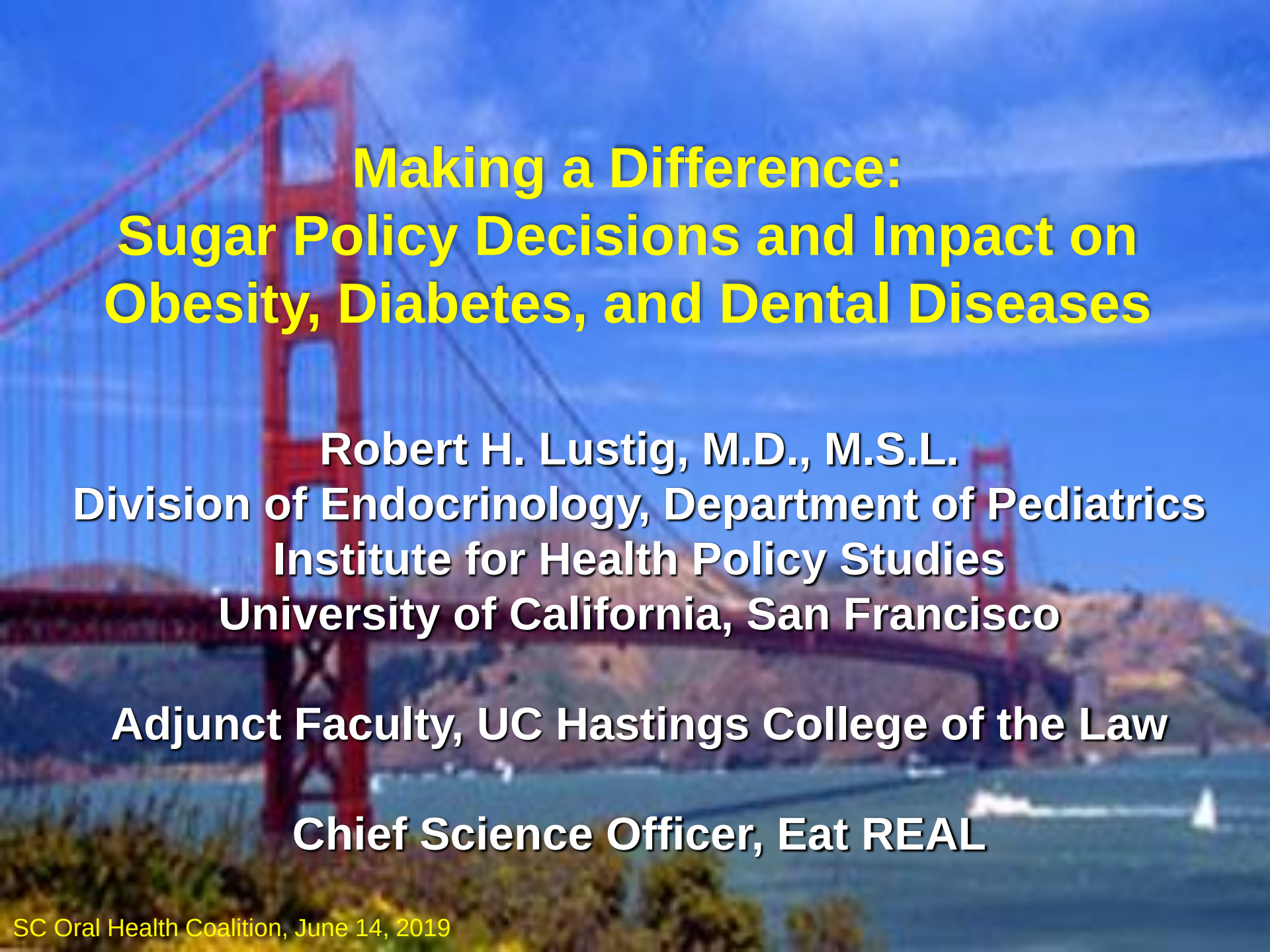


Making a Difference: Sugar Policy Decisions and Impact on Obesity, Diabetes, and Dental Diseases

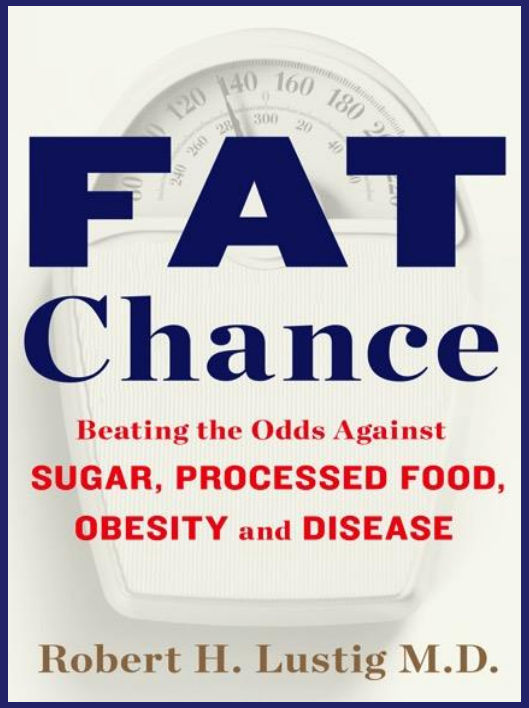
Robert H. Lustig, M.D., M.S.L.
Division of Endocrinology, Department of Pediatrics
Institute for Health Policy Studies
University of California, San Francisco

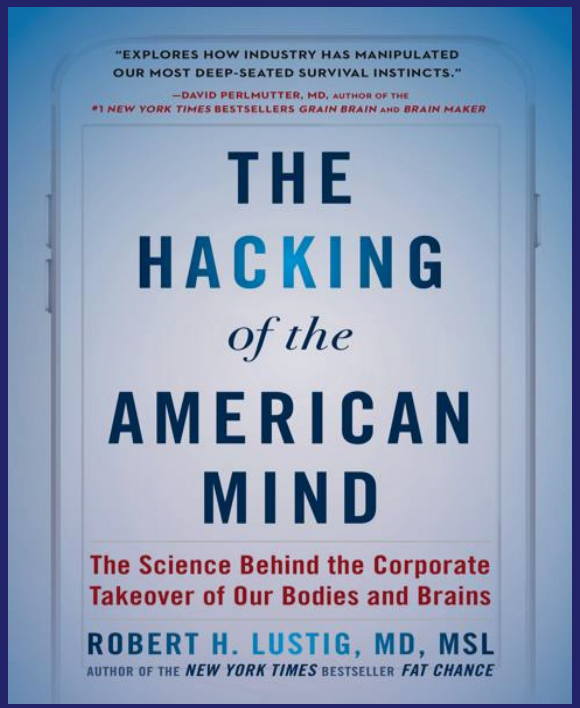
Adjunct Faculty, UC Hastings College of the Law

Chief Science Officer, Eat REAL

SC Oral Health Coalition, June 14, 2019

Disclosures





The reason I am here today

If a researcher isn't willing to follow his data into the policy arena, who will?

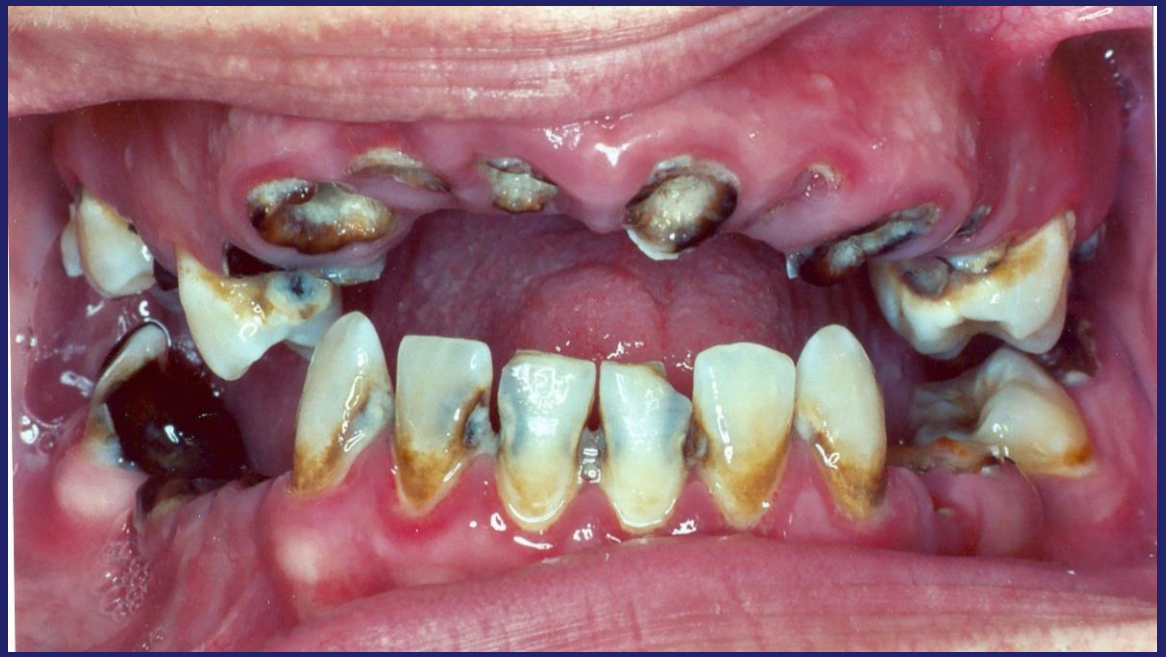
— Dr. Jeremiah Stamler,
"Father" of Cardiovascular Epidemiology

Agenda

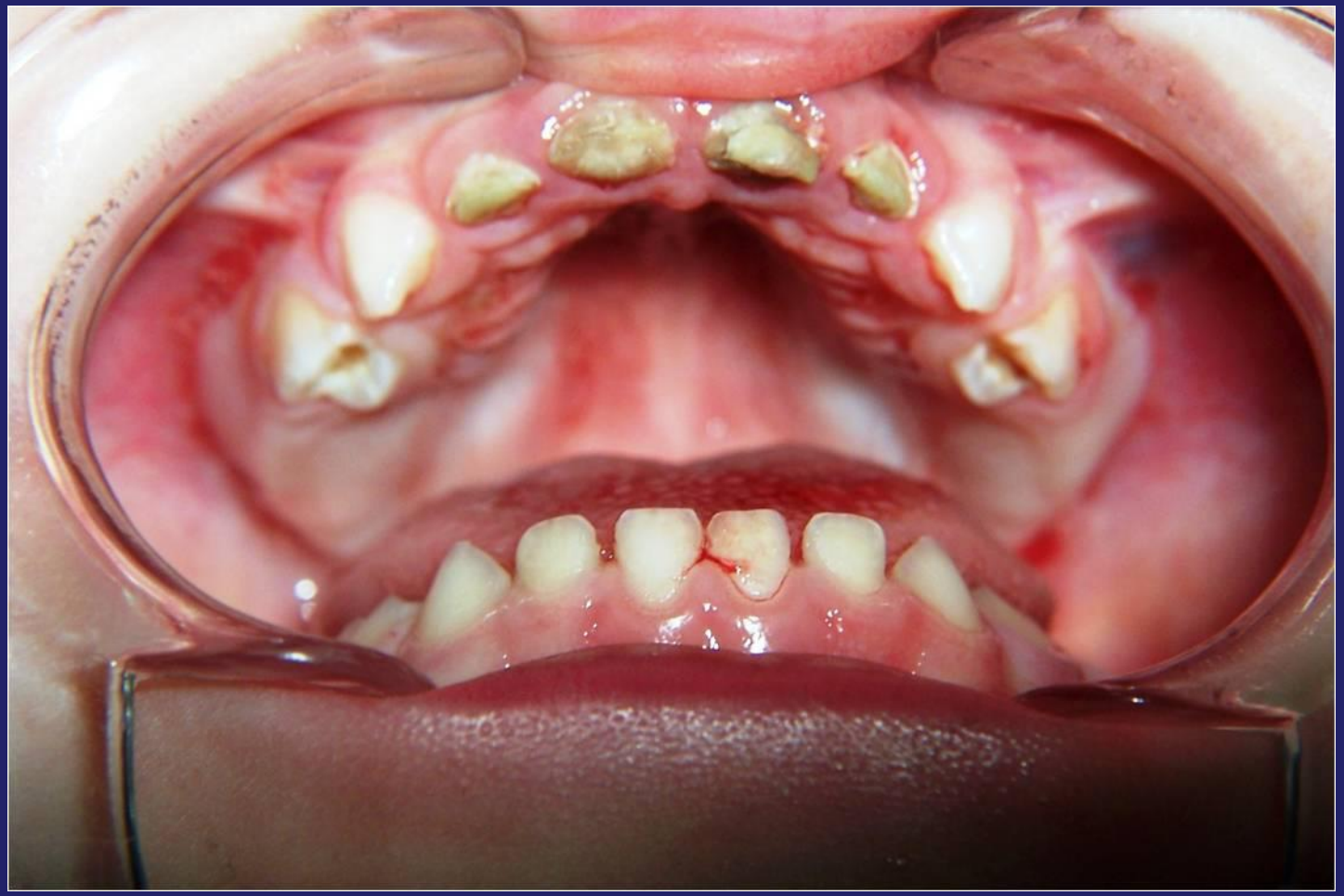
- 1. The oral / systemic health problem
- 2. The three myths
- 3. The dark forces
- 4. The solutions

1a. The Oral Health Problem

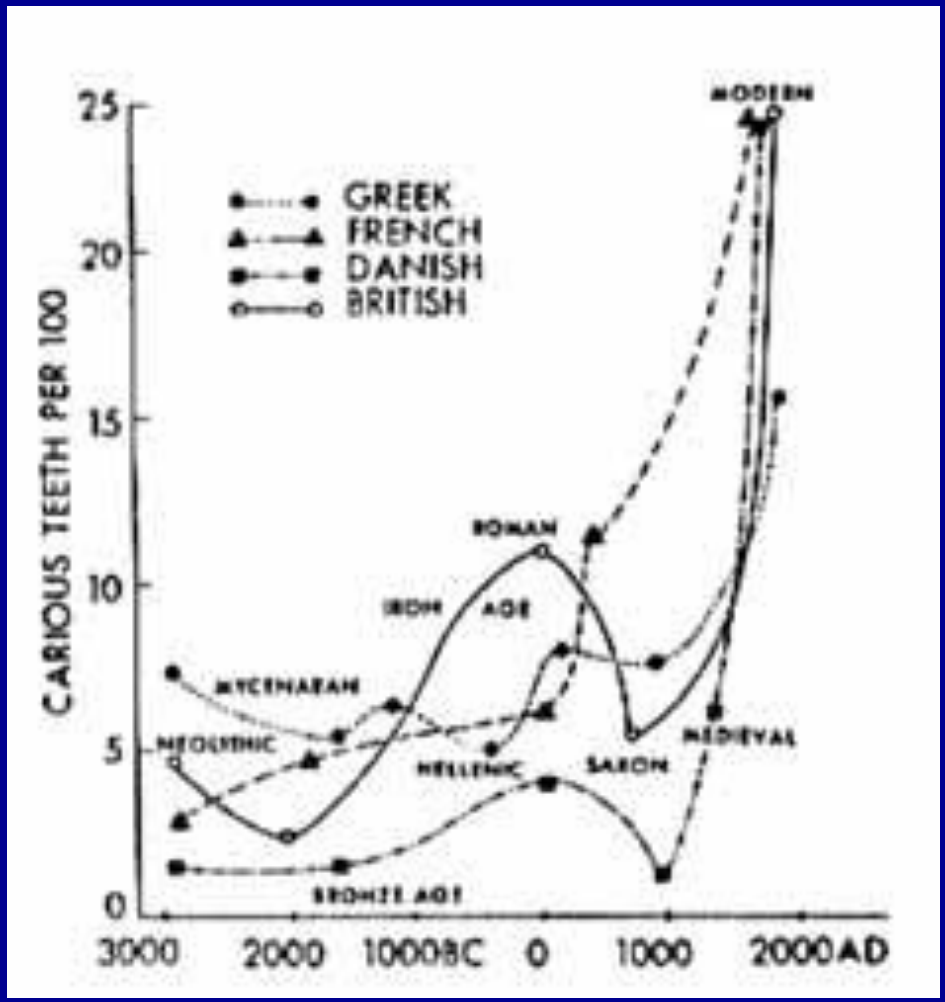
Mountain Dew Mouth



Mountain Dew Mouth in 18 month-old



Prevalence of Dental Caries in European Populations



Kean, 1980

March 27, 1934
Hotel Pennsylvania, New York City

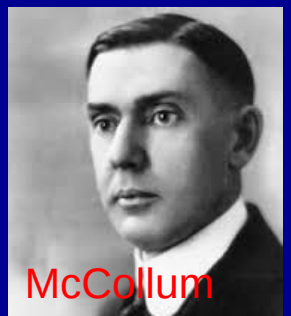
Conservative theory — Clean teeth do not decay:

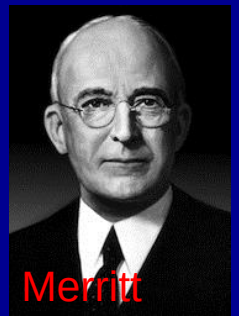
Dr. Thaddeus P. Hyatt, Metropolitan Life and New York University
Dr. Alfred Walker, New York University
Dr. Maurice William, Oral Hygiene Committee of Greater New York

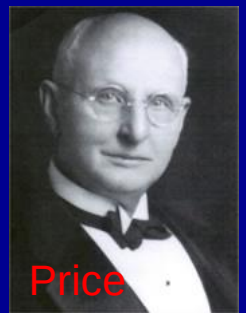
Nutritional dentistry — Caries are a manifestation of your internal metabolic milieu:

Dr. Elmer V. McCollum, Johns Hopkins University
Dr. Arthur H. Merritt, American Academy of Periodontics
Dr. Weston A. Price, Dental Research Laboratories, Cleveland, OH.


William

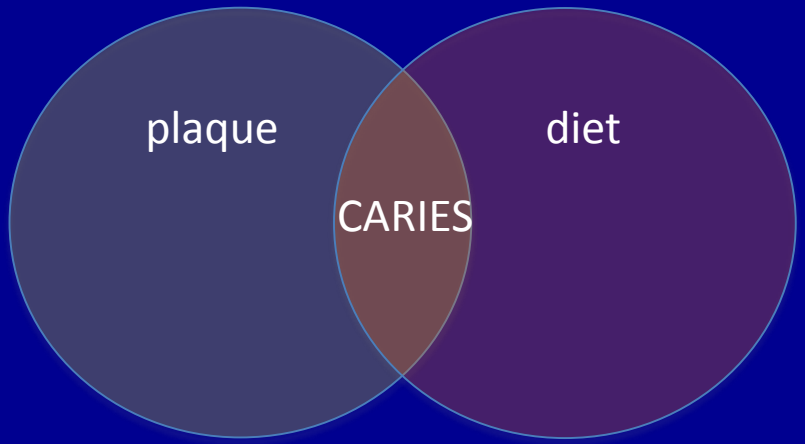

McCollum


Merritt


Price

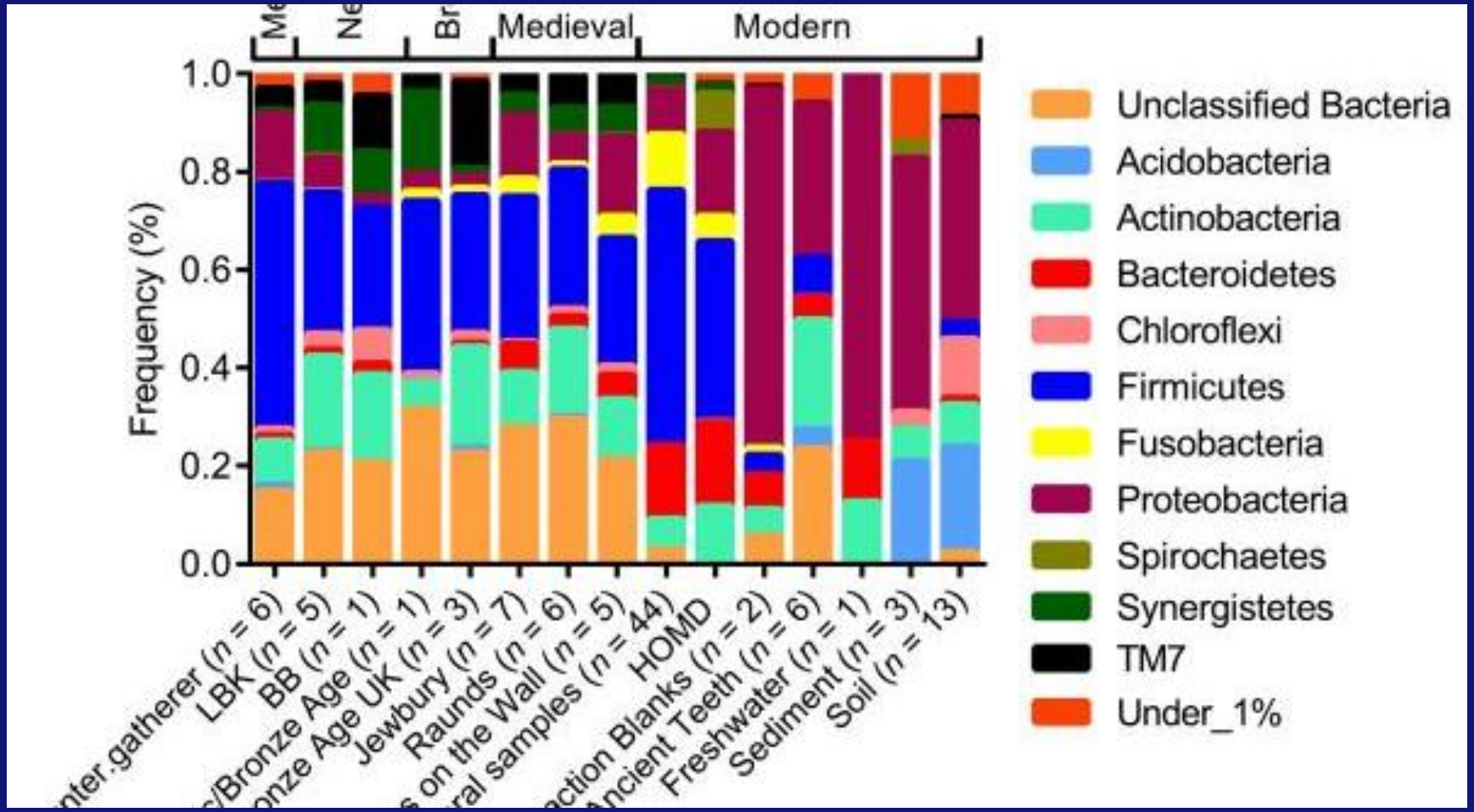
The pathogenesis of caries 1934

Hyatt
Walker
William



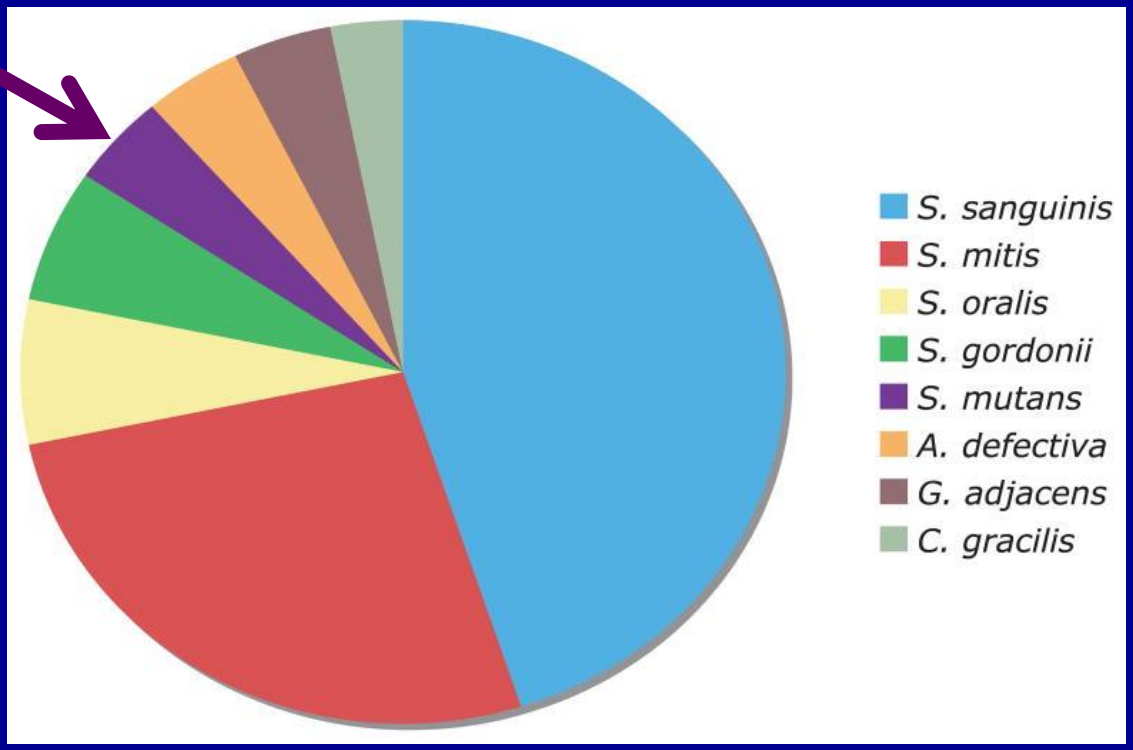
Keyes and Jordan, 1963

Phylum level characterization of ancient calculus deposits



Adler et al. Nat Genet 45:450, 2013

Current mouth flora



Peterson et al. Int Dent J 61:11, 2011

The Modern Rise of Strep. Mutans

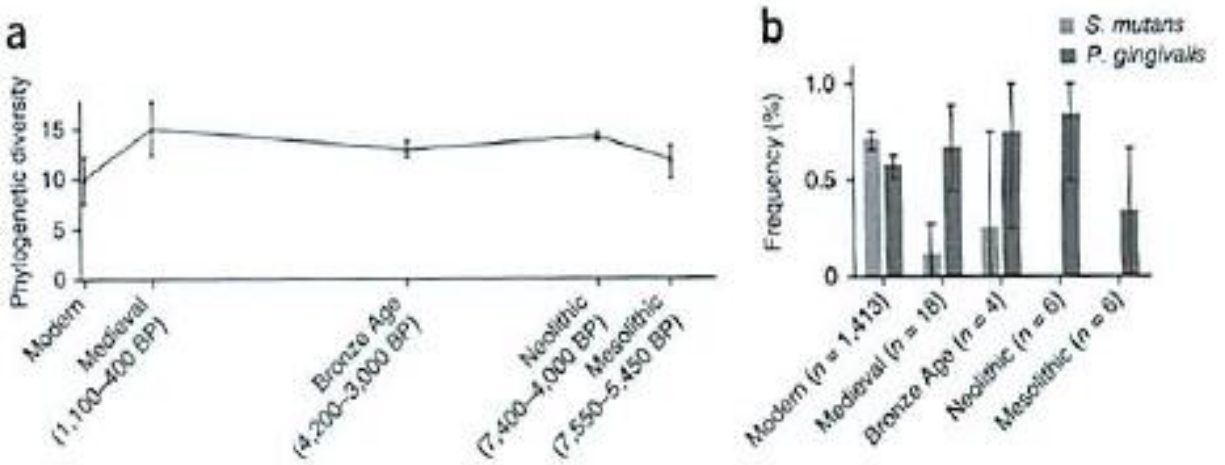
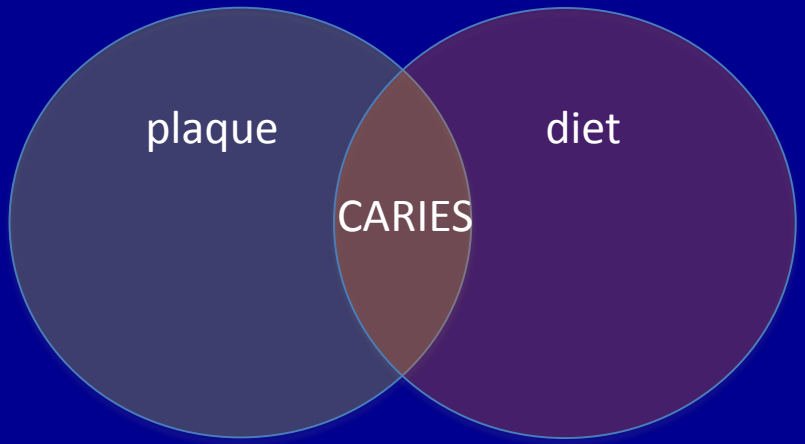


Figure 3 Changes in the diversity and composition of oral microbiota. (**a**) For the V3 region sequences, we estimated the phylogenetic diversity[50] (**Supplementary Note**) of the archaeological dental calculus samples ($n = 34$) and compared them to modern calculus ($n = 6$) and plaque ($n = 13$). We estimated phylogenetic diversity from only classified, Gram-positive bacterial sequences to minimize the influence of taphonomic bias (**Supplementary Note**). Diversity was calculated at a depth of 34 sequences and bootstrapped to assess the robustness of the pattern. Error bars represent bootstrapped diversity values generated by sampling 255 replicates without replacement. BP, years before the present. (**b**) Specific primers were used to amplify sequences unique to the oral pathogens *S. mutans* and *P. gingivalis*. Error bars represent bootstrapped frequencies generated by sampling 255 replicates without replacement.

Adler et al. Nat Genet 45:450, 2013

The pathogenesis of caries 1934

Hyatt
Walker
William



McCollum
Merritt
Price

Keyes and Jordan, 1963

More sugar + older teeth = More caries

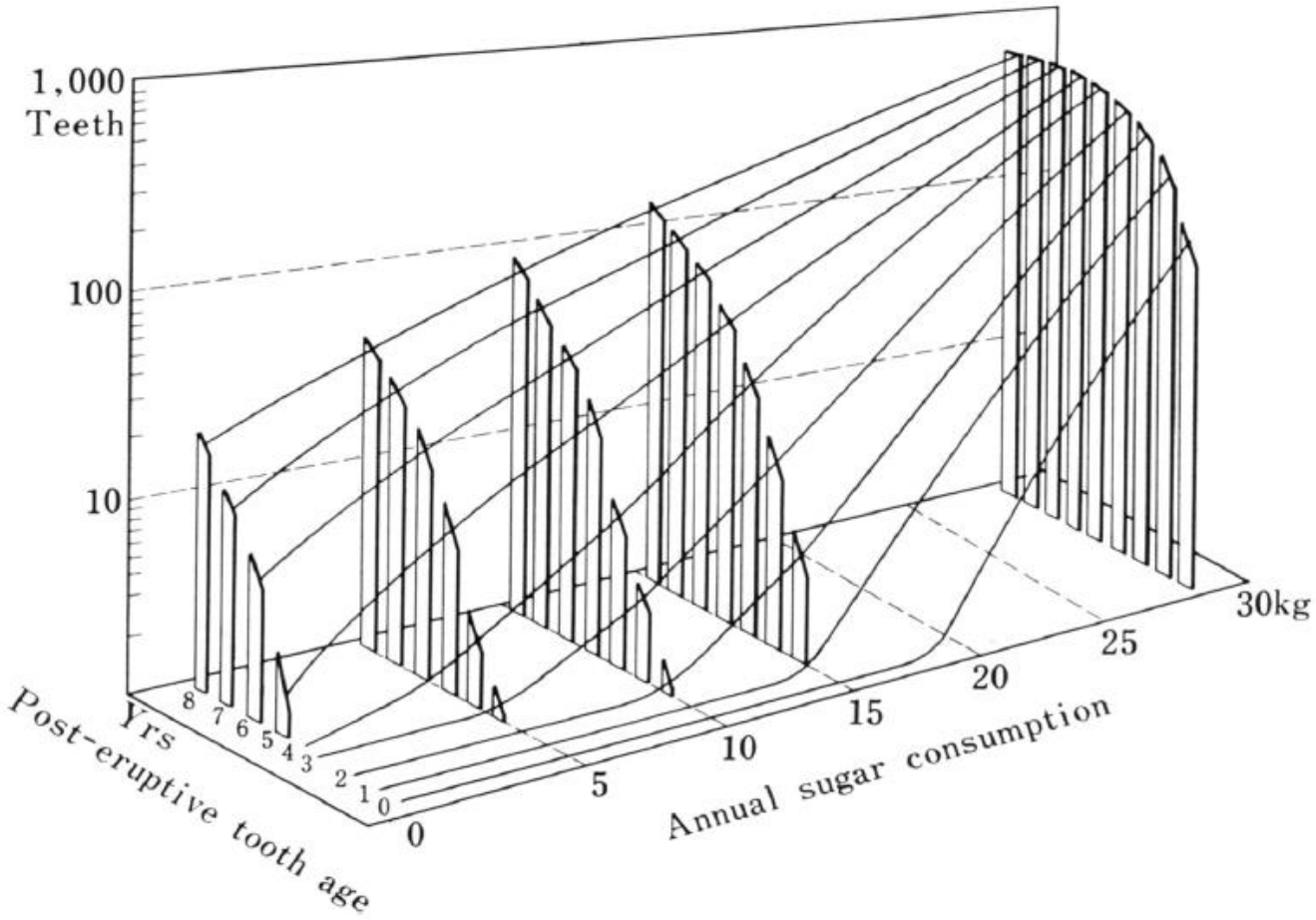


Figure 1 Three-dimensional model of the cumulative numbers of caries in upper central incisor teeth. Data were plotted on a log scale, by post-eruptive tooth age up to 8 years, and related to the average annual sugar consumption per head in Japan from 1935 to 1957 (Takeuchi et al. [14], with permission).

Sheiham and James, BMC Public Health 14:863, 2014

Log-linear relationship between sugar and caries

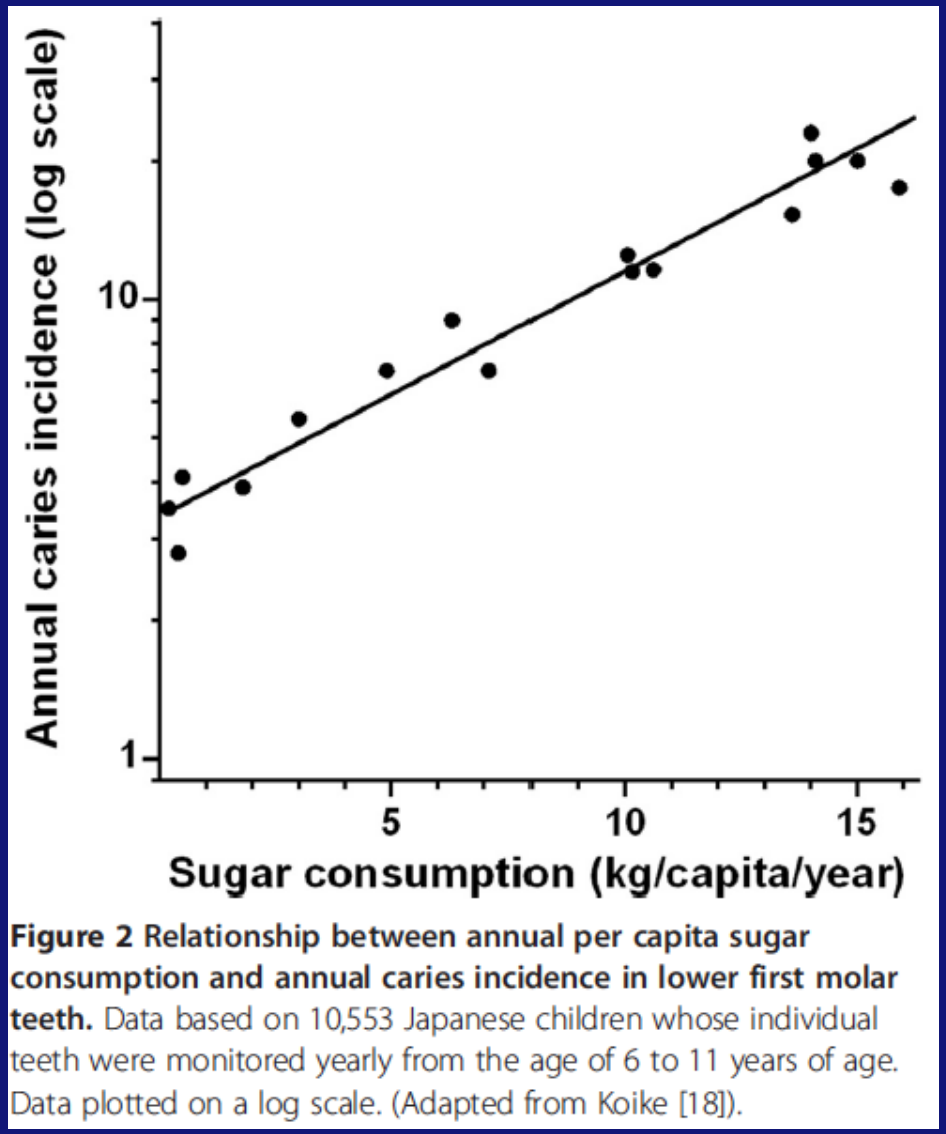
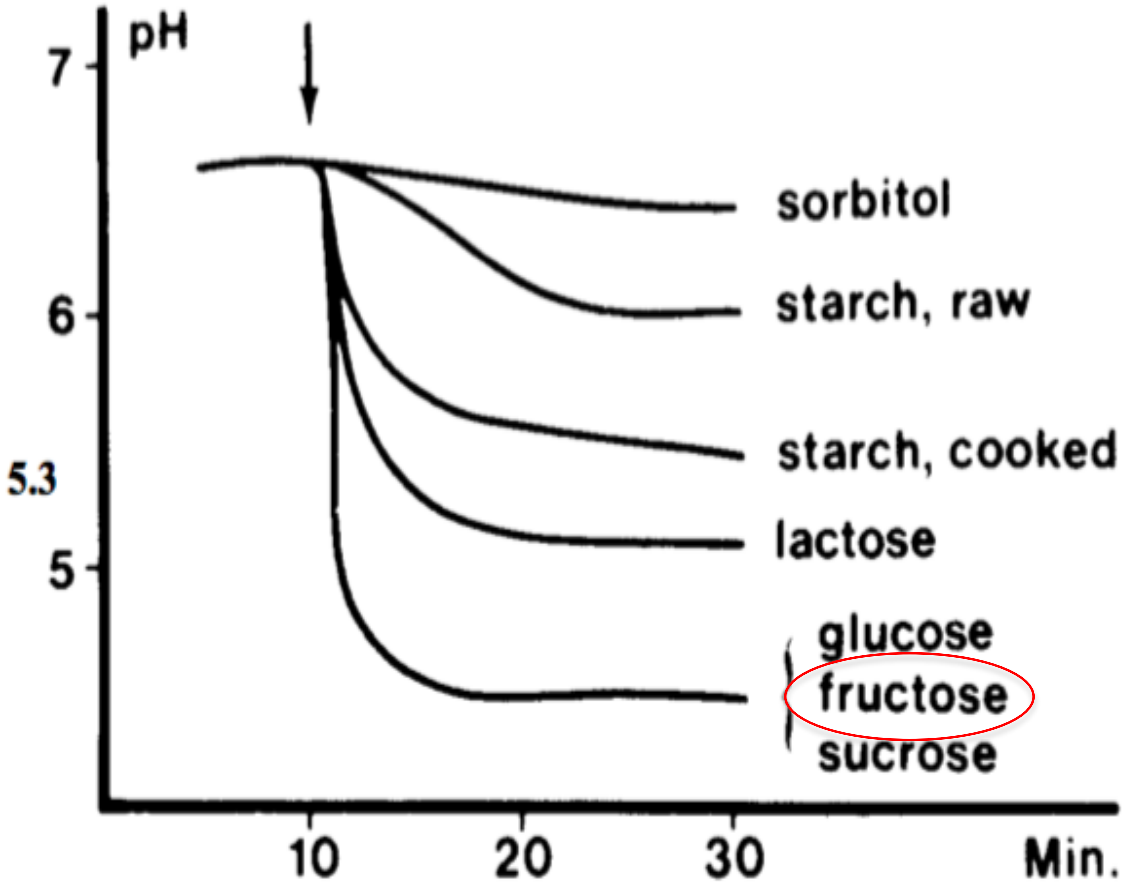


Figure 2 Relationship between annual per capita sugar consumption and annual caries incidence in lower first molar teeth. Data based on 10,553 Japanese children whose individual teeth were monitored yearly from the age of 6 to 11 years of age. Data plotted on a log scale. (Adapted from Koike [18]).

