability of the kidney to excrete salt
- **Mechanisms** Plasma Na, corrected volume expansion
- **Animal** All forms of hypertension are caused or aggravated by salt. Chimpanzees
- **Treatment** Trials, Meta-analysis. Dose response
- **Mortality studies** Finland (24h UNa)
- **Outcome trials** TOHP, Taiwan (mineral salt: high K, low Na)

Population Study in Two Portuguese Villages (n=1600)



Genetic

Salt Aggravates

G.R.A. -----> ↑
11 β OH DEF -----> ↑
17 α OH DEF -----> ↑
A.M.E. -----> ↑

Liddle's -----> ↑

Mineralocorticoid
Activity

Kidney
Na⁺ Reabsorption

Na Balance

BP

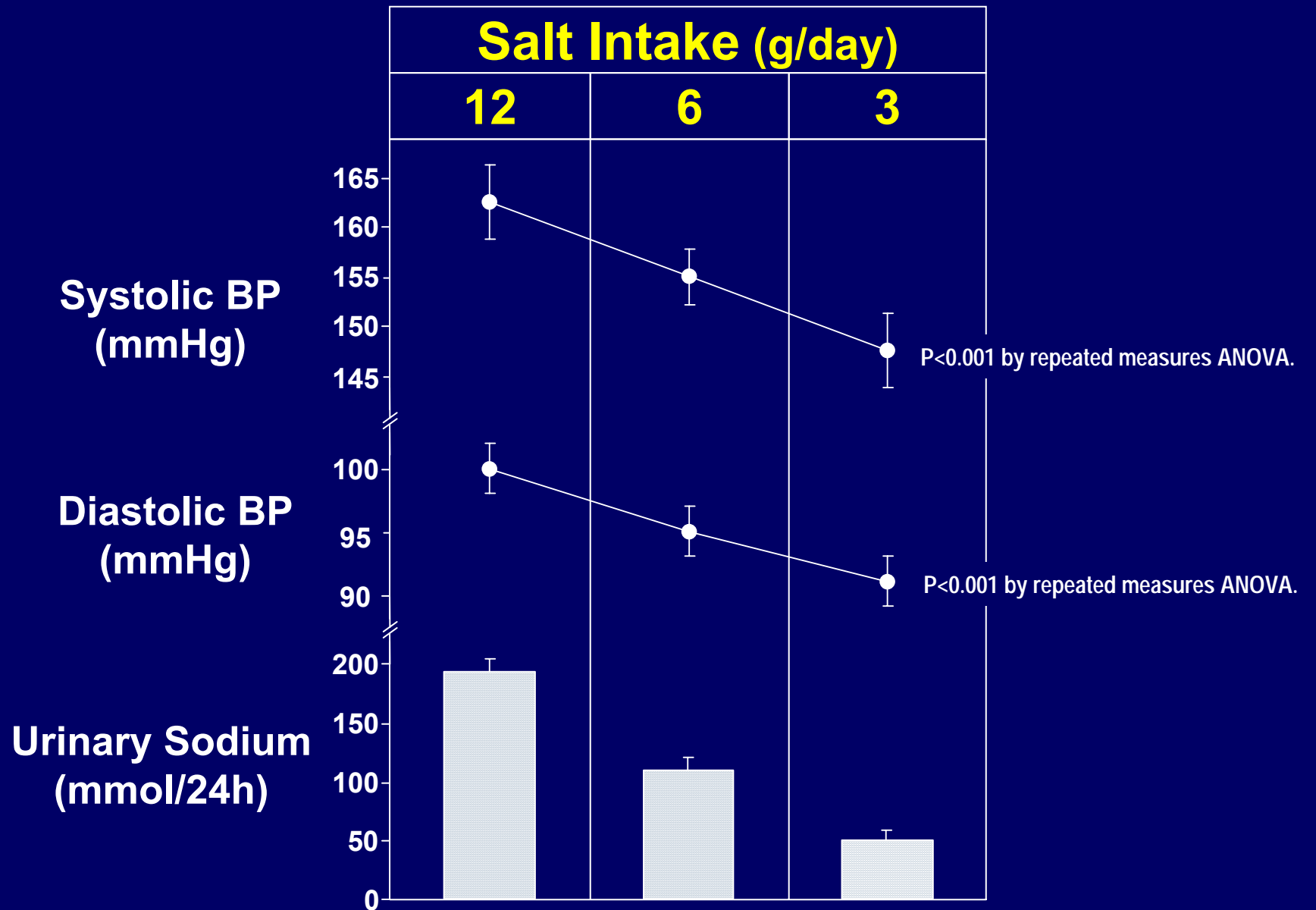
Salt Ameliorates

Gitelmann's -----> ↓
Bartters -----> ↓
Pseudohypo-
aldosteronism -----> ↓

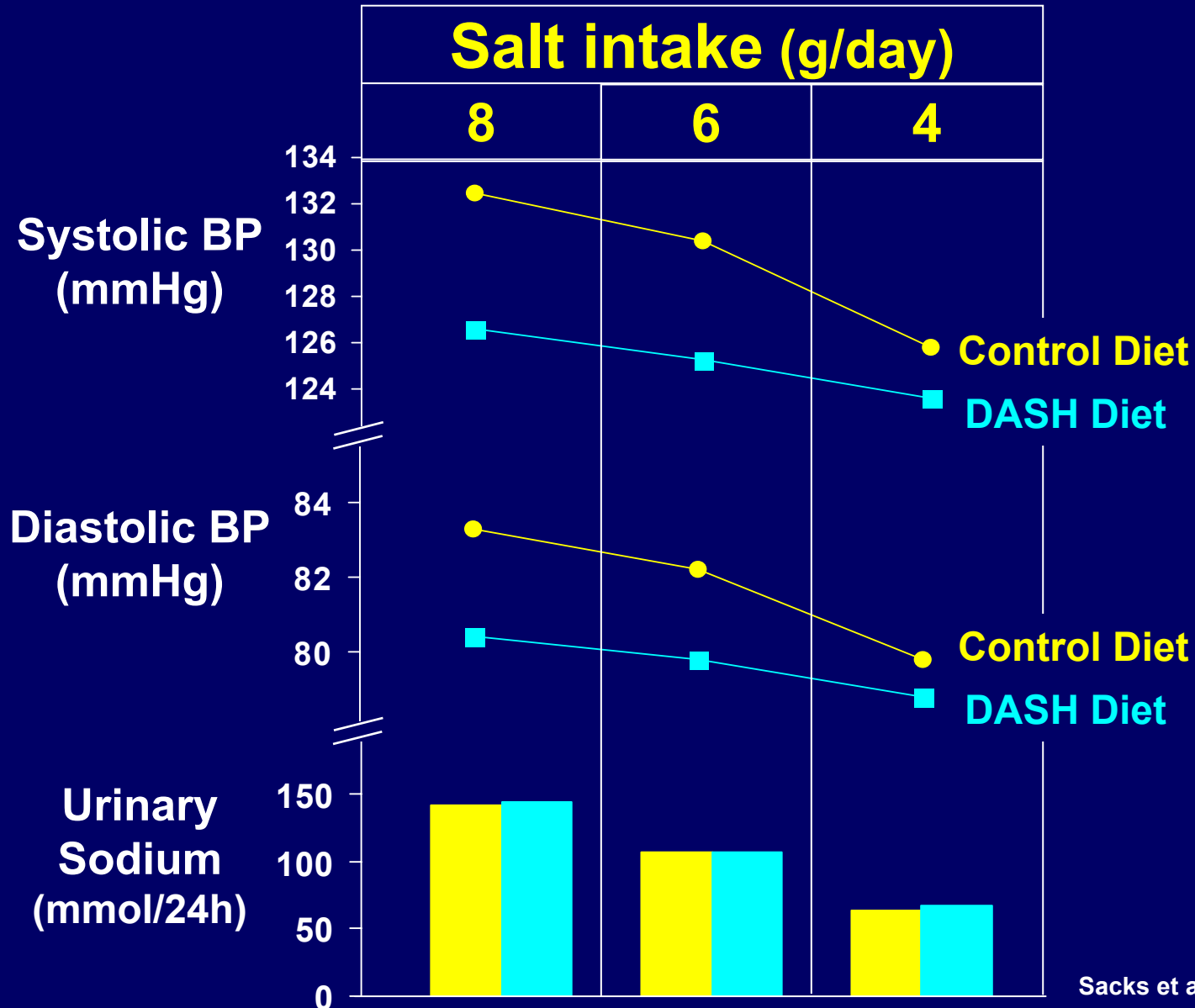
High BP

Low BP

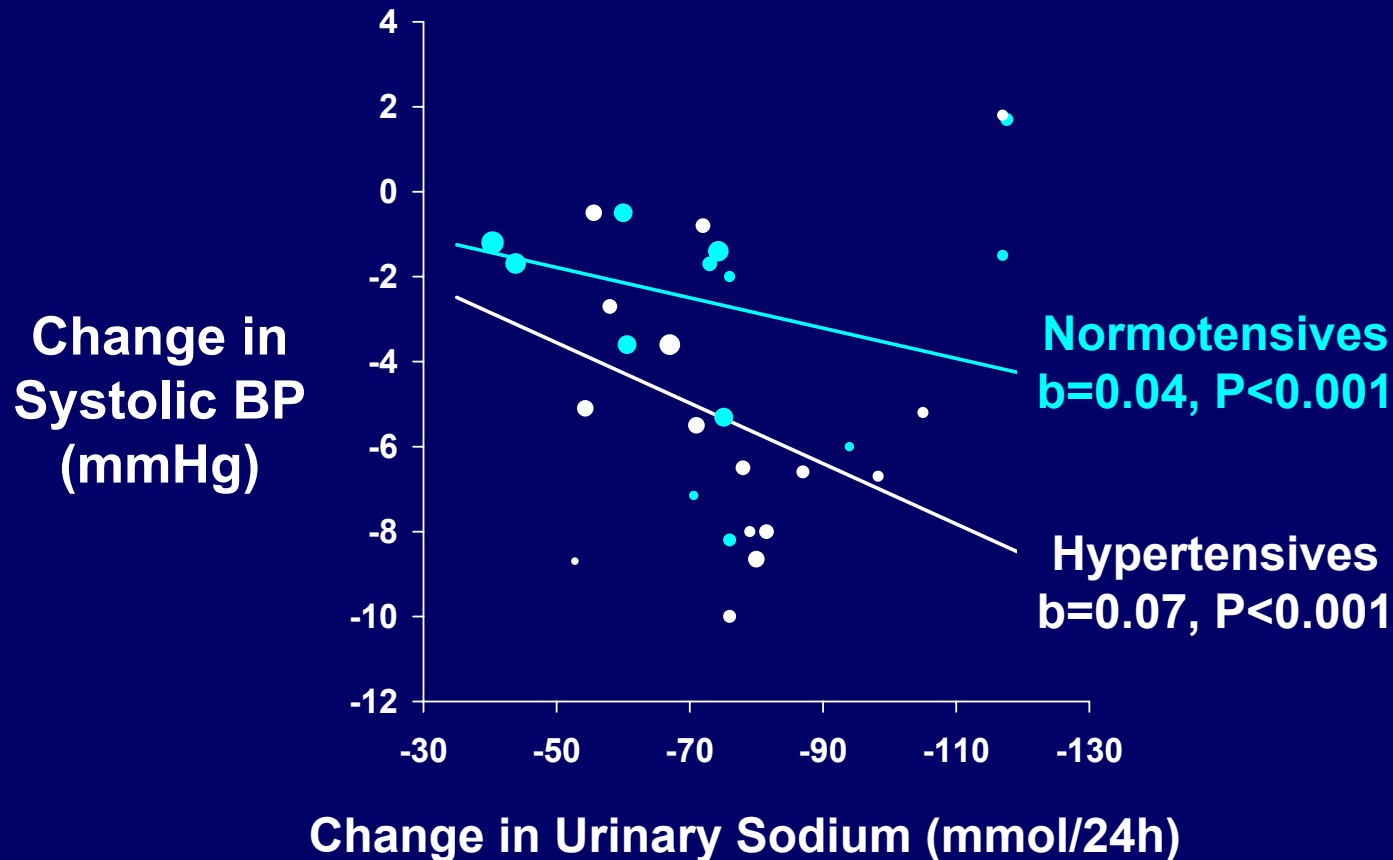
Randomised Double-Blind Crossover Study (N=20)



DASH-Sodium Trial (All participants N=412)



Dose Response: Meta-analysis (1 month or longer)



∴ A **6 g/day** reduction in salt intake predicts a **fall in SBP** of:

↓ **7 mmHg** in Hypertensives ($p<0.001$)

↓ **4 mmHg** in Normotensives ($p<0.01$)

↓ **Avg. 5 mmHg**

↓ **salt intake 6g/day**

```
graph TD; A[↓ salt intake 6g/day] --> B[↓ Stroke 24%]; A --> C[↓ CHD 18%];
```

