American Society of Sugar
Beet Technologists
Biennial Meeting
March 5, 2011

Dietary Sugars and Diet Quality

Charles Baker
Executive Vice President & Chief Science Officer
Sugar Association

THE SUGAR ASSOCIATION

Background

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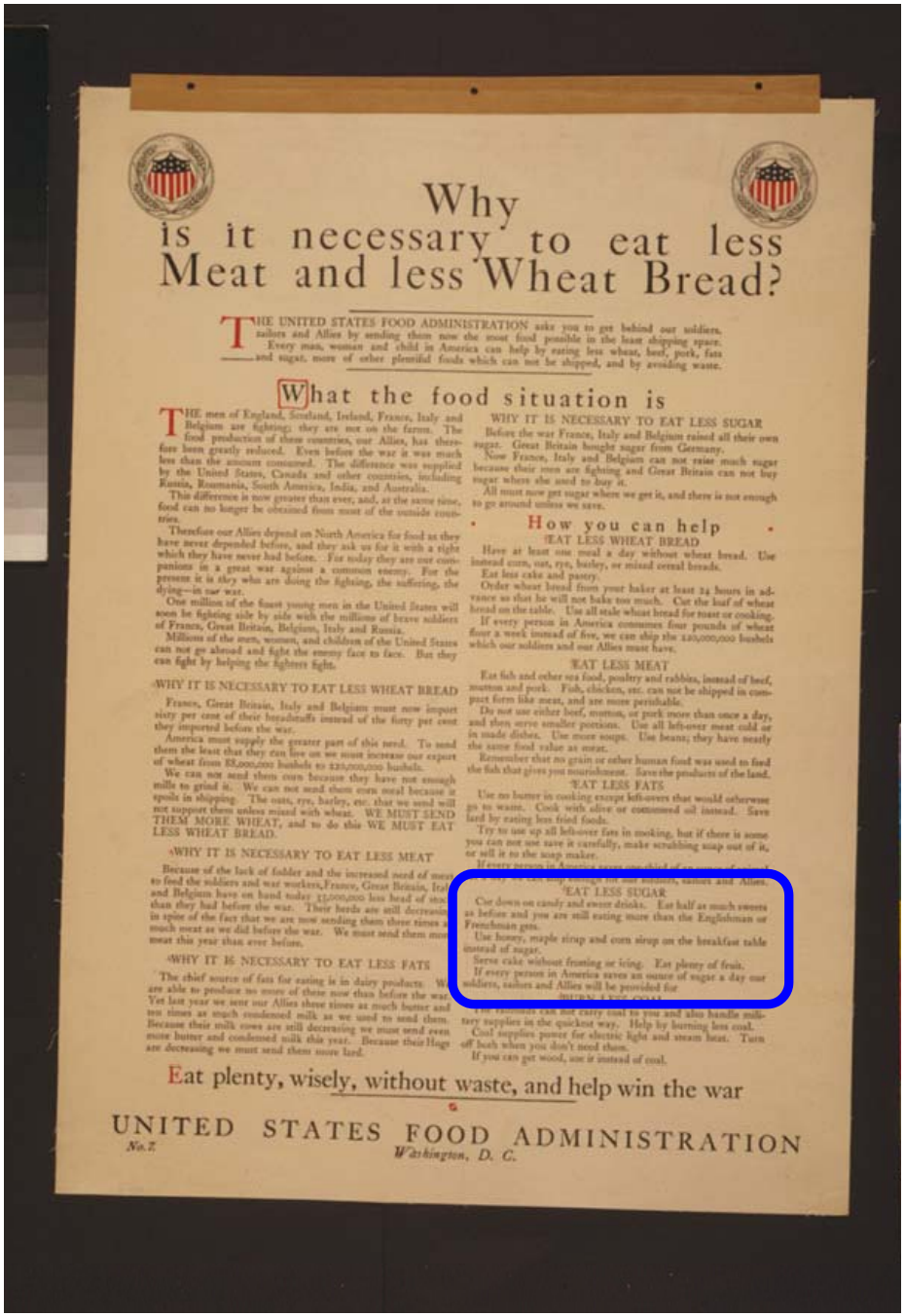

Why is it necessary to eat less Meat and less Wheat Bread?

THE UNITED STATES FOOD ADMINISTRATION asks you to get behind our soldiers, sailors and Allies by sending them now the most food possible in the least shipping space. Every man, woman and child in America can help by eating less wheat, beef, pork, fats ——and sugar, more of other plentiful foods which can not be shipped, and by avoiding waste.

What the food situation is

THE men of England, Scotland, Ireland, France, Italy and Belgium are fighting; they are not on the farms. The food production of these countries, our Allies, has therefore been greatly reduced. Even before the war it was much less than the amount consumed. The difference was supplied by the United States, Canada and other countries, including Russia, Roumania, South America, India, and Australia.

This difference is now greater than ever, and, at the same time, food can no longer be obtained from most of the outside countries.

Therefore our Allies depend on North America for food as they have never depended before, and they ask us for it with a right which they have never had before. For today they are our companions in a great war against a common enemy. For the present it is they who are doing the fighting, the suffering, the dying—in our war.

One million of the finest young men in the United States will soon be fighting side by side with the millions of brave soldiers of France, Great Britain, Belgium, Italy and Russia.

Millions of the men, women, and children of the United States can not go abroad and fight the enemy face to face. But they can fight by helping the fighters fight.

WHY IT IS NECESSARY TO EAT LESS WHEAT BREAD

France, Great Britain, Italy and Belgium must now import sixty per cent of their breadstuffs instead of the forty per cent they imported before the war.

America must supply the greater part of this need. To send them the least that they can live on we must increase our export of wheat from 85,000,000 bushels to 220,000,000 bushels.

We can not send them corn because they have not enough mills to grind it. We can not send them corn meal because it spoils in shipping. The oats, rye, barley, etc. that we send will not support them unless mixed with wheat. WE MUST SEND THEM MORE WHEAT, and to do this WE MUST EAT LESS WHEAT BREAD.

WHY IT IS NECESSARY TO EAT LESS MEAT

Because of the lack of fodder and the increased need of meat to feed the soldiers and war workers, France, Great Britain, Italy and Belgium have on hand today 35,000,000 less head of stock than they had before the war. Their herds are still decreasing in spite of the fact that we are now sending them three times as much meat as we did before the war. We must send them more meat this year than ever before.

WHY IT IS NECESSARY TO EAT LESS FATS

The chief source of fats for eating is in dairy products. We are able to produce no more of these now than before the war. Yet last year we sent our Allies three times as much butter and ten times as much condensed milk as we used to send them. Because their milk cows are still decreasing we must send even more butter and condensed milk this year. Because their Hogs are decreasing we must send them more lard.

WHY IT IS NECESSARY TO EAT LESS SUGAR

Before the war France, Italy and Belgium raised all their own sugar. Great Britain bought sugar from Germany.

Now France, Italy and Belgium can not raise much sugar because their cows are fighting and Great Britain can not buy sugar where she used to buy it.

All must now get sugar where we get it, and there is not enough to go around unless we save.

How you can help

EAT LESS WHEAT BREAD

Have at least one meal a day without wheat bread. Use instead corn, oat, rye, barley, or mixed cereal breads.

Eat less cake and pastry.

Order wheat bread from your baker at least 24 hours in advance so that he will not bake too much. Cut the loaf of wheat bread on the table. Use all stale wheat bread for toast or cooking.

If every person in America consumes four pounds of wheat flour a week instead of five, we can ship the 220,000,000 bushels which our soldiers and our Allies must have.

EAT LESS MEAT

Eat fish and other sea food, poultry and rabbits, instead of beef, mutton and pork. Fish, chicken, etc. can not be shipped in compact form like meat, and are more perishable.

Do not use either beef, mutton, or pork more than once a day, and then serve smaller portions. Use all left-over meat cold or in made dishes. Use more soups. Use beans; they have nearly the same food value as meat.

Remember that no grain or other human food was used to feed the fish that gives you nourishment. Save the products of the land.

EAT LESS FATS

Use no butter in cooking except left-overs that would otherwise go to waste. Cook with olive or cottonseed oil instead. Save lard by eating less fried foods.

Try to use up all left-over fats in cooking, but if there is some you can not use save it carefully, make scrubbing soap out of it, or sell it to the soap maker.

If every person in America saves one [illegible] of meat, butter and fats, there will be enough for our soldiers, sailors and Allies.

EAT LESS SUGAR

Cut down on candy and sweet drinks. Eat half as much sweets as before and you are still eating more than the Englishman or Frenchman gets.

Use honey, maple sirup and corn sirup on the breakfast table instead of sugar.

Serve cake without frosting or icing. Eat plenty of fruit.

If every person in America saves an ounce of sugar a day our soldiers, sailors and Allies will be provided for.

[illegible] can not carry coal to you and also handle military supplies in the quickest way. Help by burning less coal.

Coal supplies power for electric light and steam heat. Turn off both when you don't need them.

If you can get wood, use it instead of coal.

Eat plenty, wisely, without waste, and help win the war

UNITED STATES FOOD ADMINISTRATION

No. 7. Washington, D. C.

THE SUGAR ASSOCIATION

Mindset of empowerment

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WHO Technical Report Series
916

DIET, NUTRITION AND THE PREVENTION OF CHRONIC DISEASES

Report of a
Joint WHO/FAO Expert Consultation

World Health Organization
Geneva 2003

WORLD HEALTH ORGANIZATION

GLOBAL STRATEGY ON DIET, PHYSICAL ACTIVITY AND HEALTH

In May 2004, the 57th World Health Assembly (WHA) endorsed the World Health Organization (WHO) Global Strategy on Diet, Physical Activity and Health. The Strategy was developed through a wide-ranging series of consultations with all concerned stakeholders in response to a request from Member States at World Health Assembly 2002 (Resolution WHA55.23).

The Strategy, together with the Resolution by which it was endorsed (WHA57.17), are contained in this document.

OMB Number 0584-0535

USDA United States Department of Agriculture
Center for Nutrition Policy and Promotion

DietaryGuidelines.gov

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You are here: Home > Dietary Guidelines for Americans > Previous Guidelines

Previous Guidelines

The *Dietary Guidelines for Americans* are the cornerstone of Federal nutrition policy and nutrition education activities. Since 1980, the Guidelines have been jointly issued and updated every 5 years by the Departments of Agriculture (USDA) and Health and Human Services (HHS).

The 2010 Dietary Guidelines are the current guidance; for information on the previous six editions, click on the links below.

Resources

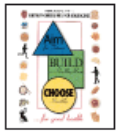
- Current Guidelines
- Previous Guidelines
- Related Topics

Downloads

- Adobe Reader

2005

2000



1995

1990

1985

1980

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Nutrient Displacement Model

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Nutrient Displacement Hypothesis

Dietary Guidelines Advisory Committee

Prepared for the Committee by the Agricultural Research Service

United States Department of Agriculture

Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2000

To the Secretary of Health and Human Services and the Secretary of Agriculture

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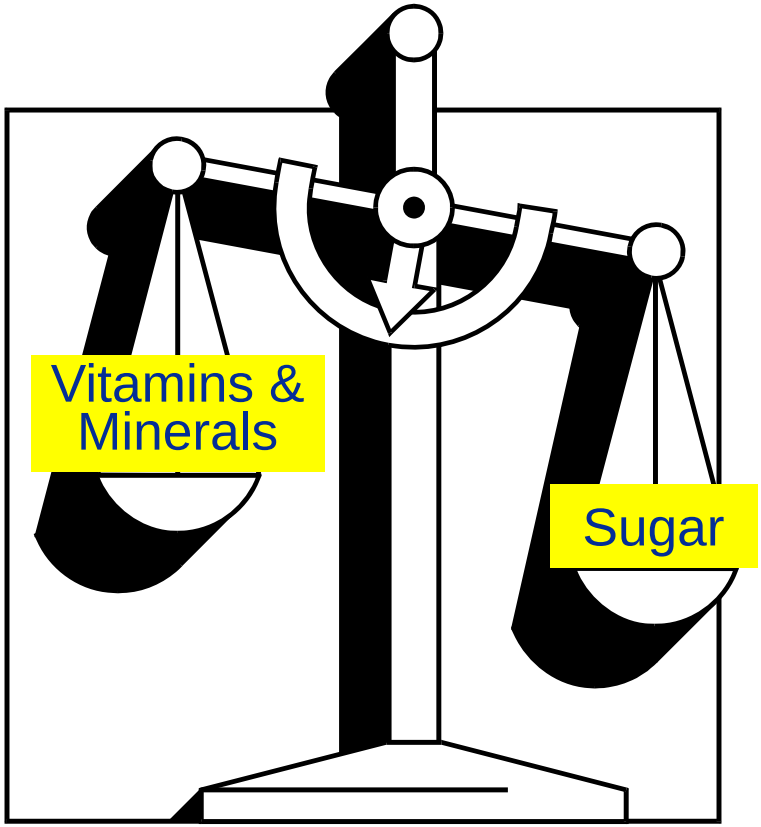
Nutrient Displacement Hypothesis