Sheiham and James, BMC Public Health 14:863, 2014

Stephan Curve

pH changes in plaque following application of different carbohydrate solutions

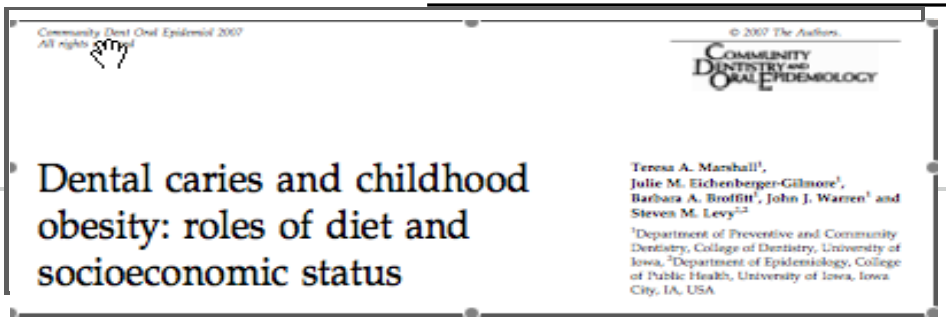


“Dentist Does Diet”

"It seems that were we to turn to a low sugar, high fat type of diet, such as is prescribed for diabetic patients, we might expect a prompt and marked reduction in caries susceptibility. This type of diet is practicable in many countries, but fats are in many regions considerably more expensive to produce than are starches and sugars. At any rate, we now know how to produce good teeth as respects structure and how to preserve them in considerable measure from decay. “

Elmer V. McCollum, Newer Knowledge of Nutrition, 1939

CONSUMER PRICE INDEX

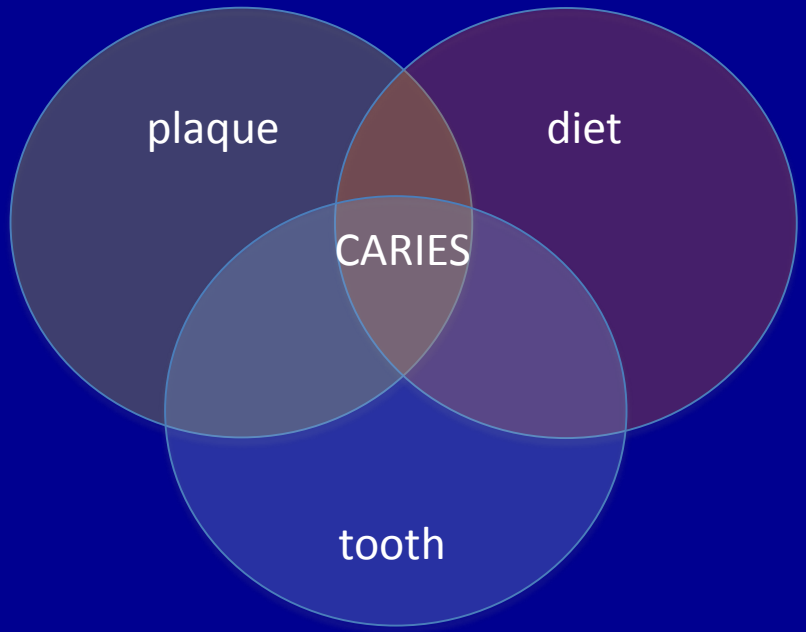


Hoping for a miracle

"We realize very well, however, that if sugar is the great offender in the cause of dental caries, as seems to be the case, we have a very difficult task ahead in making much progress in its control by the reduction of sugar intake so far as the mass of people is concerned. **Most people would prefer some decay rather than to eliminate the sweets**… We should keep up the admonition and give the evidence as to its harmful effect on teeth. At the same time, **let us hope our research workers discover a more practical means of controlling or preventing dental decay.**"

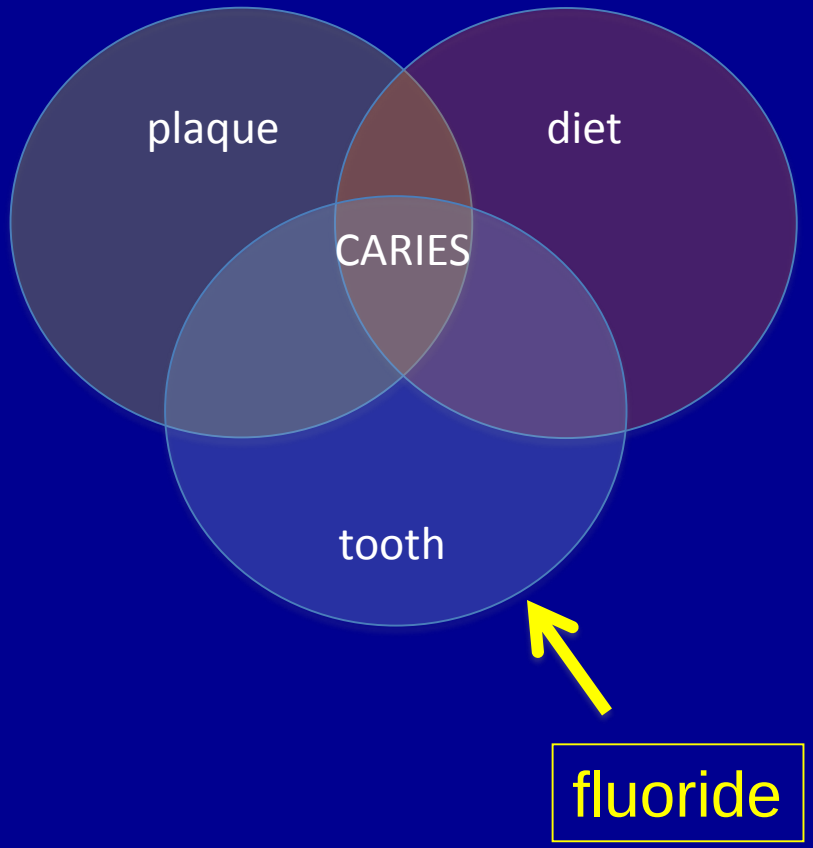
William Davis, Am J Public Health, 1941

The pathogenesis of caries 1947



Keyes and Jordan, 1963

The pathogenesis of caries 1947



Keyes and Jordan, 1963

Mechanisms of action of fluoride

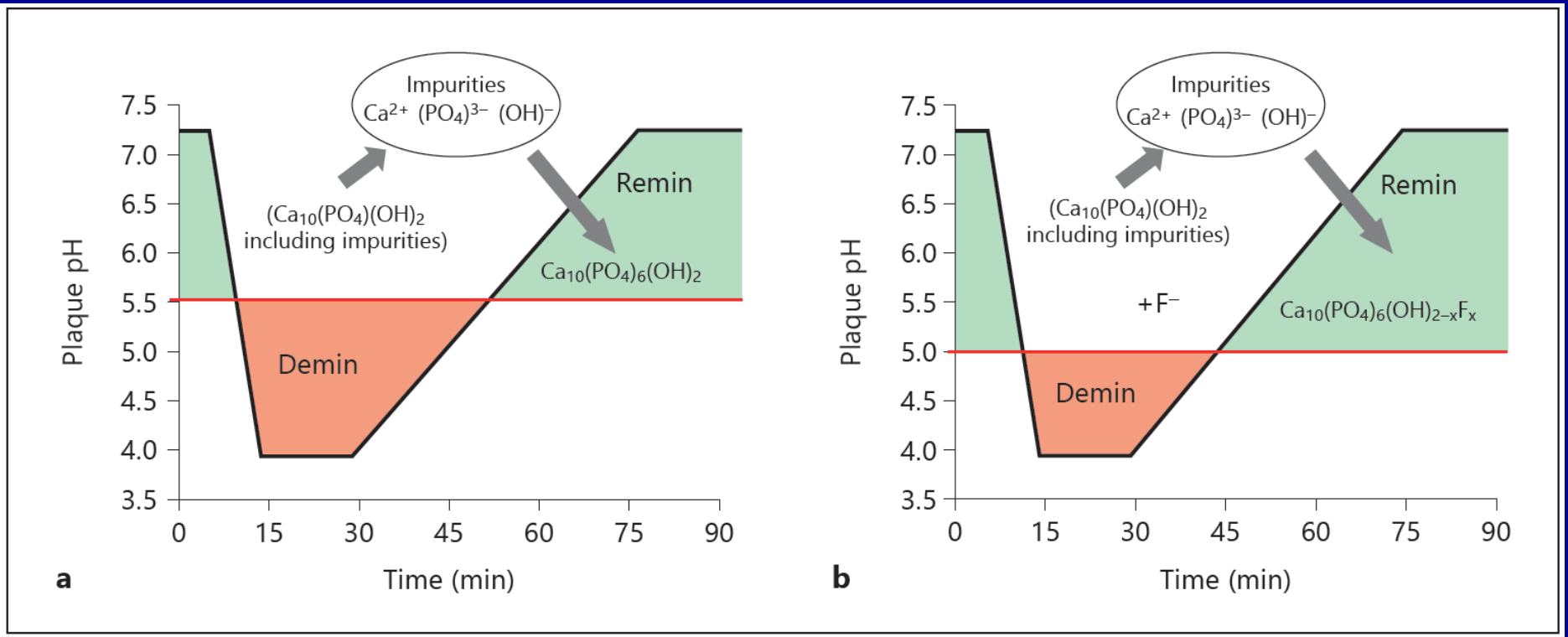


Fig. 1. Caries attack in the absence of fluoride (**a**) and in the presence of fluoride (**b**). In the presence of fluoride, the risk period (red area) is smaller than in the absence of fluoride as a result of a lower critical pH (pH 5.0 vs. 5.5). During remineralization, fluoridated hydroxyapatite is formed which is less soluble than the hydroxyapatite formed in the absence of fluoride.

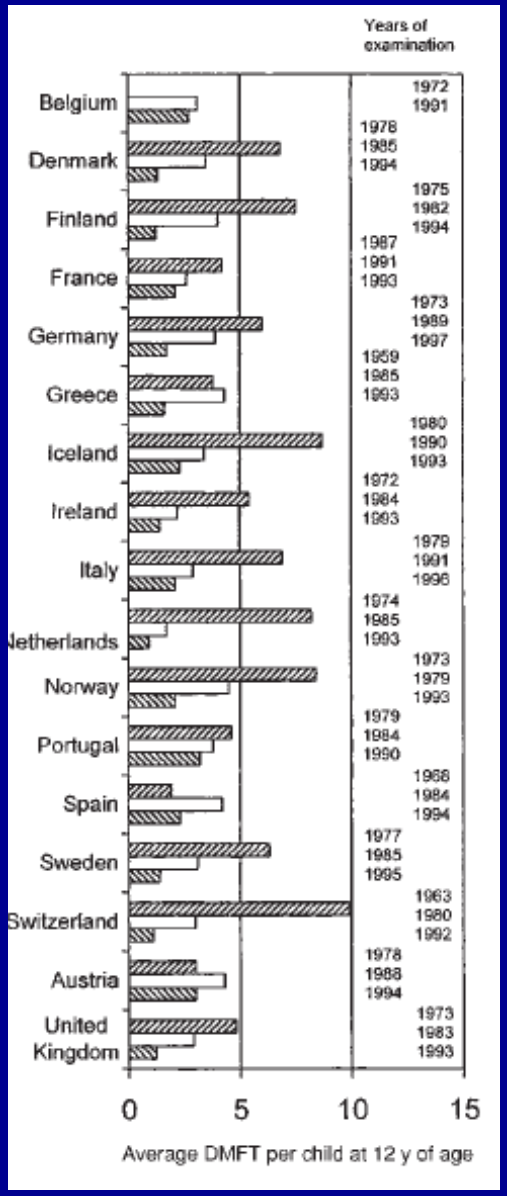
Amaechi and van Loveren, Monogr Oral Sci, Karger 2013, pp. 15-26

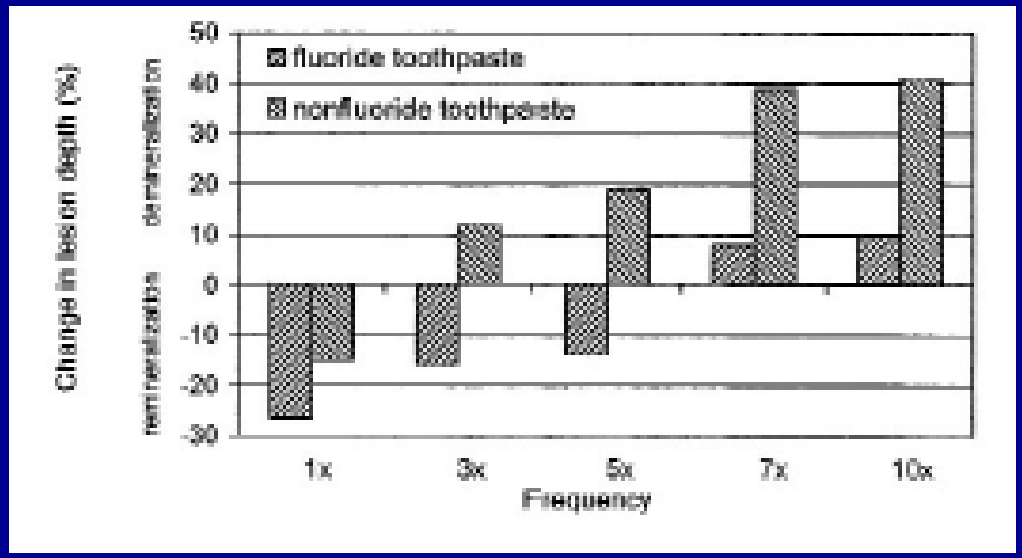
Water fluoridation becomes the standard

In 1945, Grand Rapids became the first city in the world to fluoridate its drinking water… During the 15-year project, researchers monitored the rate of tooth decay among Grand Rapids' almost 30,000 schoolchildren. After just 11 years, [Dr. H. Trendley] Dean - who was now director of the NIDR-announced an amazing finding. The caries rate among Grand Rapids children born after fluoride was added to the water supply dropped more than 60 percent. This finding, considering the thousands of participants in the study, amounted to a giant scientific breakthrough that promised to revolutionize dental care, making tooth decay for the first time in history a preventable disease for most people.

FJ McClure: Water Fluoridation, the Search and the Victory, NIDR, 1970

Fluoride in water or toothpaste cuts cavities





Touger-Decker and van Loveren, Am J Clin Nutr 78:881S, 2003

Clinical trials show ~30% reduction with dentifrice with 1000-2800 ppm fluoride

Original Paper

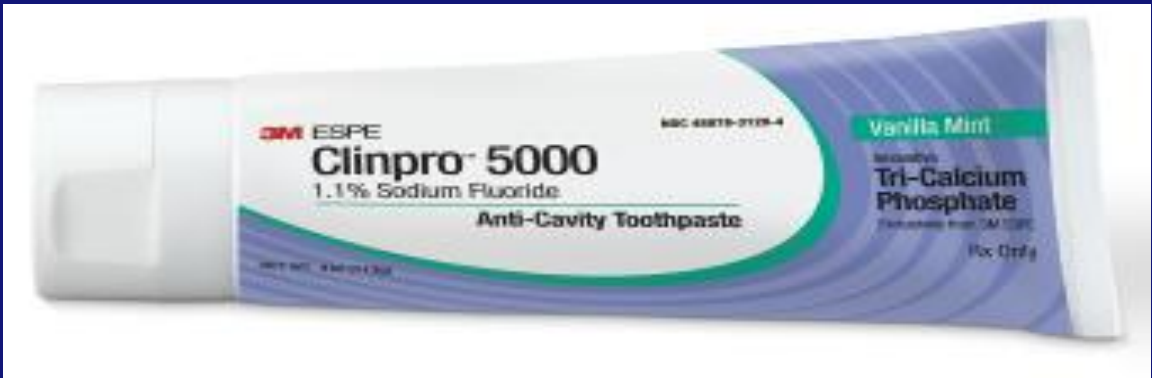
Caries Research

Caries Res 2010;44:323–331
DOI: 10.1159/000317490

Received: November 24, 2009
Accepted after revision: April 28, 2010
Published online: July 3, 2010

Preventive Effect of High-Fluoride Dentifrice (5,000 ppm) in Caries-Active Adolescents: A 2-Year Clinical Trial

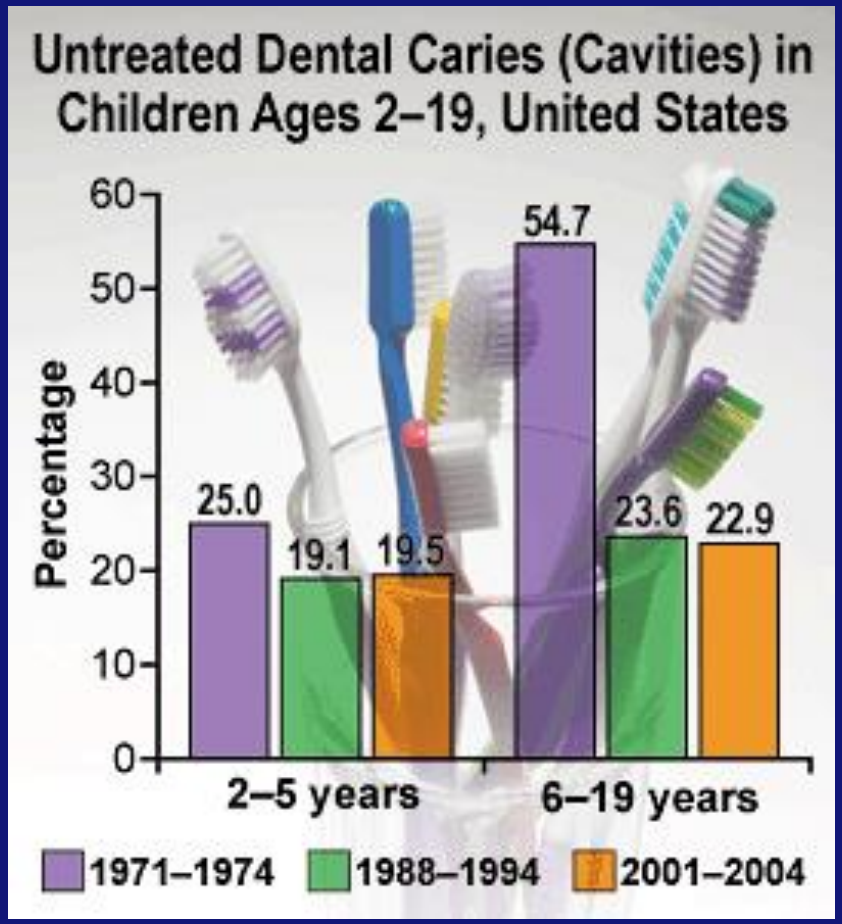
A. Nordström D. Birkhed



- 5000 ppm F vs 1450 ppm fluoride toothpaste
- Prevented fraction 40%
- Caries still progressed in many, even with high concentration fluoride

Nordström and Birkhed, Caries Res 44:323, 2010

But we've reached an equilibrium – no further reduction in prevalence in caries



Untreated Dental Caries (Cavities) in Children Ages 2-19, by Sex, Race and Hispanic Origin, and Percent of Poverty Level, United States

	1971–1974	1988–1994	2001–2004
2–5 years			
Male	26.4%	19.3%	20.0%
Female	23.6%	18.9%	19.1%
6–19 years			
Male	54.9%	22.8%	23.9%
Female	54.5%	24.5%	22.0%
Race and Hispanic Origin			
2–5 years			
Not Hispanic or Latino			
White only	23.7%	13.8%	14.5%
Black or African American	29.0%	24.7%	24.2%
Mexican	—	34.9%	29.2%
6–19 years			
Not Hispanic or Latino			
White only	51.6%	18.8%	19.4%
Black or African American	71.0%	33.7%	28.1%
Mexican	—	36.5%	30.6%
Percent of Poverty Level			
2–5 years			
Below 100% of poverty level	32.0%	30.2%	26.1%
100%–less than 200%	29.9%	24.3%	25.4%
200% or more	17.8%	9.4%	12.1%
6–19 years			
Below 100% of poverty level	68.0%	38.3%	31.5%
100%–less than 200%	60.3%	28.2%	32.7%
200% or more	46.2%	15.1%	14.7%

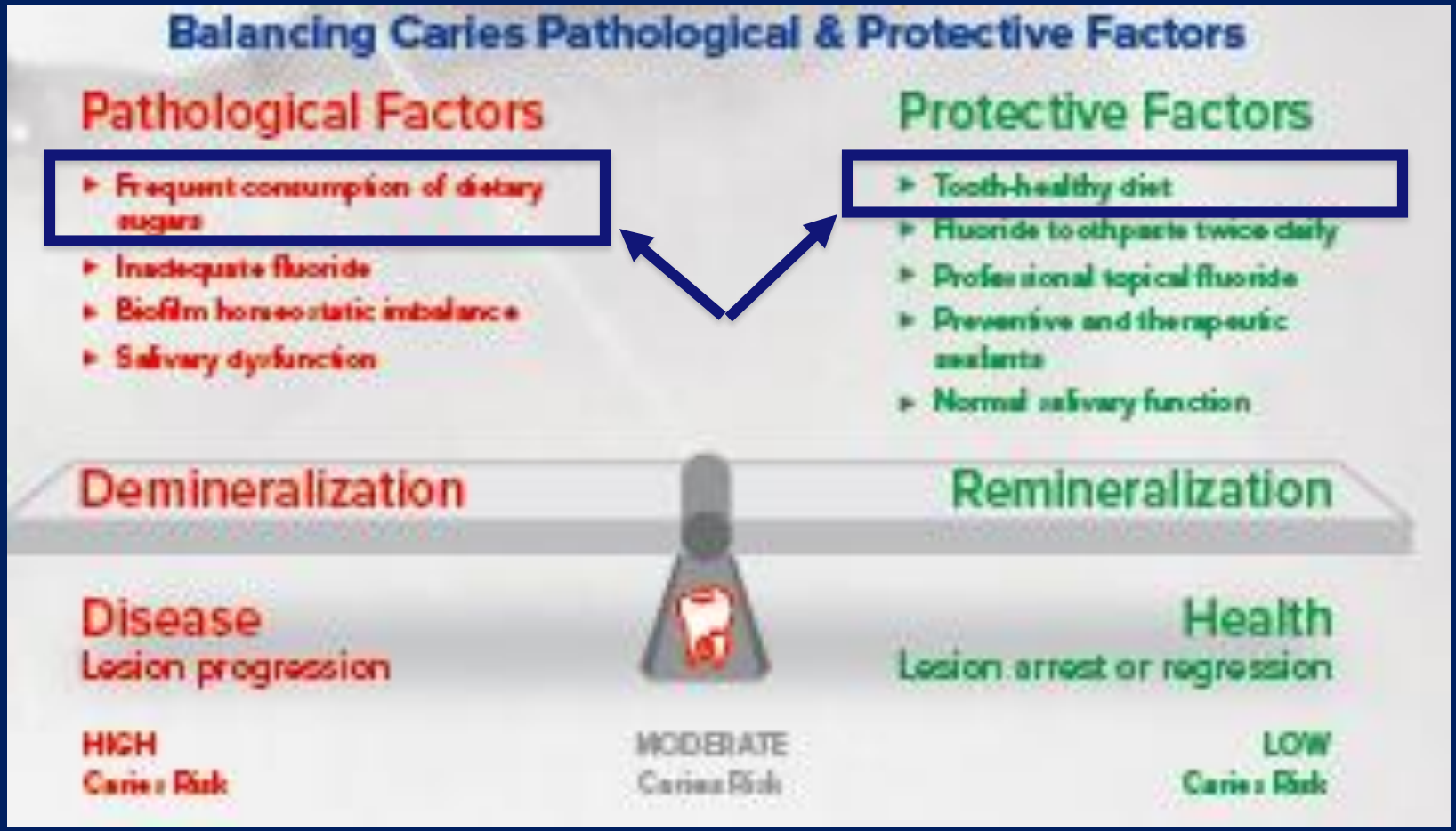
Dye et al. NCHS, Vital and Health Statistics, National Health Survey, 2007

DFC Distribution for Operative only			
Year	1	2	3
2008	25%	33%	42%
2000	23%	51%	26%
1994	20%	50%	30%

2008 DoD Recruit Oral Health Survey

A Report on Clinical Findings and Treatment Needs

Federation of Dentistry International 2017



FDI World Dental International, 2017-fdi-cpp-chairside_guide.pdf

Guideline Summary

Guideline Title

Guideline on caries-risk assessment and management for infants, children and adolescents.

Bibliographic Source(s)

American Academy of Pediatric Dentistry (AAPD). Guideline on caries-risk assessment and management for infants, children and adolescents. Chicago (IL): American Academy of Pediatric Dentistry (AAPD); 2011. 8 p. [63 references]

Example of a Caries Management Protocol for 1-2 Year Olds

Risk Category	Diagnostics	Interventions		Restorative
		Fluoride	Diet	
Low risk	• Recall every 6-12 months • Baseline mutans streptococci (MS)[a]	• Twice daily brushing	Counseling	• Surveillance[x]
Moderate risk parent engaged	• Recall every 6 months • Baseline MS[a]	• Twice daily brushing with fluoridated toothpaste[β] • Fluoride supplements[d] • Professional topical treatment every 6 months	Counseling	• Active surveillance[ε] of incipient lesions
Moderate risk parent not engaged	• Recall every 6 months • Baseline MS[a]	• Twice daily brushing with fluoridated toothpaste[β] • Professional topical treatment every 6 months	Counseling, with limited expectations	• Active surveillance[ε] of incipient lesions
High risk parent engaged	• Recall every 3 months • Baseline and follow up MS[a]	• Twice daily brushing with fluoridated toothpaste[β] • Fluoride supplements[d] • Professional topical treatment every 3 months	Counseling	• Active surveillance[ε] of incipient lesions • Restore cavitated lesions with interim therapeutic restorations (ITR)[ε] or definitive restorations
High risk parent not engaged	• Recall every 3 months • Baseline and follow up MS[a]	• Twice daily brushing with fluoridated toothpaste[β] • Professional topical treatment every 3	Counseling, with limited expectations	• Active surveillance[ε] of incipient lesions • Restore cavitated lesions with interim therapeutic restorations[ε] or definitive restorations

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No dietary advice for any age group

HEALTH DIET/NUTRITION

The Sugar Industry Shaped Government Advice On Cavities, Report Finds

Alexandra Sifferlin @acsifferlin

March 10, 2015

Internal sugar industry documents reveal how it influenced national research priorities for tooth decay


Getty Images

A new report reveals that the sugar industry heavily influenced federal research—as well as the guidelines that resulted from that research.

Tooth decay remains a

PLOS | MEDICINE

RESEARCH ARTICLE

Sugar Industry Influence on the Scientific Agenda of the National Institute of Dental Research's 1971 National Caries Program: A Historical Analysis of Internal Documents

Cristin E. Kearns[1,2,3], Stanton A. Glantz[1,2,4,5*], Laura A. Schmidt[1,2,6,7]

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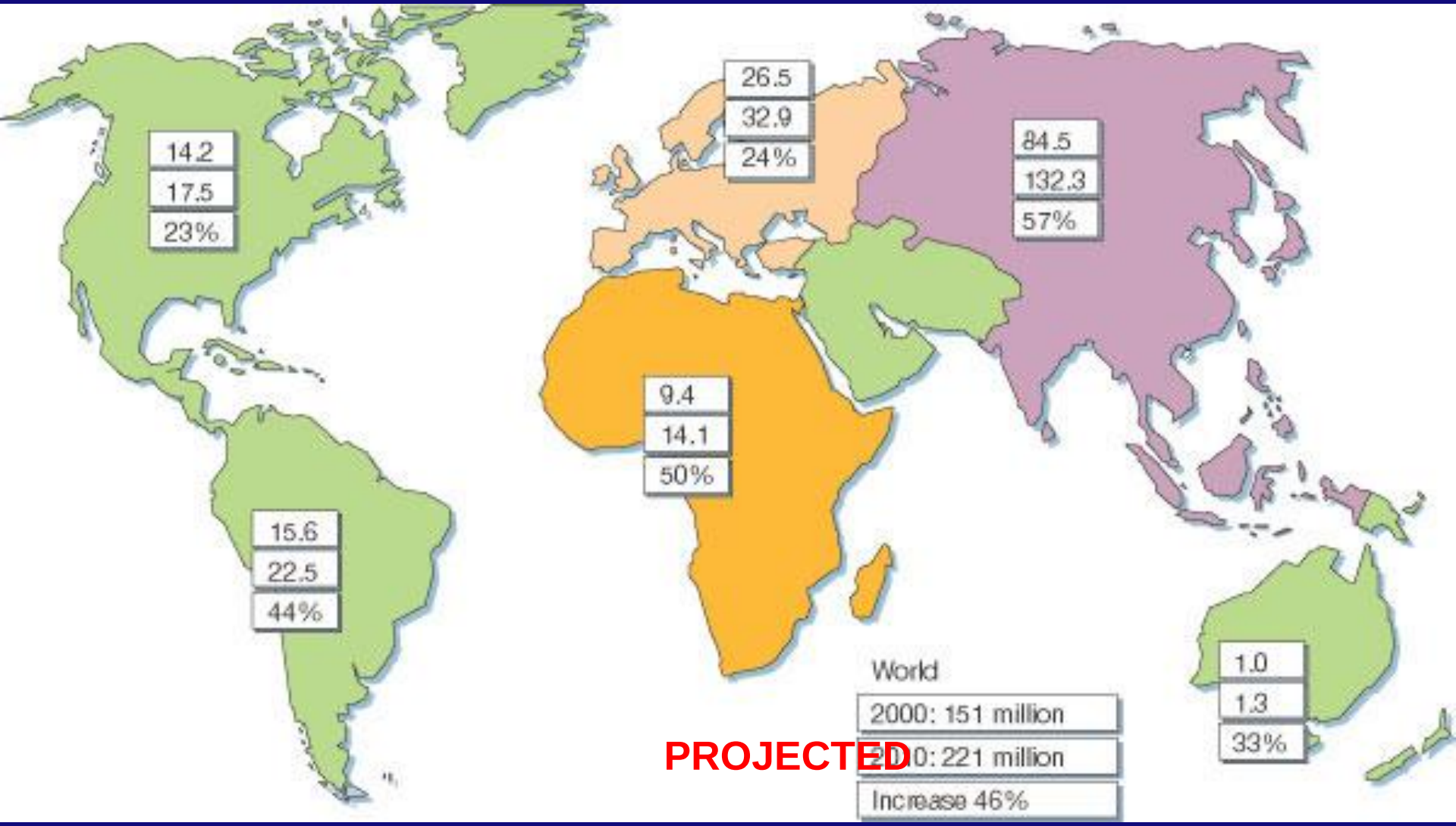
0037000-140672