↓ **Stroke 24%**

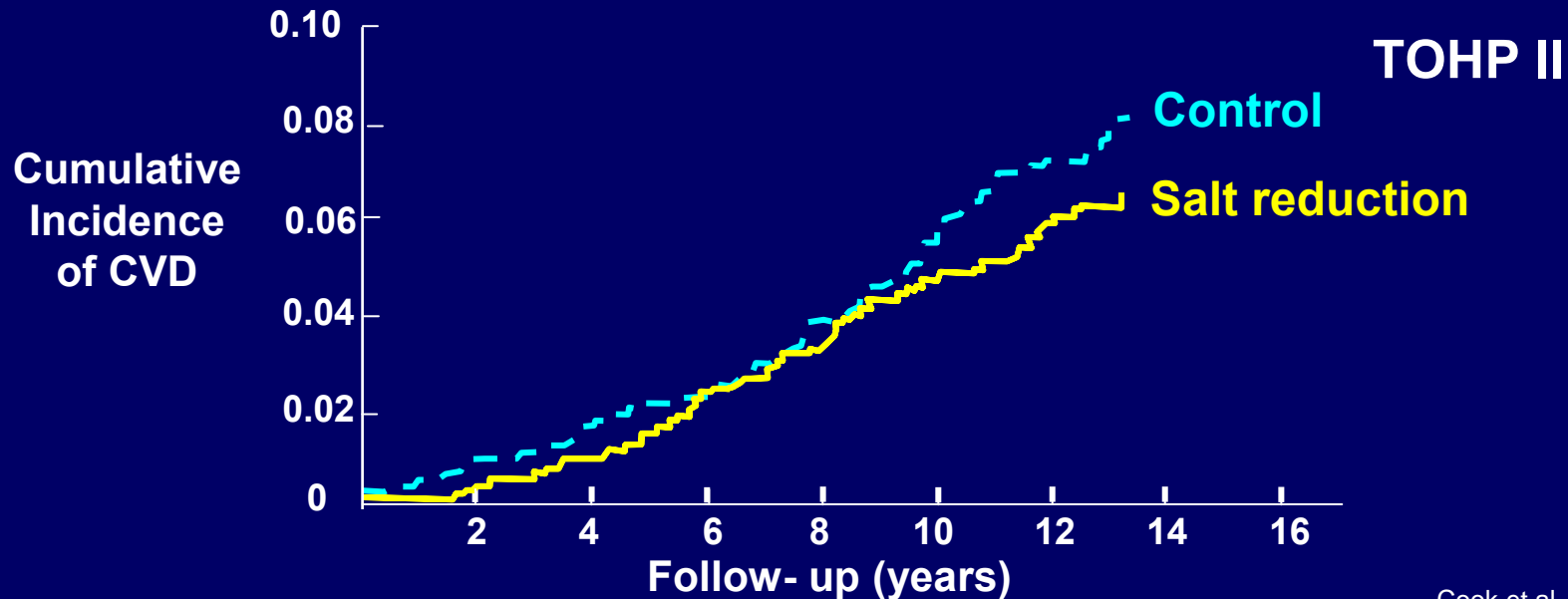
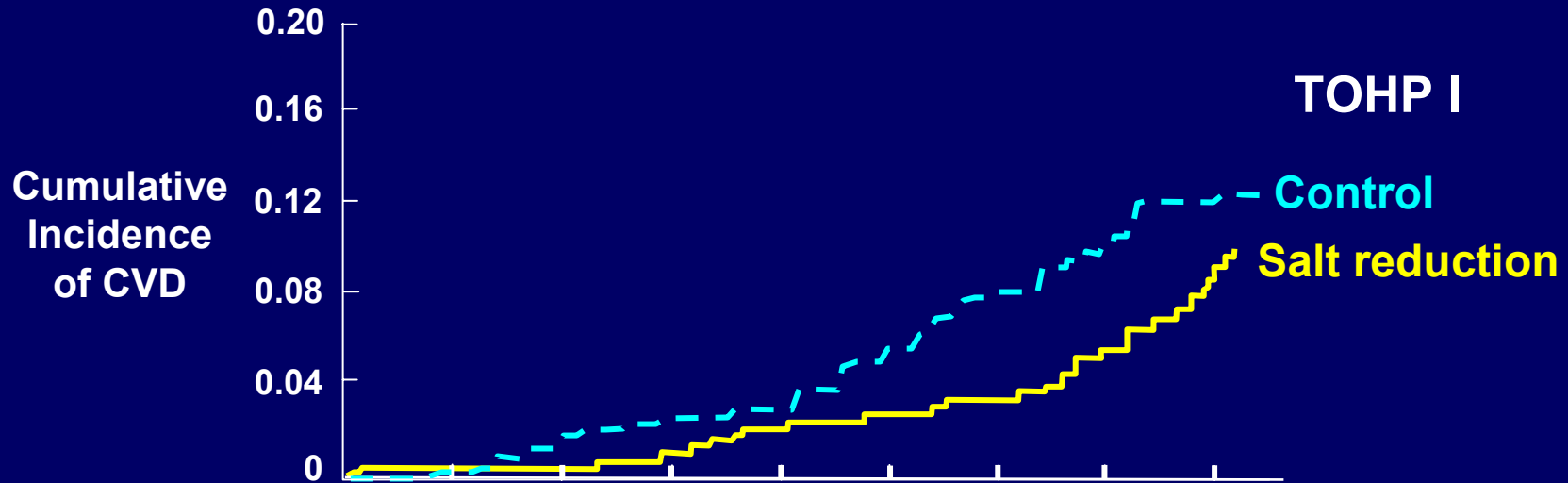
↓ **CHD 18%**

Feng J. He & GA. MacGregor Hypertension 2003;42:1093-99

Worldwide 2.5 million (approx) **Stroke & Heart attack deaths prevented / year**

Outcome trial

↓ 25% Salt intake → ↓ 25% CVD



Salt - Other harmful effects

- **Cancer of the stomach**
(↑ Salt (gastric irritant) - ↑ H pylori)
- **Stroke**
- **LVH**
- **Heart failure. Idiopathic & cyclical oedema**
- **Kidney disease / Albuminuria**
- **Renal stones**
- **Bone demineralisation (osteoporosis)**
(↑ Salt - ↑ Urinary calcium)
- **Asthma**
- **Menieres**