Calcium

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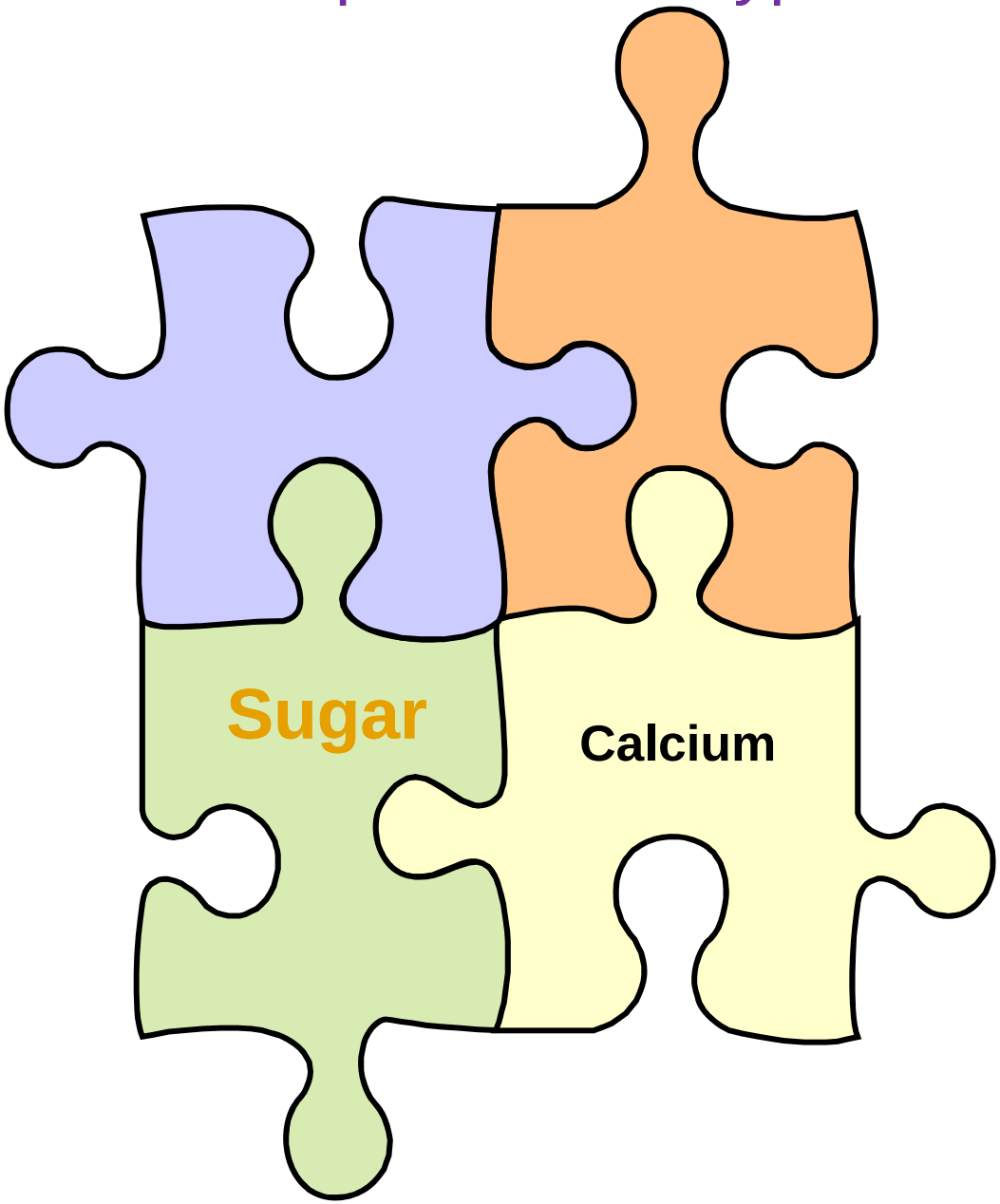
Nutrient Displacement Hypothesis



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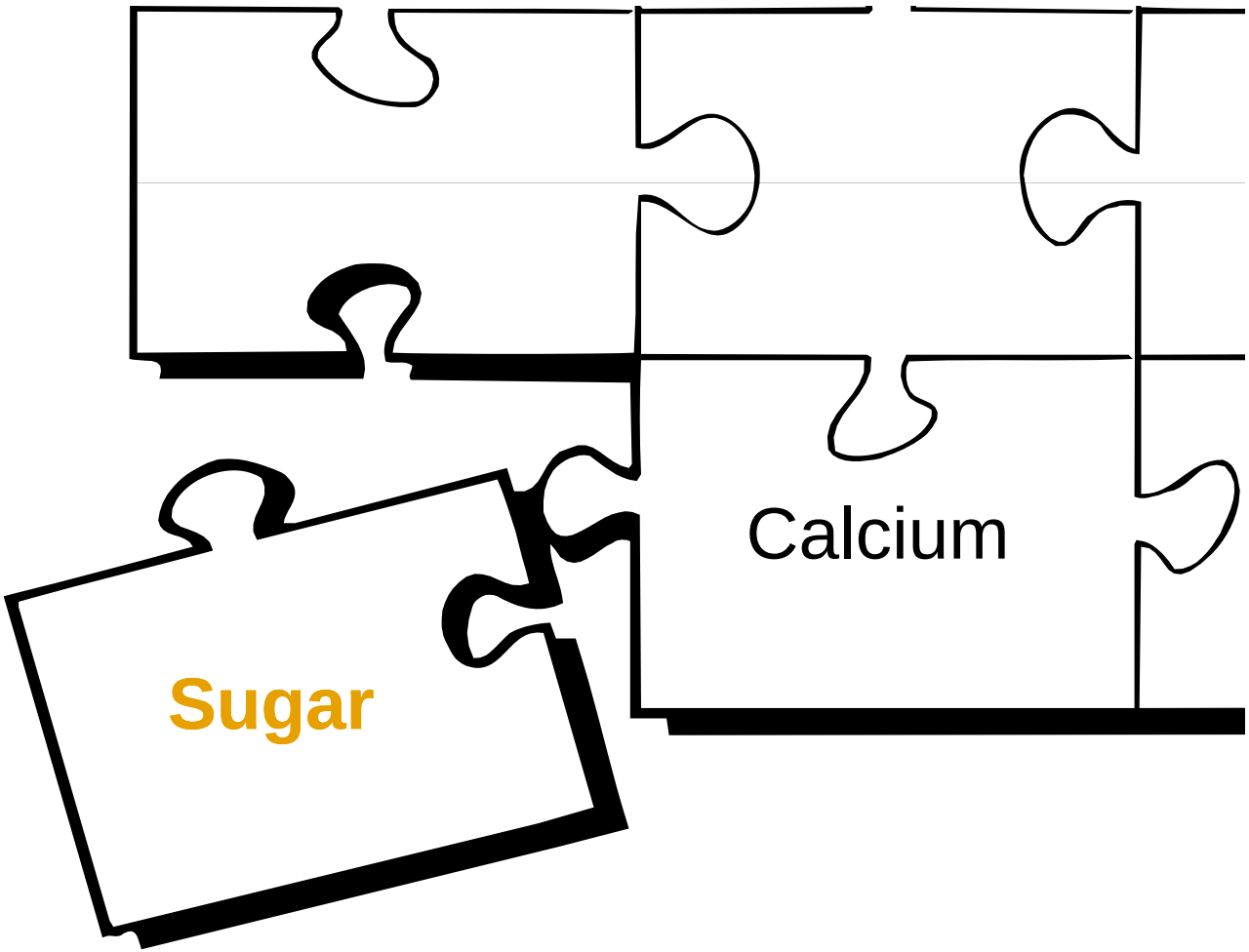
Nutrient Displacement Hypothesis



THE SUGAR ASSOCIATION

September 2002

INSTITUTE OF MEDICINE

Shaping the Future for Health

DIETARY REFERENCE INTAKES FOR ENERGY, CARBOHYDRATE, FIBER, FAT, FATTY ACIDS, CHOLESTEROL, PROTEIN, AND AMINO ACIDS

Unlike vitamins and minerals, which sometimes perform unique functions to meet the body's needs, fats, carbohydrates, and proteins substitute for one another to some extent to meet the body's energy needs. In a recent report released by the Food and Nutrition Board of the National Academies, acceptable *ranges* of intake for each of these energy sources are set, based on evidence that consumption above or below these ranges may be associated with nutrient inadequacy and increased risk of developing chronic diseases, including coronary heart disease, obesity, diabetes, and/or cancer. For example, studies have shown a connection between low-fat, and therefore, high-carbohydrate diets and decreased high-density lipoprotein cholesterol in the bloodstream, a physiological indicator associated with increased risk of coronary heart disease. Conversely, diets too high in fat may result in increased caloric intake, and therefore lead to obesity and its complications.

The report, titled *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*, is the sixth in a series providing Dietary Reference Intakes (DRIs) developed jointly by American and Canadian scientists, and focuses on carbohydrate, fiber, fat, fatty acids, cholesterol, protein, and amino acids, collectively known as the macronutrients, as well as energy and physical activity. The report recommends that to meet the body's daily nutritional needs while minimizing risk for chronic disease, adults should consume 45 to 65 percent of their total calories from carbohydrates, 20 to 35 percent from fat, and 10 to 35 percent from protein. The acceptable ranges for children are similar to those for adults, except that infants and younger children need a somewhat higher proportion of fat in their diets. These ranges may be more useful and flexible for dietary planning than single maximum values recommended in the past.

...to meet the body's daily energy and nutritional needs while minimizing risk for chronic disease, adults should consume 45 to 65 percent of their total calories from carbohydrates, 20 to 35 percent from fat, and 10 to 35 percent from protein.

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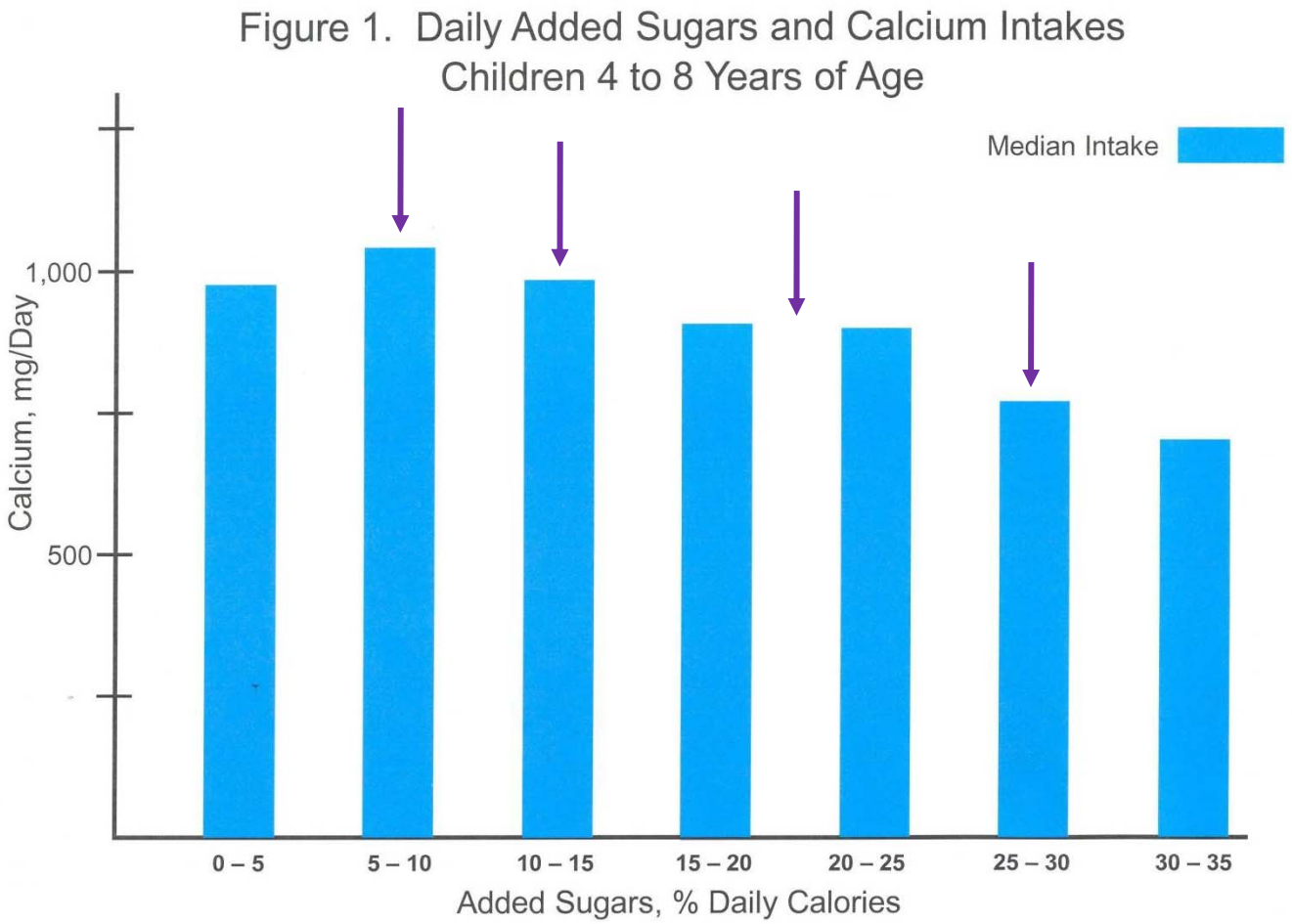
Nutrient Displacement Hypothesis



Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. September 2002. Table J-1.