1b. The Systemic Health Problem

T2DM increasing around the world

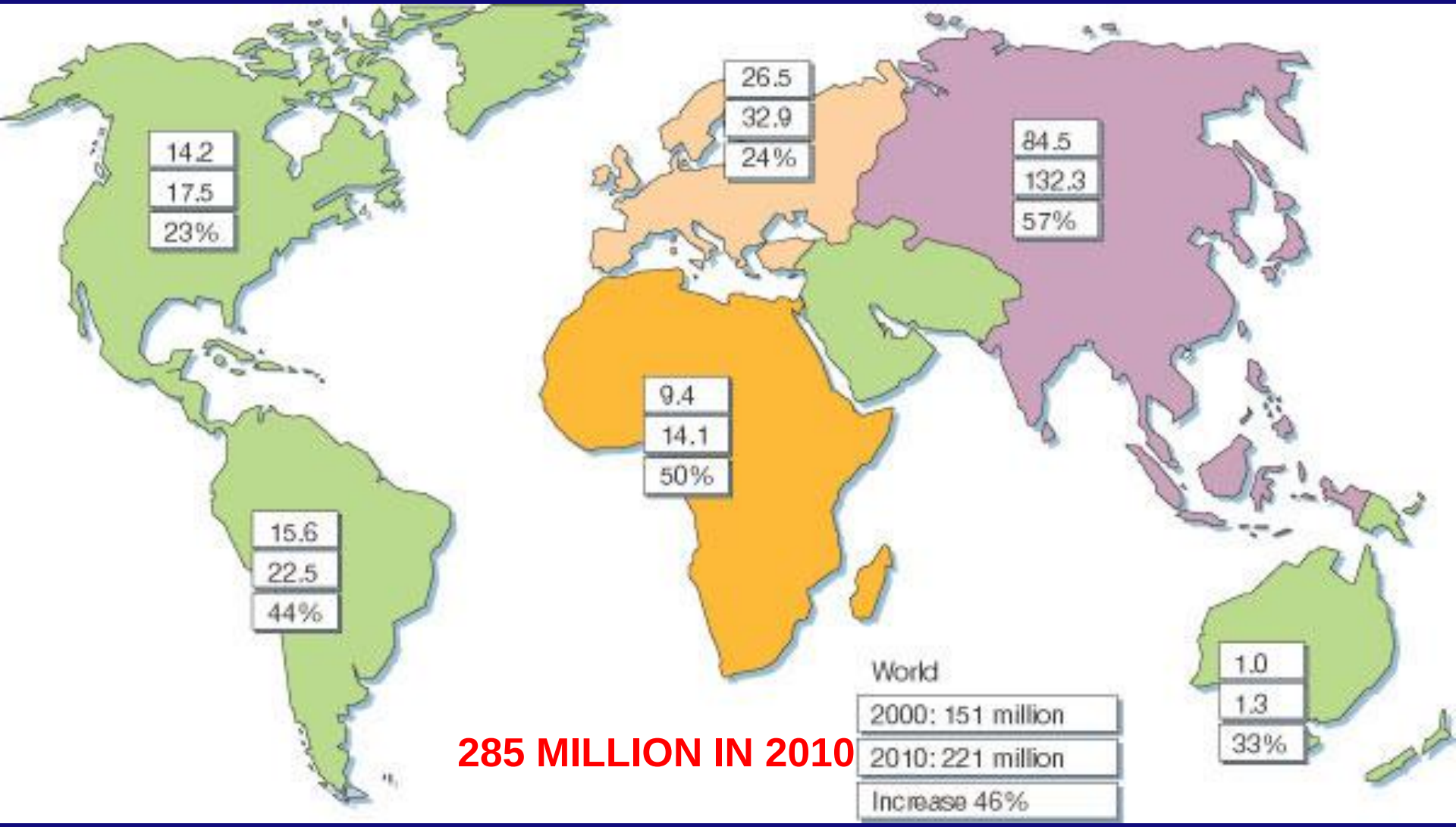


People with DM (in millions) for 2000, projection for 2010, and % increase

Zimmet et al. Nature 414: 782, 2001

Projected annualized inflation rate 3.88%

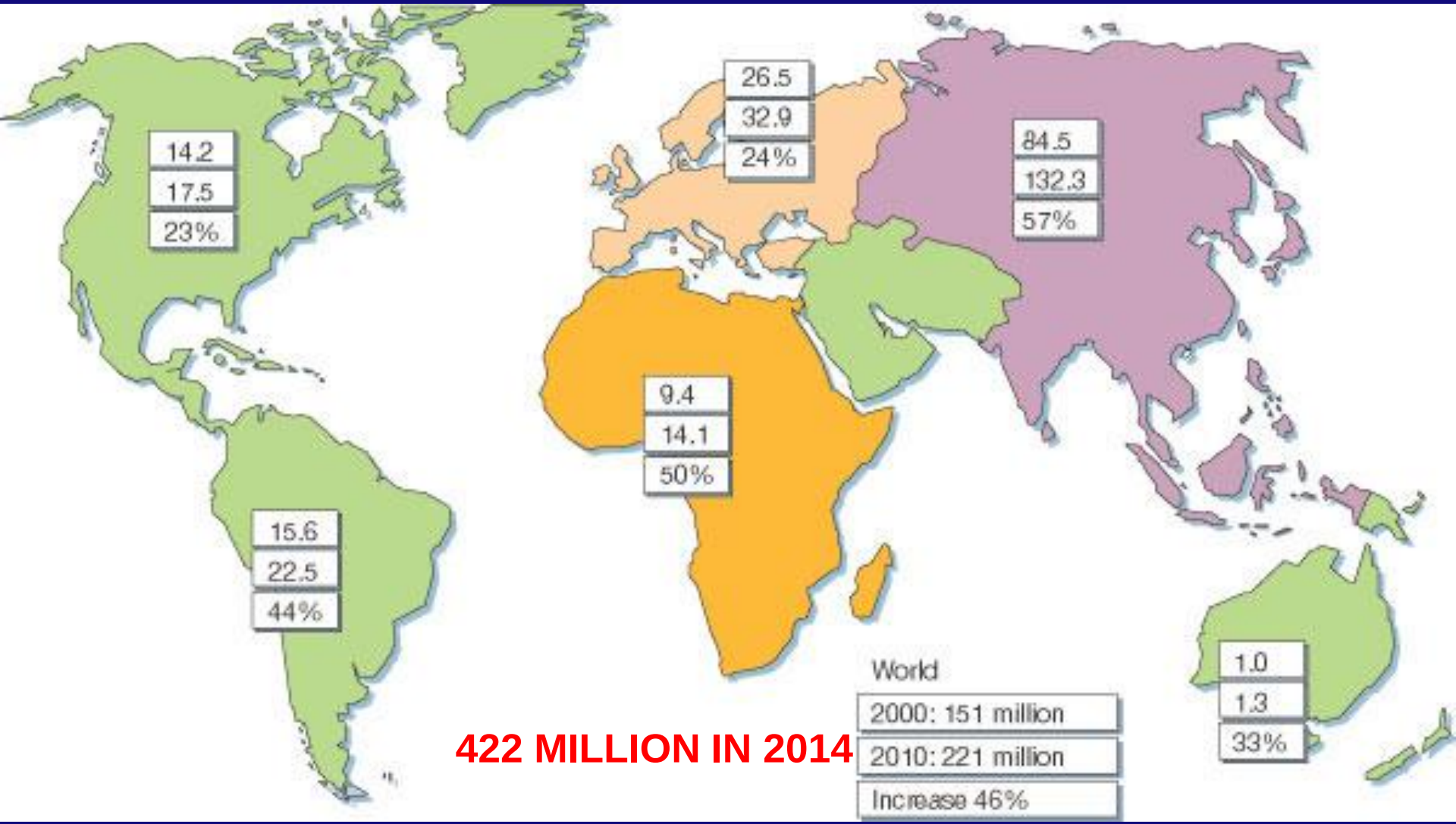
T2DM increasing around the world



People with DM (in millions) for 2000, projection for 2010, and % increase

Zimmet et al. Nature 414: 782, 2001 **Actual annualized inflation rate 6.55%**

T2DM increasing around the world

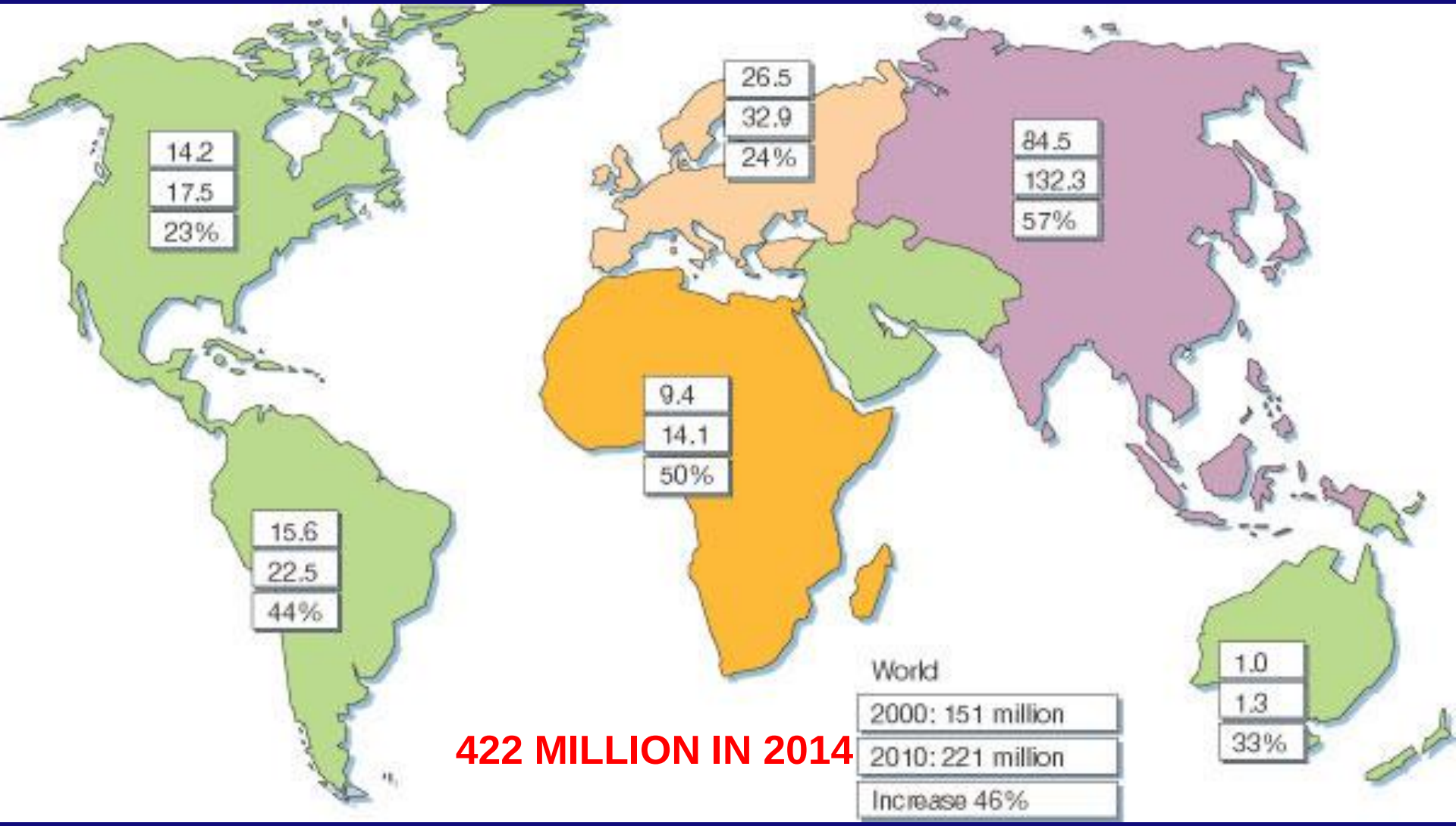


422 MILLION IN 2014

People with DM (in millions) for 2000, projection for 2010, and % increase

Zimmet et al. Nature 414: 782, 2001 **Actual annualized inflation rate 10.30%**

T2DM increasing around the world



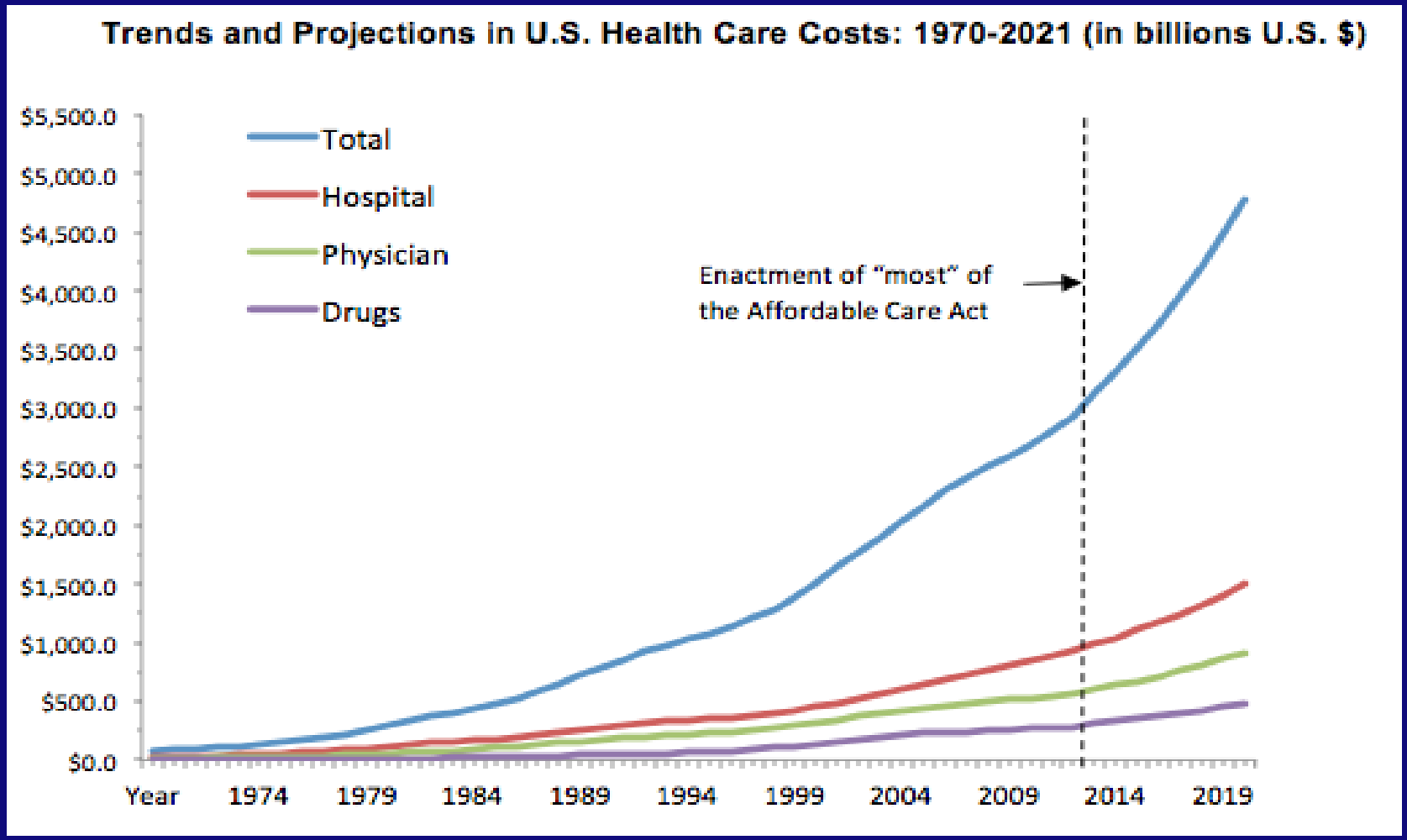
422 MILLION IN 2014

People with DM (in millions) for 2000, projection for 2010, and % increase

Zimmet et al. Nature 414: 782, 2001

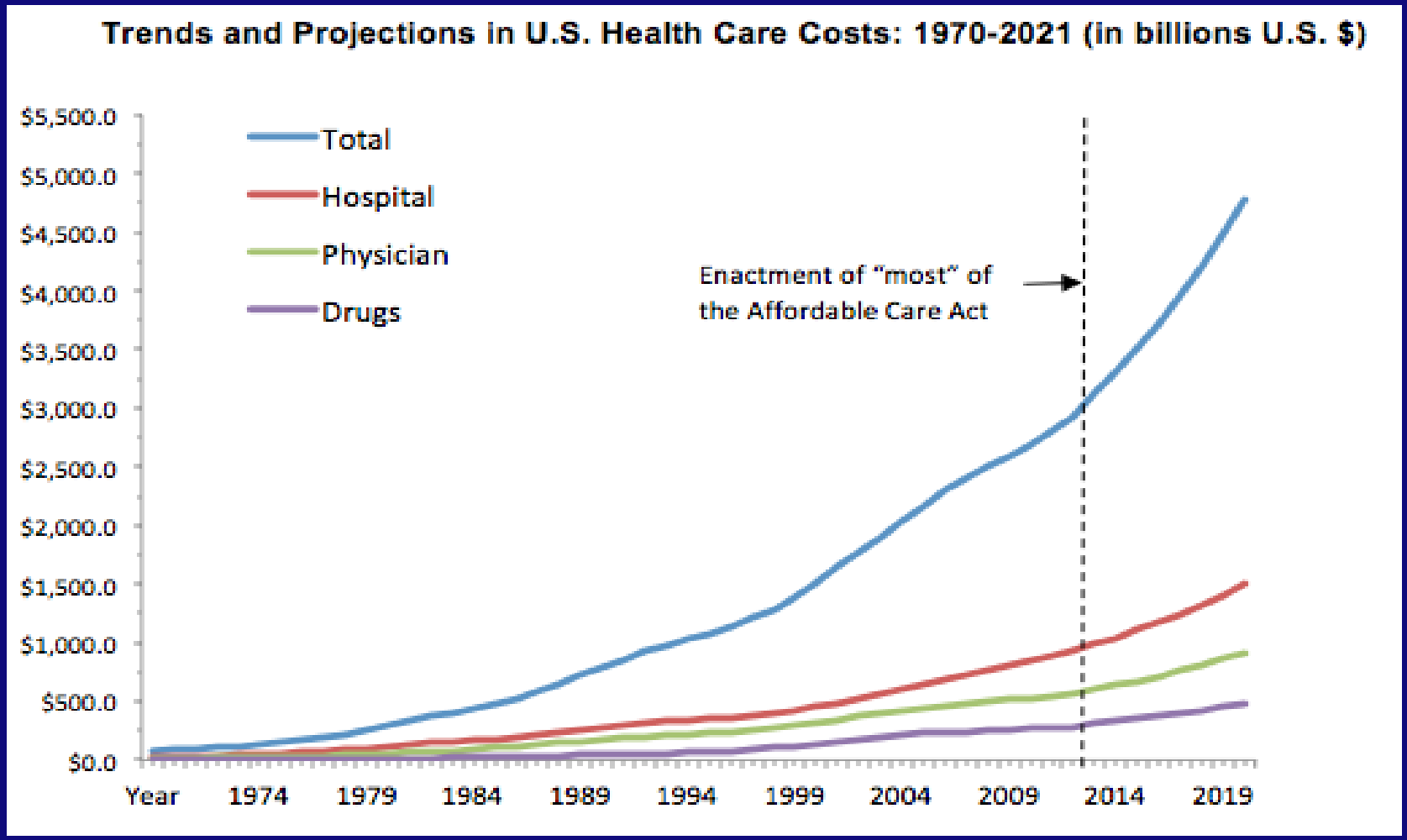
WTF??

The money is not going to hospitals, physicians, or Big Pharma



The money is not going to hospitals, physicians, or Big Pharma

It's going to chronic metabolic disease



Two inconvenient truths

Two inconvenient truths

- There is no rational medical therapy to prevent chronic metabolic disease
- There's just long-term treatment

Two inconvenient truths

- There is no rational medical therapy to prevent chronic metabolic disease
- There's just long-term treatment

- You can't fix healthcare until you fix health
- You can't fix health until you fix the diet
- And you can't fix the diet until you know what is wrong

The six cellular pathways to longevity are also the same pathways to chronic metabolic disease

1. Glycation
2. Oxidative stress
3. Inflammation
4. Mitochrondrial dysfunction
5. Insulin resistance
6. Membrane instability

The six cellular pathways to longevity are also the same pathways to chronic metabolic disease

1. Glycation
2. Oxidative stress
3. Inflammation
4. Mitochrondrial dysfunction
5. Insulin resistance
6. Membrane instability

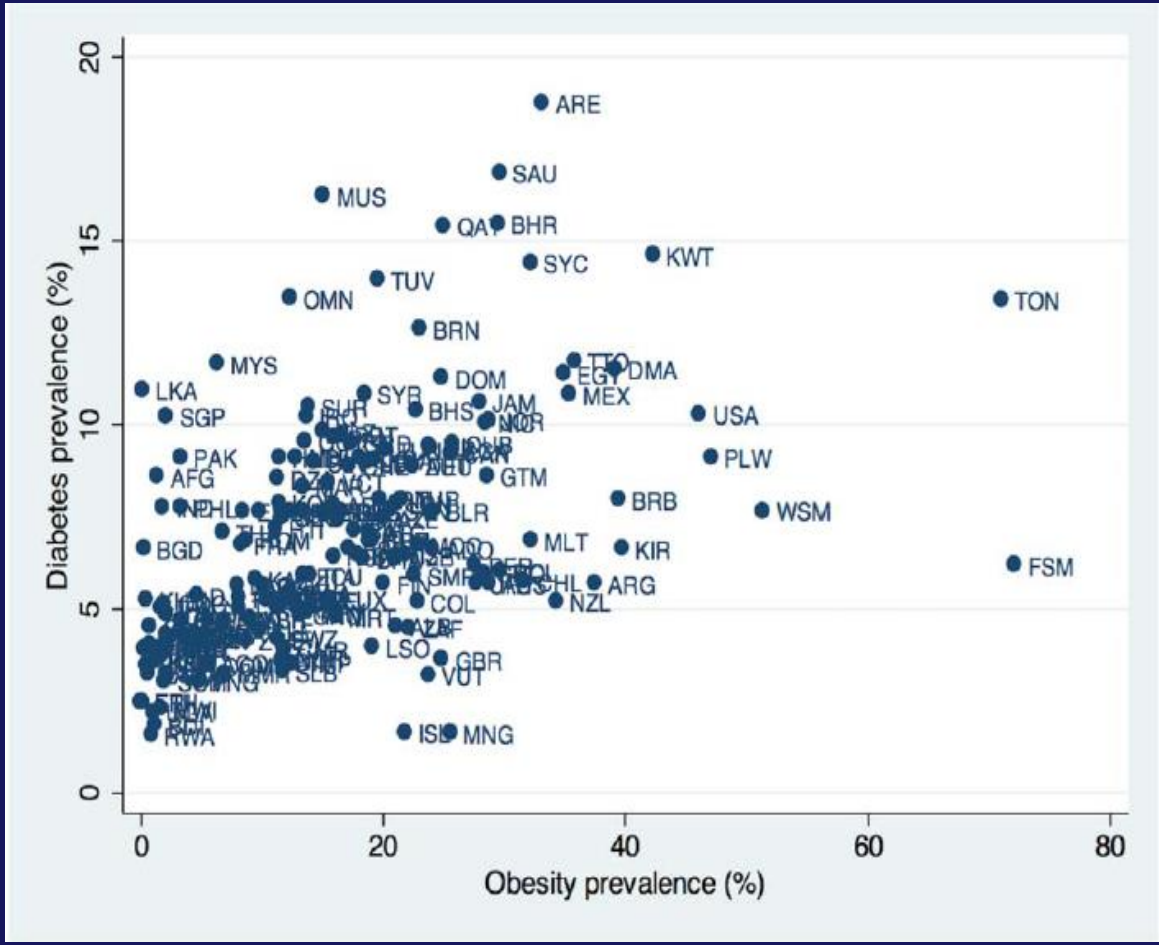
And none of these pathways are druggable,
except maybe inflammation, and that may be downstream of the other five

2. The three myths

Myth #1

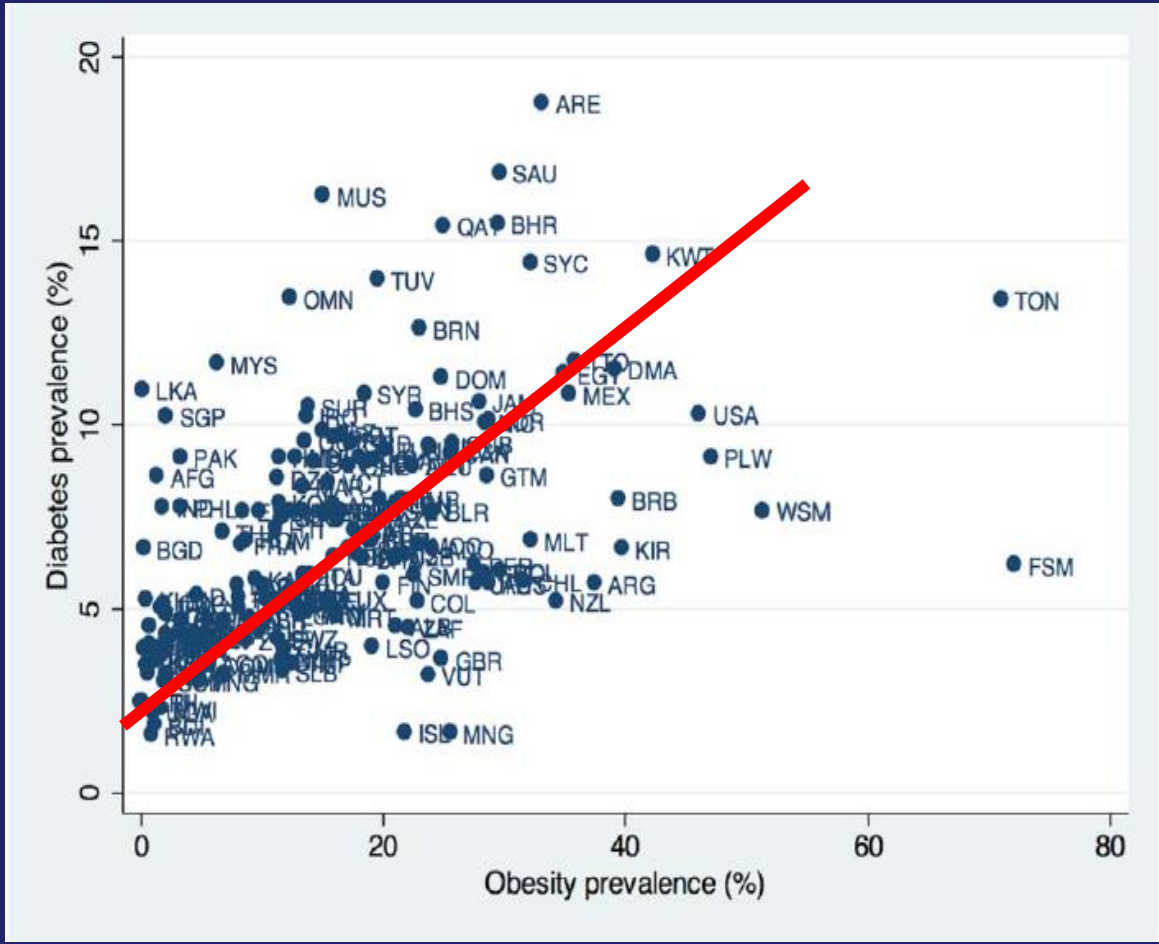
It’s about obesity

Obesity is the problem (?)



Basu et al. PLoS One 8:e58783, 2013

Obesity is the problem (?)



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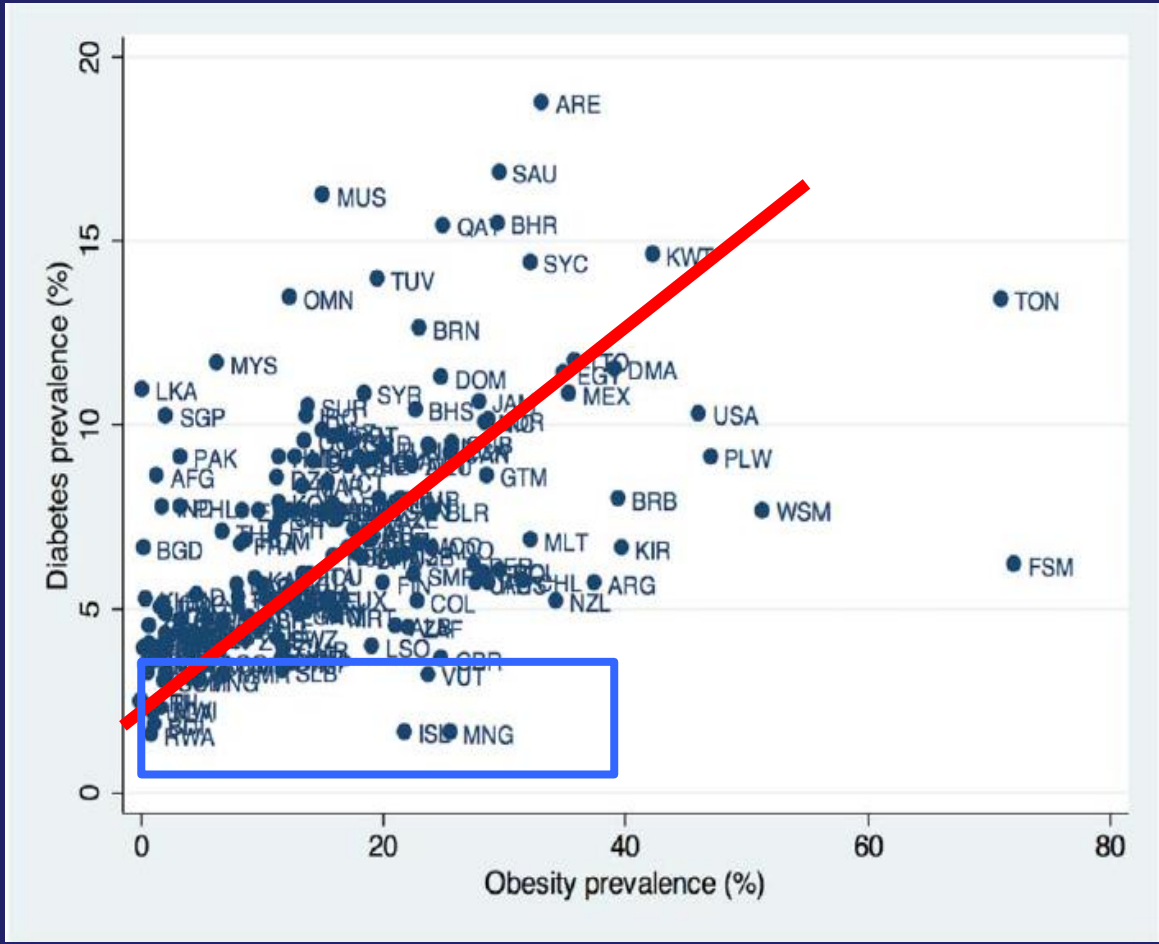
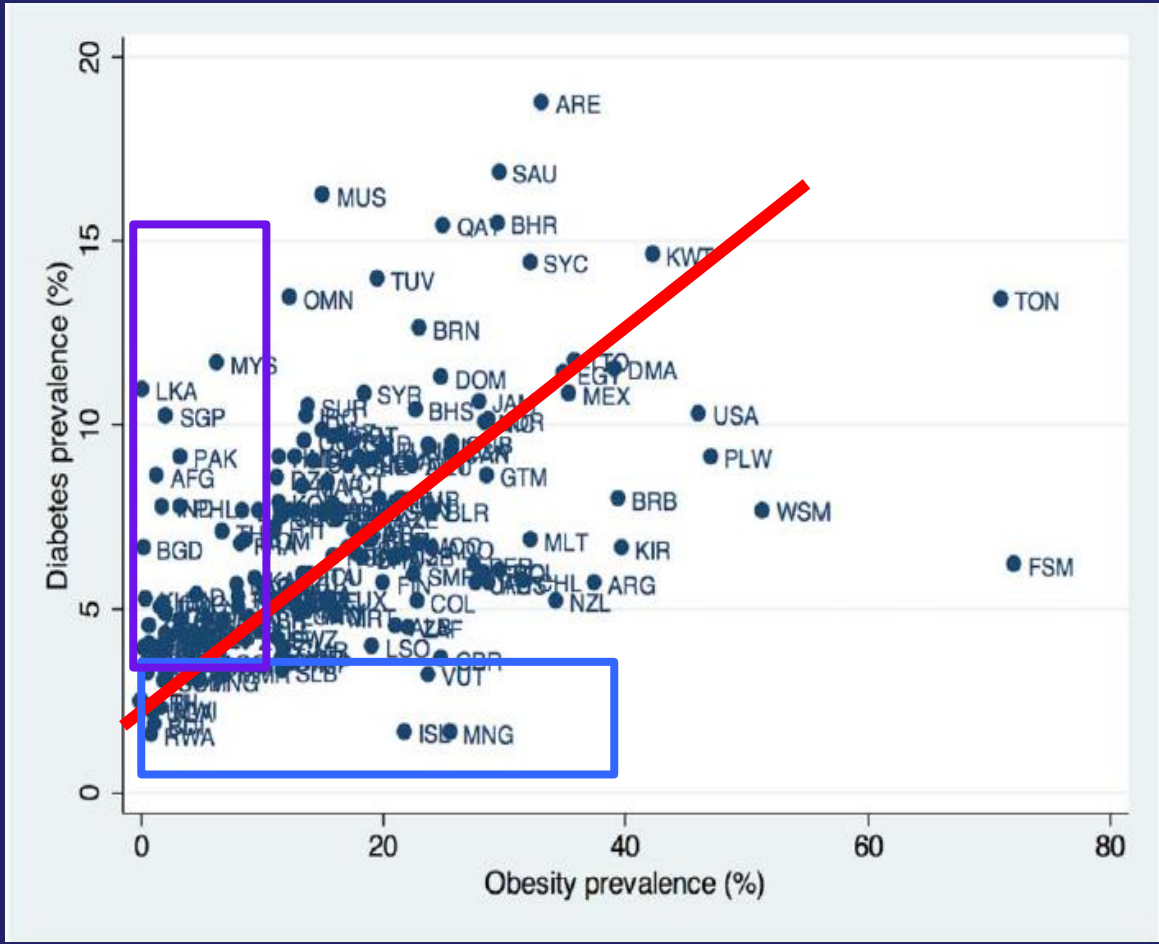
Obesity is the problem (?)



Basu et al. PLoS One 8:e58783, 2013

Obesity is the problem (?)



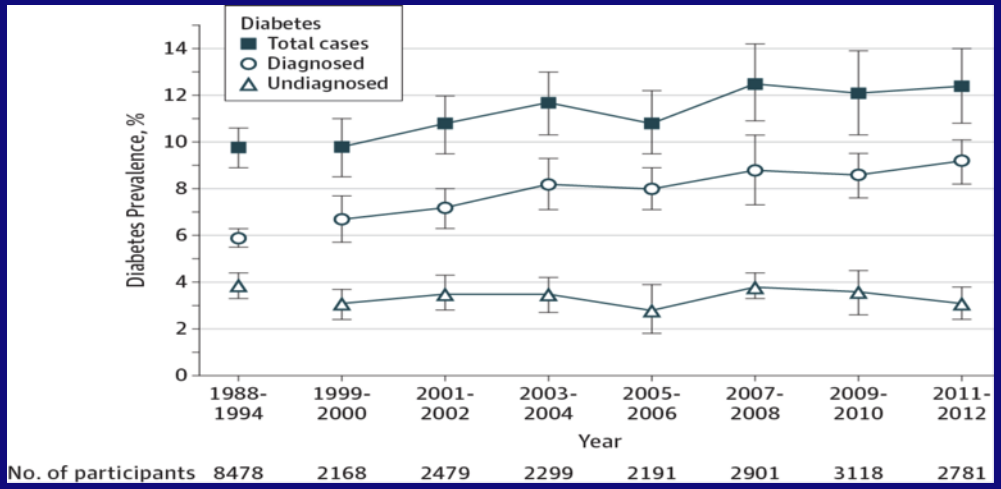
Basu et al. PLoS One 8:e58783, 2013

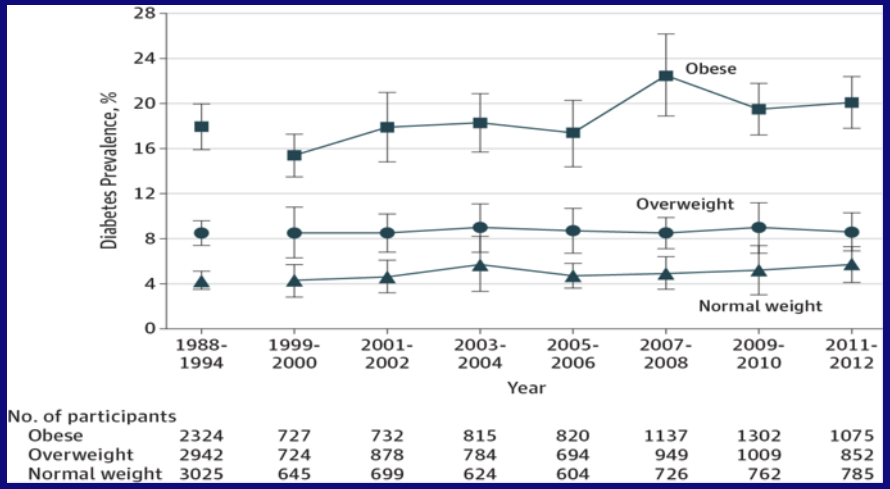
Obesity is the problem (?)

- Obesity is increasing worldwide by **2.78% per year** 1975-2015 Lancet Oct 10, 2017 http://dx.doi.org/10.1016/S0140-6736(14)60460-8

- Diabetes is increasing worldwide by **4.07% per year**
- 1980-2014 Lancet Apr 6, 2016
- http://dx.doi.org/10.1016/S0140-6736(16)00618-8

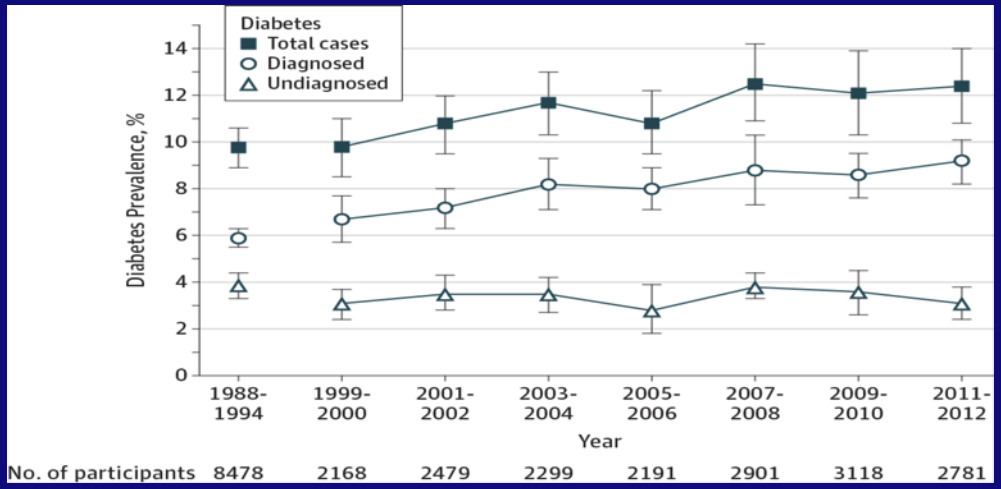
Secular trend in diabetes among U.S. adults, 1988-2012

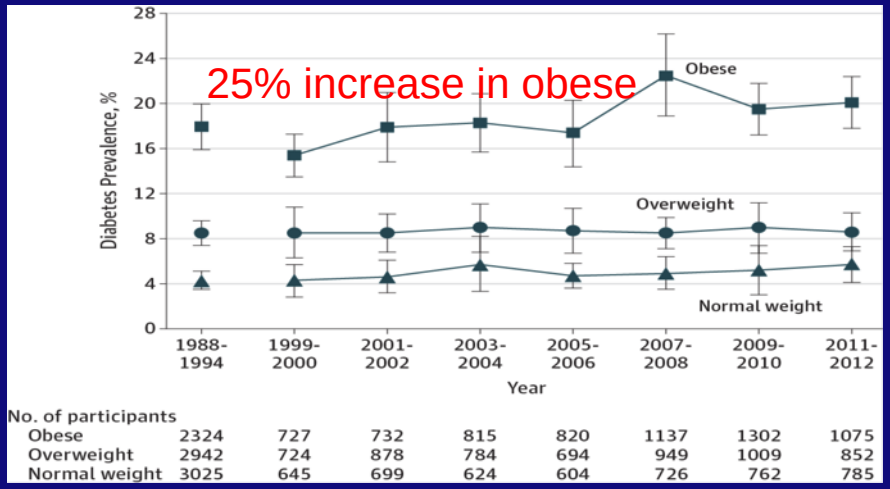




JAMA 314:1021, 2015, doi:10.1001/jama.2015.10029

Secular trend in diabetes among U.S. adults, 1988-2012





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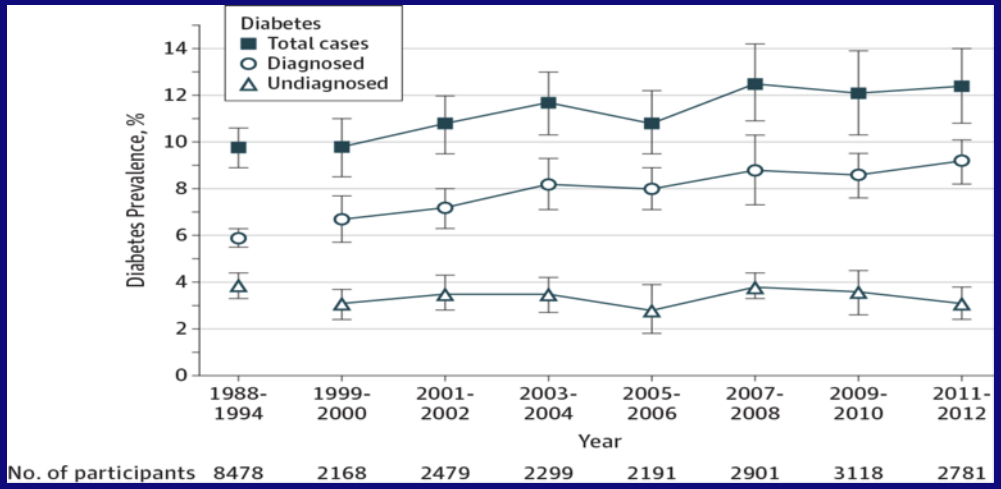
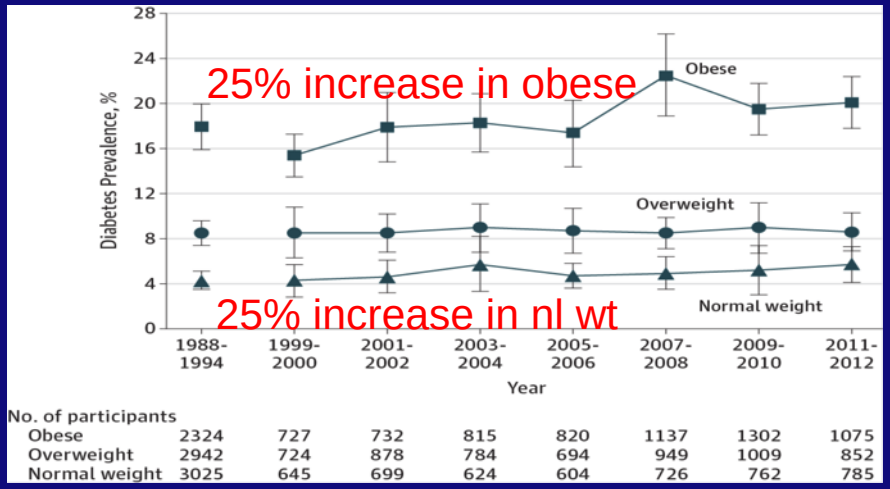




JAMA 314:1021, 2015, doi:10.1001/jama.2015.10029

Obesity is not the problem
People don’t die of obesity

Obesity is not the problem
People don't die of obesity

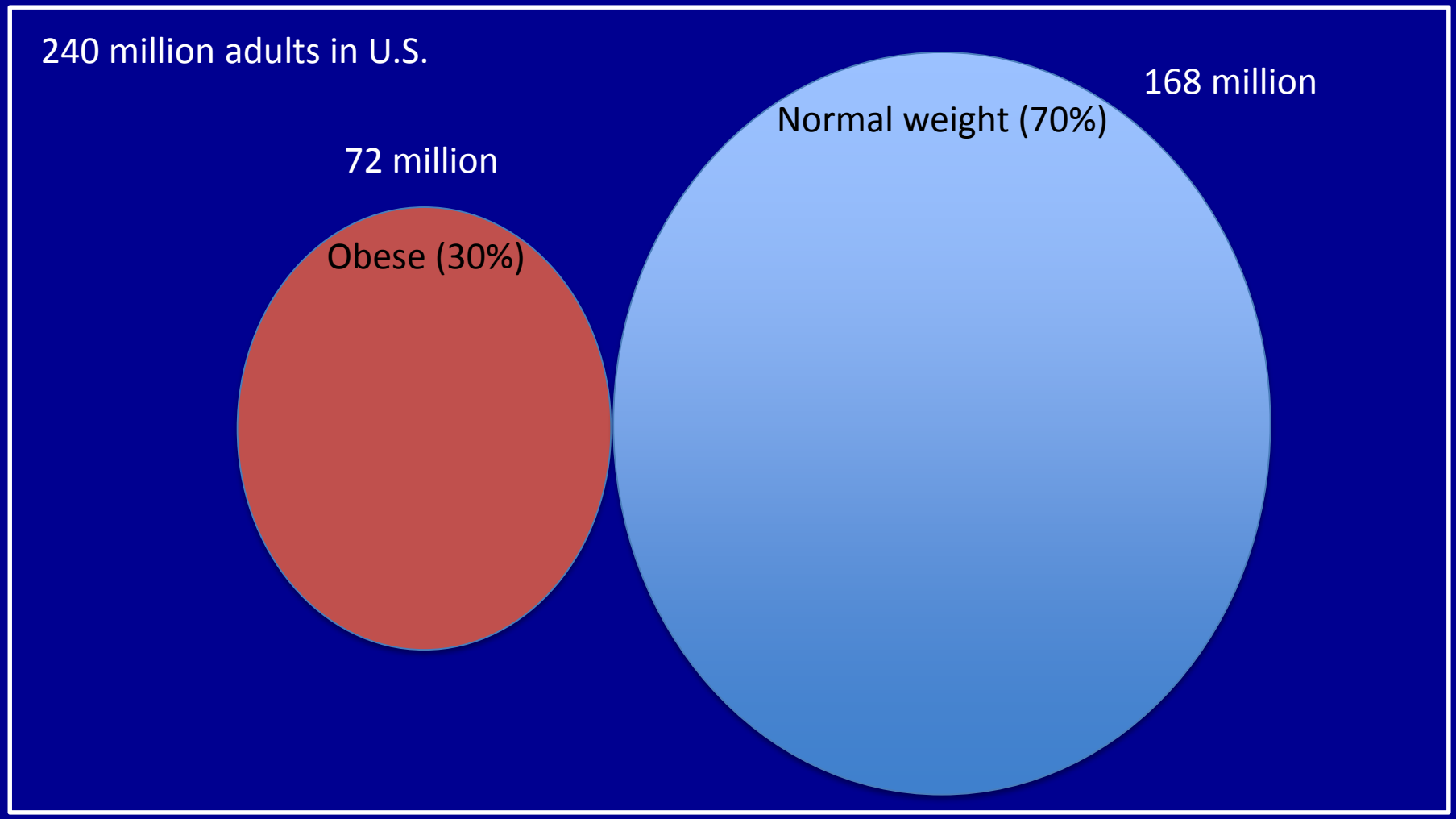
Metabolic Syndrome: where all the money goes (75% of all healthcare dollars)