Summary

Salt intake (10 – 12 g/day)

- Population BP, rise in BP with age, hypertension
- Other effects e.g. stomach cancer, stroke, LVH, kidney disease, osteoporosis etc

Reduce salt intake

- from 10 - 12 g/day to 5 - 6g/day

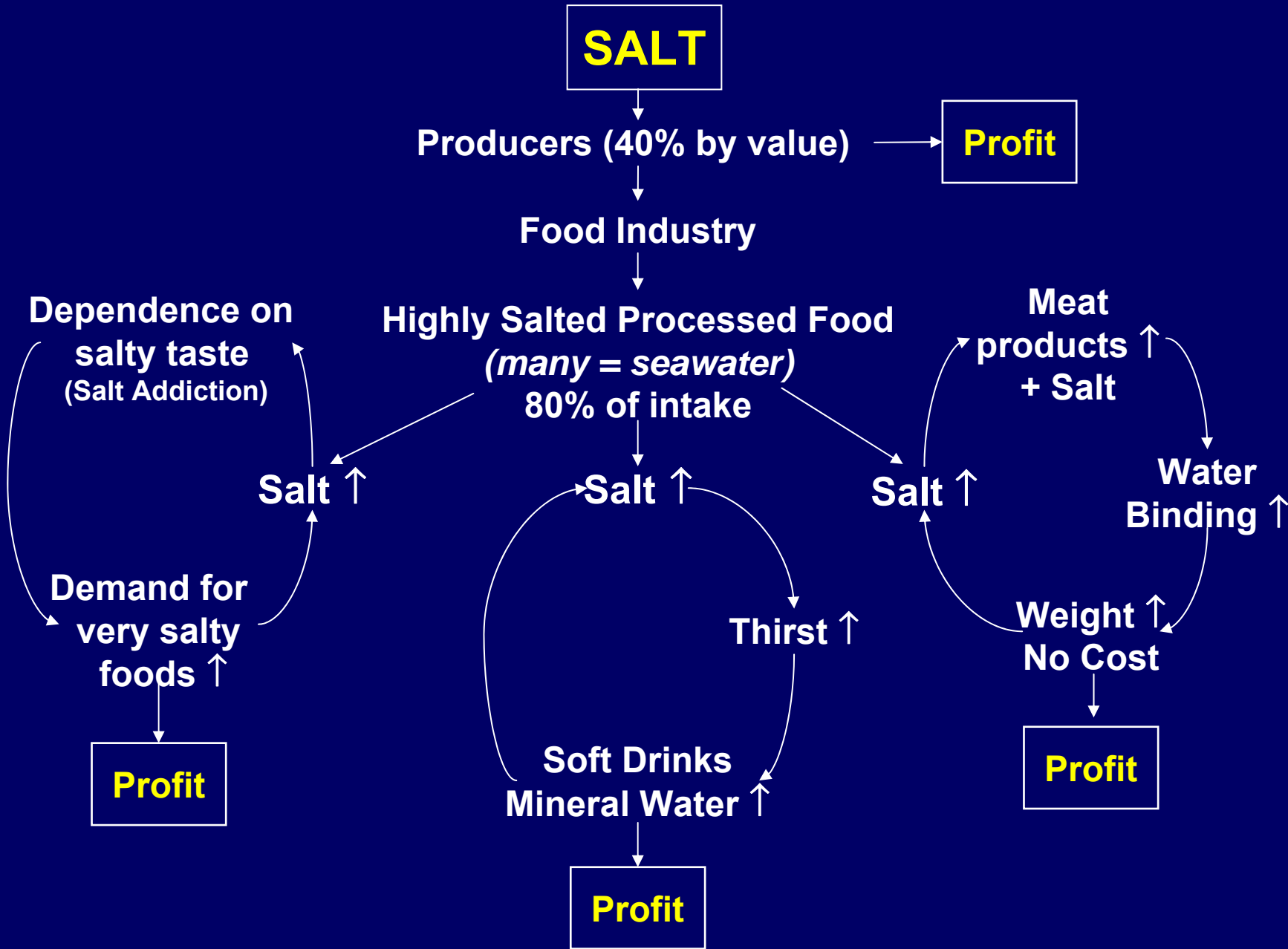
(WHO target < 5g/day)

Salt Intake

1. Hidden salt
2. Added salt (Cooking, Table)
3. Salt
 - a) Sauces/Spices, e.g. soya
 - b) Dried products, e.g. salted fish