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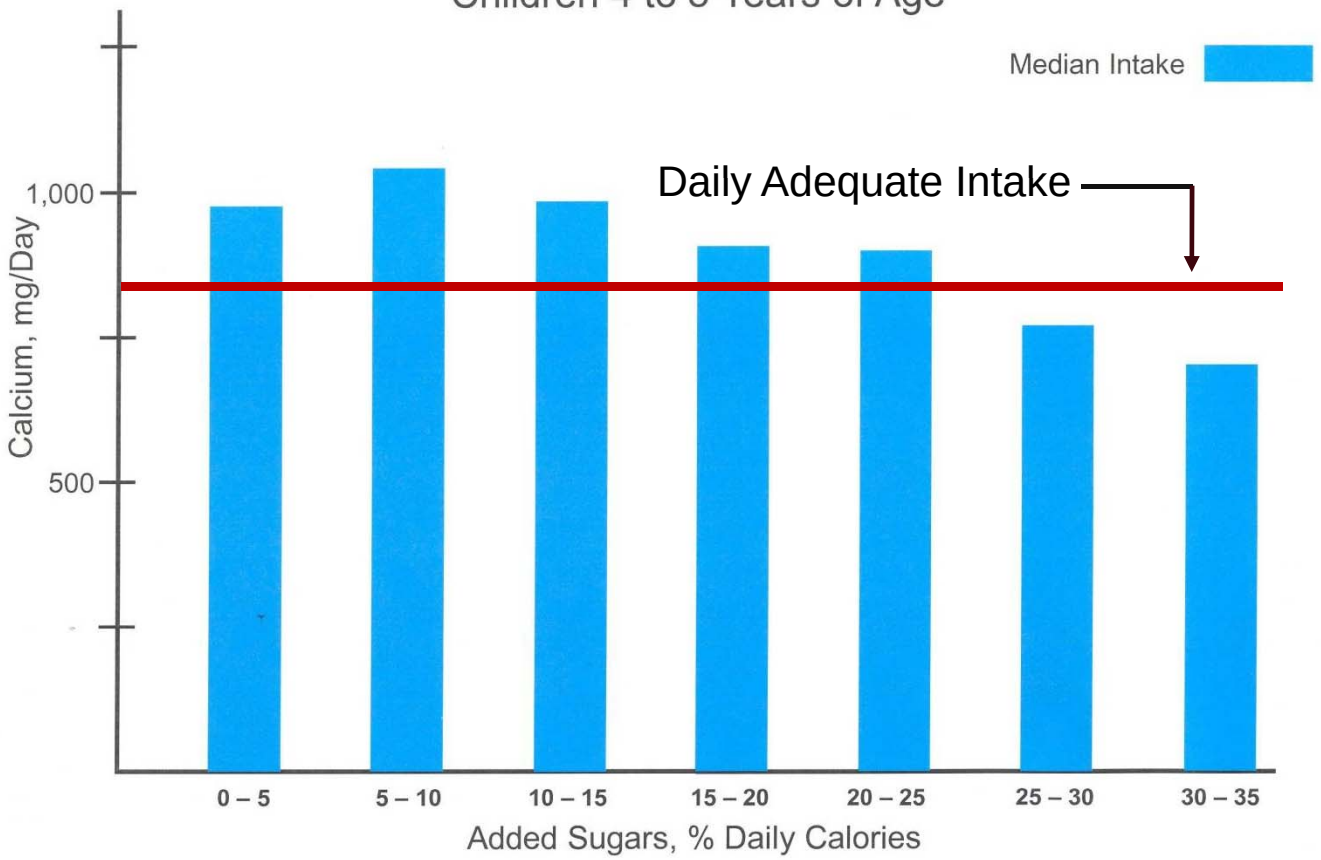
Nutrient Displacement Hypothesis

Figure 1. Daily Added Sugars and Calcium Intakes
Children 4 to 8 Years of Age



Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. September 2002. Table J-1.

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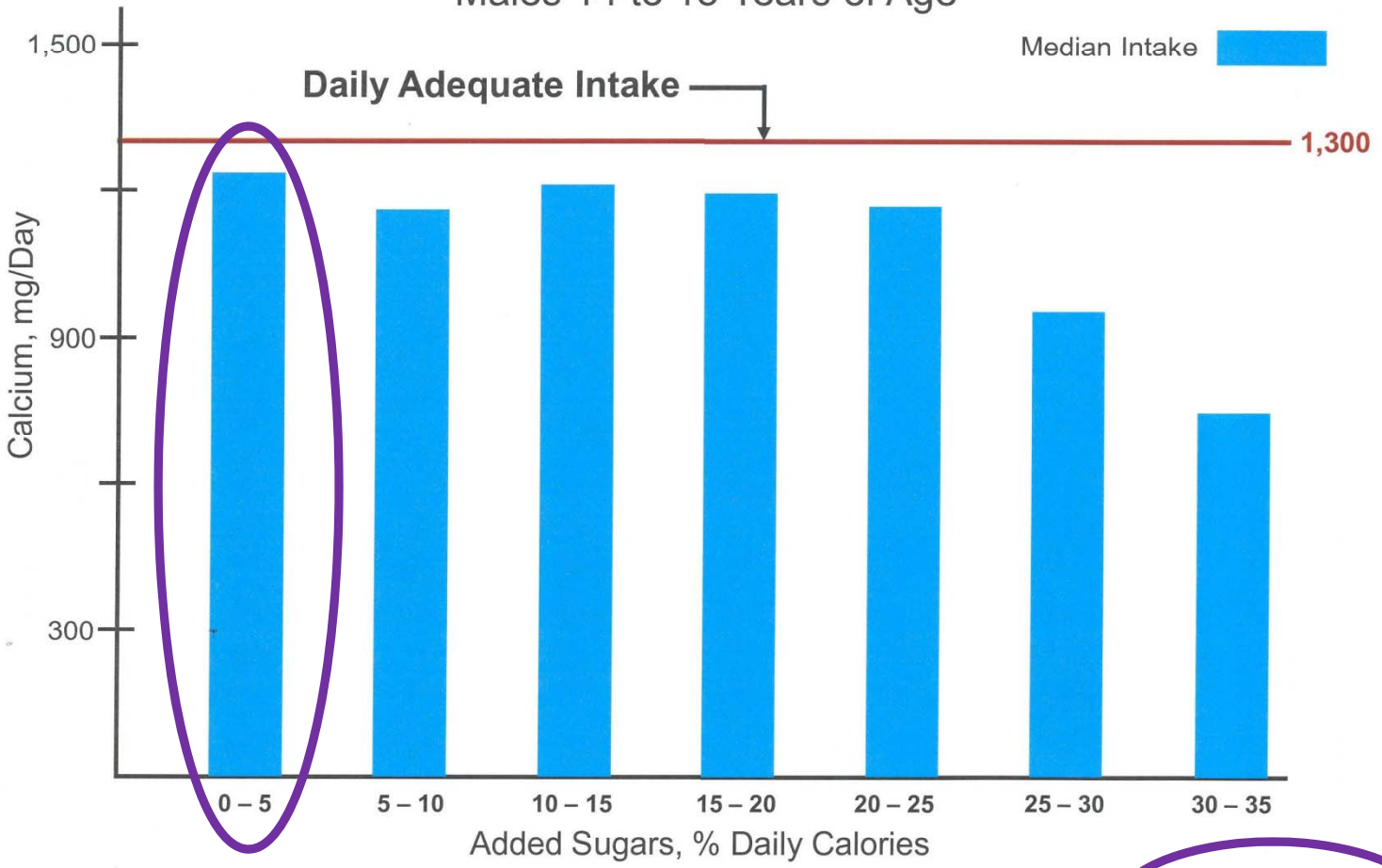
Figure 4. Daily Added Sugars and Calcium Intakes
Males 14 to 18 Years of Age



Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. September 2002. Table J-3.

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Shaping the Future for Health

DIETARY REFERENCE INTAKES FOR ENERGY, CARBOHYDRATE, FIBER, FAT, FATTY ACIDS, CHOLESTEROL, PROTEIN, AND AMINO ACIDS

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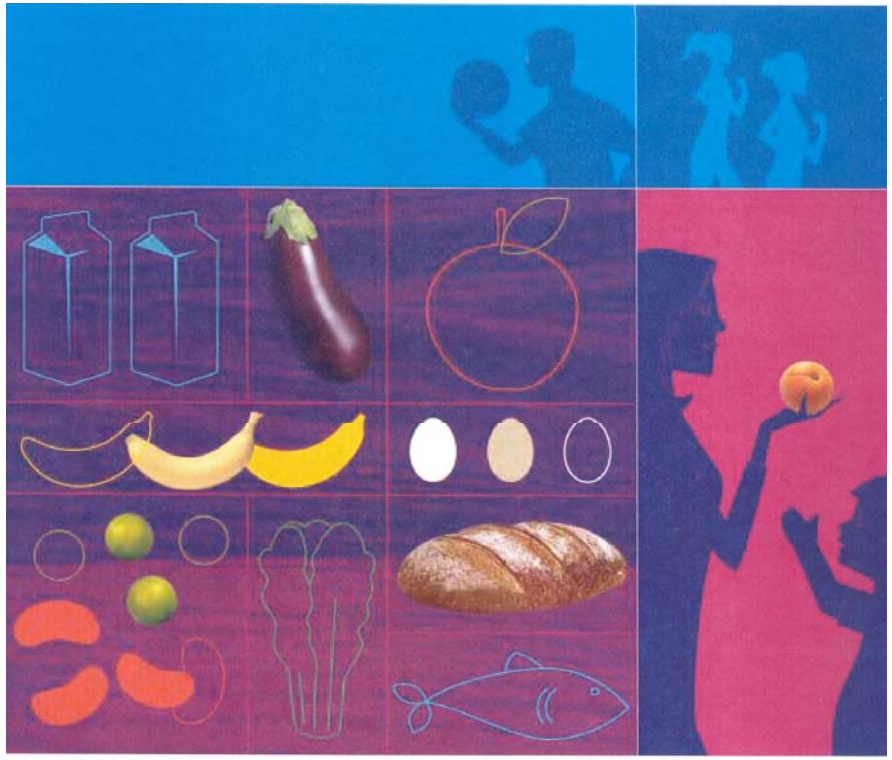
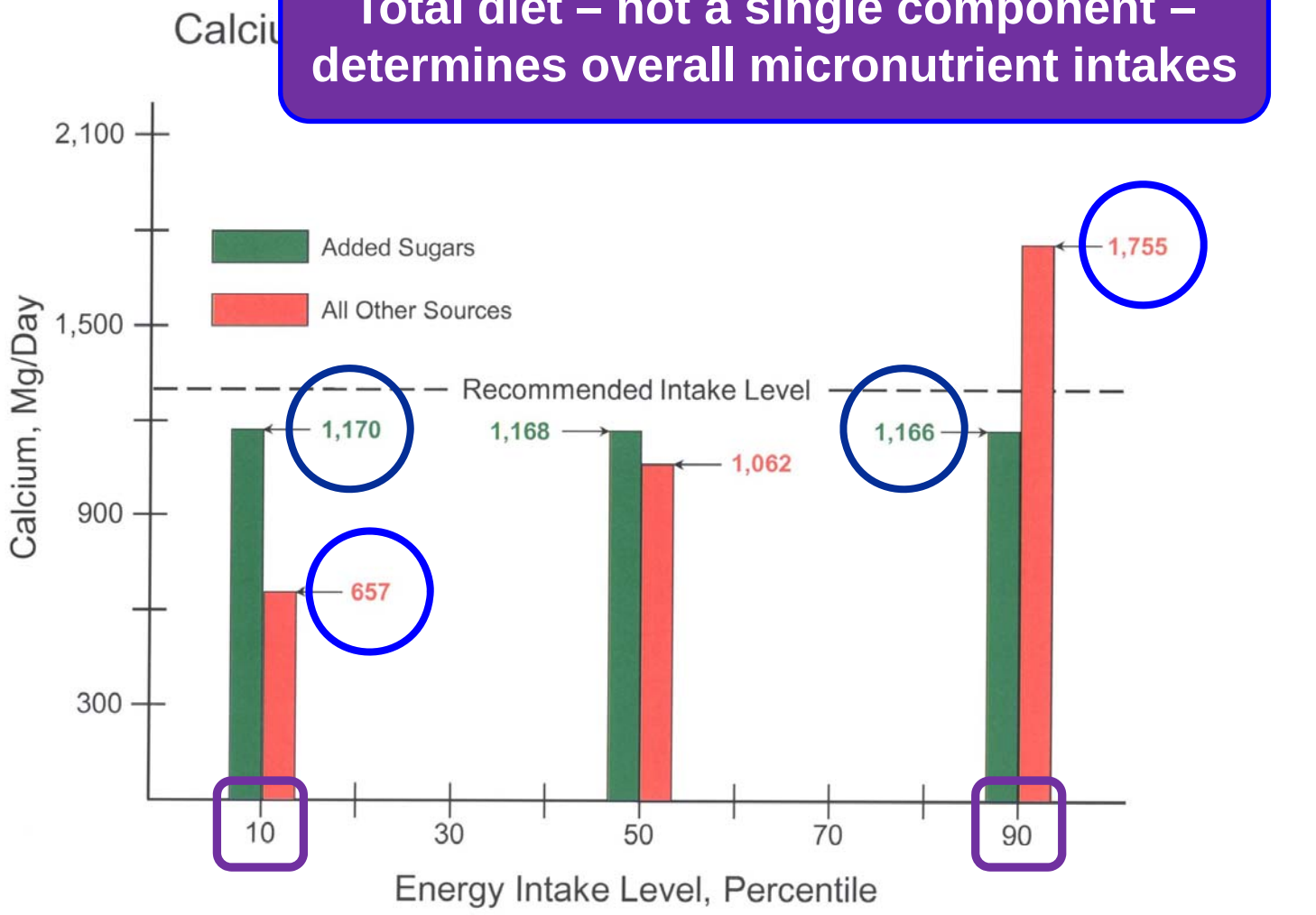