Obesity is not the problem
People don't die of obesity

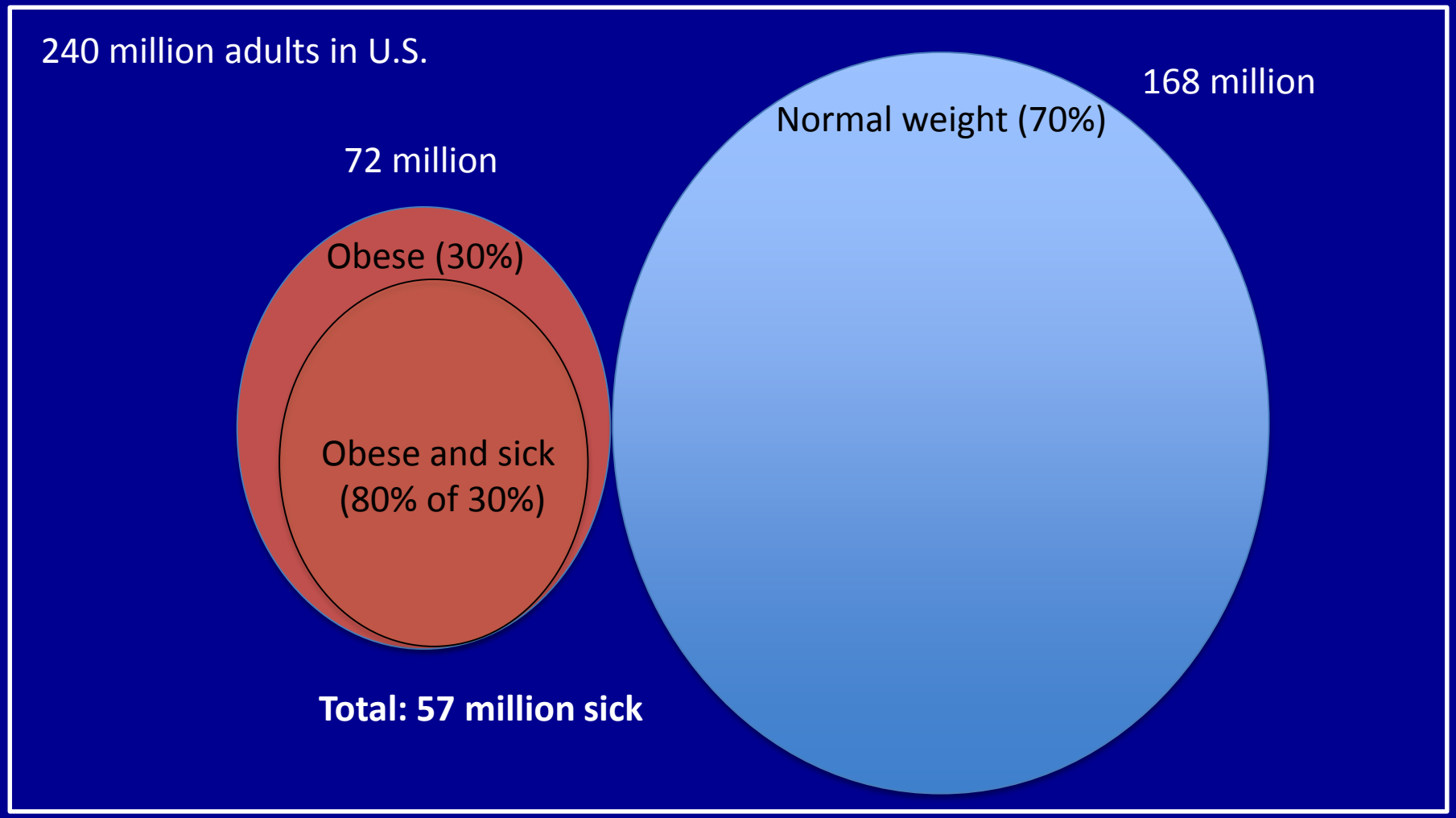
Metabolic Syndrome: where all the money goes (75% of all healthcare dollars)

Diabetes
Hypertension
Lipid abnormalities
Cardiovascular disease
Non-alcoholic fatty liver disease
Polycystic ovarian disease
Cancer
Dementia

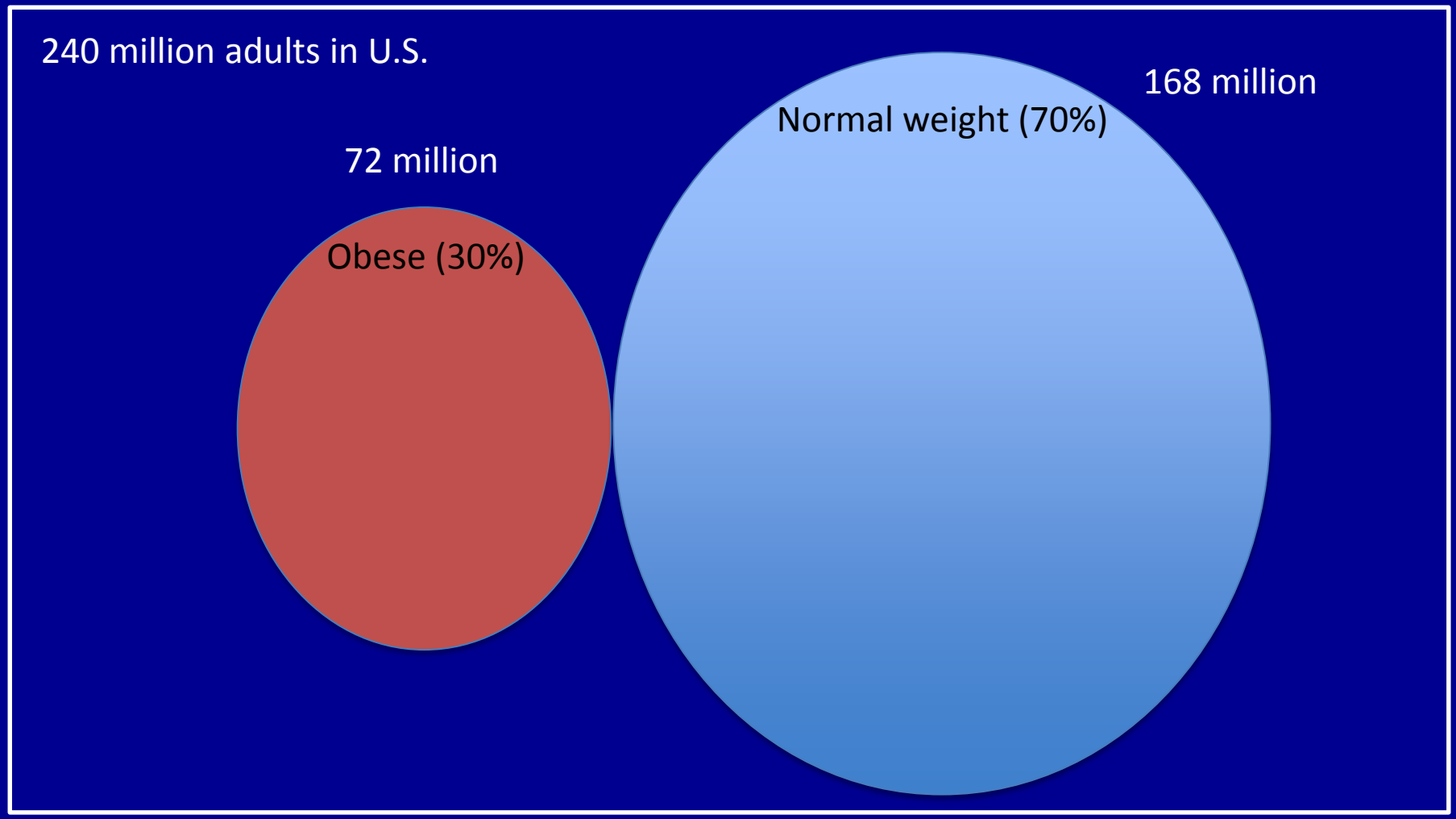
“Exclusive” view of obesity and metabolic dysfunction



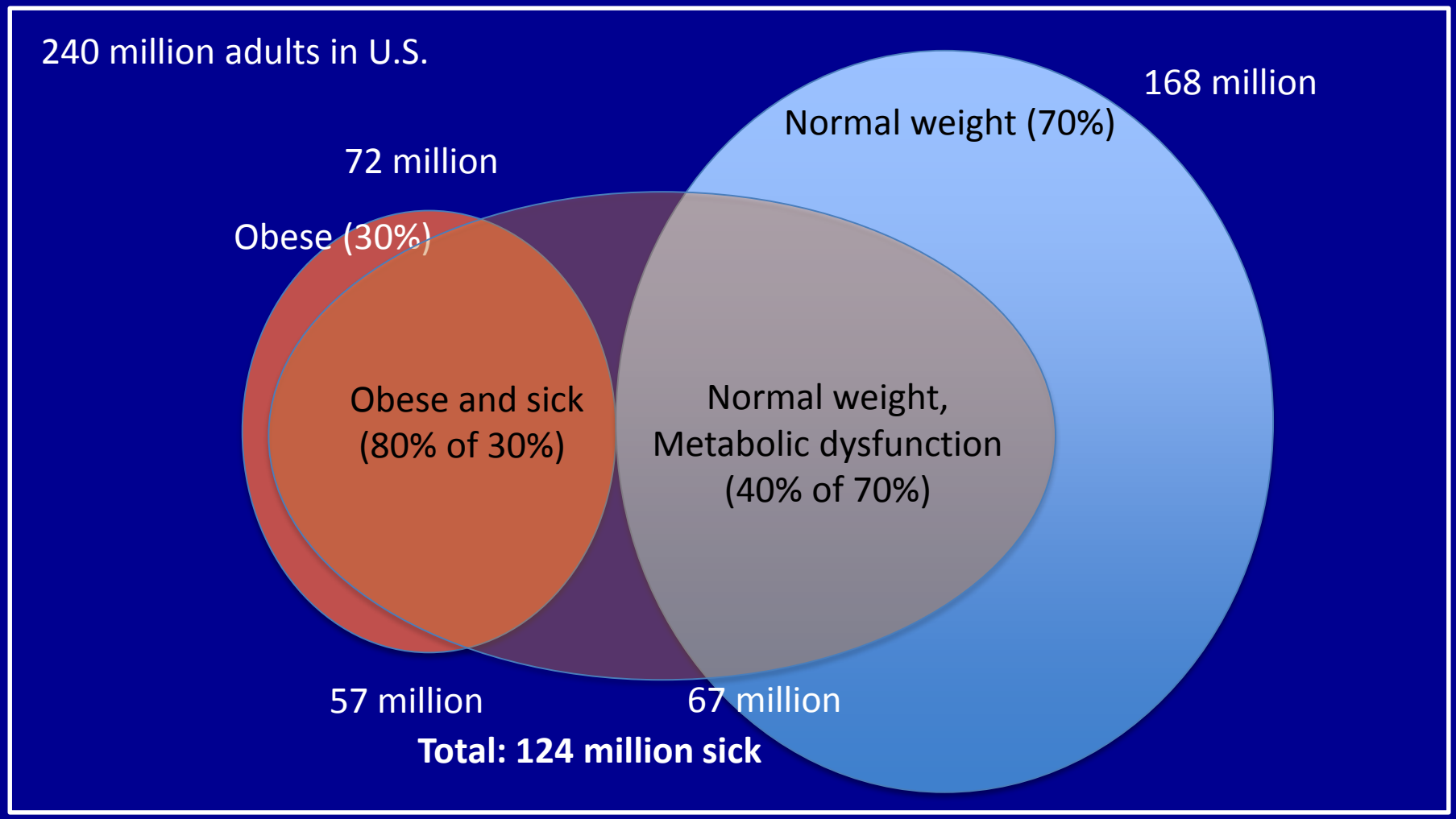
“Exclusive” view of obesity and metabolic dysfunction



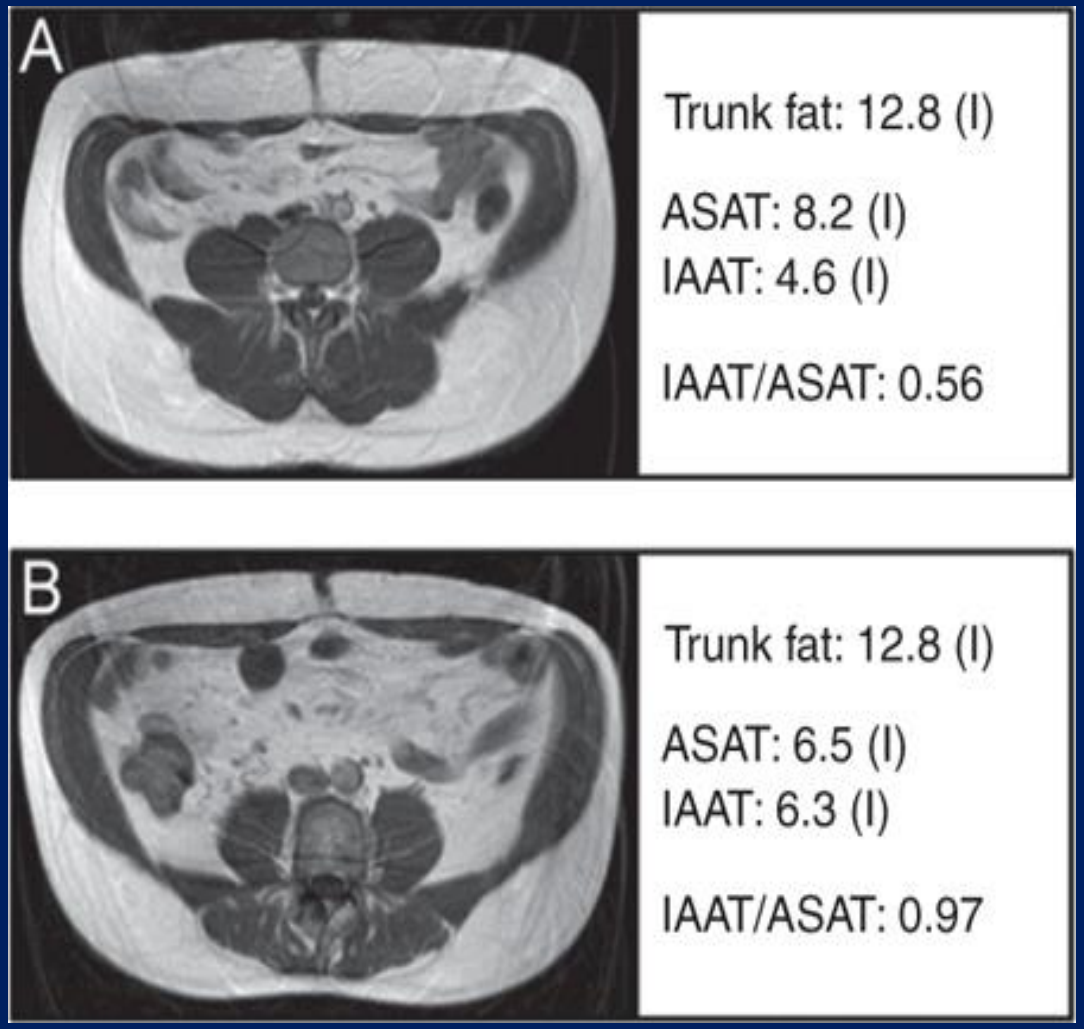
“Inclusive” view of obesity and metabolic dysfunction



“Inclusive” view of obesity and metabolic dysfunction

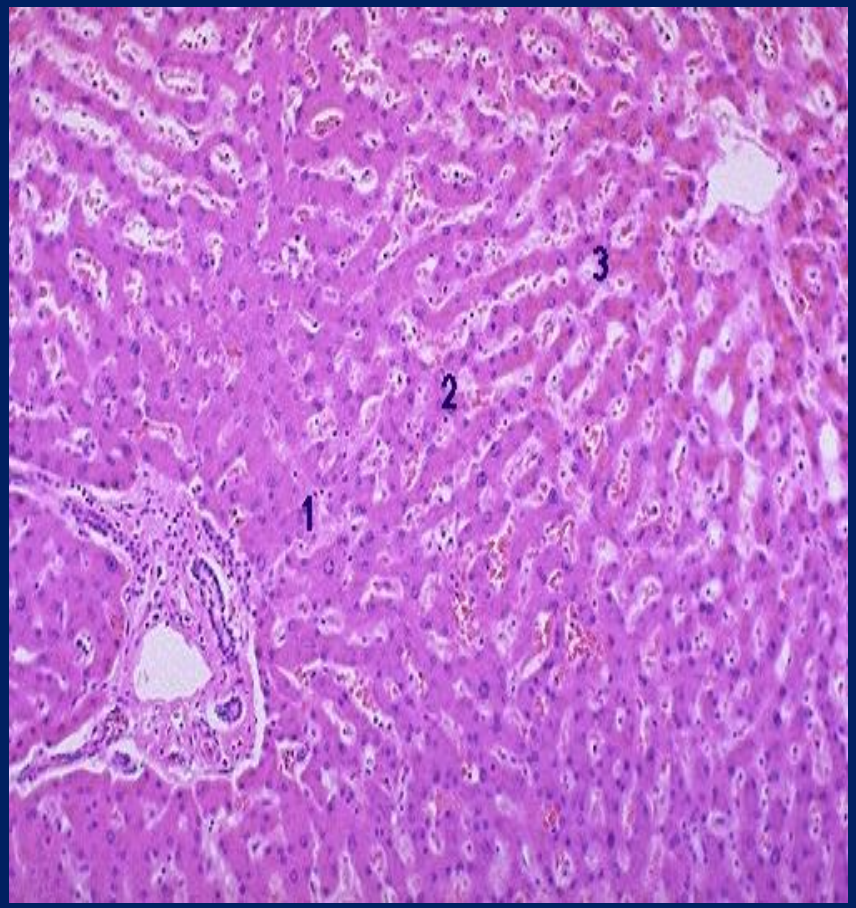


Relation between visceral and subcutaneous obesity
TOFI (thin on the outside, fat on the inside)

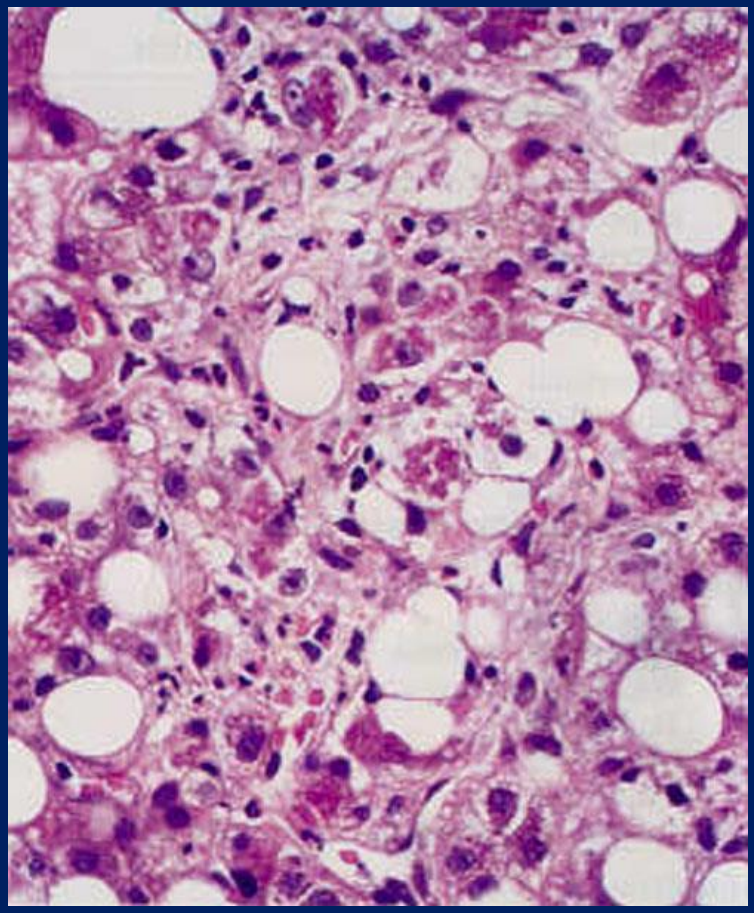


Thomas et al. Obesity doi: 10.1038/oby.2011.142, 2011

Histology of (N)AFLD



Normal



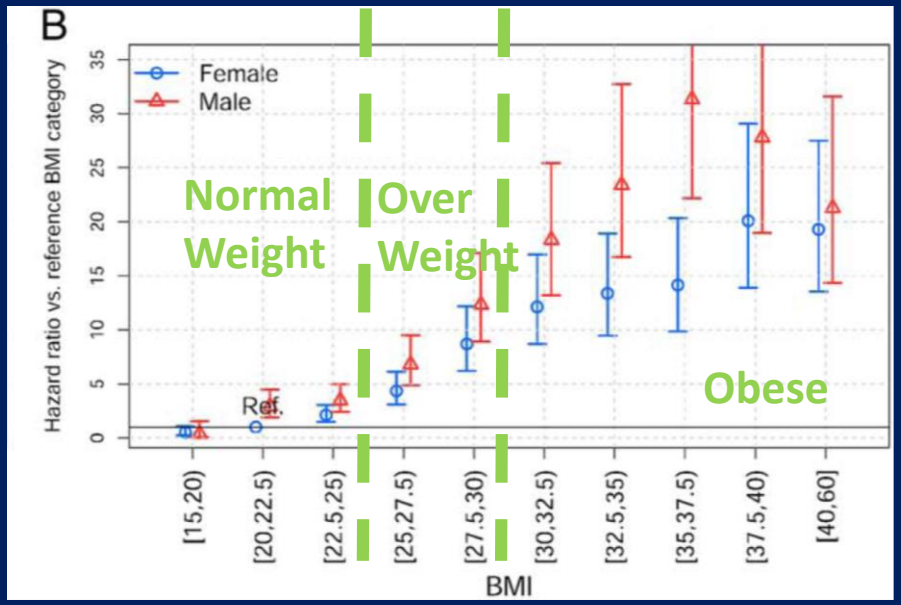
(N)AFLD

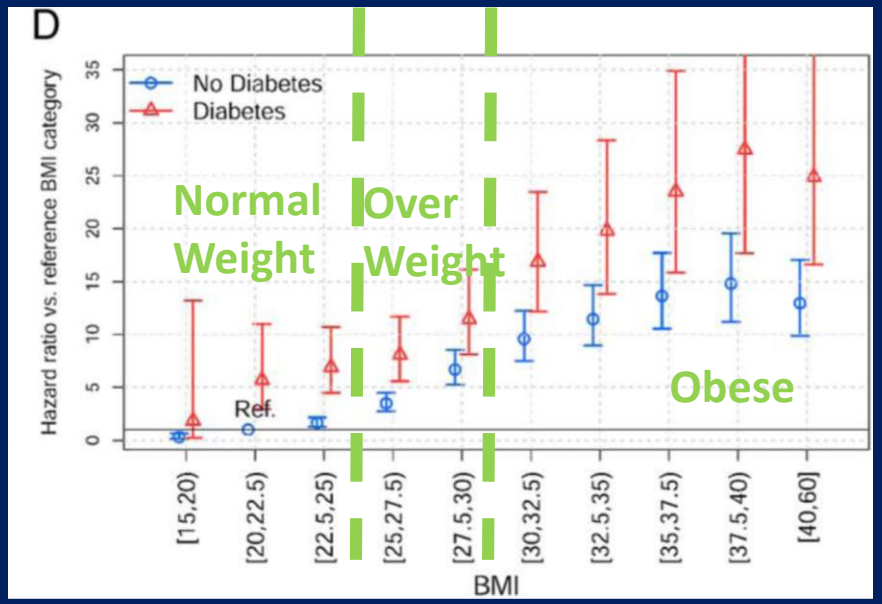
NAFLD is a worldwide problem, even in normal weight people

Study	Country	n	Mode of diagnosis	NAFLD prevalence BMI <25	NAFLD prevalence BMI >25
Younossi *et al.*2012	United States	11,613	Ultrasound	9.6%	28.8%
Xu *et al.*2013	China	6,905	Ultrasound	7.2%	Not studied
Das *et al.*2010	India	1,911	Ultrasound/CT	5.1%	31.7%
Kwon *et al.*2012	Korea	29,994	Ultrasound	12.6%	50.1%
Bellentani *et al.*2000	Italy	257	Ultrasound	16.4%	75.8%
Sinn *et al.*2012	Korea	5,878	Ultrasound	27% (BMI 20-25) 16% (BMI <20)	Not studied
Wei *et al.*2015	Hong Kong	911	Magnetic Resonance	19.3%	60.5%

Kumar and Mohan, J Clin Trans Hepat 5:216, 2017

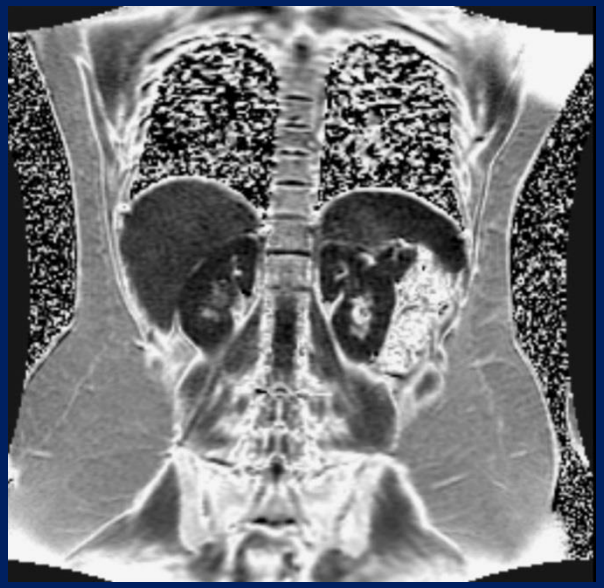
NAFLD is associated with diabetes, even in normal weight people





Loomis et al. J Clin Endocrinol Metab. 101:945, 2016

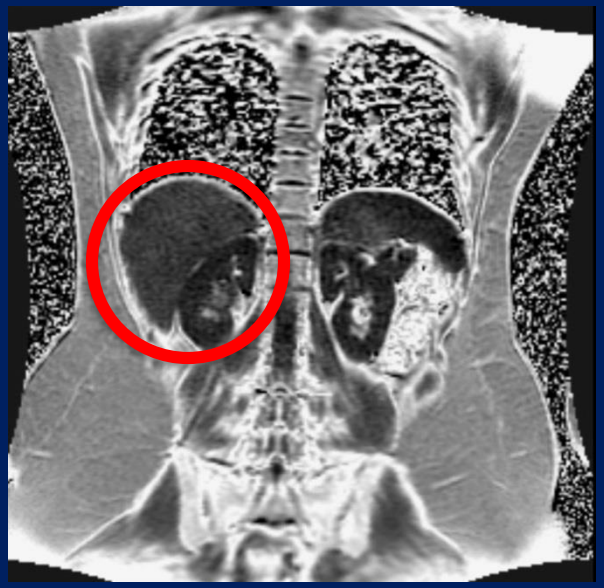
MRI Fat Fraction Maps



Obese

Low Liver Fat = 2.6%

MRI Fat Fraction Maps



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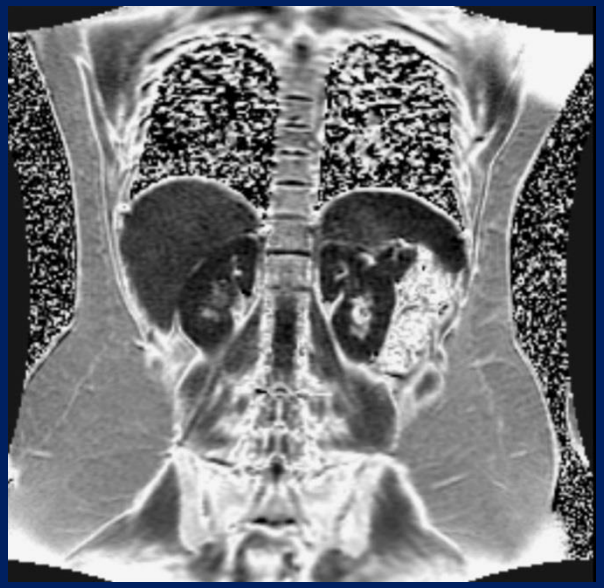

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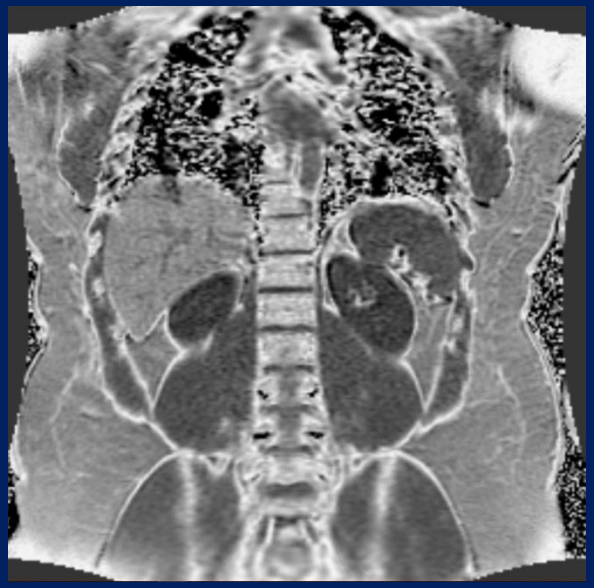
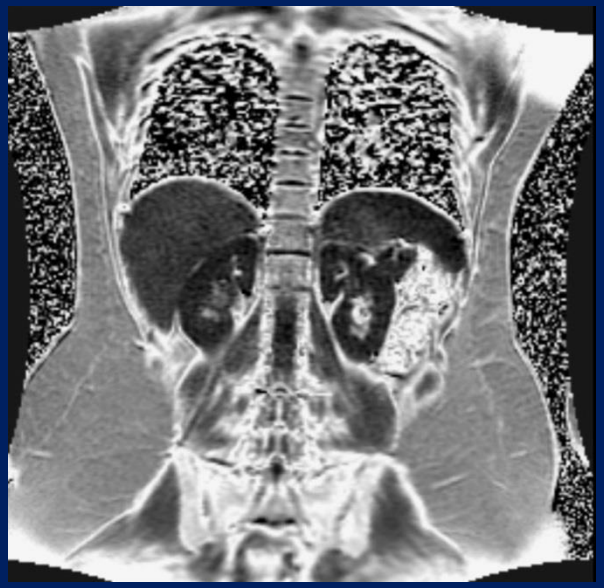


Obese

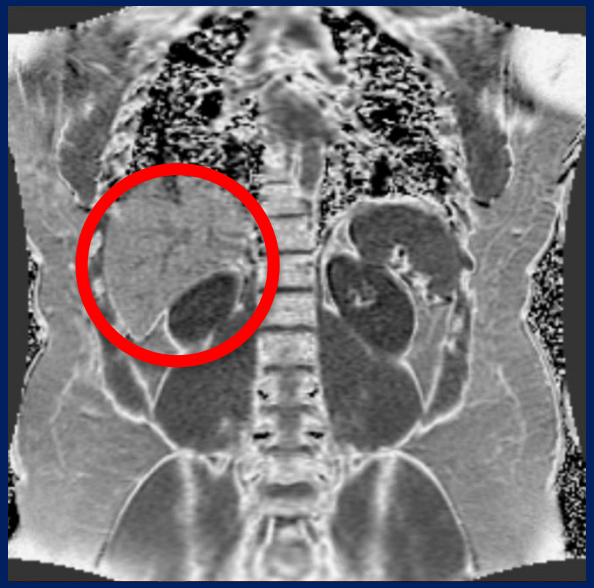
High Liver Fat = 24%

MRI Fat Fraction Maps



Obese

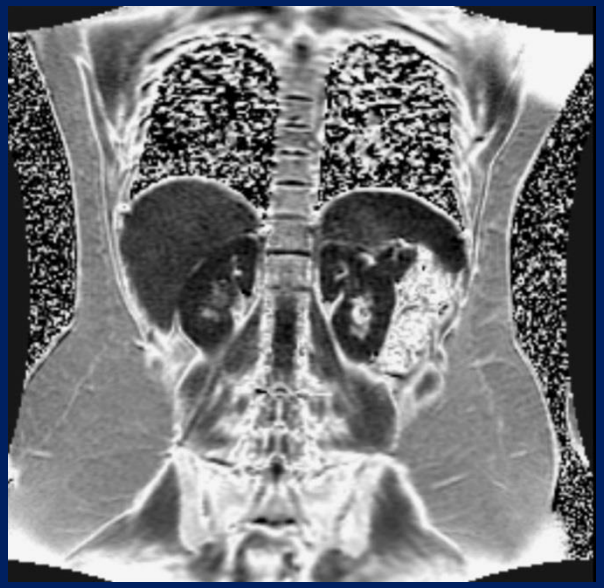
Low Liver Fat = 2.6%



Obese

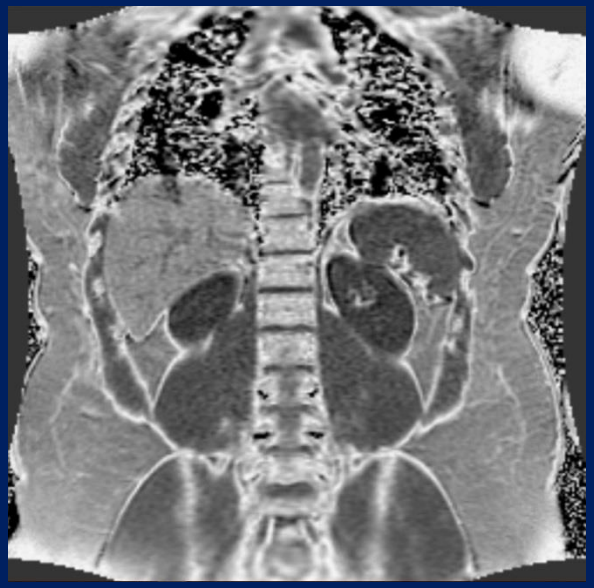
High Liver Fat = 24%

MRI Fat Fraction Maps



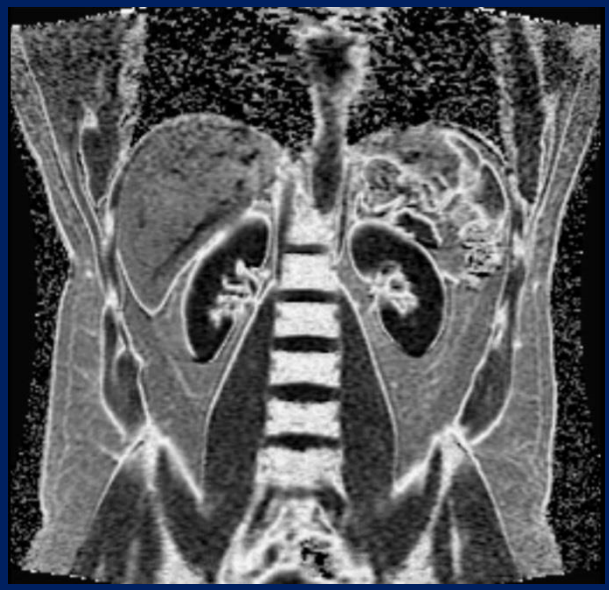
Obese

Low Liver Fat = 2.6%



Obese

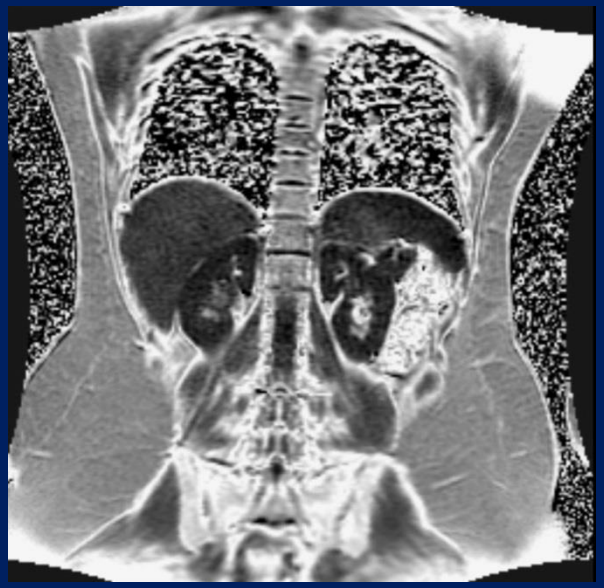
High Liver Fat = 24%



Thin

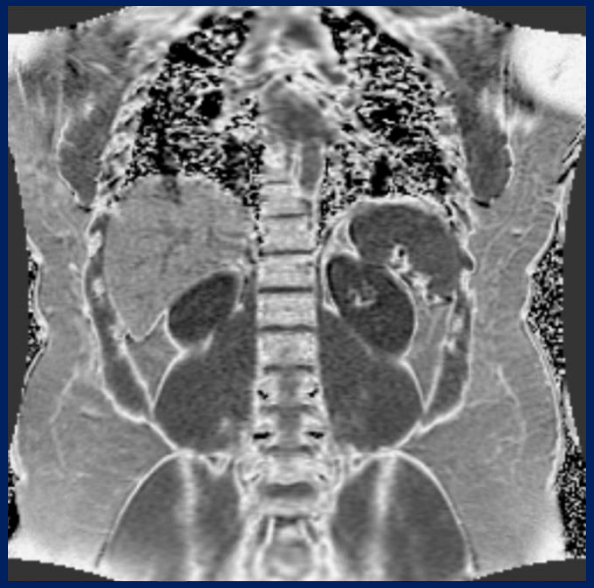
High Liver Fat = 23%

MRI Fat Fraction Maps



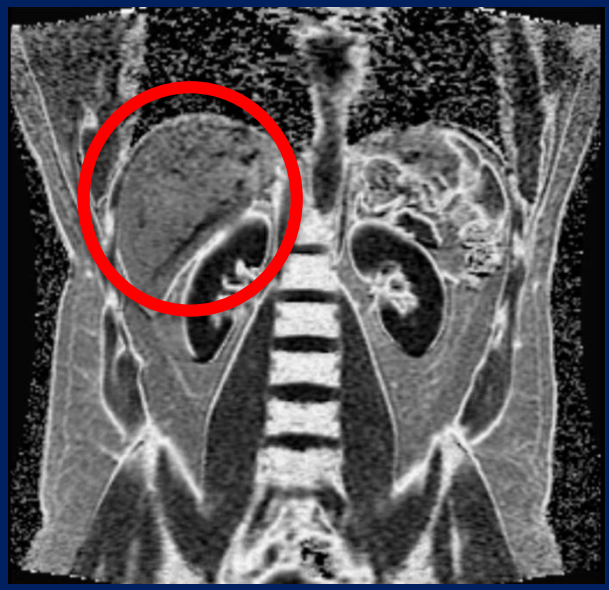
Obese

Low Liver Fat = 2.6%



Obese

High Liver Fat = 24%



Thin

High Liver Fat = 23%

The key to the kingdom:

It's not about obesity —

It's about metabolic dysfunction (anyone can get it!)