Strategy depends on major source of salt in each country

Hidden Salt – Its Commercial Value



Sea Water Comparison

Pizza	60%	Medium Sliced White	50%
Chicken Curry	60%	Granary Loaf	60%
Processed Cheese	130%	Crumpets	80%
Bacon	200%	Plain Scones	80%
Sausages	100%	Digestive	60%
Smoked Fish	190%	Cream Crackers	60%
Sweet Pickle	170%	Cheddar Cheese	70%
Lasagne	40%	Stilton Cheese	90%
Shepherds Pie	40%	Processed Cheese	130%
Frozen Prawns	80%	Branflakes	100%
Crisps	110%	Cornflakes	110%
Salad Cream	100%	Tomato Ketchup	110%
Savoury Biscuits	70%	Brown Sauce	100%

KRAFT
dairylea Lunchables

now with pure orange juice & strawberry flavour yogurt

NEW

100% PURE Orange Juice

Yogurt strawberry flavour

hotdogs

a good source of CALCIUM

CONTENTS INCLUDE: HOTDOGS, BREAD ROLLS, DAIRYLEA SLICES, TOMATO KETCHUP, STRAWBERRY FLAVOUR YOGURT AND PURE ORANGE JUICE
 FULL PRODUCT INFORMATION: SEE SIDES OF RACK

The Golden Vale Cheese Co.

STRINGYS
 PEELABLE STRINGY CHEESE

Bernard Matthews

DINOSAUR

QUALITY ESTD 1950 GUARANTEED

100g e

WIN A SONY BRAVIA

INSTANTLY

25 TOP PRIZES PLUS 1,000s OF RUNNERS UP

Golden Vale

CHEE STRINGYS
 THE PEELABLE STRINGY CHEESE!

A Glass of Milk in every Cheestrings!

Swsster

240ml of Milk

SMOKY BACON FLAVOUR

4 INDIVIDUALLY WRAPPED

MEDIUM FAT HARD

Bernard Matthews

30% EXTRA FREE

85p
 65.4p/100g

MORRISONS
 BST054801

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30% EXTRA FREE

SOCCER SLICES

QUALITY ESTD 1950 GUARANTEED

BL6099901

ACTION IN THE UK

Consensus Action on Salt & Health (CASH)

- **Members all experts on salt and BP**
- **Set up 1996 in response to rejection of salt reduction recommendations by UK Dept. of Health**

Aims

- **Change Department of Health policy ✓**
- **Ensure Food Standards Agency adopted salt reduction & labeling ✓**
- **Media publicity to the public and food industry ✓**
- **Persuade retailers and food company's to reduce salt added to food ✓**

UK Strategy for Reducing Salt

Current salt intake / day

Reduction needed

Table / Cooking (15%)	1.8 g	50% reduction	0.9 g
Natural (5%)	0.6 g	No reduction	0.6 g
Food industry (80%)	9.6 g	53% reduction	4.5 g

Total 12 g

Target 6 g

- ∴ Food industry needs to reduce salt content of **ALL** foods where salt has been added by 53% over the next 5 years

UK salt intake 2003 9.5 g/day → 2006 8.6 g/day

By EMMA SHRIMSLEY

IT'S one of the world's deadliest white powders – not cocaine, but salt.

It's responsible for 35,000 deaths in the UK EVERY year yet we sprinkle and scoff it at every meal. It's also hidden in thousands of everyday foods.

Most of us are eating **AT LEAST** one-and-a-half times more salt than we should. Eating too much salt is dangerous because it makes the body retain more water.

This pushes up blood pressure and increases the level of fluids circulating through the brain, heart and other organs, which increases the risk of a stroke or heart attack.

Excessive salt intake is a modern phenomenon. In ancient Rome it was scarce and so prized it was used to pay army wages. Our word for salary is from the Latin for salt.

Sun Health looked at the diets of three adults and a child to see how much salt they consume in a year – and the results were alarming.

Only one of the four was within their recommended intake. The others were eating up to 85 per cent more salt than they should. The recommended daily maximum for adults and children aged 11 or more is 6g. Much lower levels apply to younger children.

The majority of the population consume dangerously high amounts of salt and the Government have laid the blame firmly at the feet of food manufacturers because 75 per cent of our salt intake comes from processed and fast foods.

For this reason Health Minister Malcolm Johnson has called on firms to reduce the salt in their products.

She wants a 40 per cent reduction in beefburgers, 20-40 per cent in bread and cereals, 35 per cent in sausages, 38 per cent in ready meals and 33 per cent in baked beans within four years.

Most of us don't realise how much salt we consume each day as it is hidden in the foods we buy for ourselves and our children.

The Food and Drinks Federation say they have been making efforts to reduce salt in processed foods and accuse the Government of being unrealistic in setting specific targets and timescales.

Spokeswoman Christine Fisk says: "What we can achieve is dependent on consumer acceptance. If they don't buy the products because they don't like the taste, or then add salt to them, it is pointless."