Dietary Guidelines for Americans 2005

U.S. Department of Health and Human Services
U.S. Department of Agriculture
www.healthierus.gov/dietaryguidelines

~~Nutrient Displacement Hypothesis~~

Total diet – not a single component – determines overall micronutrient intakes



[1]*Journal of Nutrition* **134(10):** 2733 – 2737, 2004. Adapted from Figure 4.

Published, peer-reviewed evidence

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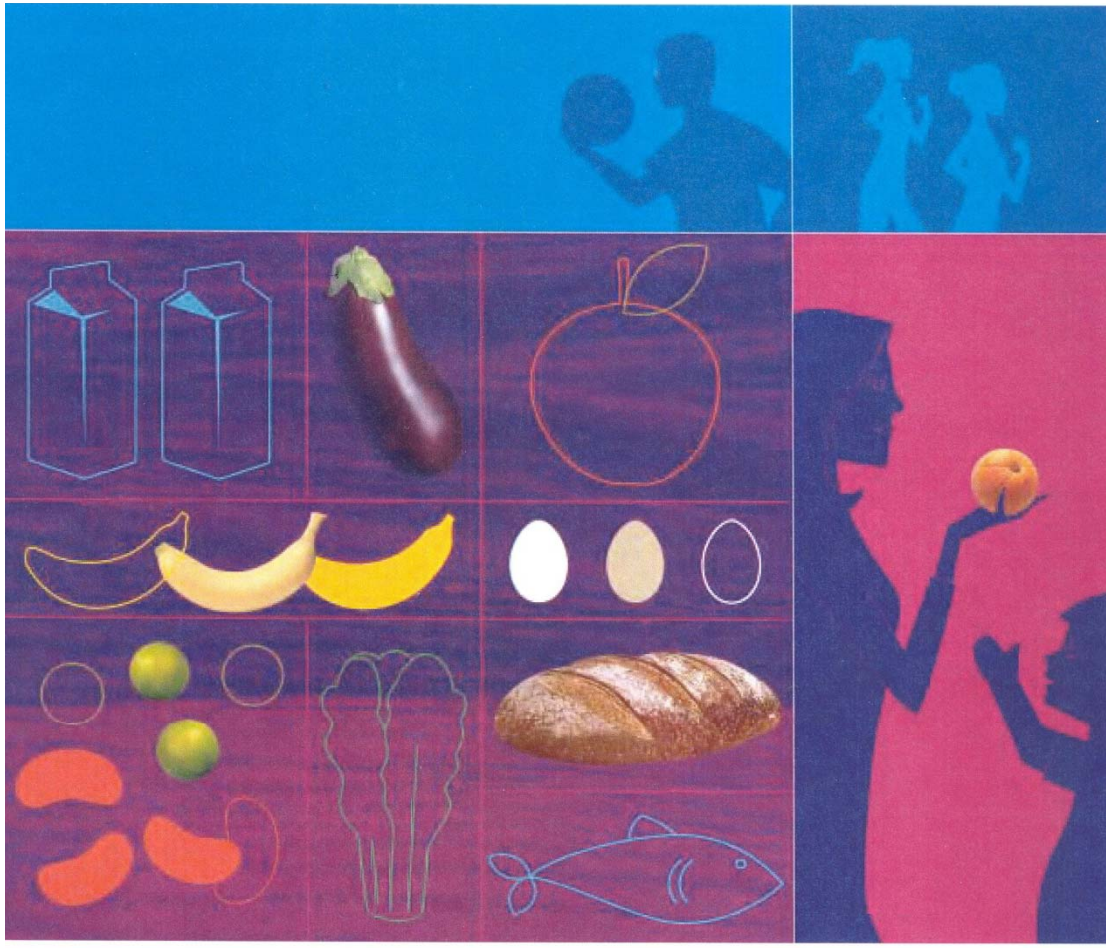

Dietary Guidelines for Americans 2005

U.S. Department of Health and Human Services
U.S. Department of Agriculture
www.healthierus.gov/dietaryguidelines

Discretionary Calories Model

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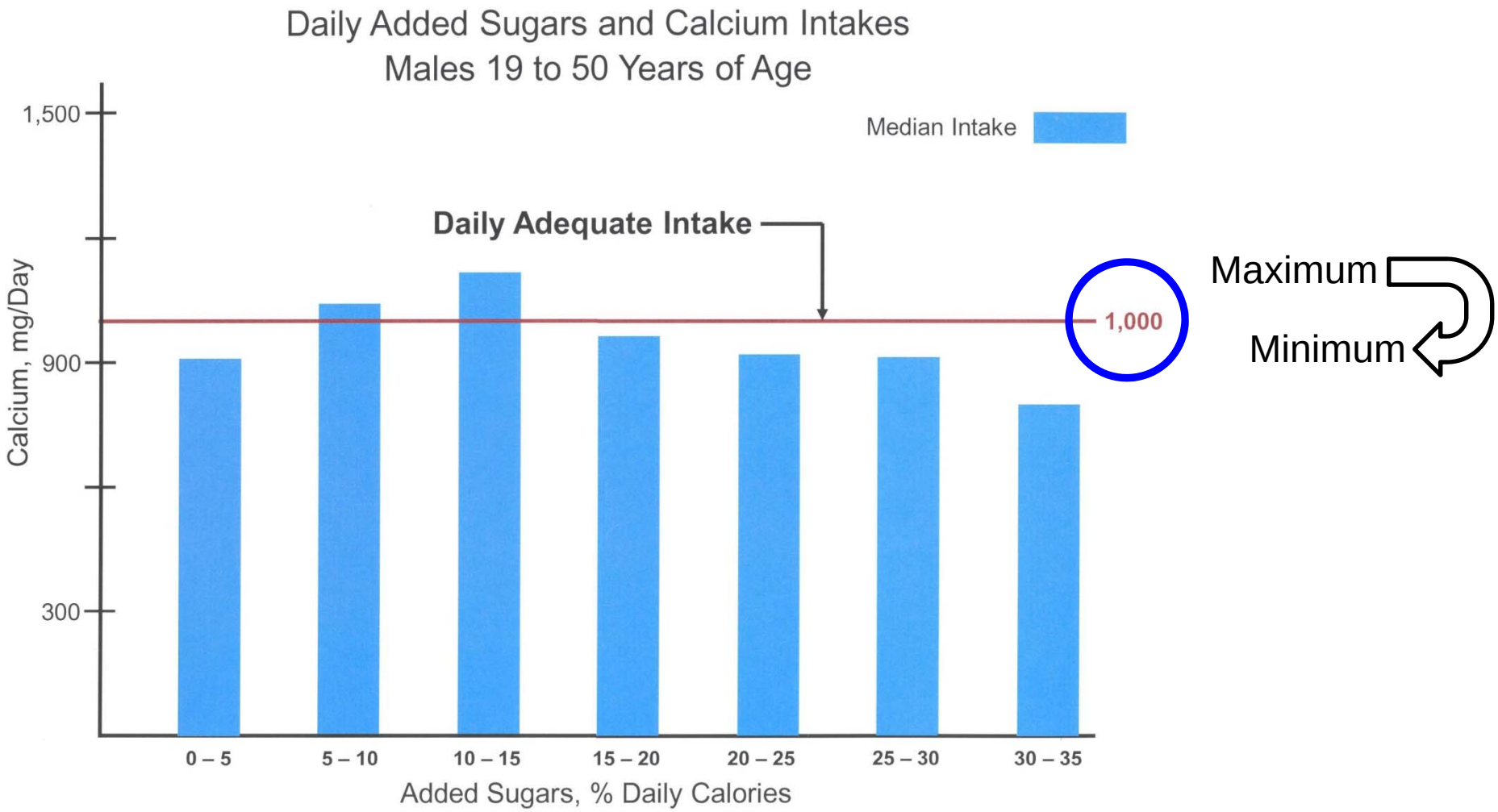
Discretionary Calories Hypothesis



Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. September 2002. Table J-4.

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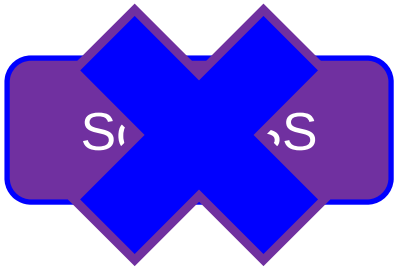
~~Discretionary Calories~~ Hypothesis

Indecipherable Acronym – 2005



Solid Fats + Alcohol + Added Sugars + Sodium

NUTRIENTS TO AVOID

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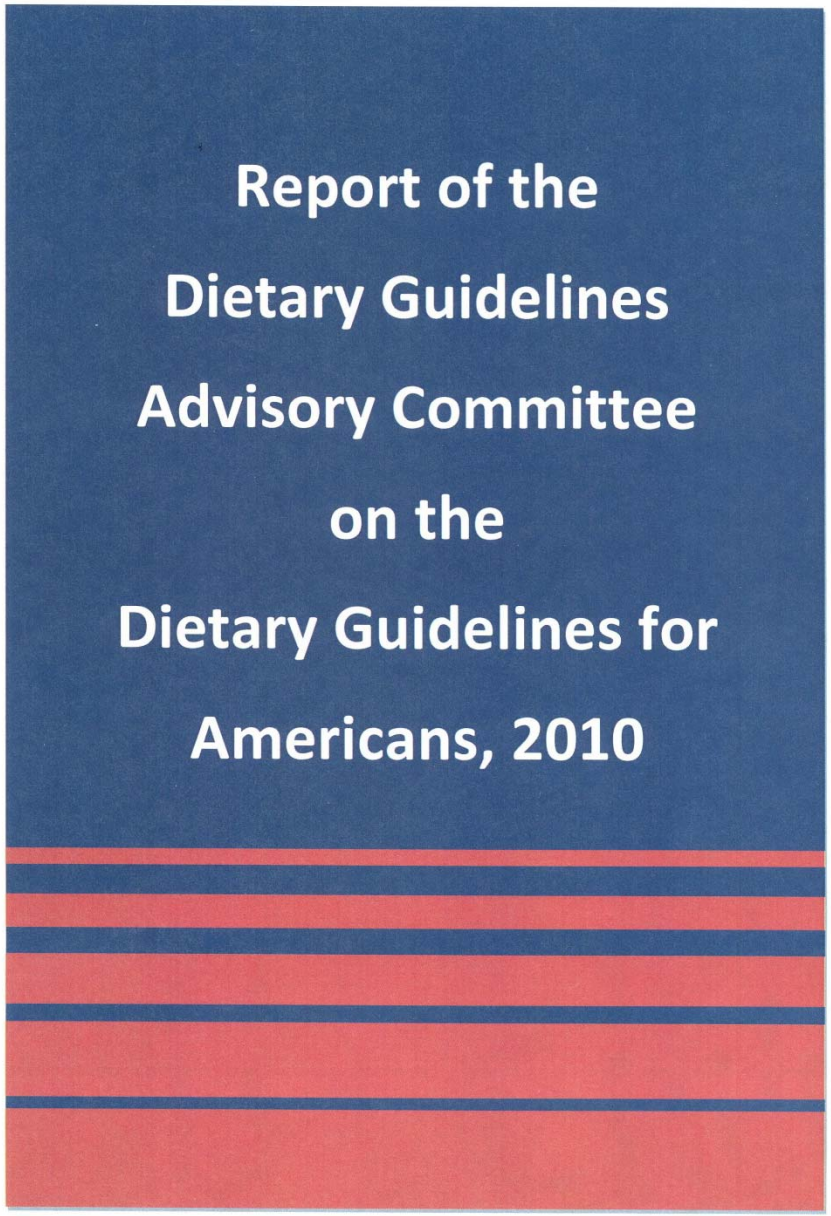
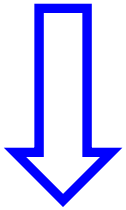