of which obesity is a result, not a cause

Myth #2

A calorie is a calorie

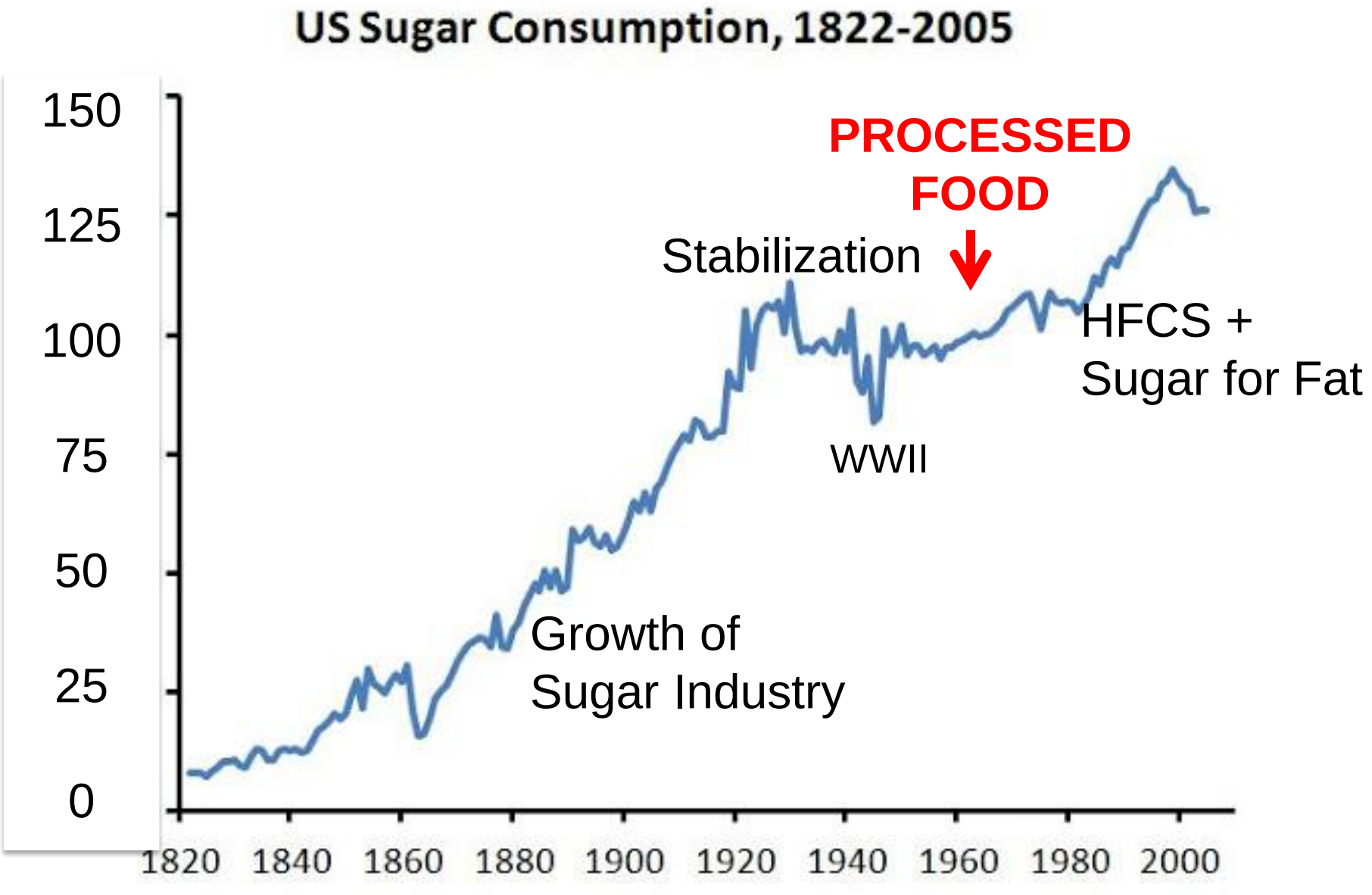
The Fiction

"Beating obesity will take action by all of us, based on one simple *common sense* fact: All calories count, no matter where they come from, including Coca-Cola and everything else with calories…"

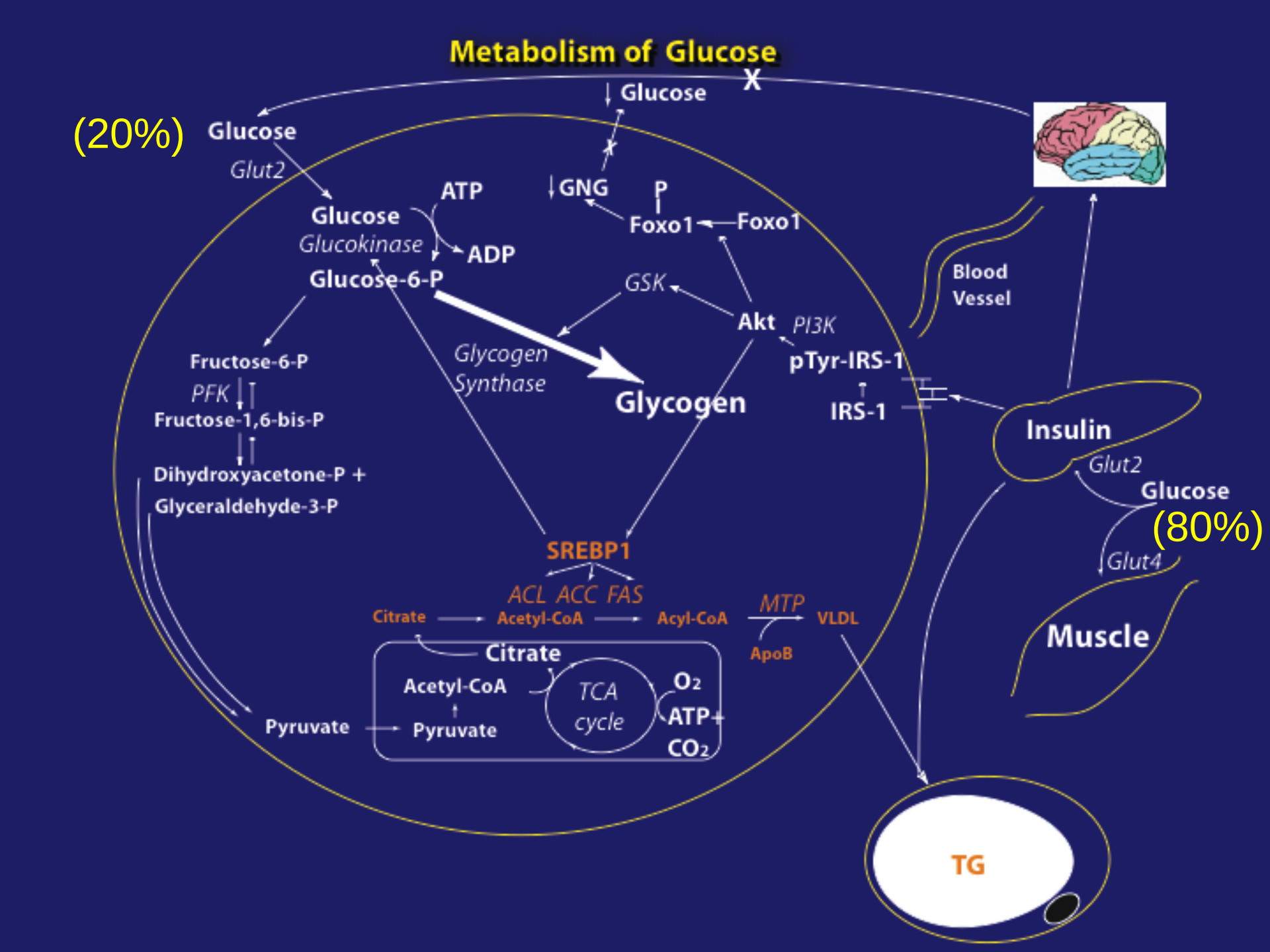
-The Coca Cola Company, "Coming Together", 2013

The Science

- **Some Calories Cause Disease More than Others**
- **Different Calories are Metabolized Differently**
- **A Calorie is Not A Calorie**
  - **Fiber**
  - **Protein**
  - **Fat**
  - **Fructose**



U.S. Commerce Service 1822-1910, combined with Economic Research Service, USDA 1910-2010
http://ushealthcarespending.gov


Metabolism of Glucose
Glucose
(20%)
Glucose
Glut2
ATP
GNG
P
Foxo1
Foxo1
Glucose
Glucokinase
ADP
Glucose-6-P
GSK
Akt
PI3K
Blood
Vessel
Fructose-6-P
PFK
Fructose-1,6-bis-P
Glycogen
Synthase
Glycogen
pTyr-IRS-1
IRS-1
Insulin
Glut2
Glucose
(80%)
Glut4
Muscle
Dihydroxyacetone-P +
Glyceraldehyde-3-P
SREBP1
ACL ACC FAS
Citrate
Acetyl-CoA
Acyl-CoA
MTP
VLDL
ApoB
Citrate
Acetyl-CoA
TCA
cycle
O2
ATP+
CO2
Pyruvate
Pyruvate
TG

Metabolism of Ethanol

(80%) Ethanol

Ethanol

Alcohol Dehydrogenase 1B

Acetaldehyde

ROS

Inflammation

JNK1

Insulin

Aldehyde Dehydrogenase 2

PKC

Lipid droplet

SREBP1

FFA

ACL ACC FAS

Citrate → Acetyl-CoA → Malonyl-CoA → Acyl-CoA → VLDL

MTP

CPT-1

ApoB

Dys-lipidemia

Muscle IR

Citrate

Acetyl-CoA

ACCS2

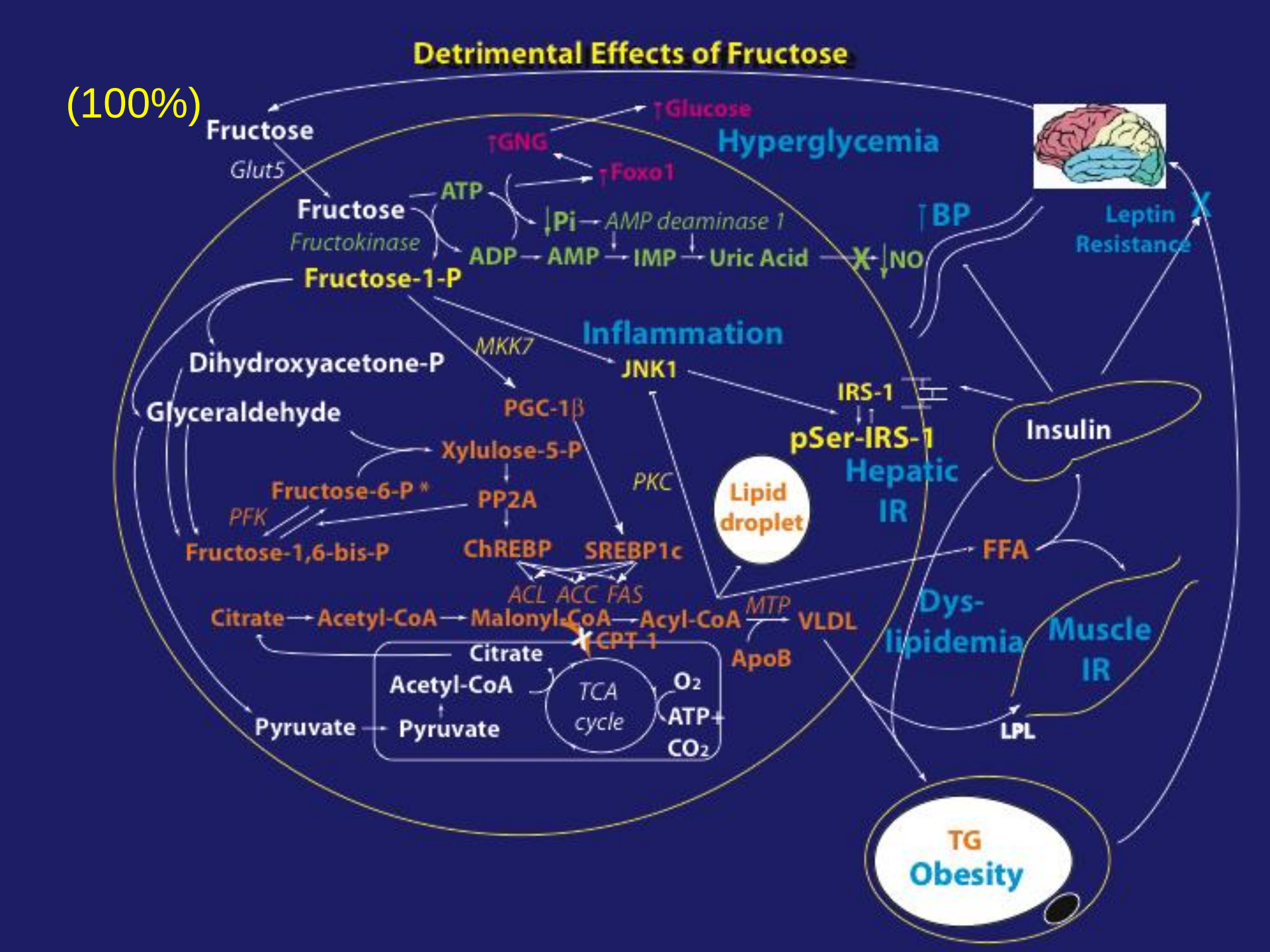
TCA cycle

O_2

ATP+ CO_2

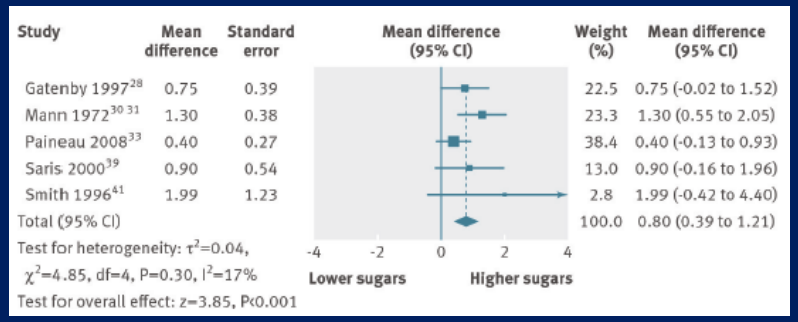
Acetate → Acetate

TG

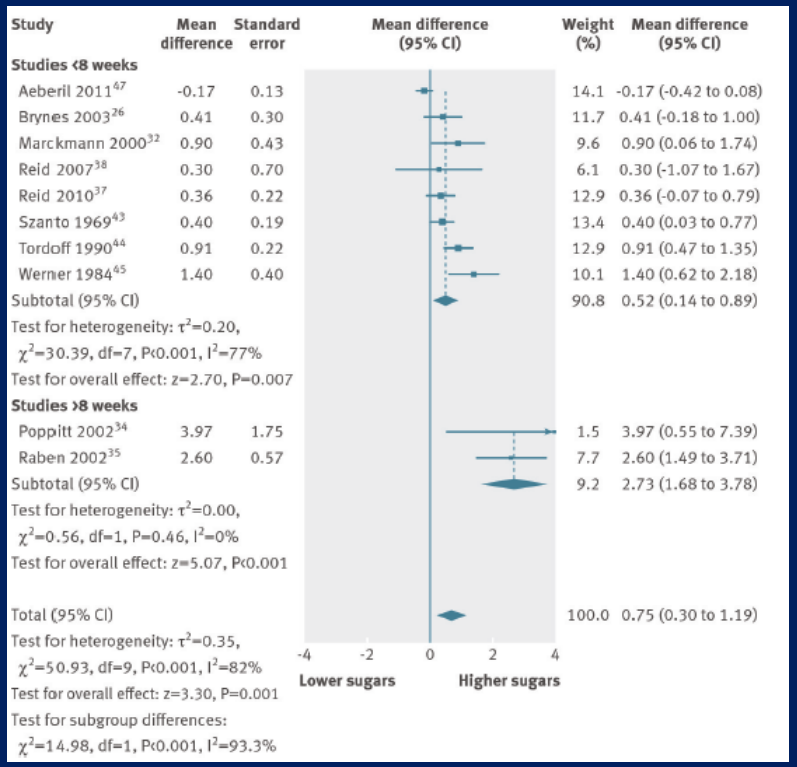

Detrimental Effects of Fructose
(100%)
Fructose
Glut5
Fructose
Fructokinase
Fructose-1-P
ATP
ADP
↓Pi
AMP deaminase 1
AMP
IMP
Uric Acid
↑GNG
↑Glucose
↑Foxo1
Hyperglycemia
↑BP
↓NO
Leptin Resistance
Inflammation
MKK7
JNK1
PGC-1β
Dihydroxyacetone-P
Glyceraldehyde
Xylulose-5-P
Fructose-6-P
PP2A
PFK
Fructose-1,6-bis-P
PKC
ChREBP
SREBP1c
ACL ACC FAS
Citrate
Acetyl-CoA
Malonyl-CoA
Acyl-CoA
CPT-1
Citrate
Acetyl-CoA
Pyruvate
Pyruvate
TCA cycle
O2
ATP
CO2
IRS-1
pSer-IRS-1
Hepatic IR
Insulin
Lipid droplet
FFA
MTP
VLDL
ApoB
Dys-lipidemia
Muscle IR
LPL
TG
Obesity

Sugar is responsible for about 10% of obesity

Lowering sugar

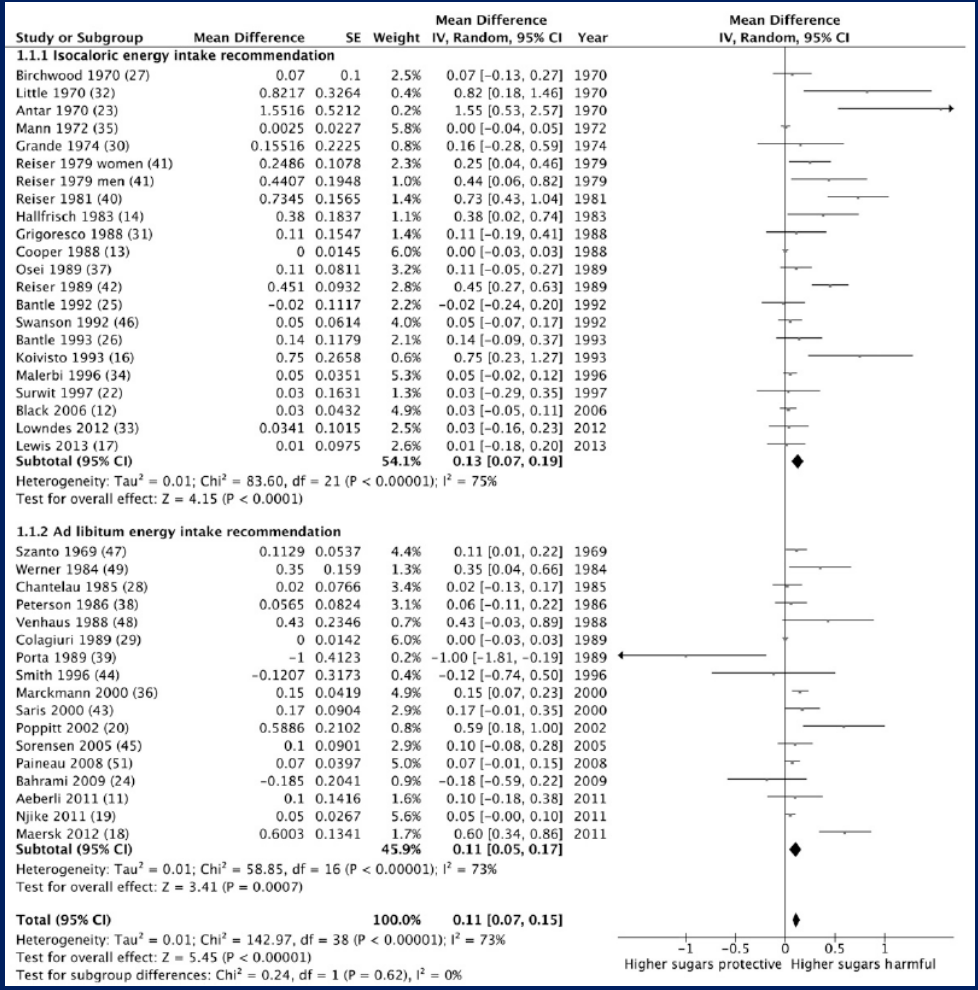


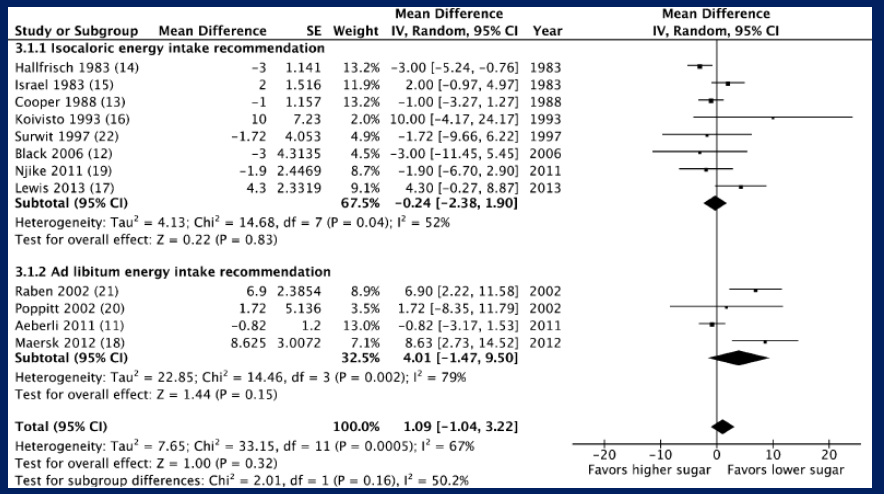
Raising sugar

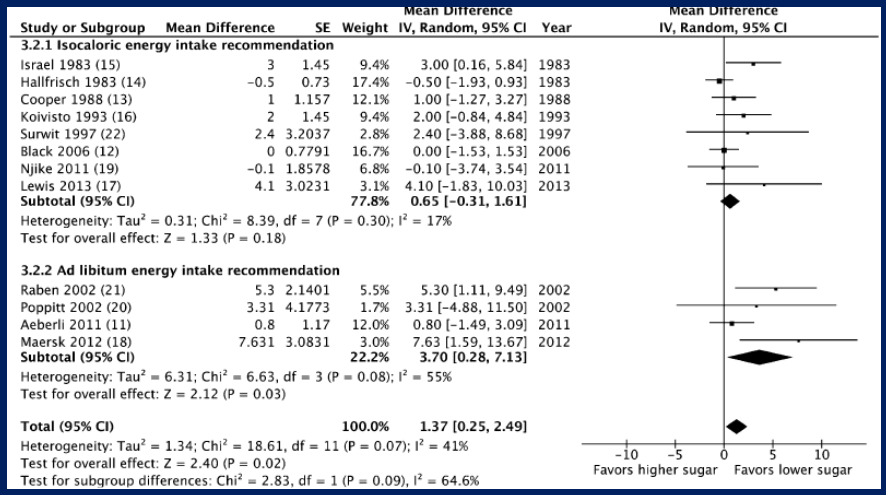


Te Morenga et al. BMJ 345:e7492, 2013

The role of sugar in other diseases



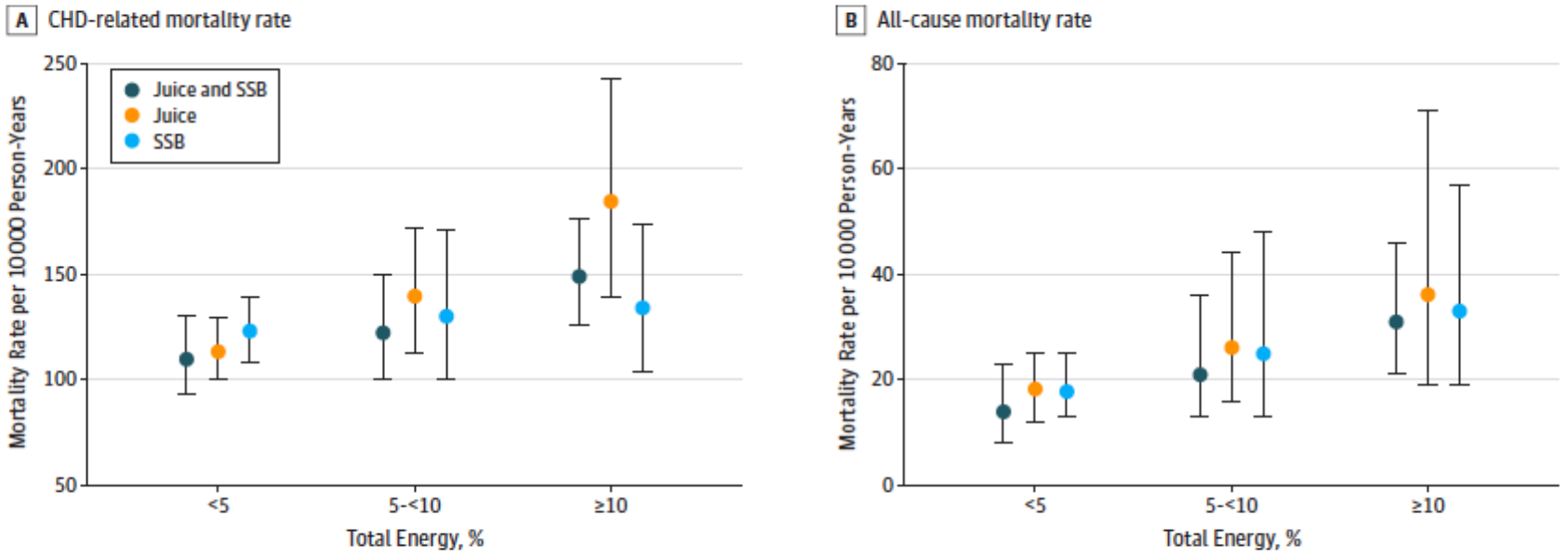




Te Morenga et al. Am J Clin Nutr doi: 10.3945/ajcn.113.081521, May 7, 2014

Cardiovascular and all-cause mortality rates based on percent of calories as SSB's, juice, or both

Figure. Coronary Heart Disease (CHD)–Specific and All-Cause Mortality Rates Among 13 440 US Adults in the Reasons for Geographic and Racial Differences in Stroke (REGARDS) Study



Unadjusted mortality rates at follow-up among US adults in the REGARDS study who consumed 0% to less than 5%, 5% to less than 10%, and 10% or greater of total energy as sugary beverages (ie, 100% fruit juice and sugar-sweetened beverages [SSB]) alone and in combination. Error bars indicate 95% CIs.

Collin et al. JAMA Network Open 2(5):e193121, 2019

Sugar causes disease, unrelated to its calories or effects on weight

Original Article
PEDIATRIC OBESITY

Obesity

Isocaloric Fructose Restriction and Metabolic Improvement in Children with Obesity and Metabolic Syndrome

Robert H. Lustig[1], Kathleen Mulligan[2,3], Susan M. Noworolski[4], Viva W. Tai[2], Michael J. Wen[2], Ayca Erkin-Cakmak[1], Alejandro Gugliucci[3], and Jean-Marc Schwarz[5]

Lustig et al. Obesity 24:453, 2016

Short-term isocaloric fructose restriction lowers apoC-III levels and yields less atherogenic lipoprotein profiles in children with obesity and metabolic syndrome

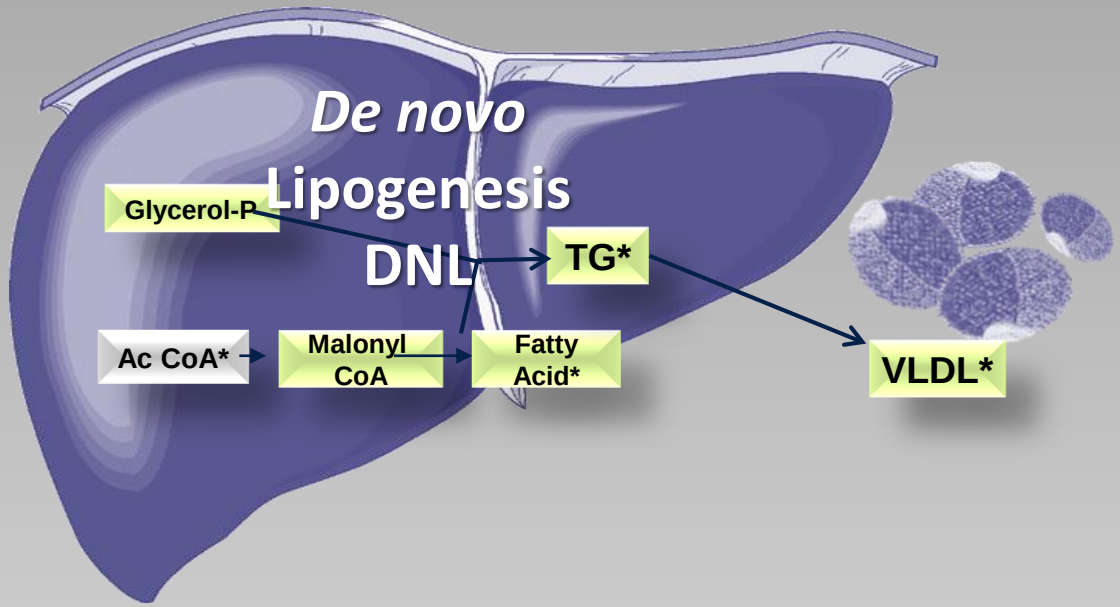
Alejandro Gugliucci [a,*], Robert H. Lustig [b], Russell Caccavello [a], Ayca Erkin-Cakmak [b], Susan M. Noworolski [d], Viva W. Tai [c], Michael J. Wen [c], Kathleen Mulligan [a,c], Jean-Marc Schwarz [e]

Gugliucci et al. Atherosclerosis 253:171, 2016

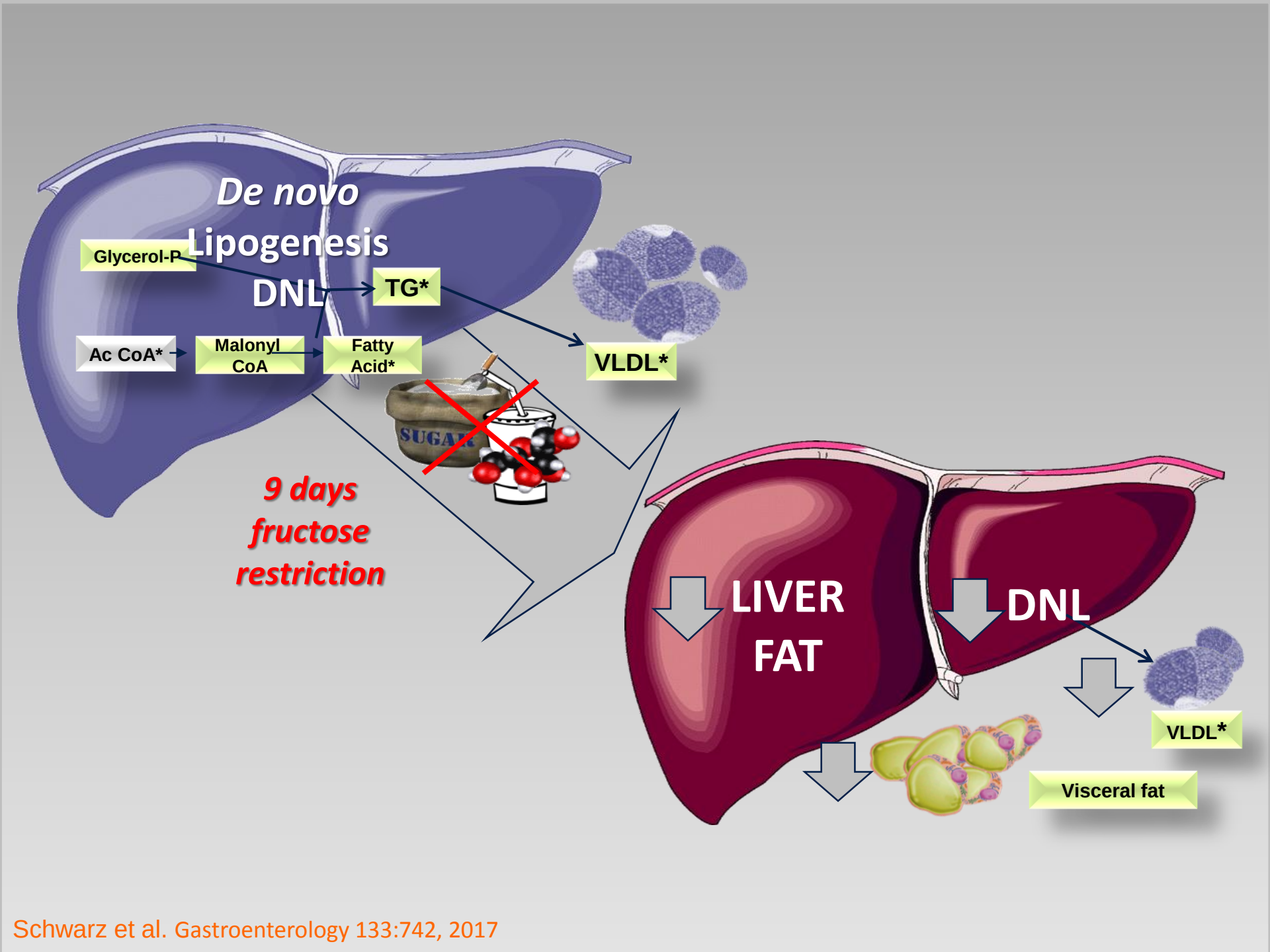
Effects of Dietary Fructose Restriction on Liver Fat, De Novo Lipogenesis, and Insulin Kinetics in Children With Obesity

Jean-Marc Schwarz,[1,2] Susan M. Noworolski,[3] Ayca Erkin-Cakmak,[4] Natalie J. Korn,[3] Michael J. Wen,[2] Viva W. Tai,[5] Grace M. Jones,[1] Sergiu P. Palii,[1] Moises Velasco-Alin,[1,2] Karen Pan,[2] Bruce W. Patterson,[6] Alejandro Gugliucci,[1] Robert H. Lustig,[4] and Kathleen Mulligan[1,2]

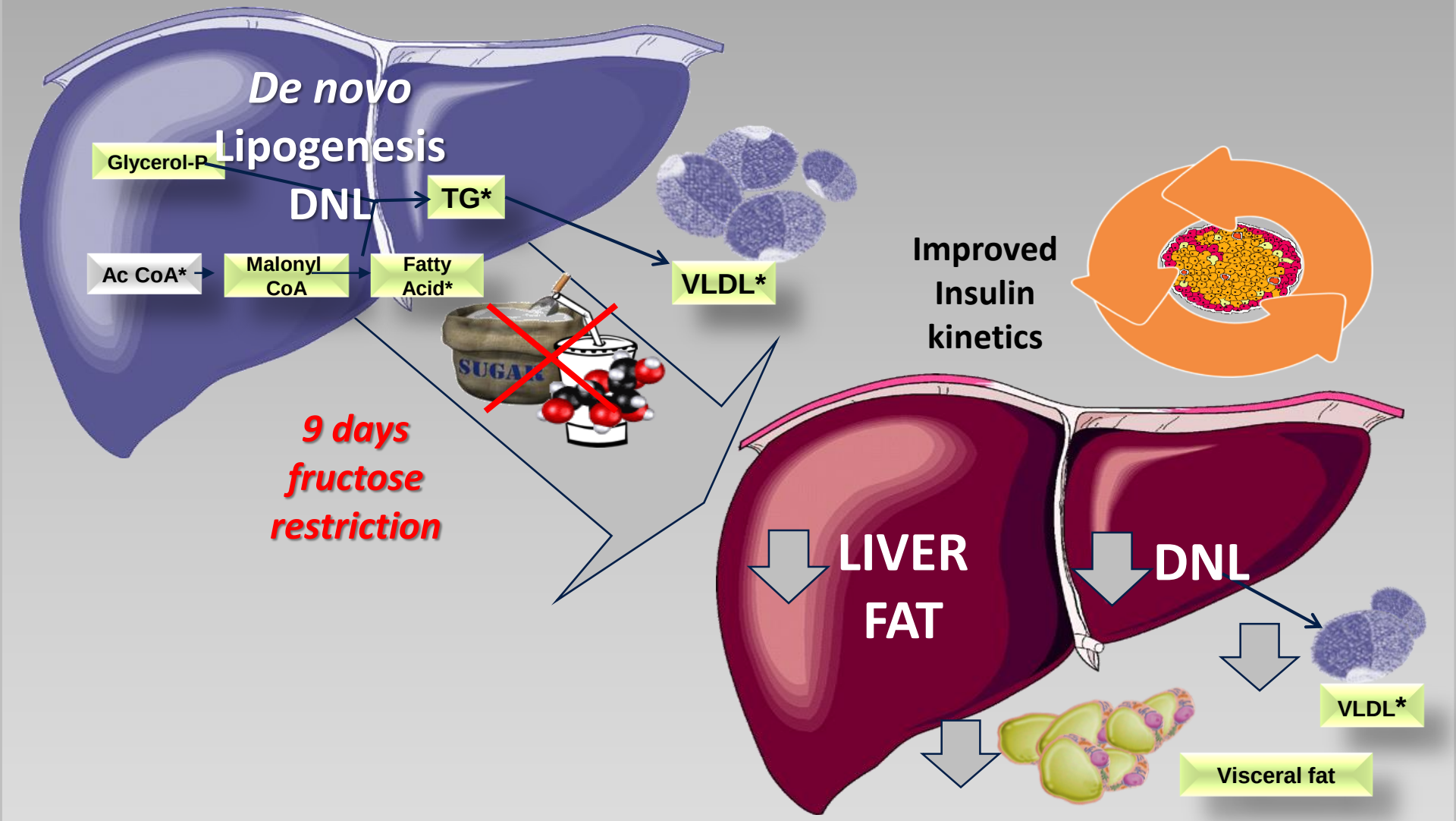
Schwarz et al. Gastroenterology 153:743, 2017



Schwarz et al. Gastroenterology 133:742, 2017



Schwarz et al. Gastroenterology 133:742, 2017



Schwarz et al. Gastroenterology 133:742, 2017

Independent Confirmation

This Issue | Views 5,870 | Citations 0 | Altmetric 389

Preliminary Communication

January 22, 2019

Effect of a Low Free Sugar Diet vs Usual Diet on Nonalcoholic Fatty Liver Disease in Adolescent Boys

A Randomized Clinical Trial

Jeffrey B. Schwimmer, MD[1,2]; Patricia Ugalde-Nicalo, MD[1]; Jean A. Welsh, PhD, MPH, RN[3,4,5]; et al