But Graham MacGregor, chairman of CASH Consensus Action on Salt and Health, and professor of cardiovascular medicine at St George's Hospital in London, says: "Studies on the salt taste receptors have shown that reductions of at least 15 per cent in the salt concentration can be achieved without anyone detecting a difference in flavour."

"This would mean the salt content of a bowl of cereal that currently contains 1g of salt could be reduced immediately to 0.9g, a ten per cent reduction no one would notice."

The Co-op are proving it can be done. They have successfully been cutting down on salt in their own-brand products since 1997.

They have reduced by up to half the levels of salt in packet soups, some sauces, chicken pizzas and sandwiches. Birds Eye are another success story. They have cut salt in 130 of their products.

And yesterday Heinz announced they are launching a low-salt range.



SALT... deadly white powder that wipes out 35,000 a year

ROXANNA MODIRI, 28

SINGLE mum Roxanna is an assistant office manager from Sutton Coldfield, West Midlands. Son Louis is seven.

TYPICAL DAY'S FOOD:
BREAKFAST: One Weetabix and milk or bowl of Asda Vitality cereal and milk.

LUNCH: Tinned pasta with tomato sauce from "good for you" range or Heinz Big soup chunky vegetable.

DINNER IN: Ready-made cheese-filled pasta with tomato sauce or lasagne.

DINNER OUT: Cheese-and-vegetable-filled pastry with chips and salad or garlic bread and pasta with sauce.

SNACKS: A bar of chocolate or a piece of coffee cake once or twice a week.

ANNUAL SALT: 2,555g. Recommended max: 2,195g.

ROXANNA SAYS: "My son has Attention Deficit Hyperactivity Disorder which is made worse by additives so all of his food is home-made. But because I am vegetarian I don't generally eat the same things as him. So between working and caring for him I don't really have time to cook for me."

PENELOPE GILBERT, nutritionist at CASH (Consensus Action on Salt and Health), says: "The cereals are by no means the worst offenders but she could try lower salt versions such as Shredded Wheat or muesli."

"Tinned soups and pasta, ready meals such as lasagne and pastry products are all high in salt and should only be eaten occasionally, if she doesn't have time to make them from scratch she should look for meals that contain less than 0.1g of sodium per 100g."



STEVE BUTTERS, 24

STEVE is single. He is a personal trainer from Chorley, Lancashire.

TYPICAL DAY'S FOOD:
BREAKFAST: Porridge with banana and slice of wholemeal bread and jam or two poached eggs on two slices of toast, no butter.

MID-MORNING SNACK: Fruit, unsalted nuts and yogurt.

LUNCH: Two rounds of tuna sandwiches, (no mayonnaise) or baked potato with baked beans and bacon, fruit and yogurt.

MID-AFTERNOON SNACK: Home-made chicken and pasta salad with a little low fat mayonnaise.

DINNER: Chili con carne with rice using a jar of cooking sauce or tuna and vegetable casserole with home-made low fat cheese sauce.

EVENING: Protein shake.

ANNUAL SALT: 2,062g, below recommended maximum.

STEVE SAYS: "Being a personal trainer I am very aware of what I eat."

"Most important to me is that food is low-fat and has a low GI (Glycaemic Index)."

"But I also watch my sugar and salt. Apart from that I just aim for a balanced diet."

PENELOPE SAYS: "Steve is eating a sensible, well-balanced diet."

"As most of his meals are home-made he is consuming less salt than if he bought a lot of processed foods."

"To reduce his salt intake further Steve could make his own bread."

"He is currently having up to four slices a day, which accounts for 2g of salt."



GINA HARRIS, 35

MARRIED Gina is an eye specialist from North London. She has two children, Zoe, two and Ben, 13 weeks.

TYPICAL DAY'S FOOD:
BREAKFAST: Bowl of frosted flakes, semi-skimmed milk, slice toast with salted butter, peanut butter or jam.

LUNCH: Sandwich of chicken-and-mayonnaise salad or smoked salmon or shop-bought pasta salad with feta cheese and roast vegetables, fruit and/or yogurt.

DINNER IN: Pasta and shop-bought tomato sauce with added meat and vegetables and parmesan or ready-made lasagne and salad with dressing.

DINNER OUT: Pizza or beefburger with chips and salad with dressing, cheese cake for dessert.

SNACKS: Fruit, crisps, cereal bars and flapjacks.

ANNUAL SALT: 4,105g.

GINA SAYS: "With two young children I tend to eat food I can prepare quickly for lunch and once the kids are in bed it's often too late to start a meal from scratch."

"If I feel the need for a sugary snack I eat flapjacks and cereal bars because I feel it's healthier than chocolate."