Discretionary Calories Hypothesis



Discretionary Calories Hypothesis

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Discretionary Calories Hypothesis

Memorable Acronym – 2010

SoFAS

Solid Fats + Added Sugars

NUTRIENTS TO AVOID

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Discretionary Calories Hypothesis

Table 1. Estimated per capita calories from loss-adjusted food supply[6]					
	Calories		% of Total		% of 1970 – 2005 Calorie Increase
	1970	2005	1970	2005	
Added Fats	411	645	18.94	23.74	42.9
Added Sugars	402	480	18.50	17.65	14.3
Total	2,172	2,718			

Table 3. Estimated per capita calories from loss-adjusted food supply[6]					
	Calories		% of Total		% of 1970 – 2007 Calorie Increase
	1970	2007	1970	2007	
Added Fats	411	710	18.94	25.59	49.6
Added Sugars	402	459	18.50	16.55	9.5
Total	2,172	2,775			

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Discretionary Calories Hypothesis

Table 1. Agricultural Research Service, US Department of Agriculture. What we eat in America, NHANES[1,2,3,4]

		NHANES, 2001 - 2002					NHANES, 2003 - 2004					NHANES, 2005 - 2006				
Sex	Age Range, Years	Total Calories	Total Sugars, g	TS ÷ TC	Added Sugars, g	AS ÷ TC	Total Calories	Total Sugars, g	TS ÷ TC	Added Sugars, g	AS ÷ TC	Total Calories	Total Sugars, g	TS ÷ TC	Added Sugars, g	AS ÷ TC
Males	2 - 5	1733	135	31.2%	74	17.0%	1679	128	30.5%	70	16.7%	1641	122	29.7%	67	16.3%
	6 - 11	2108	153	29.0%	84	15.9%	2256	161	28.5%	88	15.6%	2092	142	27.2%	78	14.9%
	12 - 19	2684	195	29.1%	107	15.9%	2652	176	26.5%	96	14.5%	2707	177	26.2%	97	14.3%
	20 - 29	2901	184	25.4%	101	13.9%	2969	179	24.1%	98	13.2%	2821	160	22.7%	88	12.4%
	30 - 39	2872	172	24.0%	94	13.1%	2888	162	22.4%	89	12.3%	2978	153	20.6%	84	11.2%
	40 - 49	2748	150	21.8%	82	11.9%	2873	161	22.4%	88	12.3%	2753	141	20.5%	77	11.2%
	50 - 59	2426	146	24.1%	80	13.2%	2388	121	20.3%	66	11.1%	2597	143	22.0%	78	12.0%
	60 - 69	2211	117	21.2%	64	11.6%	2109	107	20.3%	59	11.1%	2202	114	20.7%	62	11.3%
	70 and over	1889	105	22.2%	57	12.2%	1868	105	22.5%	57	12.3%	1984	109	22.0%	60	12.0%
	20 and over	2621	154	23.5%	84	12.9%	2612	145	22.2%	79	12.1%	2638	141	21.4%	77	11.7%
Females	2 - 5	1560	117	30.0%	64	16.4%	1759	129	29.3%	71	16.0%	1486	112	30.1%	61	16.5%
	6 - 11	1856	133	28.7%	73	15.7%	1964	132	26.9%	72	14.7%	1879	124	26.4%	68	14.4%
	12 - 19	1981	146	29.5%	80	16.1%	2007	136	27.1%	74	14.8%	1906	124	26.0%	68	14.2%
	20 - 29	2055	135	26.3%	74	14.4%	2103	136	25.9%	74	14.1%	1959	118	24.1%	65	13.2%
	30 - 39	2014	133	26.4%	73		14	23.3%	62	12.8%	1923	104	21.6%	57		
	40 - 49	1874	114	24.3%	62		17	24.2%	64	13.2%	1873	103	22.0%	56		
	50 - 59	1751	104	23.8%	57	13.0	1728	95	22.0%	52	12.0%	1718	90	21.0%	49	11.5
	60 - 69	1640	91	22.2%	50	12.1	1668	95	22.8%	52	12.5%	1598	85	21.3%	46	11.6
	70 and over	1437	89	24.8%	49	13.	1548	93	24.0%	51	13.1%	1495	90	24.1%	49	13.
	20 and over	1845	115	24.9%	63	13. %	1850	110	23.8%	60	13.0%	1785	100	22.4%	55	12. %
Males and Females	2 and over	2178	139	25.5%	76	14.0%	2195	133	24.2%	73	13.3%	2157	124	23.0%	68	12.6%

[1]NHANES = National Health and Nutrition Examination Survey; individual datasets available at http://ars.usda.gov/Services/docs.htm?docid=15044 (Reference 2)

[2]TC = Total Calories; TS = Total Sugars; TS ÷ TC = (Total sugars grams converted to calories and divided by total calories); TS ÷ TC = % of total calories attributable to total sugars

[3]Added Sugars = Total Sugars * 0.547 (Reference 10)

[4]TC = Total Calories; AS = Added Sugars; AS ÷ TC = (Added sugars grams converted to calories and divided by total calories); AS ÷ TC = % of total calories attributable to added sugars

14.0%

12.6%

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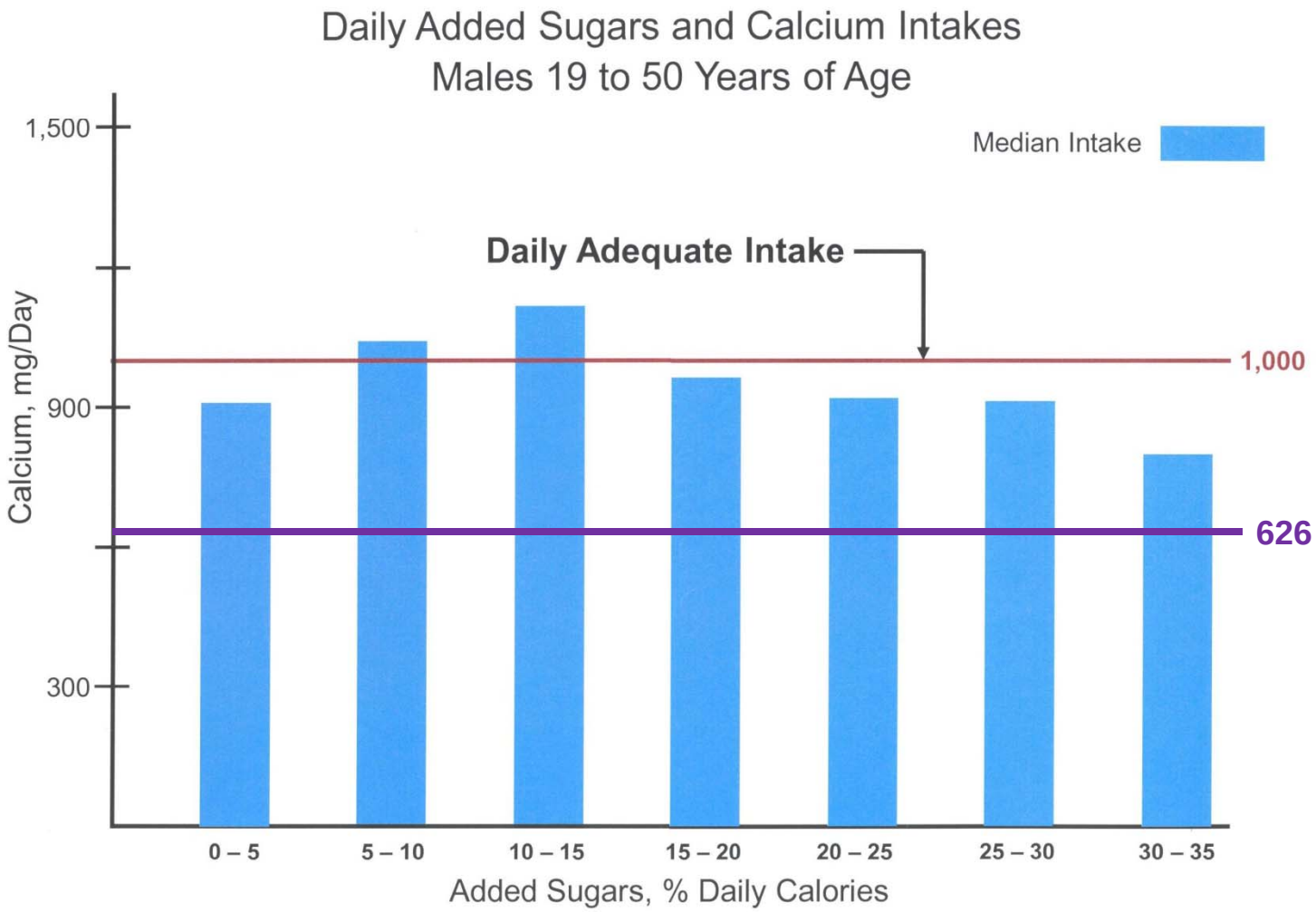
Discretionary Calories Hypothesis



Institute of Medicine. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. September 2002. Table J-4.

J Bone and Mineral Research (2009) 24(5

Published, peer-reviewed evidence

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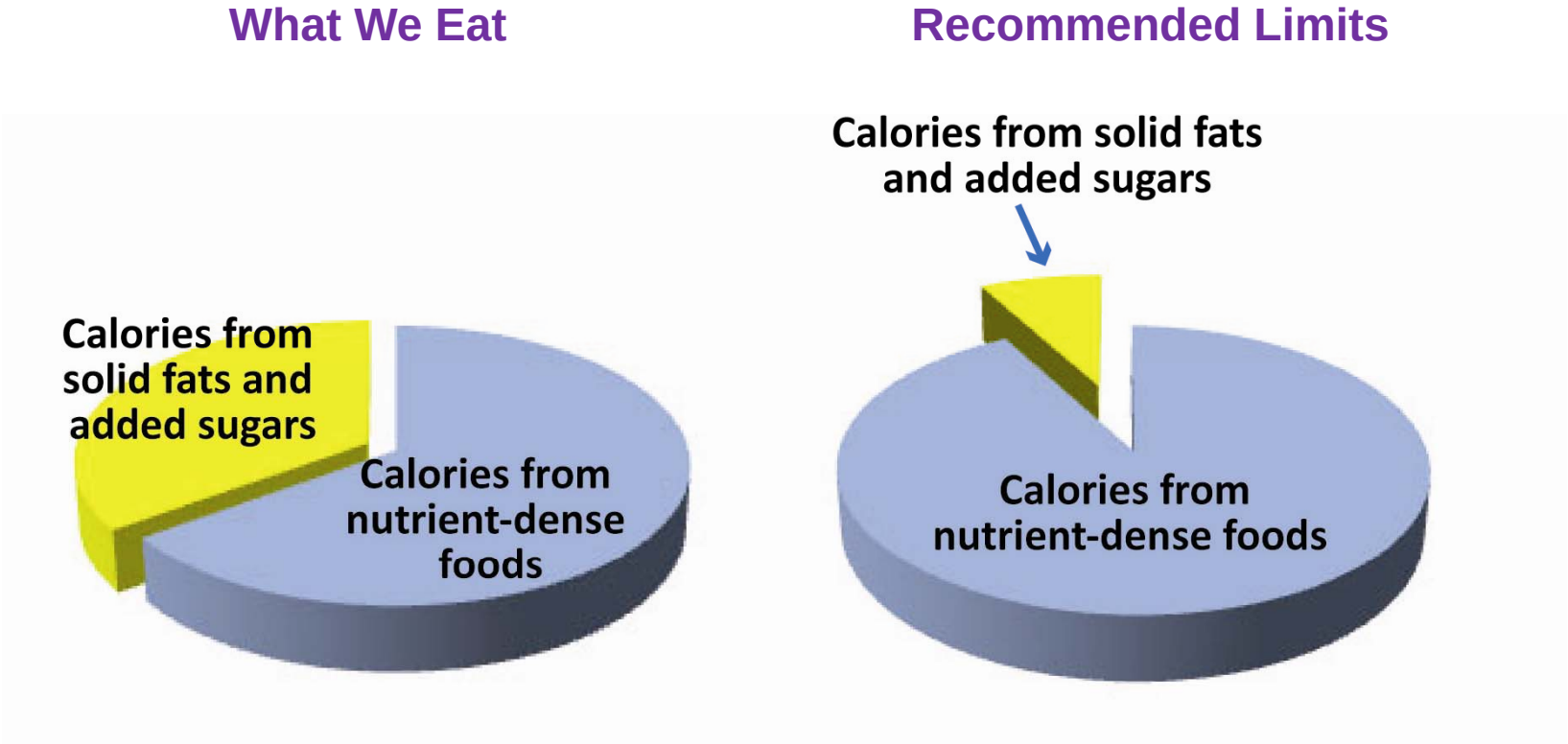
Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans, 2010