» Author Affiliations

JAMA. 2019;321(3):256-265. doi:10.1001/jama.2018.20579

CLINICAL RESEARCH ARTICLE

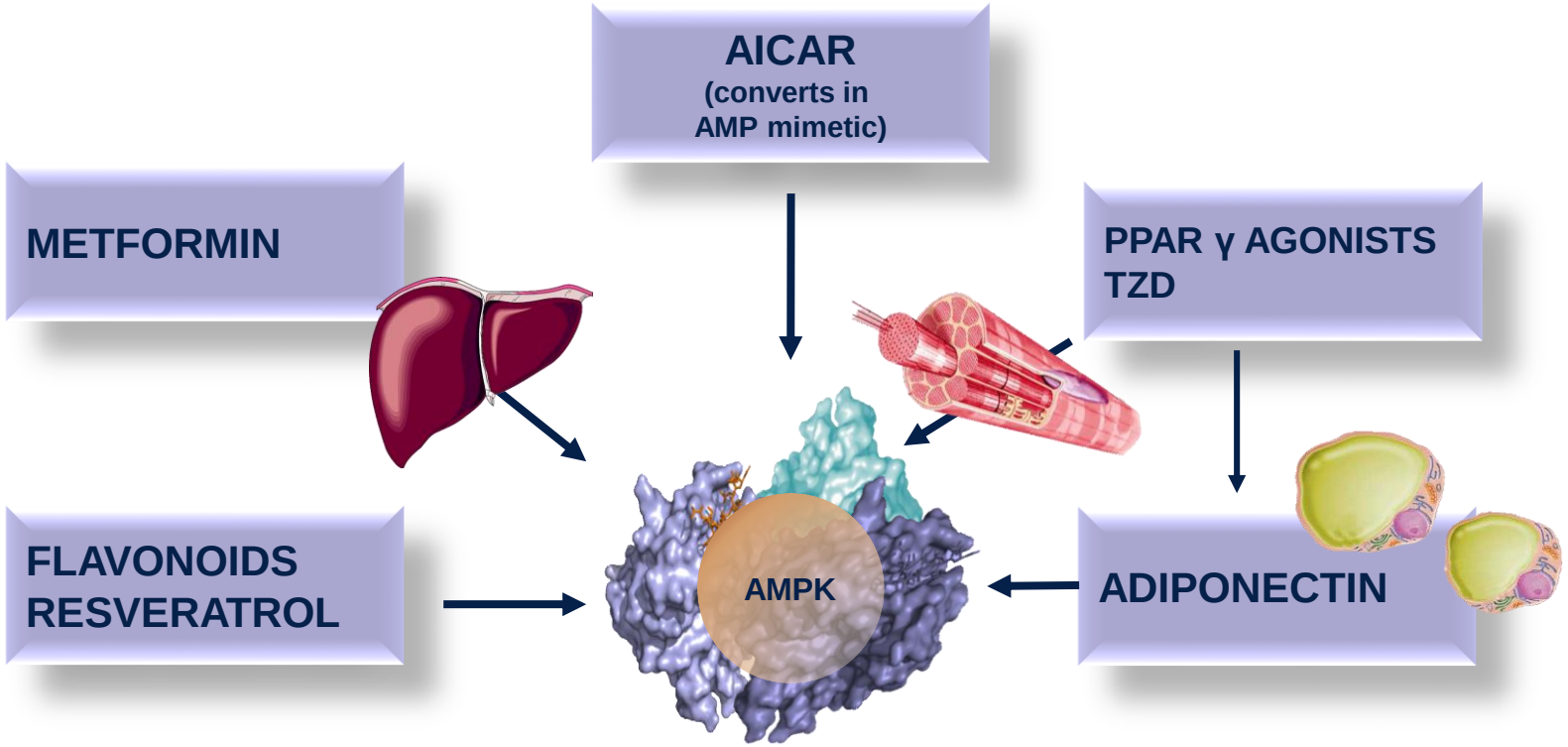
Isocaloric Fructose Restriction Reduces Serum D-Lactate Concentration in Children With Obesity and Metabolic Syndrome

Ayca Erkin-Cakmak,[1] Yasmin Bains,[2] Russell Caccavello,[2] Susan M. Noworolski,[3] Jean-Marc Schwarz,[4] Kathleen Mulligan,[4] Robert H. Lustig,[1] and Alejandro Gugliucci[2]

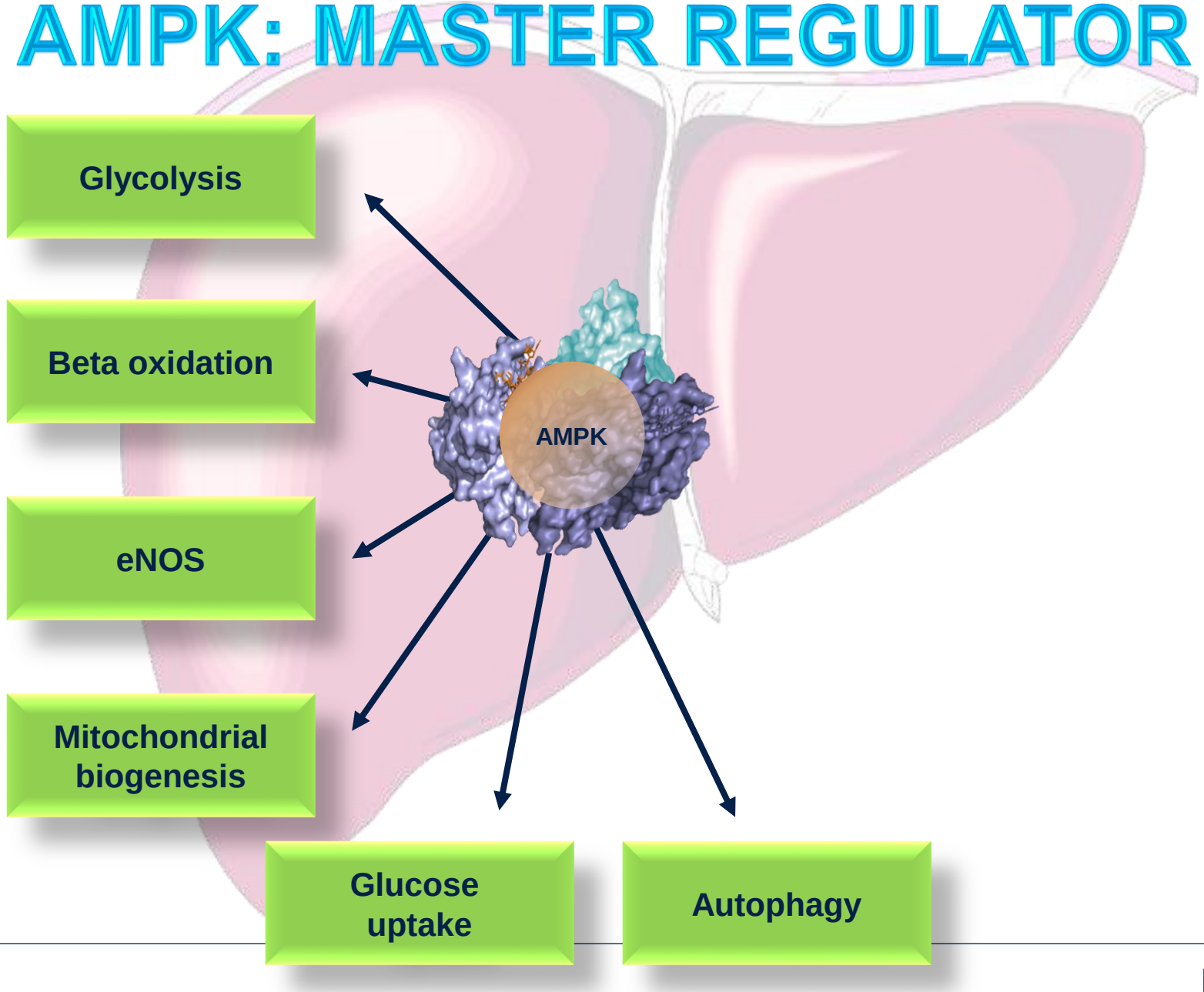
[1]Department of Pediatrics, Division of Pediatric Endocrinology, University of California San Francisco, San Francisco, California; [2]Glycation, Oxidation and Disease Laboratory, Department of Research, Touro University California College of Osteopathic Medicine, Vallejo, California; [3]Department of Radiology and Biomedical Imaging, University of California San Francisco, San Francisco, California; and [4]Department of Medicine, Division of Endocrinology, University of California San Francisco, San Francisco, California

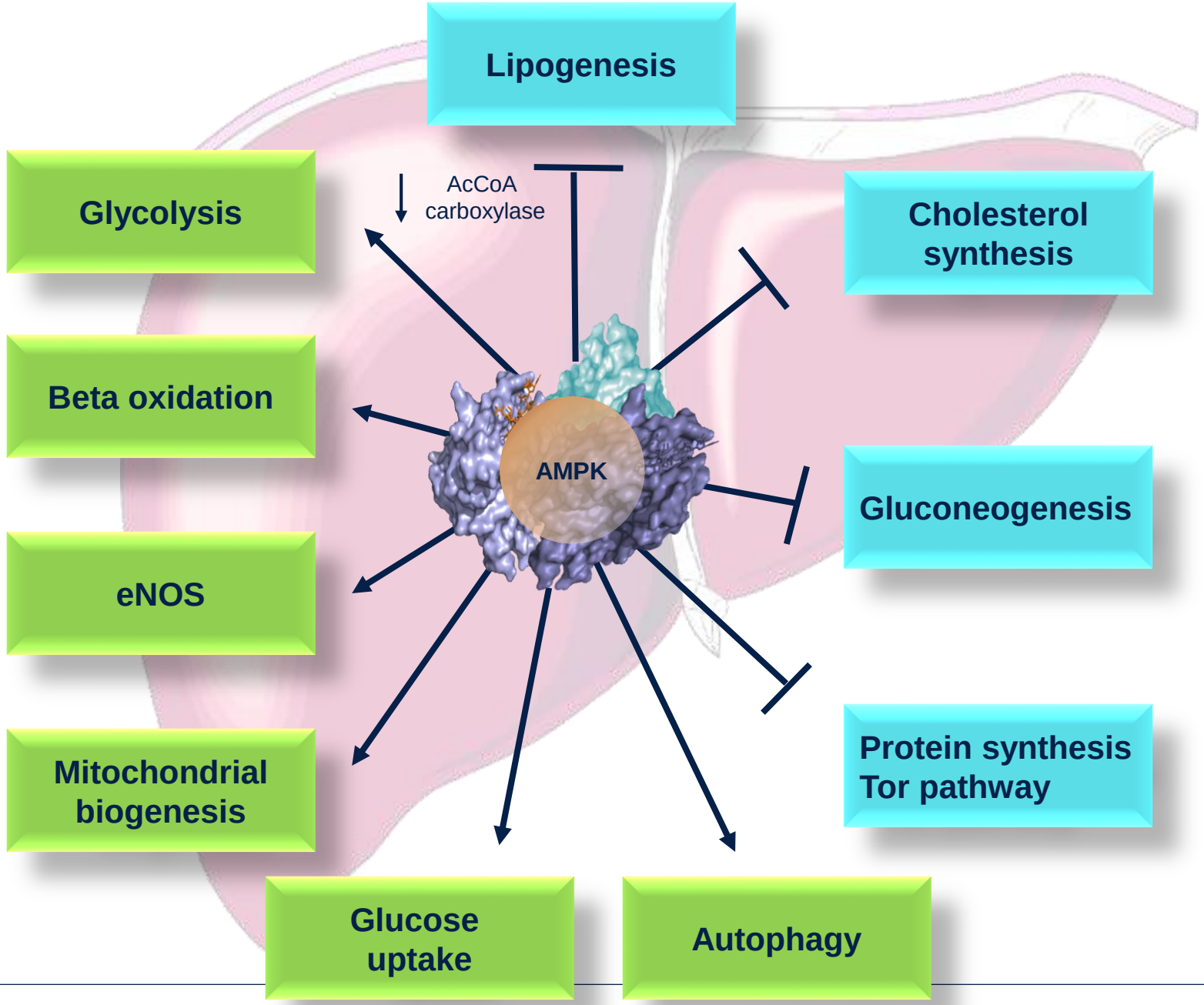
ORCiD numbers: 0000-0003-1580-9163 (A. Erkin-Cakmak).

AMPK: MASTER REGULATOR

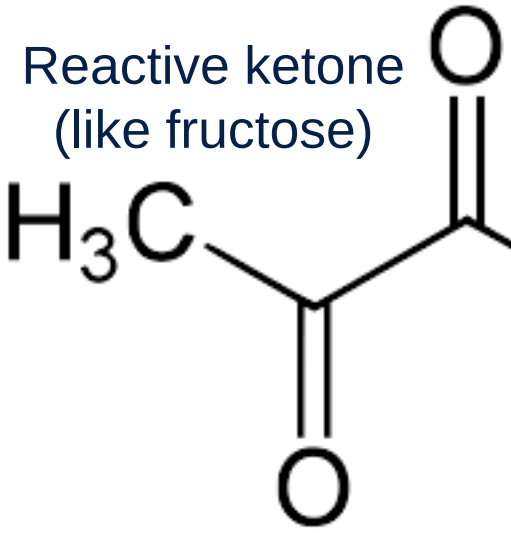


AMPK: MASTER REGULATOR




Lipogenesis
Glycolysis
AcCoA carboxylase
Cholesterol synthesis
Beta oxidation
AMPK
Gluconeogenesis
eNOS
Mitochondrial biogenesis
Protein synthesis Tor pathway
Glucose uptake
Autophagy

Reactive ketone
(like fructose)



Reactive aldehyde
(like glucose)

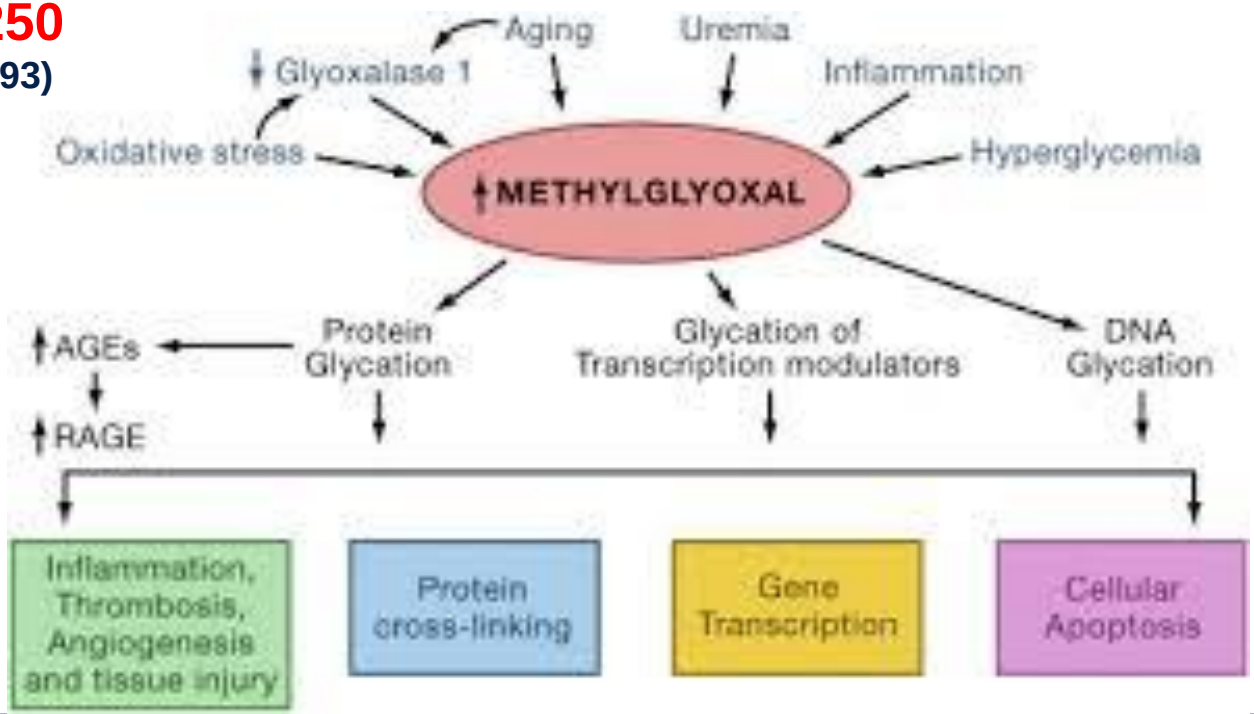
Maillard Reaction

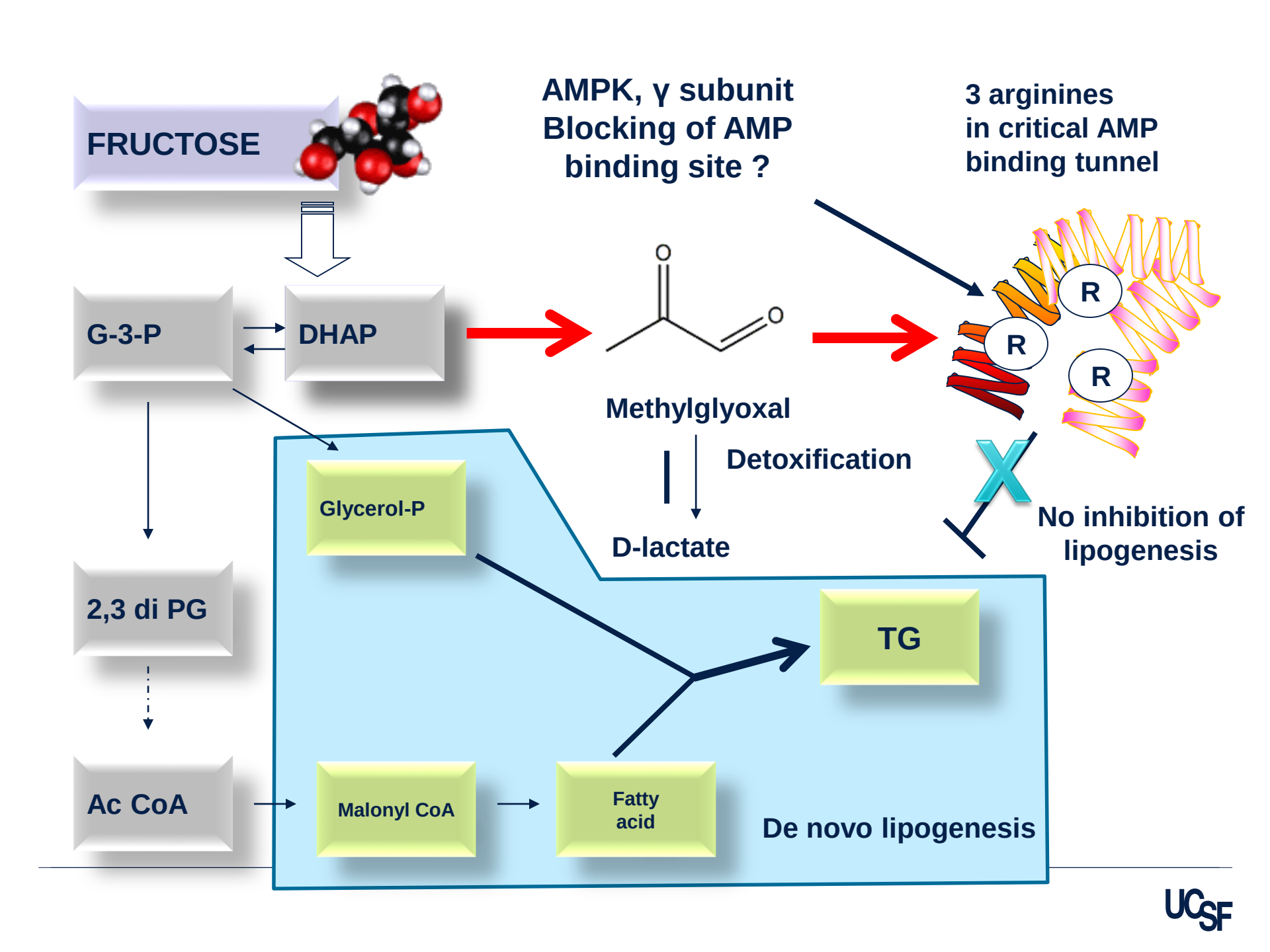
Glucose 1

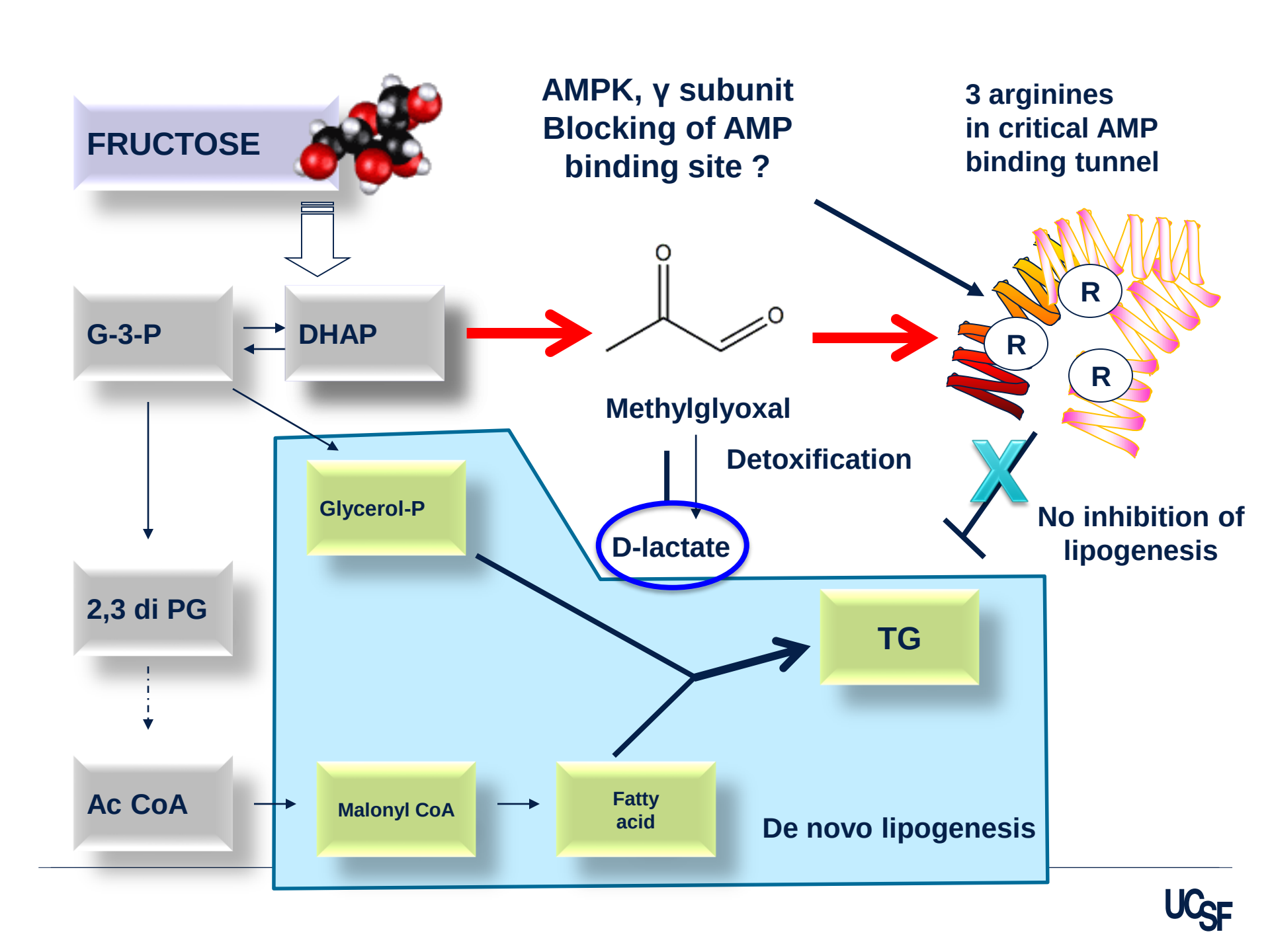
Fructose 7

MG 250

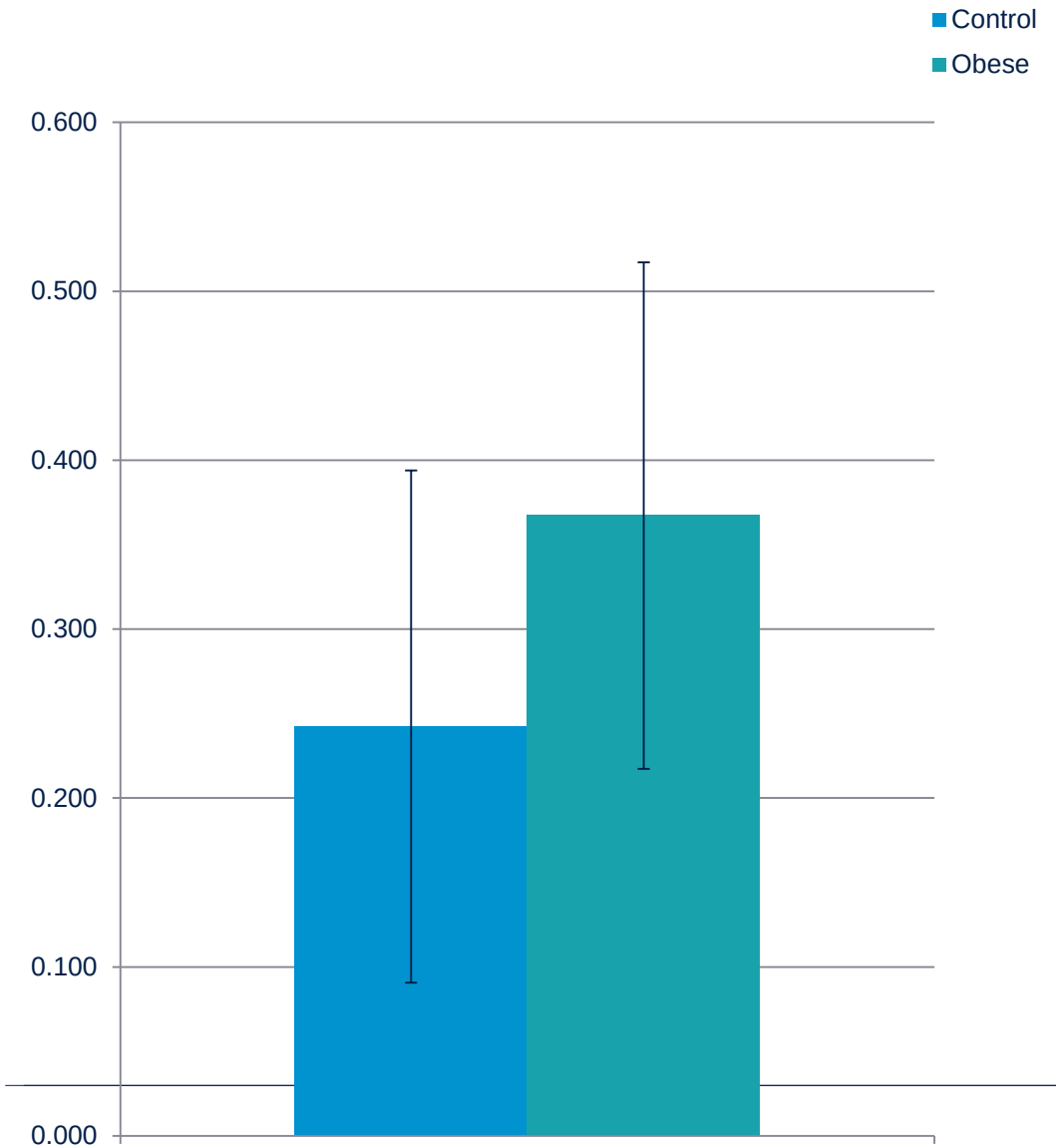
(Thornalley, 1993)




FRUCTOSE
G-3-P
DHAP
2,3 di PG
Ac CoA
Glycerol-P
Malonyl CoA
Fatty acid
TG
De novo lipogenesis
AMPK, γ subunit
Blocking of AMP
binding site ?
Methylglyoxal
Detoxification
D-lactate
3 arginines
in critical AMP
binding tunnel
R
R
R
No inhibition of
lipogenesis


FRUCTOSE
AMPK, γ subunit
Blocking of AMP
binding site ?
3 arginines
in critical AMP
binding tunnel
G-3-P
DHAP
Methylglyoxal
Detoxification
R
R
R
Glycerol-P
D-lactate
No inhibition of
lipogenesis
2,3 di PG
TG
Ac CoA
Malonyl CoA
Fatty
acid
De novo lipogenesis

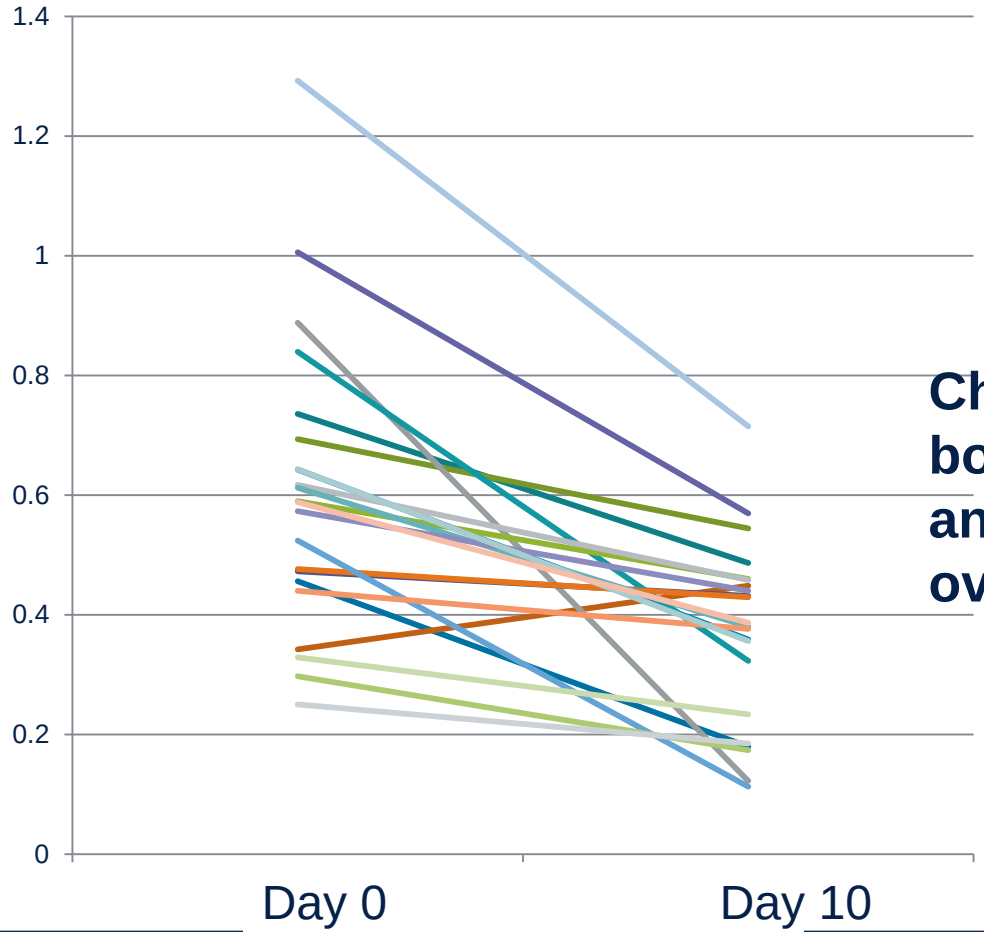
D-LACTATE 52% HIGHER IN OBESITY



P < 0.01

Masania et al. Glycoconjugates J 33:581, 2016

D-LACTATE REDUCES AFTER ISOCALORIC FRUCTOSE RESTRICTION BY 38%

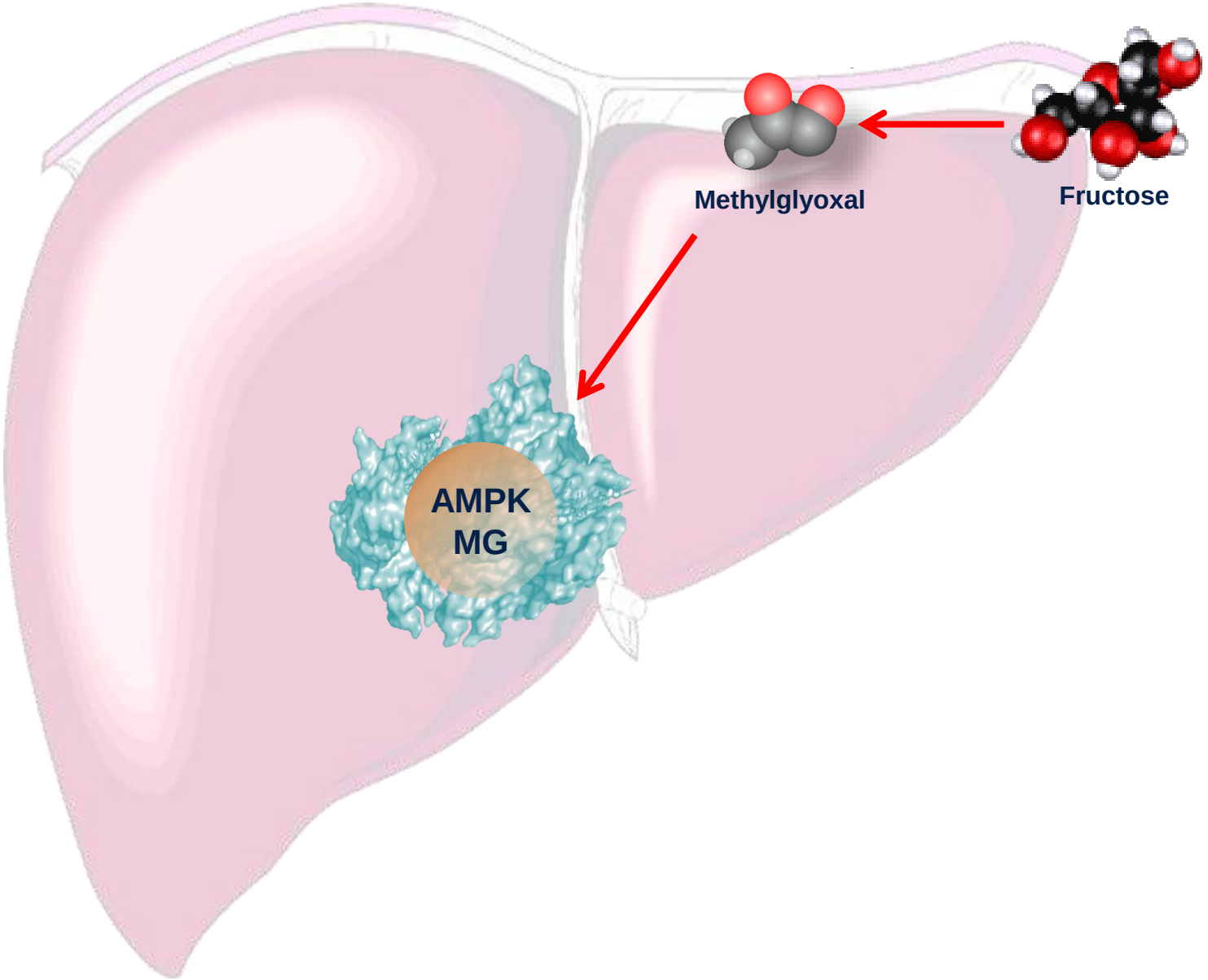


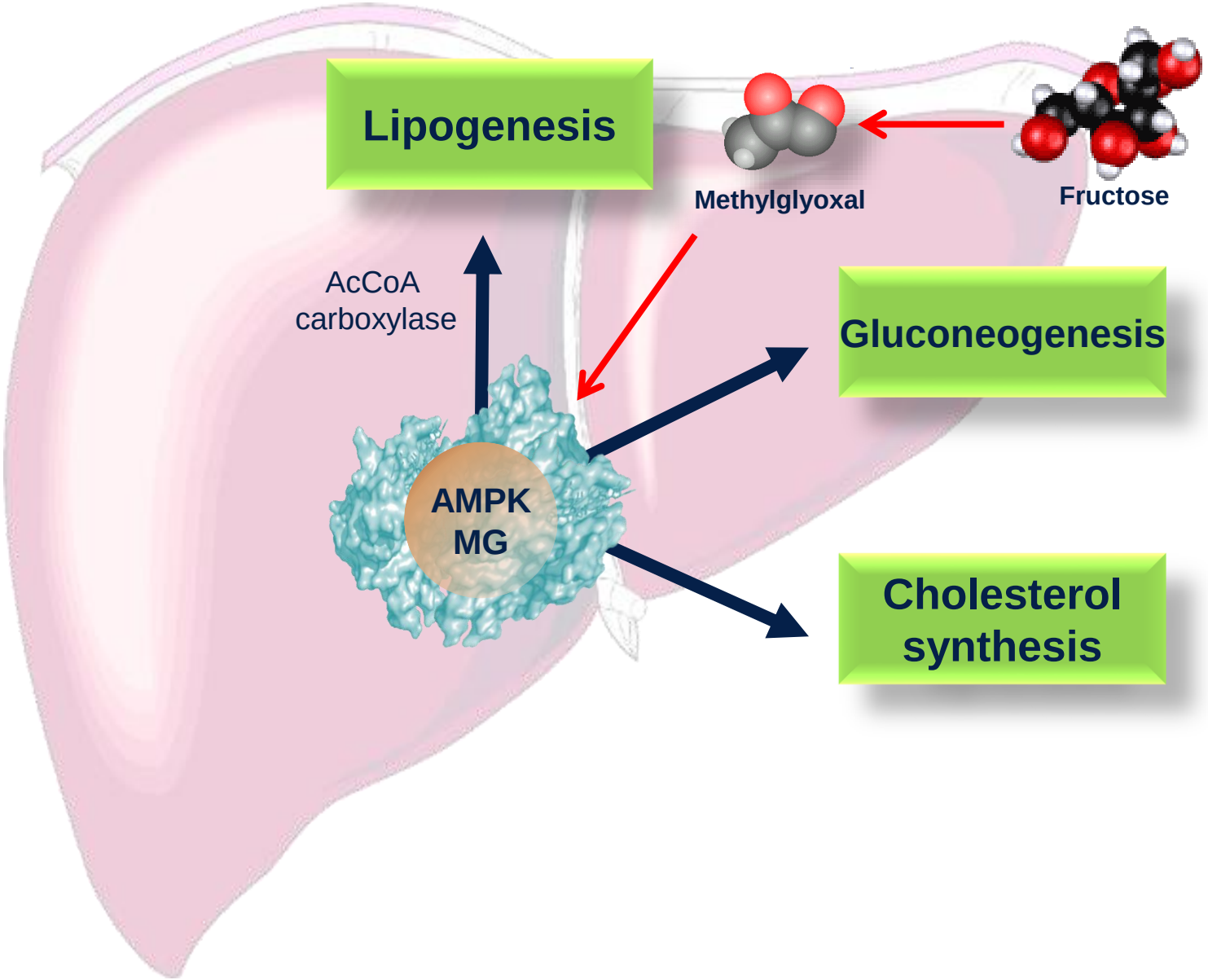
$P = 10^{-5}$

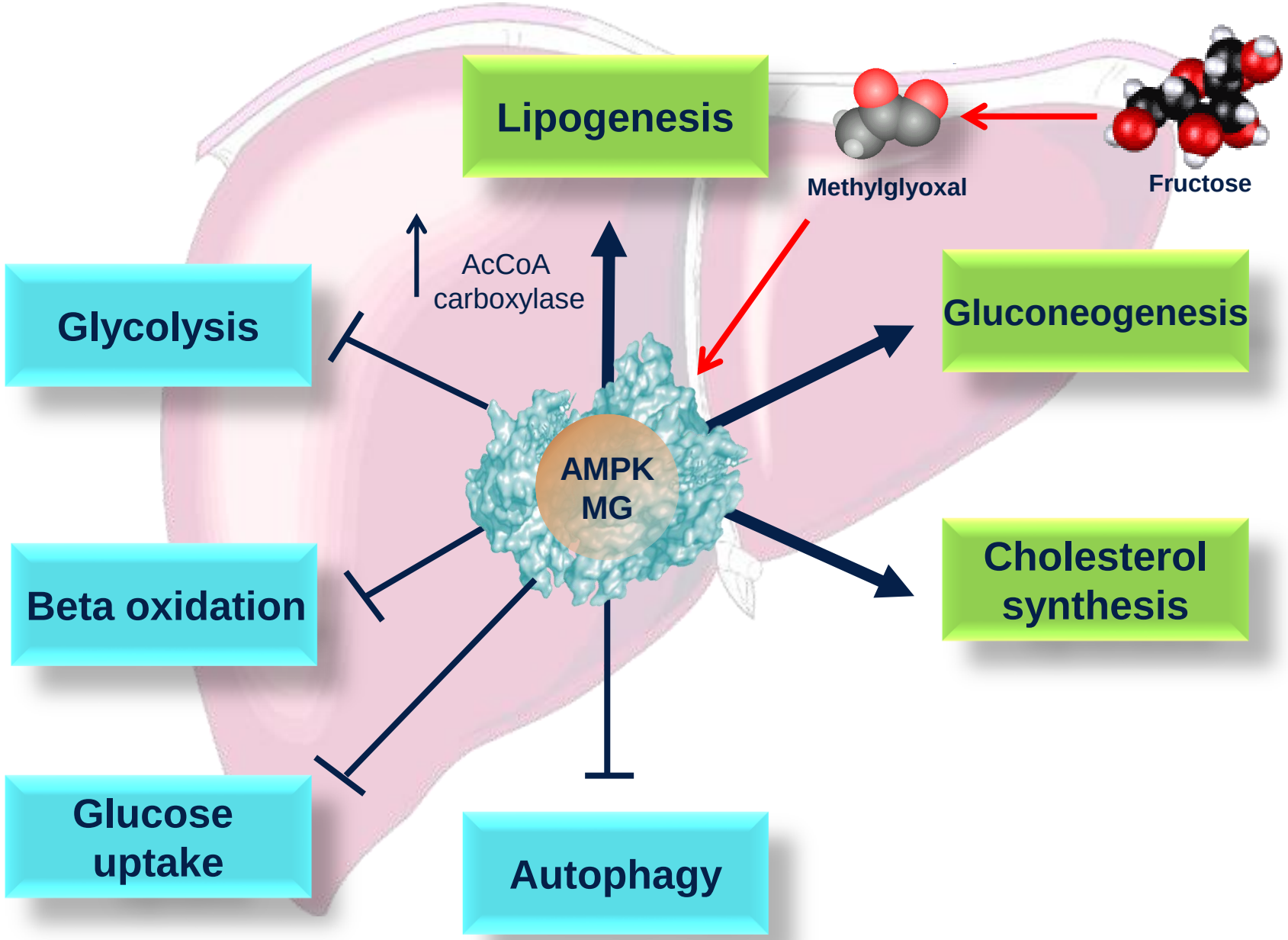
Change in D-Lactate correlated both with change in DNL and change in insulin sensitivity over the 10 days of study

Erkin-Cakmak et al. J Clin Endocrinol Metab 2019 Mar 14,. doi: 10.1210/jc.2018-02772.