PENELOPE SAYS: "She is consuming a lot of hidden salt from cereals, sandwiches and ready meals. She could choose a low-salt cereal like Shredded Wheat, use unsalted butter, restrict the smoked salmon she eats and look for alternative fillings like egg in sandwiches. She should try using tinned tomatoes as a base for a sauce and try lower salt pizzas."



JAMIE LUMSDEN, 9

SCHOOLBOY Jamie is from Helensburgh, Argyle.

TYPICAL DAY'S FOOD:
BREAKFAST: Bowl of cornflakes or chocolate-covered cereal, one or two slices of toast with lightly salted butter.

LUNCH AT SCHOOL: Sausage roll and beans or pizza, chips and salad.

LUNCH AT HOME: Filled baguette or chicken nuggets and chips and fruit for dessert.

DINNER: Steak pie and vegetables, roast chicken and bread sauce; or macaroni cheese ready meal with two slices of bread, then yogurt or fruit for dessert.

SNACKS: Salt and vinegar crisps, Toffee Crisp, Fruit Winders, fruit.

ANNUAL SALT: 2,372g.

HIS MUM ALISON SAYS: "I try to make sure he gets a balanced diet. Jamie is very good at eating fruit and vegetables and he does not have fizzy drinks."

"We don't add salt to the food we cook at home but have no control over school dinners or shop-bought meals."

PENELOPE SAYS: "Jamie is eating around 1.5g of salt above the recommended amount per day."

"Some days he is eating cornflakes for breakfast which are one of the saltiest cereals available. I suggest he tries Shredded Wheat or porridge-type cereals."

"Jamie should limit the amount of baked beans, chips and pizzas he eats at school as these are all pretty high in salt."

"For dinner, the amount of salt could be reduced if meals were cooked from scratch. Ready meals such as steak pie contain a lot of added salt."



Killing them softly with salt

Strokes, heart attacks, high blood pressure. It's not good news, especially for the young who are consuming up to six times more than they should.

Hugh Davies reports

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Feed children
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high-salt diet.

Salt causes the body fluid, and is thought to volume over time, the hypertension. Accordi sus Action on Salt and scientific evidence sug ults should consume n grams, or a teaspoon day (our bodies only t grams). For children as the target intake drop while children aged or have no more than 2 should have no added

However, recent shown not only that summing between 10 and salt a day — twice the maximum and three times need — but that children even less, are actually the same amount. This is due to their high intake salty snacks and even (als, some of which are Atlantic sea water.

According to Graham professor of cardio-vasc at St George's Hospital, London, and chair of both Blood Pressure Association intake at an early age is serious consequences in

"If you feed salt to your child, you tend to get irritable that make it much more will develop higher blood he says. "If we didn't eat and humans didn't have until about 5,000 years ago, us would have high blood Which is why we aim to get down in children from the are born."

A big stumbling block for professor MacGregor, has been the industry (75 per cent of calories comes from processed including bread). He doesn't blame when laying the blame squarely at its door.

"The food industry is the way it markets rubbish to children," he says. "Totally useless foods are sold. They then add lots of sugar and spend huge amounts

Food Standards Agency (UK)

- **Set up to deal with BSE – New variant CJD**
- **What else? – salt reduction**
 - Gradual reduction in salt added to foods 15%-25% by whole food industry
 - Repeated every 2 years
 - Aim: 2010 salt intake less than 6 g/d (adults)
 - 24h urinary sodium 2005, 9.0 g/24h compared to 2001 9.5 g/24h

I'VE ALWAYS KNOWN IT
TOO MUCH SALT IS
BAD FOR YOUR HEART

Sid the slug



FOOD
STANDARDS
AGENCY

www.salt.gov.uk



www.salt.gov.uk

& Your brain & kidneys !

World Action on Salt & Health (WASH)

>300 members worldwide, >70 countries

Target: ↓ Salt intake worldwide to 5g/d (WHO)

Worldwide

- Globally Monitor and highlight foods high in salt
- Implement salt reduction plan worldwide
- Clear labeling system (traffic light)

Individual Countries

- Facilitate individual countries to set up expert groups on salt (similar to CASH) e.g. Canada, Australia
- Convince government and health dept. to adopt scientific evidence as in Finland, UK and ensure action by food industry
- Public health campaign to reduce salt consumption at home

Croatia

How to reduce salt intake

- **Set up CROatian Action on Salt & Health (CRASH) ?**
 - Identify major sources of salt in diet**
 - Campaign:**
 - Health Department**
 - Politicians**
 - Health professional**
 - Public campaign**
 - Food industry**
 - Implement gradual reduction in salt added to food (10 to 20% per yr)**

Summary

1. ↓ Salt intake → ↓ BP →
 - ↓ Stroke
 - ↓ Heart Attacks
 - ↓ Heart Failure

↓ Stomach Cancer & Osteoporosis
2. ↓ Salt intake → biggest improvement in public health since clean water and drains (19th Century)