Figure B2.1. What we eat versus recommended limits: Calories from Solid Fats and Added Sugars (SoFAS)



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Discretionary Calories Hypothesis

- **Significantly reduce intake of foods containing added sugars and solid fats ...**
- **Americans eat too many calories from foods high in solid fats and added sugars (SoFAS) that offer few or no other nutrients besides calories.**
- **Americans currently consume 35 percent of their total calories from SoFAS. This is too high. They should reduce intake of calories from SoFAS by 20 to 30 percent. This means that no more than 5 to 15 percent of total calories should be derived from SoFAS.**

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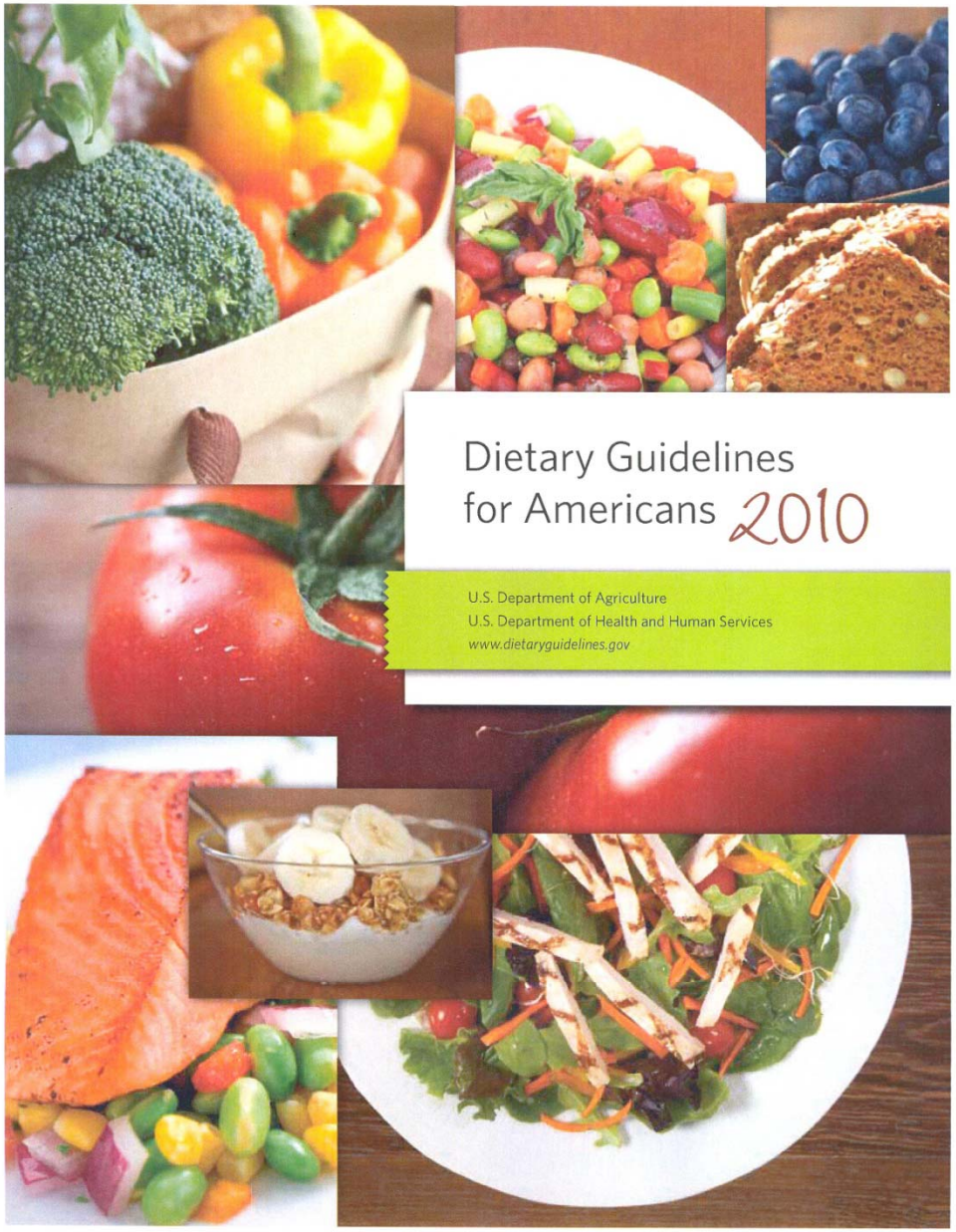

Key Recommendations

BALANCING CALORIES TO MANAGE WEIGHT

- Prevent and/or reduce overweight and obesity through improved eating and physical activity behaviors.
- Control total calorie intake to manage body weight. For people who are overweight or obese, this will mean consuming fewer calories from foods and beverages.
- Increase physical activity and reduce time spent in sedentary behaviors.
- Maintain appropriate calorie balance during each stage of life—childhood, adolescence, adulthood, pregnancy and breastfeeding, and older age.

FOODS AND FOOD COMPONENTS TO REDUCE

- Reduce daily sodium intake to less than 2,300 milligrams (mg) and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease. The 1,500 mg recommendation applies to about half of the U.S. population, including children, and the majority of adults.
- Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids.
- Consume less than 300 mg per day of dietary cholesterol.
- Keep *trans* fatty acid consumption as low as possible by limiting foods that contain synthetic sources of *trans* fats, such as partially hydrogenated oils, and by limiting other solid fats.
- Reduce the intake of calories from solid fats and added sugars.
- Limit the consumption of foods that contain refined grains, especially refined grain foods that contain solid fats, added sugars, and sodium.
- If alcohol is consumed, it should be consumed in moderation—up to one drink per day for women and two drinks per day for men—and only by adults of legal drinking age.[5]

5. See Chapter 3, Foods and Food Components to Reduce, for additional recommendations on alcohol consumption and specific population groups. There are many circumstances when people should not drink alcohol.

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High – Intensity Sweeteners

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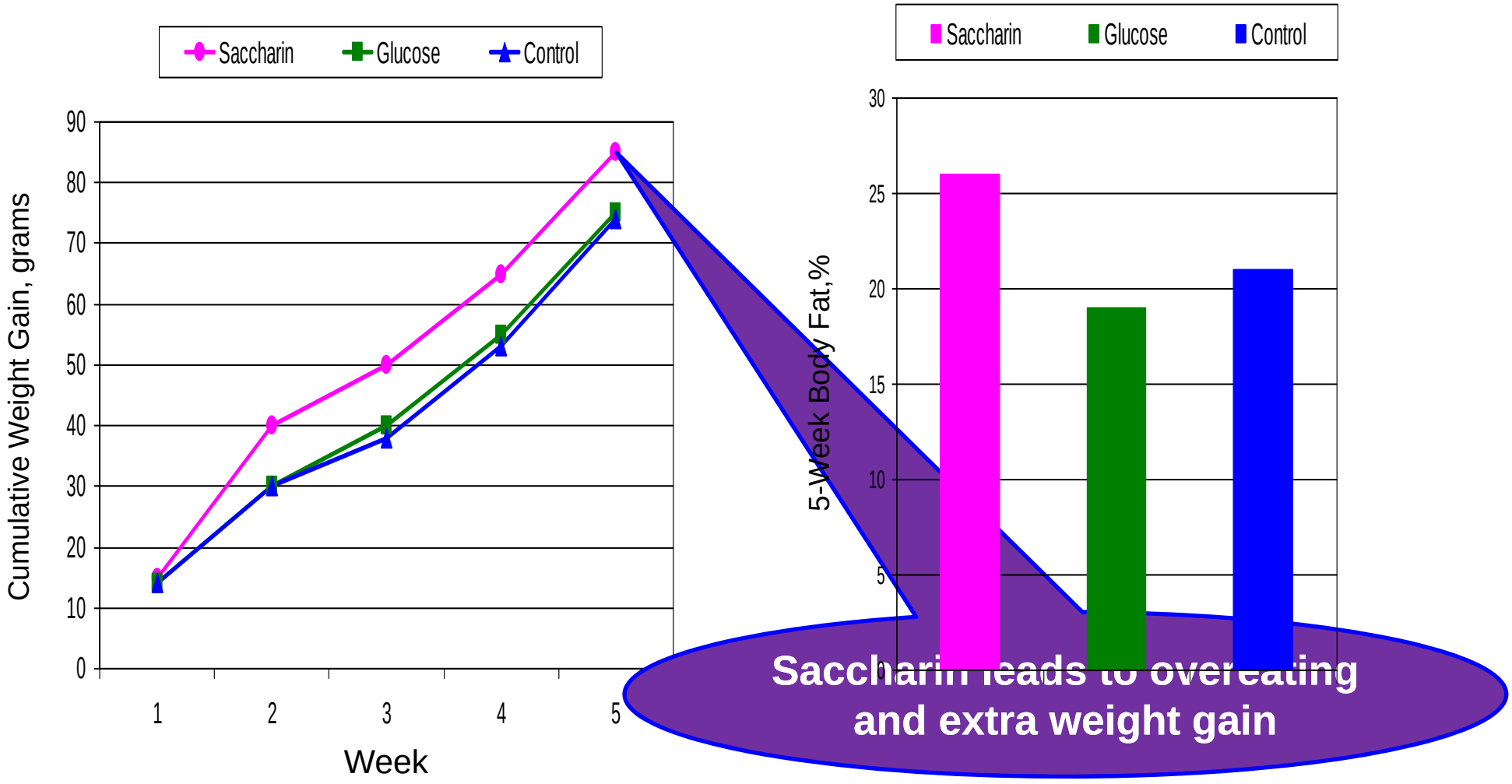
Sweet Taste and Caloric Intake