UCSF


Methylglyoxal
Fructose
AMPK
MG


Lipogenesis
Methylglyoxal
Fructose
AcCoA
carboxylase
Gluconeogenesis
AMPK
MG
Cholesterol
synthesis


Lipogenesis
Methylglyoxal
Fructose
AcCoA
carboxylase
Glycolysis
Gluconeogenesis
AMPK
MG
Beta oxidation
Cholesterol
synthesis
Glucose
uptake
Autophagy

JAMA Internal Medicine | Special Communication

Sugar Industry and Coronary Heart Disease Research
A Historical Analysis of Internal Industry Documents

Cristin E. Kearns, DDS, MBA; Laura A. Schmidt, PhD, MSW, MPH; Stanton A. Glantz, PhD

Early warning signals of the coronary heart disease (CHD) risk of sugar (sucrose) emerged in the 1950s. We examined Sugar Research Foundation (SRF) internal documents, historical reports, and statements relevant to early debates about the dietary causes of CHD and assembled findings chronologically into a narrative case study. The SRF sponsored its first CHD research project in 1965, a literature review published in the *New England Journal of Medicine*, which singled out fat and cholesterol as the dietary causes of CHD and downplayed evidence that sucrose consumption was also a risk factor. The SRF set the review's objective, contributed articles for inclusion, and received drafts. The SRF's funding and role was not disclosed. Together with other recent analyses of sugar industry documents, our findings suggest the industry sponsored a research program in the 1960s and 1970s that successfully cast doubt about the hazards of sucrose while promoting fat as the dietary culprit in CHD. Policymaking committees should consider giving less weight to food industry–funded studies and include mechanistic and animal studies as well as studies appraising the effect of added sugars on multiple CHD biomarkers and disease development.

JAMA Intern Med. doi:10.1001/jamainternmed.2016.5394
Published online September 12, 2016.

Sugar and disease

- **Causation**
  - Diabetes
  - Heart Disease
  - Fatty Liver Disease
  - Tooth Decay
- **Correlation**
  - Cancer
  - Dementia

The American Heart Association knows

AHA Scientific Statement

Dietary Sugars Intake and Cardiovascular Health

A Scientific Statement From the American Heart Association

Rachel K. Johnson, PhD, MPH, RD, Chair; Lawrence J. Appel, MD, MPH, FAHA; Michael Brands, PhD, FAHA; Barbara V. Howard, PhD, FAHA; Michael Lefevre, PhD, FAHA; Robert H. Lustig, MD; Frank Sacks, MD, FAHA; Lyn M. Steffen, PhD, MPH, RD, FAHA; Judith Wylie-Rosett, EdD, RD; on behalf of the American Heart Association Nutrition Committee of the Council on Nutrition, Physical Activity, and Metabolism and the Council on Epidemiology and Prevention

Recommends reduction in sugar intake from 22 tsp/day to 9 tsp/day (males) and 6 tsp/day (females)

Circulation 120:1011, 2009

Myth #3

It's about personal responsibility

Personal responsibility is an ideology

Personal responsibility is an ideology

Knowledge

56 names for sugar

Agave nectar	Barbados sugar	Barley malt	Beet sugar
Blackstrap molasses	Brown sugar	Buttered syrup	Cane juice crystals
Cane sugar	Caramel	Carob syrup	Castor sugar
Confectioner’s sugar	Corn syrup	Corn syrup solids	Crystalline fructose
Date sugar	Demerara sugar	Dextran	Dextrose
Diastatic malt	Diatase	Ethyl maltol	Evaporated cane juice
Florida crystals	Fructose	Fruit juice	Fruit juice concentrate
Galactose	Glucose	Glucose solids	Golden sugar
Golden syrup	Grape sugar	High-fructose corn syrup	Honey
Icing sugar	Invert sugar	Lactose	Malt syrup
Maltodextrin	Maltose	Maple syrup	Molasses
Muscovado	Organic raw sugar	Panocha	Raw sugar
Refiner’s syrup	Rice syrup	Sorghum syrup	Sucrose
Sugar	Treacle	Turbinado sugar	Yellow sugar

Why don't they list "added sugars"?
Why is there no Dietary Reference Intake?

Personal responsibility is an ideology

Knowledge

Access

Personal responsibility is an ideology

Knowledge

Access

Affordability

Personal responsibility is an ideology

Knowledge

Access

Affordability

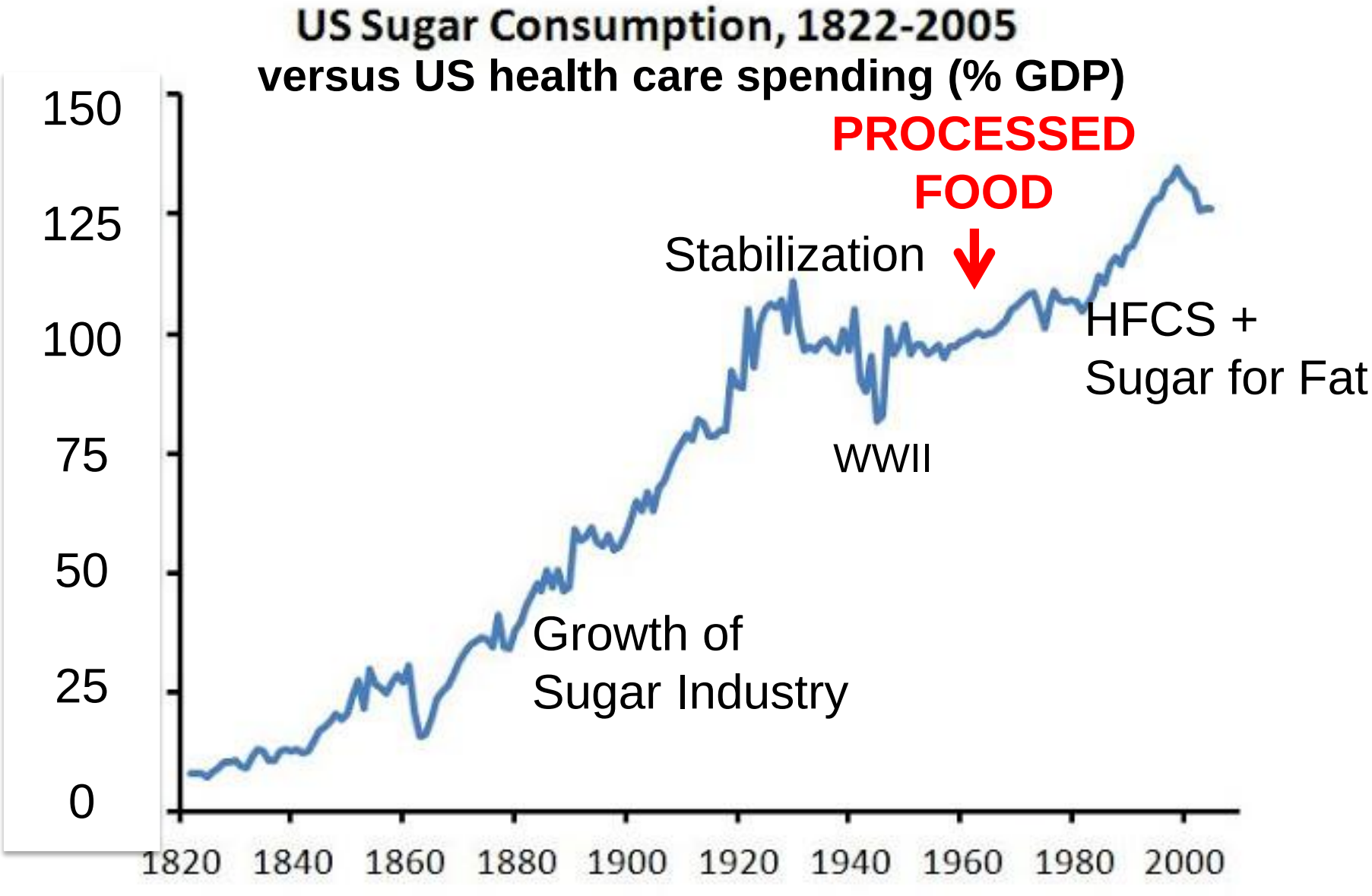
Don’t hurt anyone else

Profits and pandemics: prevention of harmful effects of tobacco, alcohol, and ultra-processed food and drink industries

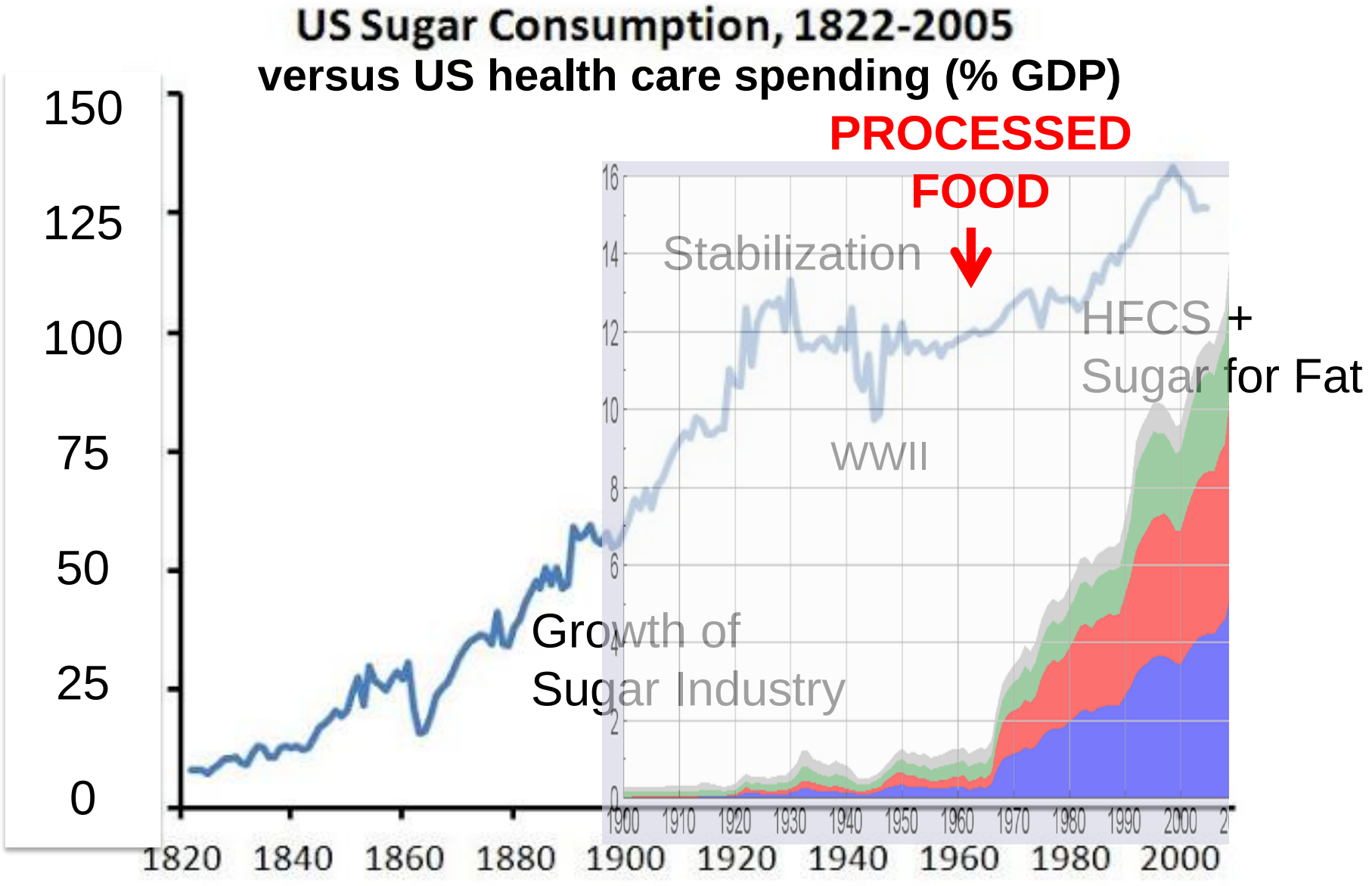
Rob Moodie, David Stuckler, Carlos Monteiro, Nick Sheron, Bruce Neal, Thaksaphon Thamarangsi, Paul Lincoln, Sally Casswell, on behalf of The Lancet NCD Action Group

Old medicine:	**infections**	**microbes**
New medicine:	**chronic disease**	**multinational corporations**

Lancet 381:670, 2013

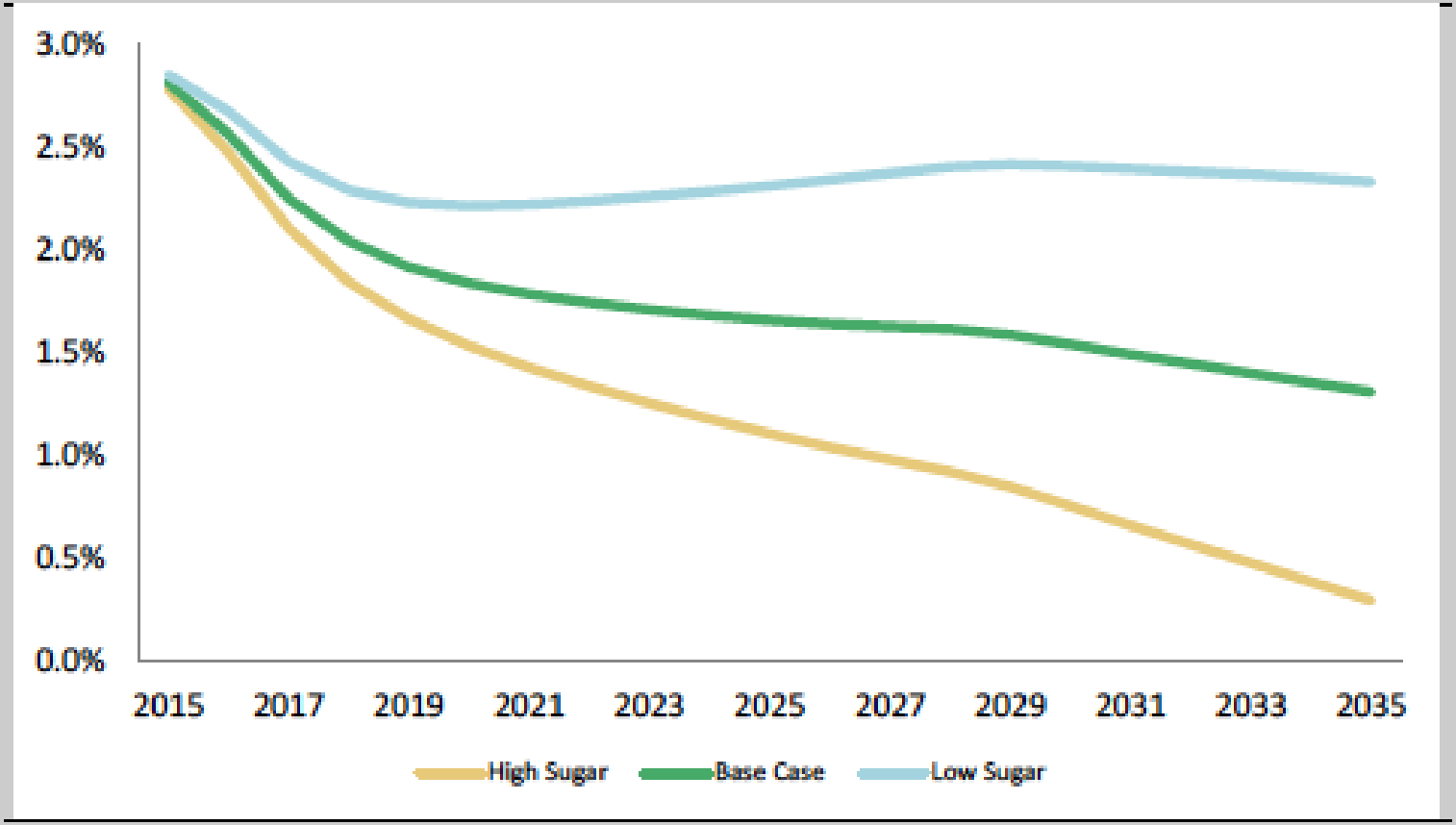


U.S. Commerce Service 1822-1910, combined with Economic Research Service, USDA 1910-2010
http://ushealthcarespending.gov



U.S. Commerce Service 1822-1910, combined with Economic Research Service, USDA 1910-2010
http://ushealthcarespending.gov

The obesity and diabetes epidemic poses threat to future economic growth



The chart shows real GDP growth in the OECD area under simulations which adjust long-term OECD forecasts for different productivity levels of normal-weight, obese and diabetic individuals, and assume different levels of sugar consumption per capita in the high- and low-sugar scenarios.
Source: Morgan Stanley Research

Morgan Stanley Report, The Bitter Aftertaste of Sugar, March, 2015

3. The Dark Forces

Ten conglomerates

Methods used by the DARK FORCES

- Shoddy science

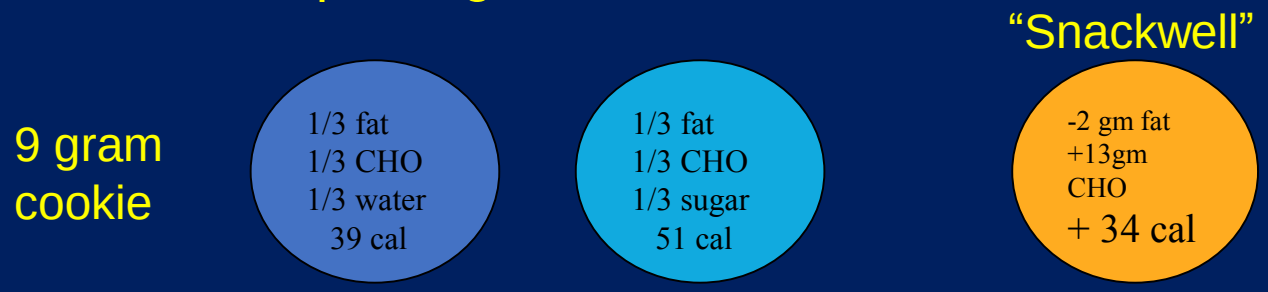
World Sugar Research Organization critique of WHO proposal to reduce sugar to 5% of total calories

June 9, 2014

- 3.1: Sugar is less energy dense than fat;

  4 kcal/gm vs. 9 kcal/gm
- In a cookie, the sugar is not displacing the fat;

  it's displacing the water



http://www.wsro.org/Portals/12/Docs/public/documents/News/FINAL%20WSRO%20Comments%20on%20Draft%20WHO%20Guideline%20on%20sugars.pdf

Annals of Internal Medicine

OBSERVATIONS

Do Sugar-Sweetened Beverages Cause Obesity and Diabetes? Industry and the Manufacture of Scientific Controversy

60 studies (28 trials and 32 systematic reviews/meta-analyses)

Food Company Sponsorship	Positive Association	Negative Association	RR; 95% CI; P
Yes (n=26)	0	26	RR 34.0
No (n=34)	33	1	[4.9-234.5] P<0.001

Schillinger et al. Annals Int Med epub Nov 1, 2016

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists

- Frederick Stare, M.D., Ph.D.

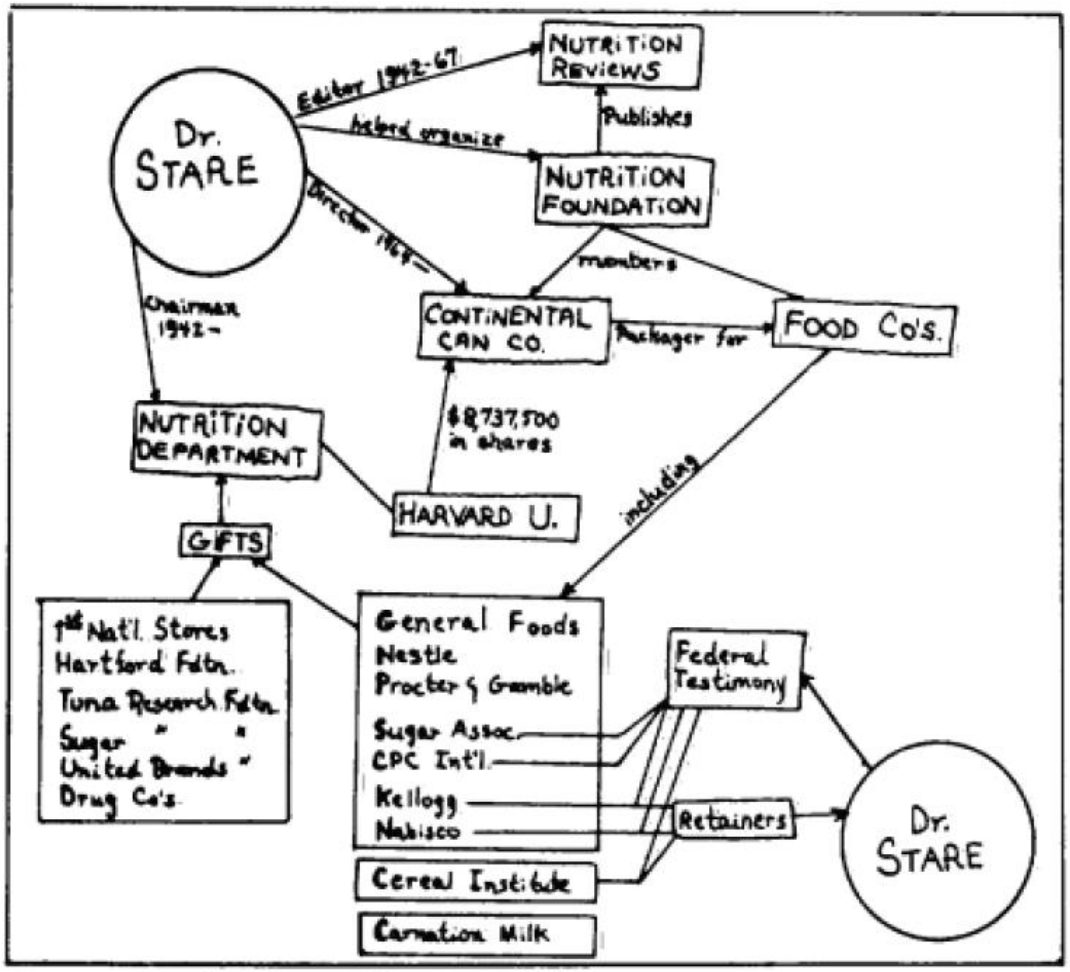
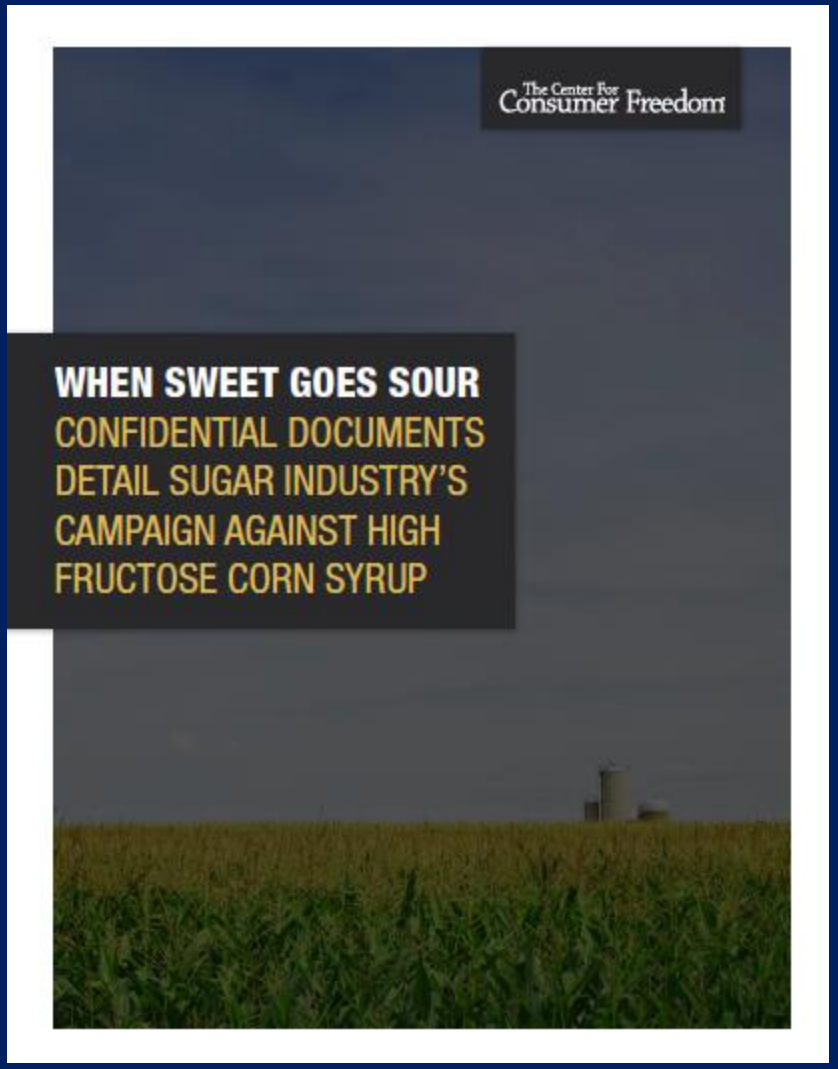
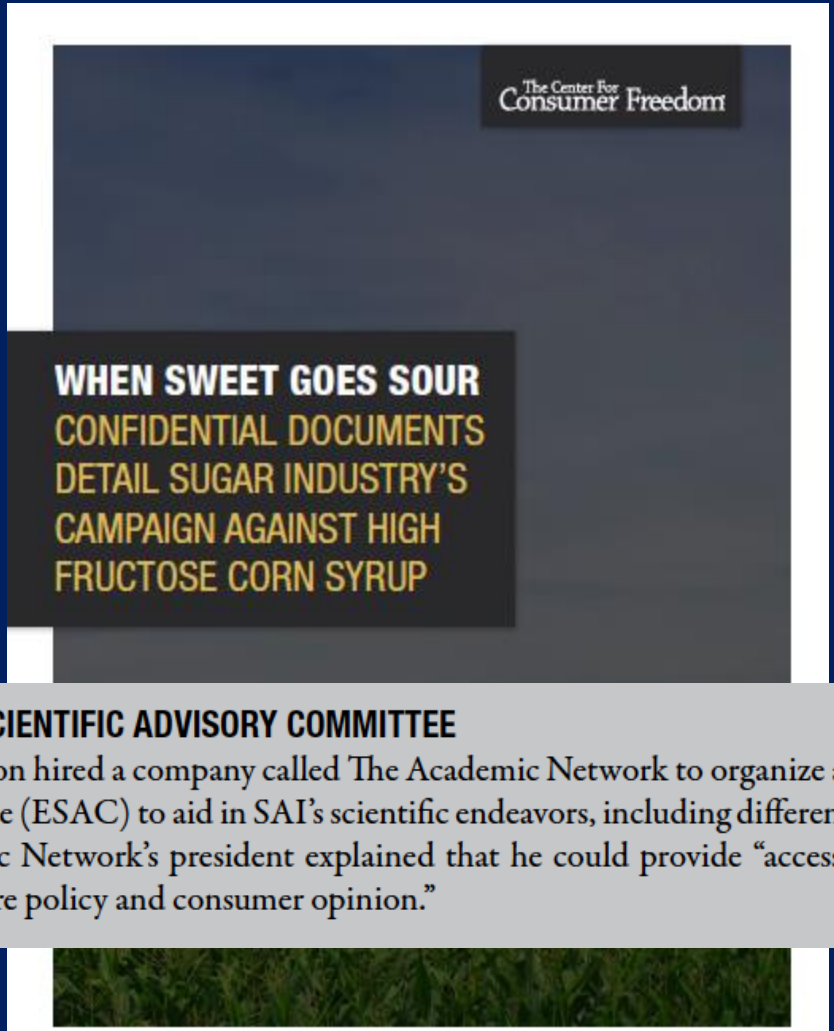


Diagram outlines Dr. Stares activities, April 1973 issue.

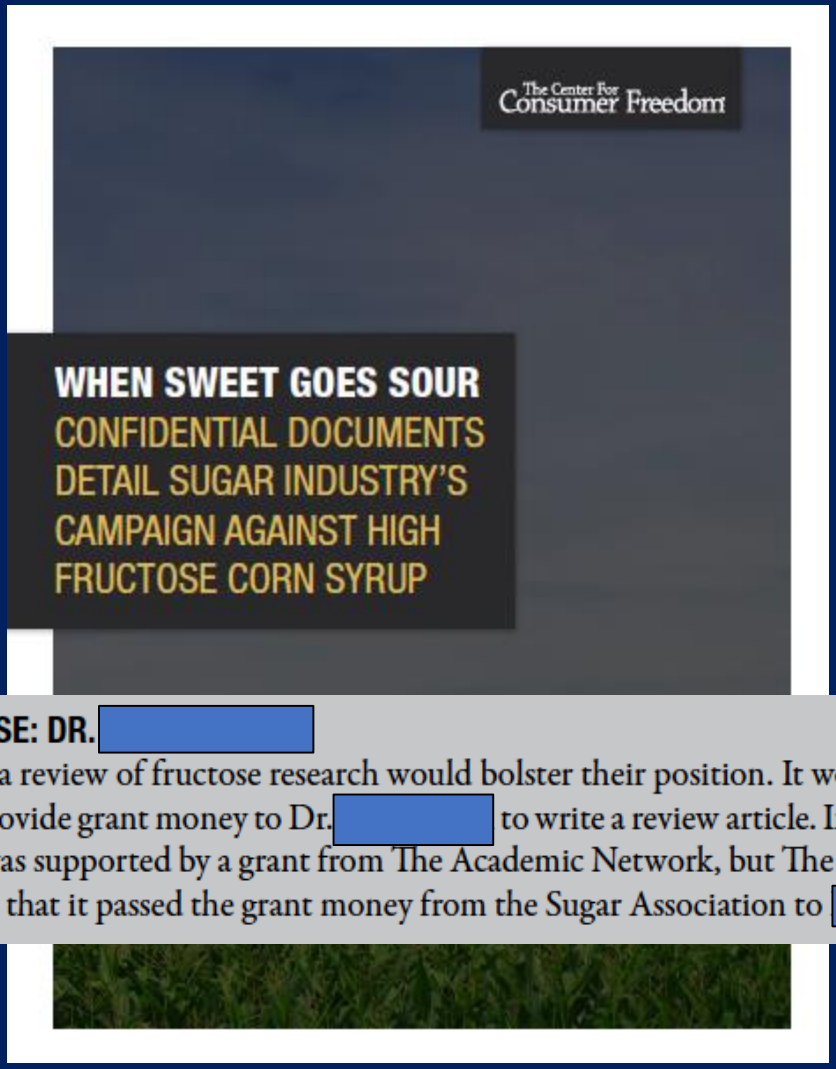
Berger, The Present Illness, Harvard Medical Alumni Bulletin, Jan/Feb 1974


The Center For Consumer Freedom
WHEN SWEET GOES SOUR
CONFIDENTIAL DOCUMENTS DETAIL SUGAR INDUSTRY'S CAMPAIGN AGAINST HIGH FRUCTOSE CORN SYRUP



SAI'S EXTERNAL SCIENTIFIC ADVISORY COMMITTEE

The Sugar Association hired a company called The Academic Network to organize an External Scientific Advisory Committee (ESAC) to aid in SAI's scientific endeavors, including differentiating fructose from sugar. The Academic Network's president explained that he could provide "access" to researchers that "influence health care policy and consumer opinion."



FAILURE TO DISCLOSE: DR. [redacted]

SAI recognized that a review of fructose research would bolster their position. It worked with The Academic Network to provide grant money to Dr. [redacted] to write a review article. In the text of that, Dr. [redacted] wrote that it was supported by a grant from The Academic Network, but The Academic Network, meanwhile, indicates that it passed the grant money from the Sugar Association to [redacted]

HEALTH

A Credibility Crisis in Food Science

The fall of a prominent behavioral scientist tells of a system where research is judged not on merit, but on the attention it gets.

JAMES HAMBLIN SEP 24, 2018

RANDALL HILL / REUTERS

Your life has almost certainly been affected by Brian Wansink.

Well

FITNESS

Coca-Cola Funds Scientists Who Shift Blame for Obesity Away From Bad Diets

BY ANAHAD O'CONNOR AUGUST 9, 2015 5:25 PM 1259

An image from a video by the Coca-Cola Foundation. In November 2012, the foundation announced a $3 million grant to Chicago's Garfield Park Conservatory Alliance. The grant was intended to establish a wellness program.

Dietary Sugar and Body Weight: Have We Reached a Crisis in the Epidemic of Obesity and Diabetes?

Health Be Damned! Pour on the Sugar

Diabetes Care 2014;37:950–956 | DOI: 10.2337/dc13-2085

George A. Bray[1] and Barry M. Popkin[2]

Dietary Sugar and Body Weight: Have We Reached a Crisis in the Epidemic of Obesity and Diabetes?

We Have, but the Pox on Sugar Is Overwrought and Overworked

Diabetes Care 2014;37:957–962 | DOI: 10.2337/dc13-2506

Richard Kahn[1] and John L. Sievenpiper[2,3]

Dietary Sugar and Body Weight: Have We Reached a Crisis in the Epidemic of Obesity and Diabetes?

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Richard Kahn[1] and John L. Sievenpiper[2,3]

Funding. J.L.S. received research grants/support from the Canadian Institutes of Health Research, Calorie Control Council, The Coca-Cola Company (investigator-initiated, unrestricted grant), Pulse Canada, and The International Tree Nut Council Nutrition Research & Education Foundation.

Duality of Interest. J.L.S. has received speaker's fees and honoraria from the American Society for Nutrition, Canadian Nutrition Society, Calorie Control Council, Diabetes and Nutrition Study Group of the European Association for the Study of Diabetes, International Life Sciences Institute North America and Brazil, Pulse Canada, Dr. Pepper Snapple Group, and The Coca-Cola Company. He is also an unpaid scientific advisor for the International Life Sciences Institute North America, Food, Nutrition, and Safety Program and spouse of an employee of Unilever Canada. No other potential conflicts of interest relevant to this article were reported.

Ignores two studies which show proximate cause for sugar and diabetes

EPIC-Interact, Diabetologia Apr 2013; Basu et al. PLoS One, Feb 2013

The web of Coca-Cola funded research, 2008-2016

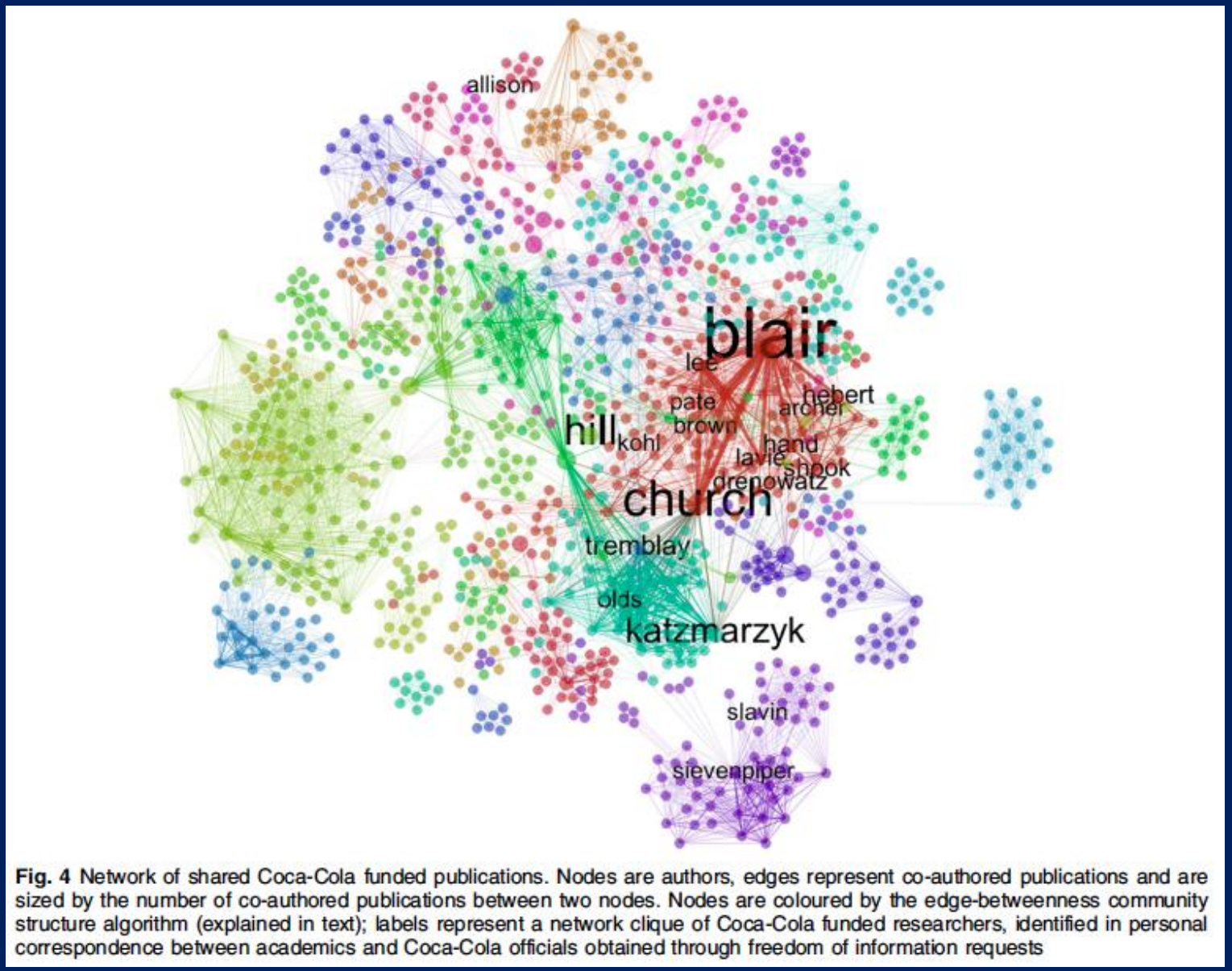


Fig. 4 Network of shared Coca-Cola funded publications. Nodes are authors, edges represent co-authored publications and are sized by the number of co-authored publications between two nodes. Nodes are coloured by the edge-betweenness community structure algorithm (explained in text); labels represent a network clique of Coca-Cola funded researchers, identified in personal correspondence between academics and Coca-Cola officials obtained through freedom of information requests

Serodio et al. Pub Health Nutr 2018 doi 10.1017/S136898001700307X

THE MILBANK QUARTERLY
A MULTIDISCIPLINARY JOURNAL OF POPULATION HEALTH AND HEALTH POLICY

Original Scholarship

Public Meets Private: Conversations Between Coca-Cola and the CDC

NASON MAANI HESSARI,* GARY RUSKIN,†
MARTIN McKEE,* and DAVID STUCKLER‡

*London School of Hygiene and Tropical Medicine; †U.S. Right to Know;
‡Dondena Research Center, Bocconi University

Hessari et al. Millbank Quartely, 2019

Opinion: Solving Childhood Obesity Requires Movement

By: Brenda Fitzgerald, MD | Apr 17, 2013

Brenda Fitzgerald, M.D., is Commissioner of the Georgia Department of Public Health (DPH) and State Health Officer.