Behavioral Neuroscience (2009) 123(4): 772 - 780

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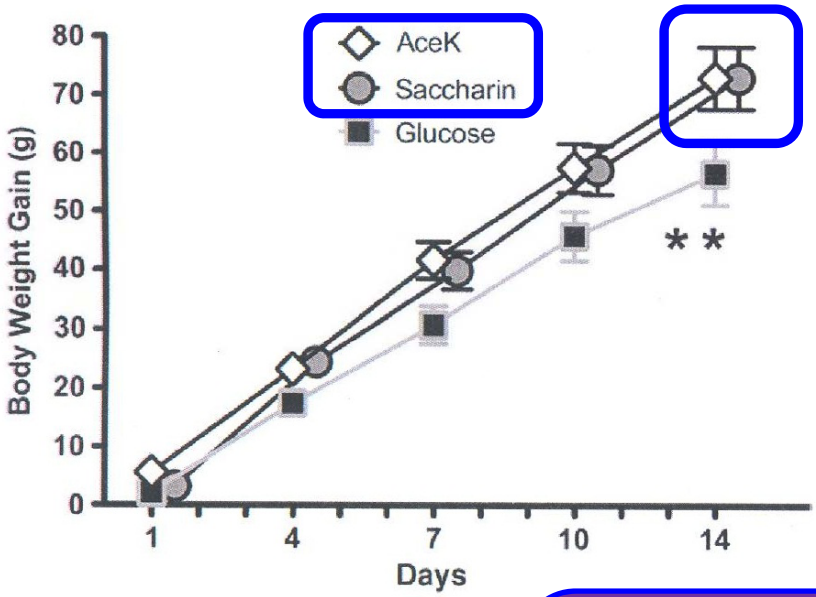
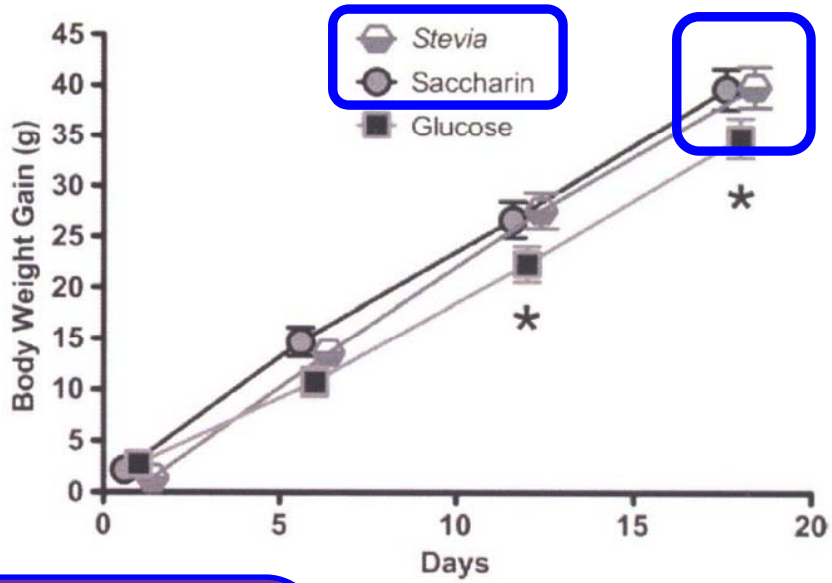
Sweet Taste and Caloric Intake





Artificial sweeteners stimulate long-term over-eating and extra weight gain

Physiology & Behavior (2010) 100(1): 55 - 62

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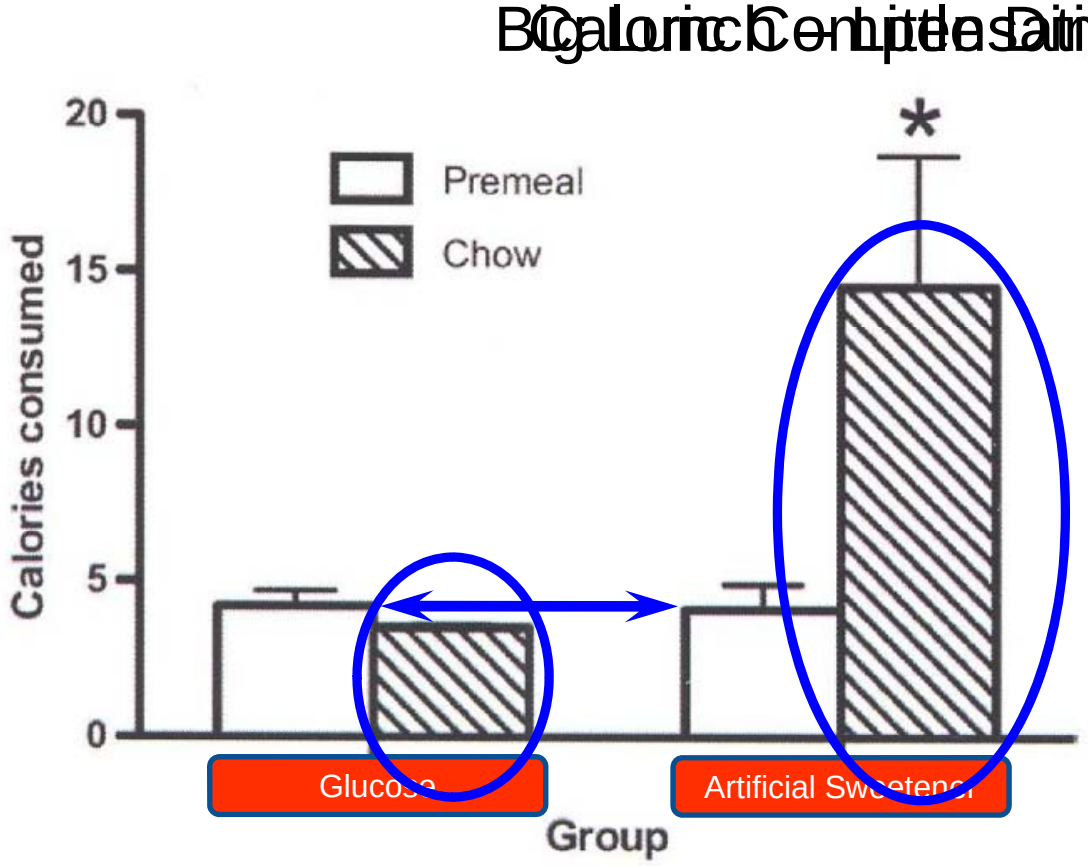
Sweet Taste and Caloric Intake



Artificial sweeteners trigger loss of ability to adjust to extra calories

Physiology & Behavior (2010) 100(1): 55 - 62

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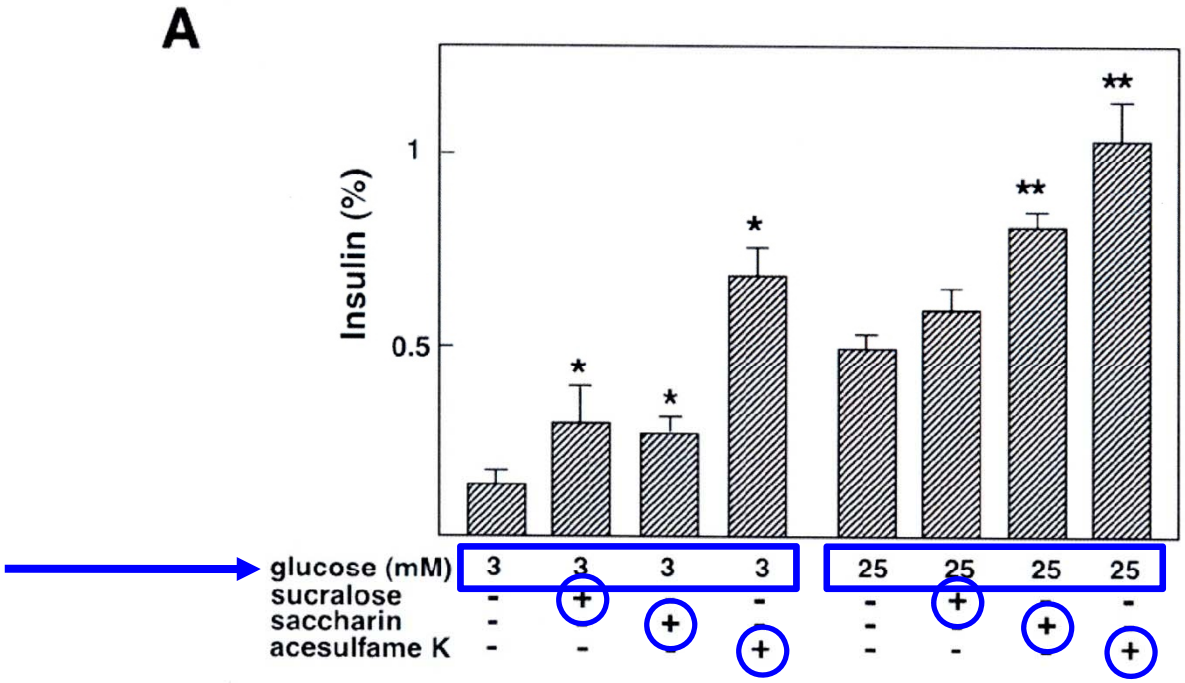
Sweet Taste and Caloric Intake

Increased Medical Research



Artificial sweeteners elicit insulin response

PLOS One (2009) 4(4): e5106, 1 - 11

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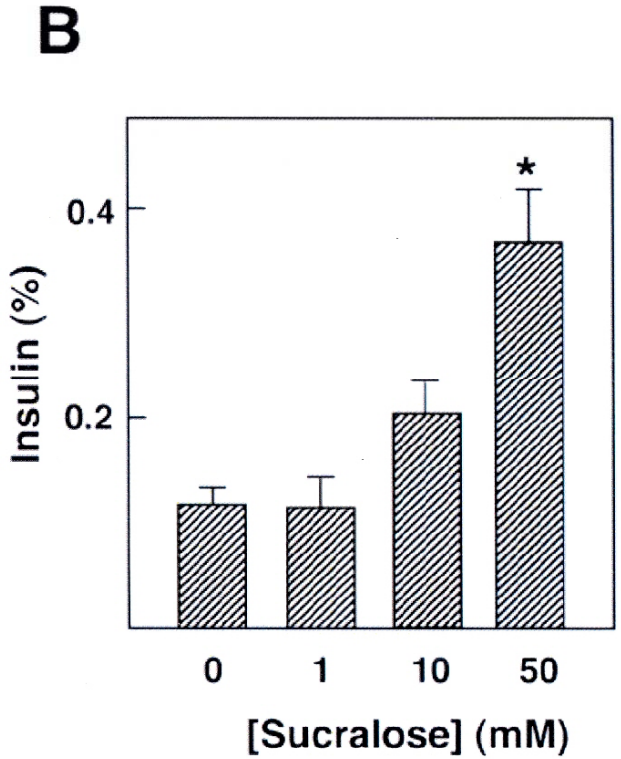
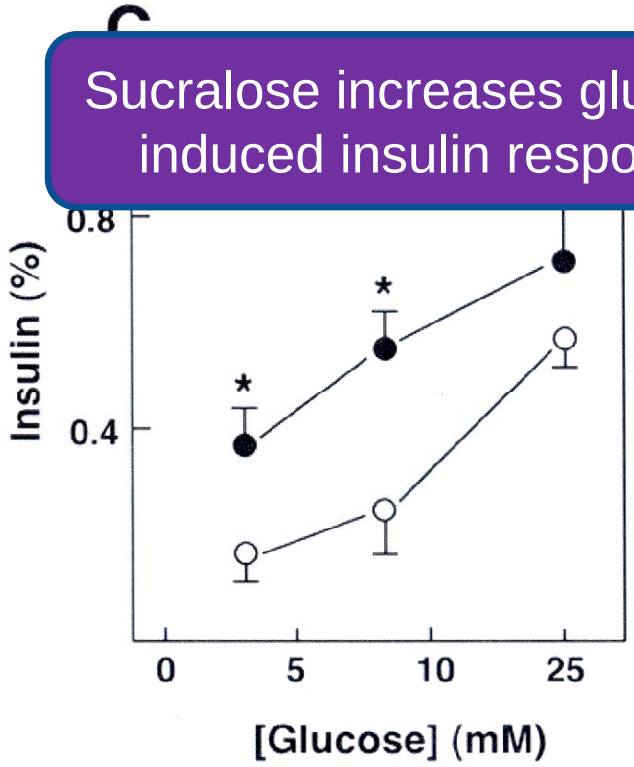
Sweet Taste and Caloric Intake





Sucralose increases glucose-induced insulin response

Sucralose triggers insulin

PLOS One (2009) 4(4): e5106, 1 - 11

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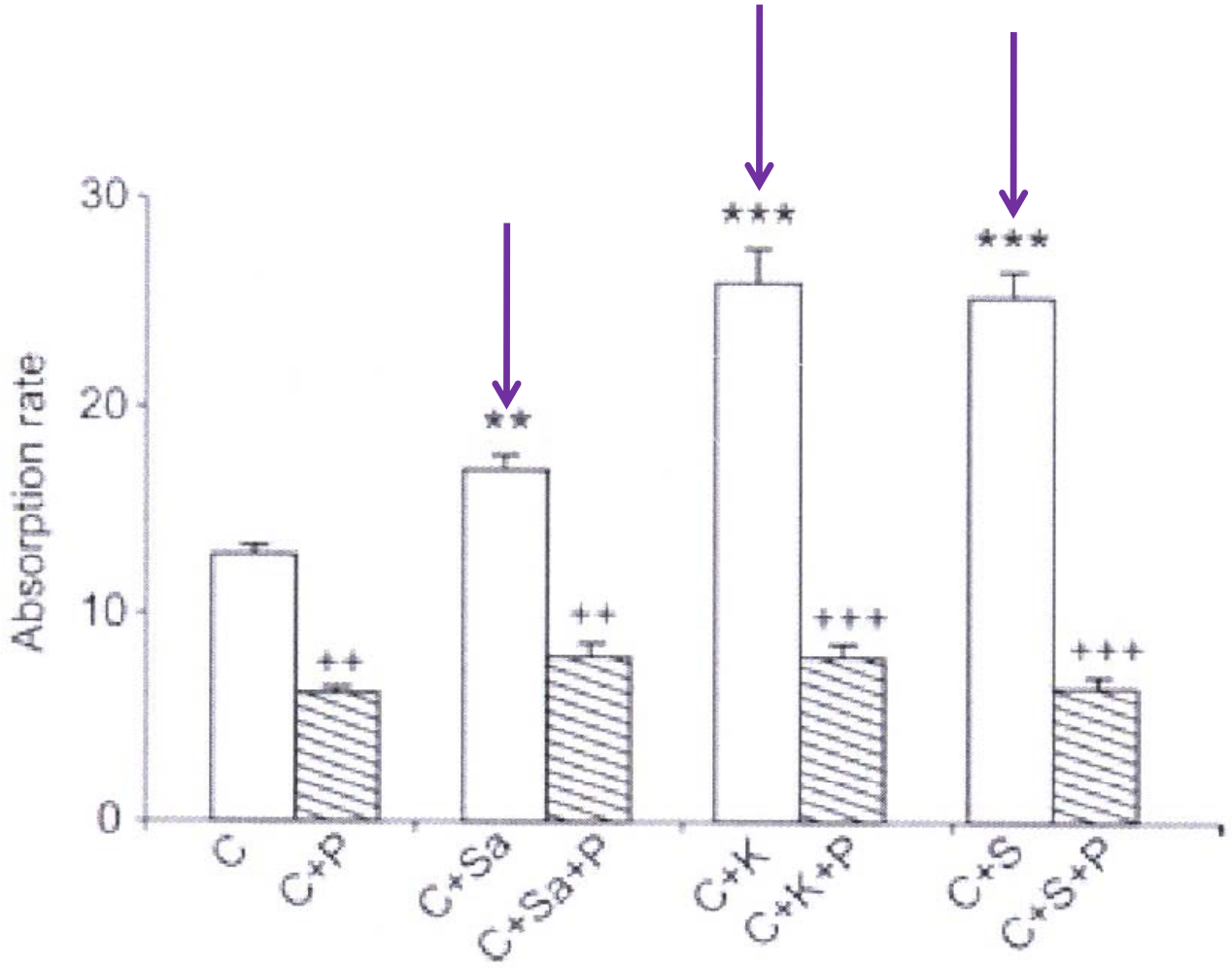
Sweet Taste and Caloric Intake



Artificial sweeteners magnify glucose uptake

J Physiology (2007) 582(1): 379 – 392

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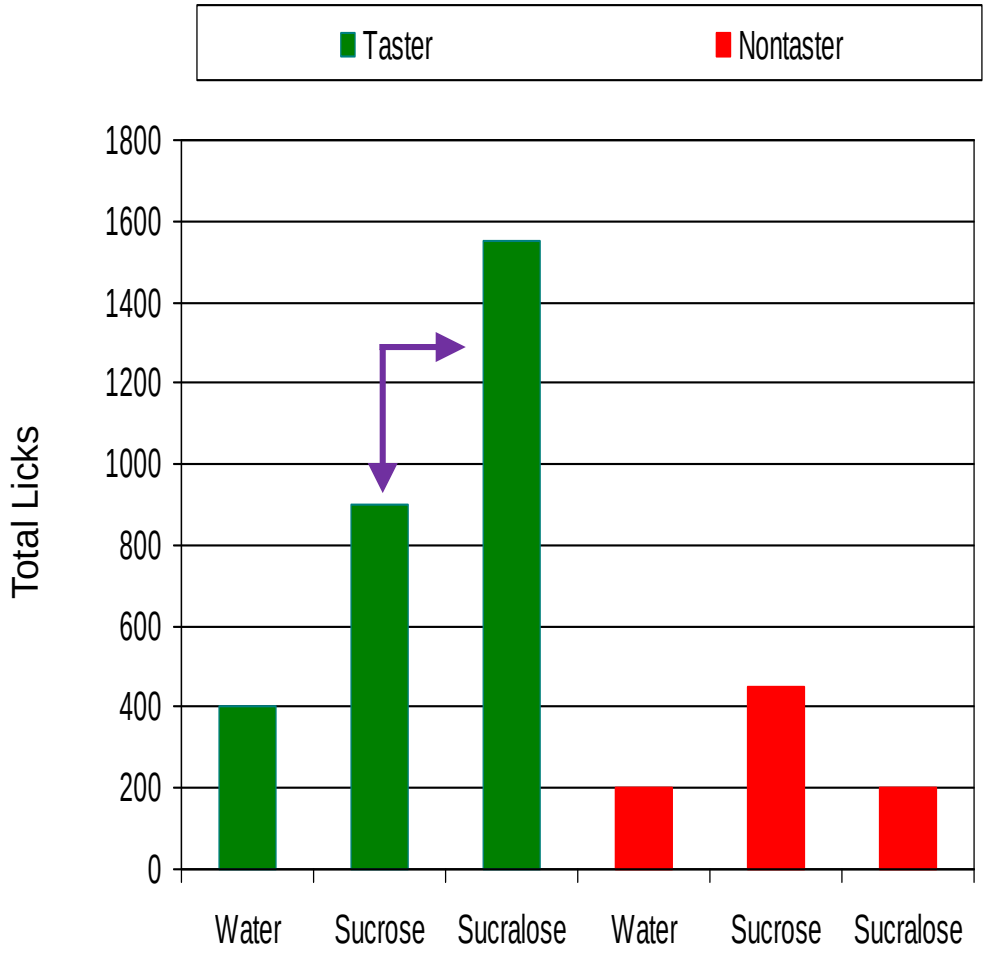
Sweet Taste and Caloric Intake



Food intake increases when brain senses no calories tied to sweet taste of artificial sweeteners

Neuron (2008) 57(6): 930 - 941

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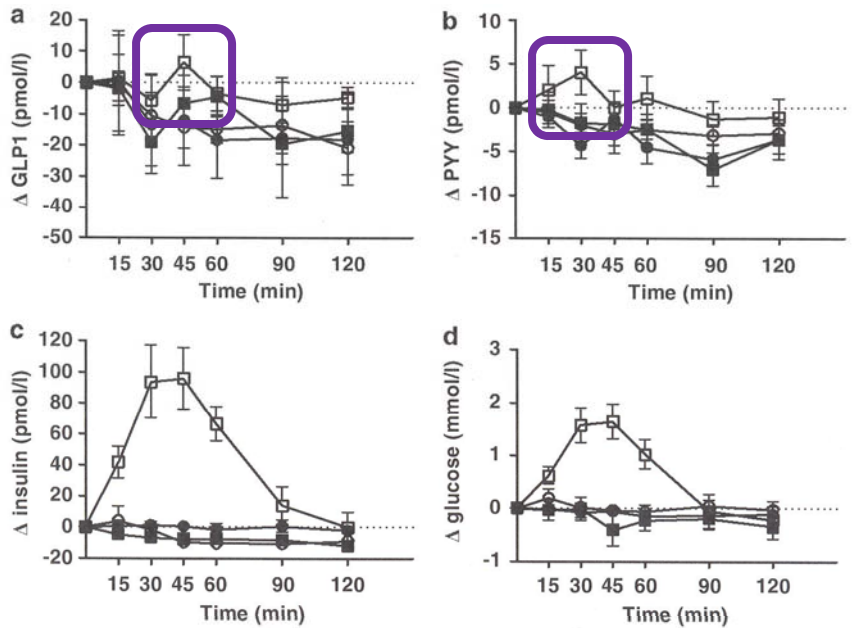
Sweet Taste and Caloric Intake

Table 2 Incremental AUC data for plasma hormones, glucose and appetite scores measured between 0 and 120 minutes (unless specified) and energy and water intake at the buffet meal

	W	*WS*	*S*	*MD*
$Insulin_{(0–10\,min)}$ (pmol min/l)	171 ± 60	235 ± 83	70 ± 25	68 ± 24
$GLP\text{-}1_{(0–10\,min)}$ (pmol min/l)	882 ± 113	948 ± 171	922 ± 132	658 ± 78
Glucose (mmol min/l)	33.5 ± 6.9[a]	51 ± 12.5[b]	25.3 ± 20.4[c]	122.3 ± 17.5
Insulin (pmol min/l)	287 ± 331[c]	−471 ± 132[c]	−459 ± 352[c]	5669 ± 519
GLP-1 (pmol min/l)	−675 ± 1610	−248 ± 784	−359 ± 401	415 ± 610
PYY (pmol min/l)	−179 ± 119	−128 ± 119	−56 ± 192	283 ± 185
Hunger (mm min)	1724 ± 322	1641 ± 336	1993 ± 199	2017 ± 472
Desire to eat (mm min)	1376 ± 216	1128 ± 275	1330 ± 458	1441 ± 461
Prospective food consumption (mm min)	1318 ± 305	1623 ± 266	2002 ± 247	1676 ± 441
Energy intake (kJ)	2355 ± 227	2417 ± 222	2597 ± 277	2460 ± 167
Water intake (ml)	267.0 ± 69.0	250.7 ± 45.1	291.8 ± 49.8	305.0 ± 49.8



Artificial sweeteners trigger loss of ability to adjust to extra calories

European J Clinical Nutrition (2011) doi: 10.1038/ejcn.2010.291

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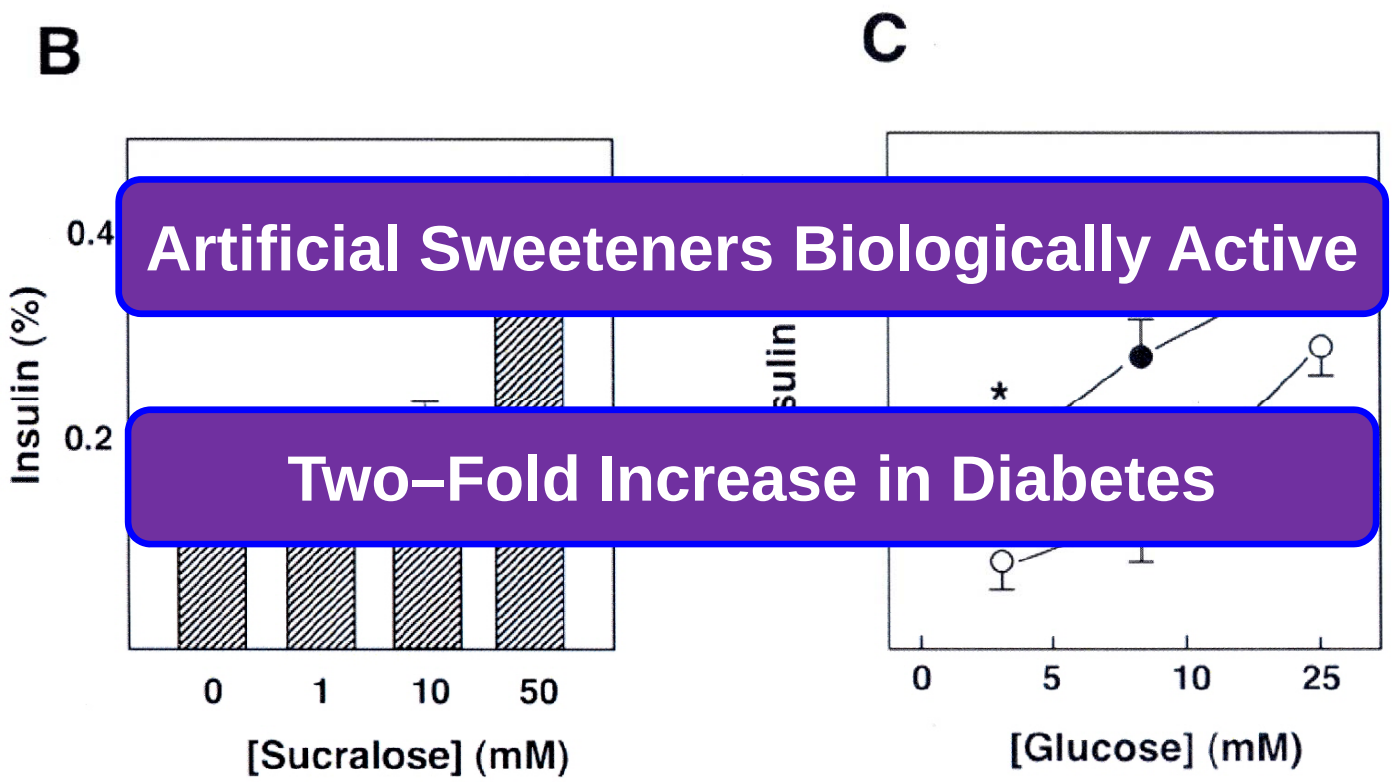
Sweet Taste and Caloric Intake



Artificial Sweeteners Biologically Active

Two–Fold Increase in Diabetes

PLOS One (2009) 4(4): e5106, 1 - 11

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Thank you