We are facing an epidemic among our children in Georgia – obesity. The data is undeniable, and the message cannot be ignored. We must get our students moving, not only during the school day, but also after. Physical activity means higher test scores, increased attention in class and a healthier student population.

Our recent evaluation of nearly a million children in Georgia revealed that only 16 percent could complete five basic measures of physical fitness, and 20 percent could

ANOTHER SIP

More Calories

Rhona Applebaum
What Is Weighing Us Down? New Infographic Shows How Calorie Imbalance Impacts Us All

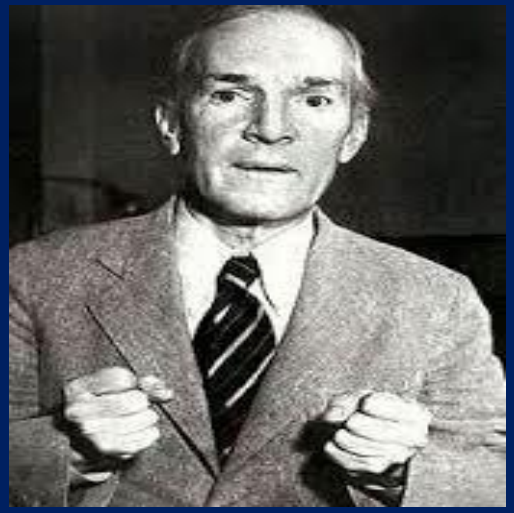
Ashley Callahan
Together for Good

Diana Garza Ciarlante
Together for Good in the Fight Against Obesity

EXPLORE JOURNEY

It is difficult to get a man to understand something,

when his salary depends on his not understanding it.

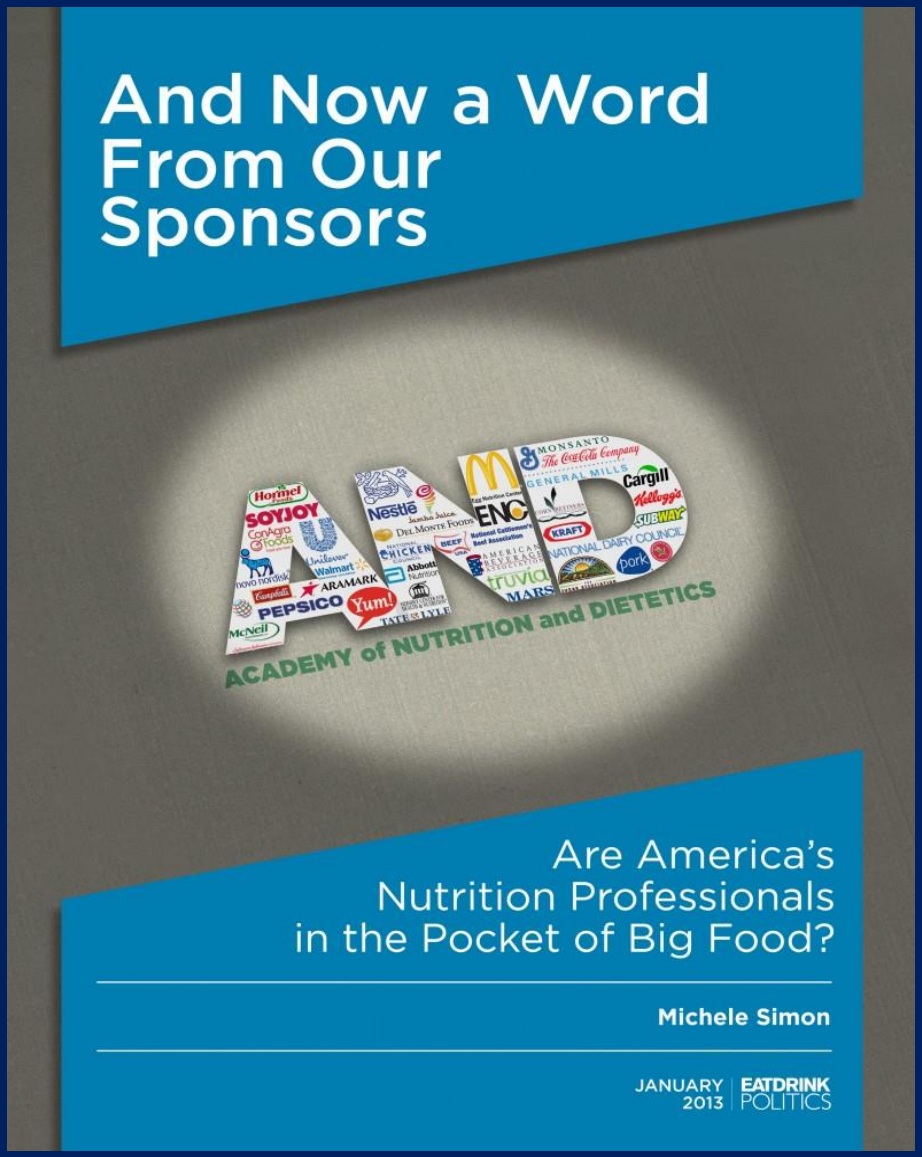


— Upton Sinclair
"I, Candidate for Governor:
And How I Got Licked", 1935

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists
- Co-opting critics

Conflicts of Interest



Conflicts of Interest

October 17, 2009
American Academy of Pediatrics (Washington, DC)
Welcome Reception *Sponsored by*

Conflicts of Interest

AAFP

American Academy of Family Physicians Launches Consumer Alliance With First Partner: The Coca-Cola Company

FOR IMMEDIATE RELEASE
Tuesday, October 06, 2009

RESEARCH ARTICLE

Sponsorship of National Health Organizations by Two Major Soda Companies

Daniel G. Aaron, BS,[1] Michael B. Siegel, MD, MPH[2]

Am J Prev Med epub
Oct 10, 2016

- Medical, Professional
- Government
- Industry Mouthpiece

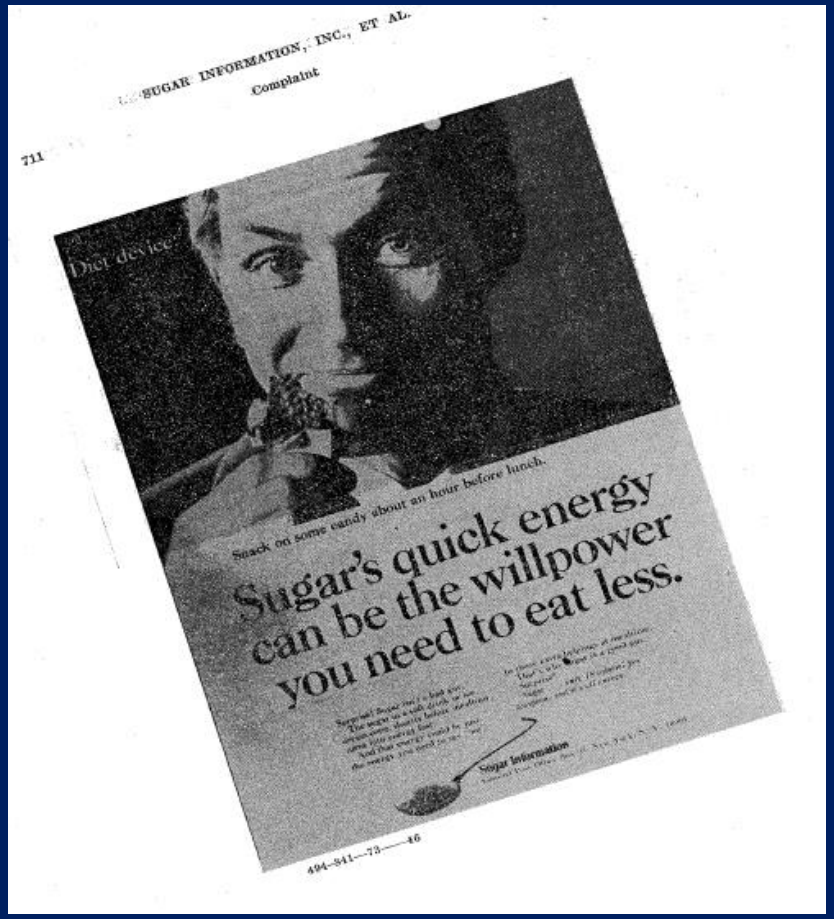
Feeding America	
Food Research and Action Center (FRAC)	
American Cancer Society (ACS)	Medical, Professional
American Diabetes Association (ADA)	Medical, Professional
Children's Miracle Network	
Cooperative for Assistance and Relief Everywhere (CARE USA)	
Juvenile Diabetes Research Foundation (JDRF)	Medical, Professional
National Breast Cancer Foundation	
Susan G. Komen for the Cure	
Centers for Disease Control (CDC)	Government
National Institutes of Health	Government
Health and Human Services (HHS)	Government
National Heart, Lung, and Blood Institute (NHLBI)	Government
National Institute of Child Health and Human Development (NICHD)	
American Academy of Family Physicians (AAFP)	Medical, Professional
American Academy of Pediatrics (AAP)	Medical, Professional
American College of Cardiology (ACC)	Medical, Professional
American College of Sports Medicine (ACSM)	Medical, Professional
American Lung Association	Medical, Professional
American Medical Association (AMA)	Medical, Professional
American Red Cross	
Association for Healthcare Foodservice	
Harvard Medical School	Medical, Professional
Human Rights Campaign Foundation	
Institute of Medicine	Medical, Professional
Medical University of South Carolina	Medical, Professional
National Association of Hispanic Nurses (NAHN)	
National Black Nurses Association (NBNA)	
National Dental Association	Medical, Professional
National Hispanic Medical Association (NHMA)	Medical, Professional
Pink Ribbon Story Foundation	Medical, Professional
Preventive Cardiovascular Nurses Association	
Satcher Health Leadership Institute	
100 Black Men of America, Inc.	
Academy of Nutrition and Dietetics (AND)	Medical, Professional
Active Trails (National Park Foundation)	
AIDS Walk	
America Scores	
American Council on Science and Health	
American Heart Association	Medical, Professional
American Society for Nutrition (ASN)	Industry Mouthpiece
AmeriHealth Caritas	
Arnold School of Public Health	
Asian American Federation	
Beth Israel/Harvard Obesity Conference	Medical, Professional
Black Girls RUN	
Boys & Girls Club of America	
Center for Food Integrity	
Childhood Obesity and Public Health Conference	

Concrete Safaris	
Congress for the New Urbanism	
Delta Citizens Alliance	
Education for a Better America, Inc.	
Emory University	Medical, Professional
Fan4Kids	
Food Science Policy Alliance	
Gameday Healthy Kids Foundation	
Girl Scouts of the USA	
Girls Inc. Mind + Body Initiative	
Global Summit on Physical Activity for Children	
Good Sports	
Habitat for Humanity	
Health Connect South	
Healthy Weight Commitment Foundation	
Hispanic Federation	
Hope Heart Institute	
Hudson Institute Obesity Solutions Initiative	
International Food Information Council	Industry Mouthpiece
International Life Sciences Institute North America	Industry Mouthpiece
International Positive Psychology Association	
Marathon Kids	
National Coalition for Women with Heart Disease	
National Foundation for Governors' Fitness Councils	
National Foundation on Fitness, Sports, and Nutrition	
National Organization on Disability (NOD)	
National Physical Activity Plan	
National Recreation and Parks Association	
National Urban League	
National 4-H Council	
Partnership for a Healthier America (sponsorship via Dasani/Aquafina)	
Project HELP (NAACP)	
Project Open Hand	
Rails-to-Trails Conservancy	
Recipe for Success Foundation	
Rippe Lifestyle Institute	
Save the Children	
Society for Nutrition Educators	
Special Olympics International	
Street Soccer USA, Inc.	
The Obesity Society (TOS)	Medical, Professional
U.S. Soccer Foundation	
United States Tennis Association	
University of Georgia Department of Foods and Nutrition	Medical, Professional
University of Washington Center for Public Health Nutrition	Medical, Professional
West Virginia University College of Public Health	Medical, Professional
YMCA	

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists
- Co-opting critics
- Weakening government oversight

Federal Trade Commission vs. Sugar Information, 1972



SUGAR INFORMATION, INC., ET AL.

Complaint

711

Diet device?

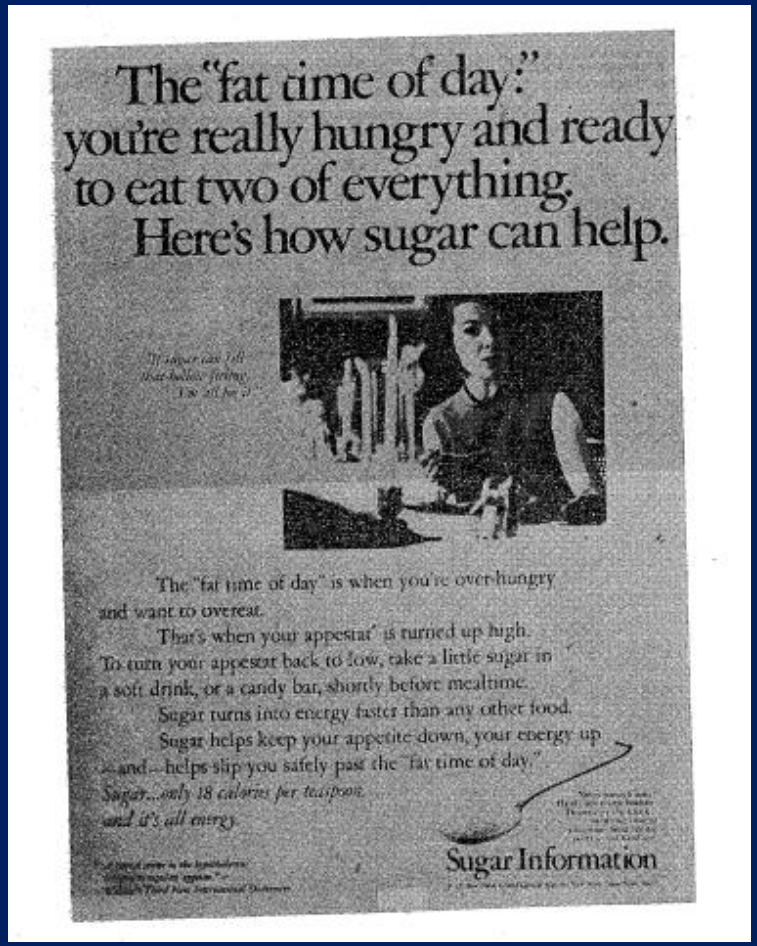
Snack on some candy about an hour before lunch.

Sugar's quick energy can be the willpower you need to eat less.

Sugar Information

494-841—73——46

Federal Trade Commission vs. Sugar Information, 1972



The "fat time of day":
you're really hungry and ready
to eat two of everything.
Here's how sugar can help.

The "fat time of day" is when you're over-hungry and want to overeat.

That's when your appestat* is turned up high.

To turn your appestat back to low, take a little sugar in a soft drink, or a candy bar, shortly before mealtime.

Sugar turns into energy faster than any other food.

Sugar helps keep your appetite down, your energy up ... and ... helps slip you safely past the "fat time of day."

Sugar...only 18 calories per teaspoon and it's all energy.

Sugar Information

The KidVid Debacle (1978-1981)

- The Federal Trade Commission initiated the "KidVid" rulemaking in 1978, seeking to regulate TV advertising to children through either a ban on all kid-targeted ads or a requirement that ads for sugared food products be "balanced" with disclosures about health and nutrition.

- This rulemaking ignited a political and regulatory firestorm.

- The FTC ended the proceeding in 1981.

- Congress enacted the FTC Improvements Act of 1980, which imposed important limits on the unfairness rulemaking authority of the commission, essentially “declawing” the agency.

- Istanbul, 2007:

  52 European health ministers voted to cease marketing of junk foods to children

- Los Angeles, 2007:

  Federal Communications Comissioner (FCC) Deborah Taylor-Tate: “I expect the food industry to police itself”.

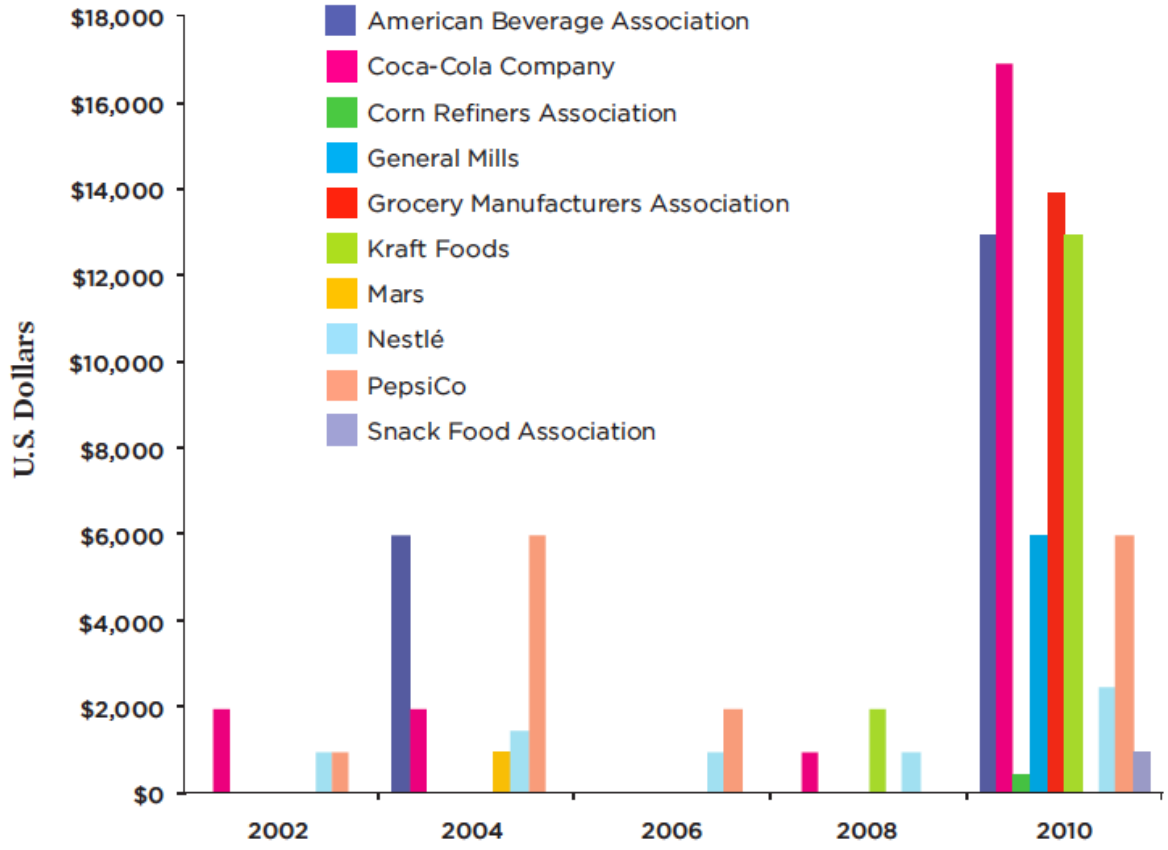
- Santa Clara and San Francisco, 2010:

  “Toy ban” on Happy Meals

- Nationally, 2012

  3 states passed “ban” on “toy bans”

FIGURE 3. Political Contributions to Blanche Lincoln, Chairman of the Senate Committee on Agriculture, Nutrition, and Forestry



thebmj

BMJ 2019;364:k5050 doi: 10.1136/bmj.k5050 (Published 9 January 2019)

FEATURE

Making China safe for Coke: how Coca-Cola shaped obesity science and policy in China

Susan Greenhalgh investigates how, faced with shrinking Western markets, the soft drink giant sought to secure sales and build its image in China

Susan Greenhalgh *John King and Wilma Cannon Fairbank research professor of Chinese society*

Department of Anthropology, Harvard University, Cambridge, MA, USA

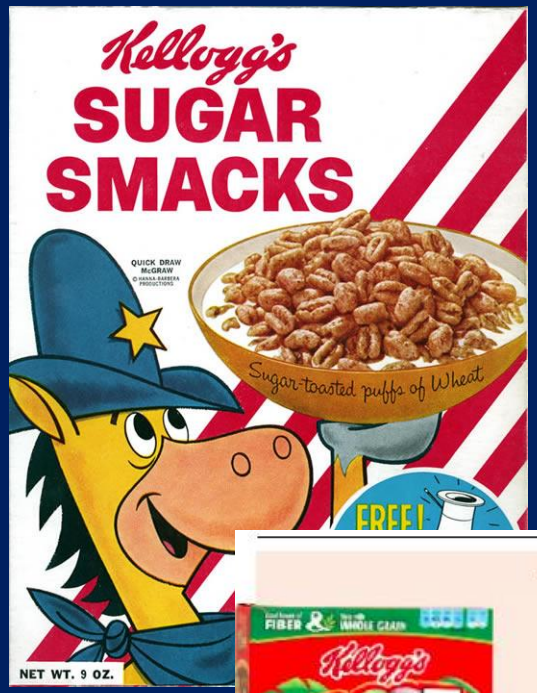
The New York Times

Research Details How Junk Food Companies Influence China's Nutrition Policy

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists
- Co-opting critics
- Weakening government oversight
- Market saturation


American Society of Nutrition
SUGAR SMACKDOWN
QUICK DRAW McGRAW
© HANNA-BARBERA PRODUCTIONS
Sugar-toasted puffs of Wheat
FREE!
"Magic Hat"
TRICK
on package back
NET WT. 9 OZ.



Of 1556 cereals, 88% had added sugar

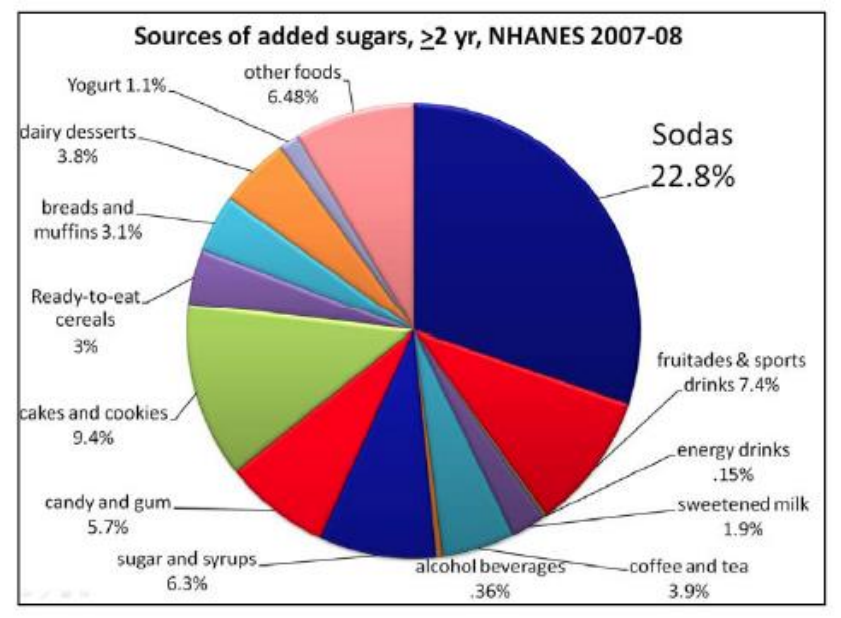
Of 181 children's cereals, all had added sugar

Not one of top 10 sugared cereals had lowered its sugar content between 2011 and 2014

Environmental Working Group, 2014

Where's the sugar?

1/3 in beverages
1/6 in desserts
½ hidden in foods that didn't used to have sugar
- **e.g. salad dressings**
- **yogurt**
- **tomato sauce, ketchup, condiments**
- **crackers, other carbohydrate products**



They've even saturated medicine!

They've even saturated medicine!

28% of U.S. Children's Hospitals have fast food venues.

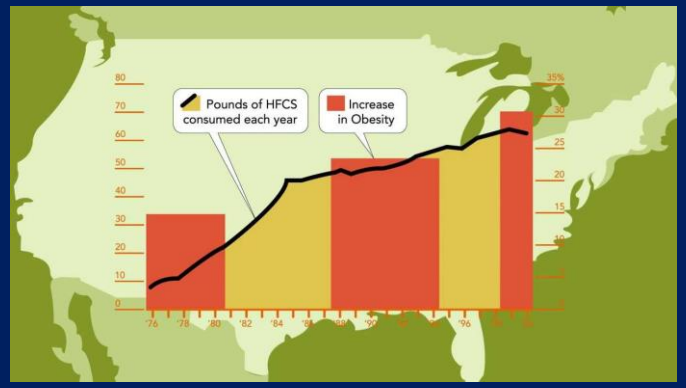
(Cafeteria in an American Children's Hospital)

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists
- Co-opting critics
- Weakening government oversight
- Market saturation
- Astroturf groups

Citizens for Health

- Non-profit
- Funded by the Sugar Association to take down High- Fructose Corn Syrup
- Exec. Director George Turner (special counsel to Senate Select Committee on Food, Nutrition, and Health and to the Senate Government Operations Subcommittee on Government Research)




IEA Discussion Paper No.62
SWEET TRUTH:
Is there a market failure in sugar?
By Rob Lyons and Christopher Snowdon
July 2015
iea
Institute of
Economic Affairs

- Government intervention in the market can only be justified if there is a market failure.
- Annual sugar consumption in Britain peaked several decades ago.
- There is insufficient scientific evidence to label sugar as addictive.
- There is insufficient evidence to suggest that a calorie from sugar is more fattening than a calorie from other foods.
- There is very little evidence of consumers being limited by choice in the food market.
- Some food campaigners may be unhappy about the kinds of choices consumers are making.
- Dietary information and sugar content is clearly marked on nearly all food products.
- A ban on television advertising for foods that are high in fat, salt or sugar before 9pm would effectively be a form of censorship.
- Limiting the availability of fast food outlets stifles competition.
- Taxes on food and soft drinks have been shown to be ineffective in reducing obesity.

Journal of Insulin Resistance
ISSN: (Online) 2519-7533, (Print) 2412-2785
AOSIS
Page 1 of 6 Commentary

The science against sugar, alone, is insufficient in tackling the obesity and type 2 diabetes crises – We must also overcome opposition from vested interests

Malhotra, Schofield, Lustig, JIR 2018

Similarly, in the United Kingdom, the Institute of Economic Affairs (IEA), an organisation that describes itself to be 'the UK's original free-market think-tank', claims to be independent of any political party, group or organisation. But in 2016, Transparify – which provides ratings of financial transparency of major think tanks – gave a 'highly opaque' zero score.

The IEA has received undisclosed voluntary donations from a number of organisations including Big American Tobacco, Coca-Cola Great Britain and Ireland, and sugar manufacturer Tate and Lyle.[64] As Transparify states[63]:

> The more lobbyists try to hijack the 'think tank' label in an attempt to mask their paid-for spin as research-driven advocacy, the more important it becomes for the think tank sector as a whole to fight back. The best weapon in that fight is transparency.

Methods used by the DARK FORCES

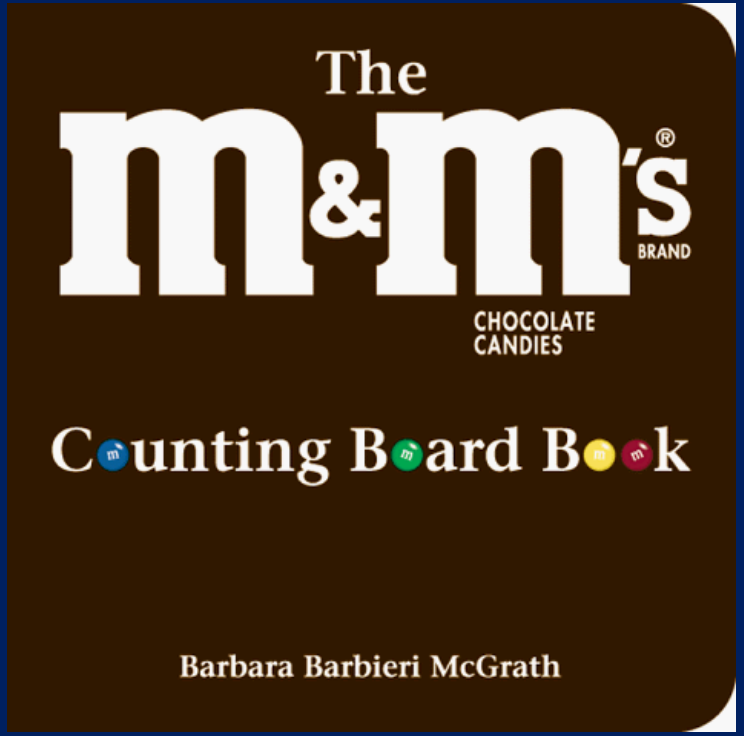
- Shoddy science
- Buying scientists
- Co-opting critics
- Weakening government oversight
- Market saturation
- Astroturf groups
- Marketing to children

Similarity to Tobacco

Food and SpongeBob Squarepants

M&M's, Hot Wheels and NASCAR

Educational Toys



Drinks are on us!

Publix is rewarding top grades with
free apple juice and soda.
Students, we salute your thirst for knowledge!

Limit one reward per student per grading period. Offer good through February 28, 2011.

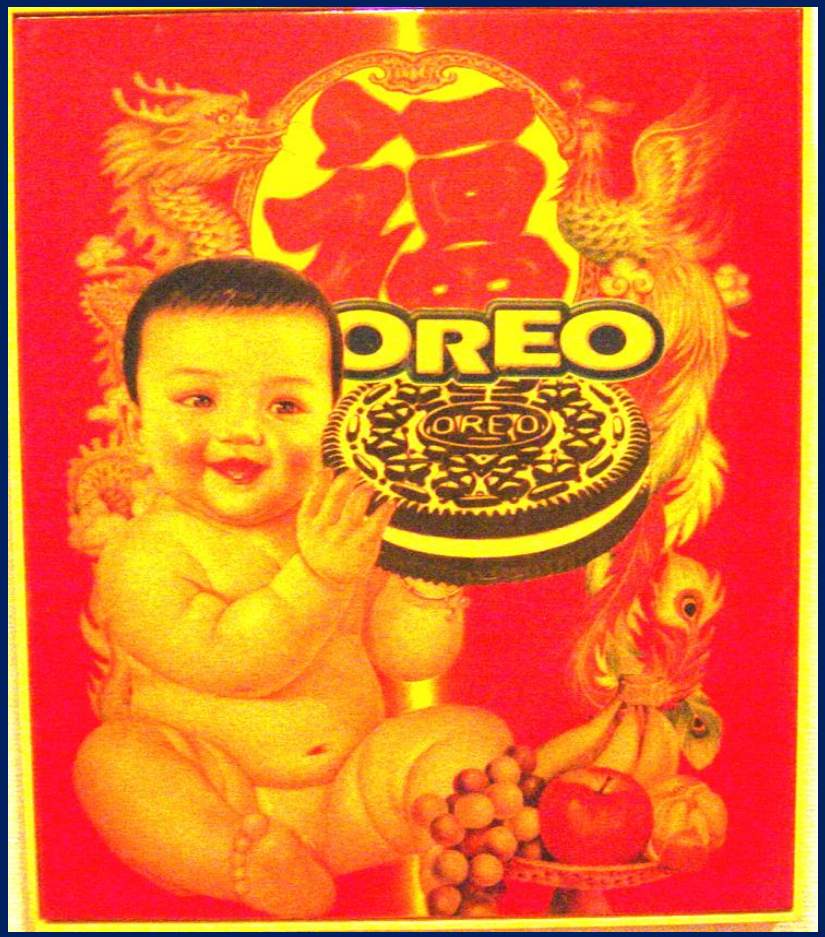
Publix
WHERE SHOPPING IS A PLEASURE®

Soft Drink Logos on Baby Bottles

The birth of the “Un-Cola”

It's a global marketing campaign…


可口可乐
Coca-Cola


OREO
OREO

…and the effect is global, too

Methods used by the DARK FORCES

- Shoddy science
- Buying scientists
- Co-opting critics
- Weakening government oversight
- Market saturation
- Astroturf groups
- Marketing to children
- Spyware and threats

The New York Times

Spyware's Odd Targets: Backers of Mexico's Soda Tax

Dr. Simón Barquera, the director of nutrition policy at Mexico's National Institute of Public Health, received disturbing text messages, as did others who were vocal proponents of Mexico's 2014 soda tax.
Adriana Zehbrauskas for The New York Times

By Nicole Perlroth

Feb. 11, 2017

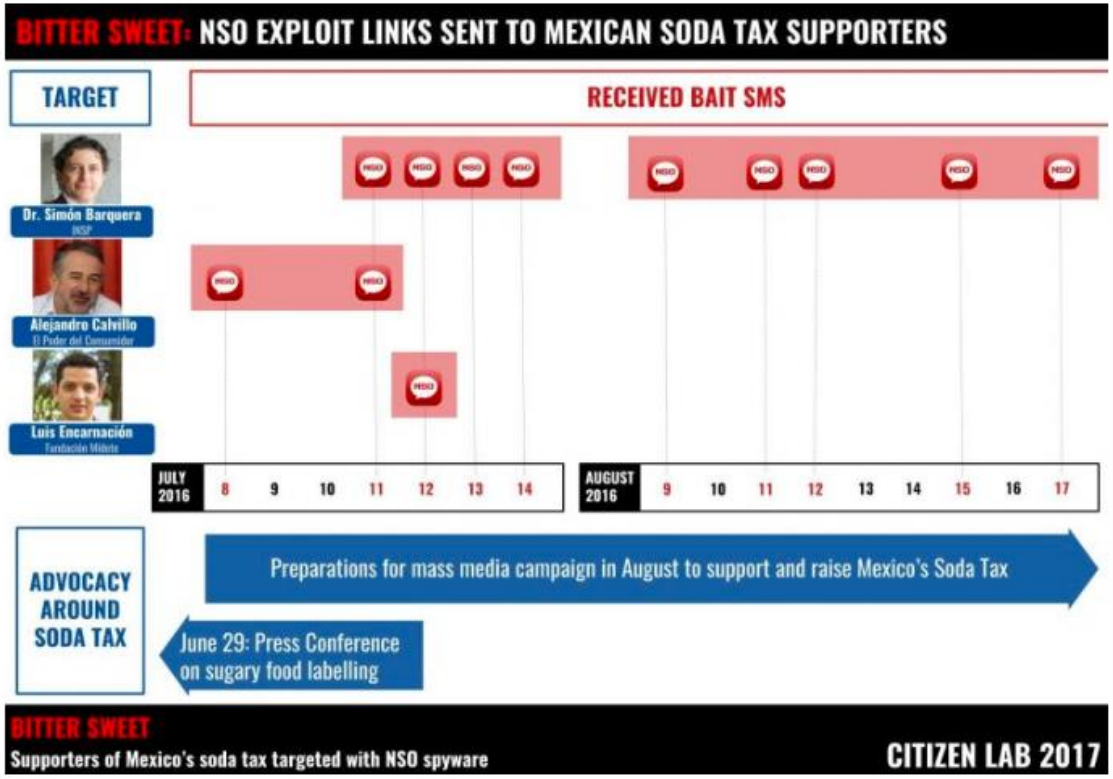


Figure 1. Dates in July 2016 when the three targets are known to have received malicious messages containing links to NSO's exploit framework. We may not have all of the messages sent to them.

Figure 2. SMS message sent to Dr. Simon Barquera, telling him that his daughter was in a serious car accident, and to click the link to learn about the hospital.

4. The solutions

The good news

FOOD
navigator-usa.com

DR LUSTIG: 'DESPITE THE FOOD INDUSTRY'S PROPAGANDA, PEOPLE NOW UNDERSTAND THAT 'A CALORIE IS NOT A CALORIE...'

IFIC Food & Health survey shows significant shift in consumer attitudes towards sugar, carbs

By Elaine Watson
08-Jun-2018 -

Dr Robert Lustig's mantra – that not all calories were created equal - appears to be resonating with more US consumers, with one third (33%) of Americans believing that sugars are the 'source of calories most likely to cause weight gain' compared with just 11% in 2011, according to a new survey.

2018 FOOD & HEALTH SURVEY

INTERNATIONAL
FOOD INFORMATION
COUNCIL FOUNDATION

FOODINSIGHT.ORG

Q: What Source of Calories is Most Likely to Cause Weight Gain? (n = 1009)

	2011	2018
Sugars	11%	33%
Carbs	9%	25%
Fat	14%	16%
Protein	2%	3%
All the same	40%	17%
Don’t know	24%	5%

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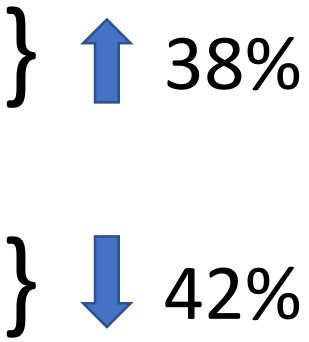

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	2011	2018
Sugars	11%	33%
Carbs	9%	25%
Fat	14%	16%
Protein	2%	3%
All the same	40%	17%
Don't know	24%	5%

} ↑ 38%

} ↓ 42%

A: 1. More people know a calorie is NOT a calorie
2. Processed food is the problem

THE WALL STREET JOURNAL.

http://www.wsj.com/articles/m-m-maker-wants-labels-for-added-sugar-1431057661

BUSINESS

M&M Maker Wants Labels for Added Sugar

Mars Inc. to support new guidelines limiting added sugar to 10% of calories

Unlike rivals, Mars Inc. supports guidelines that people should limit added sugar to 10% of daily calories. *PHOTO: AMY STROTH FOR THE WALL STREET JOURNAL*

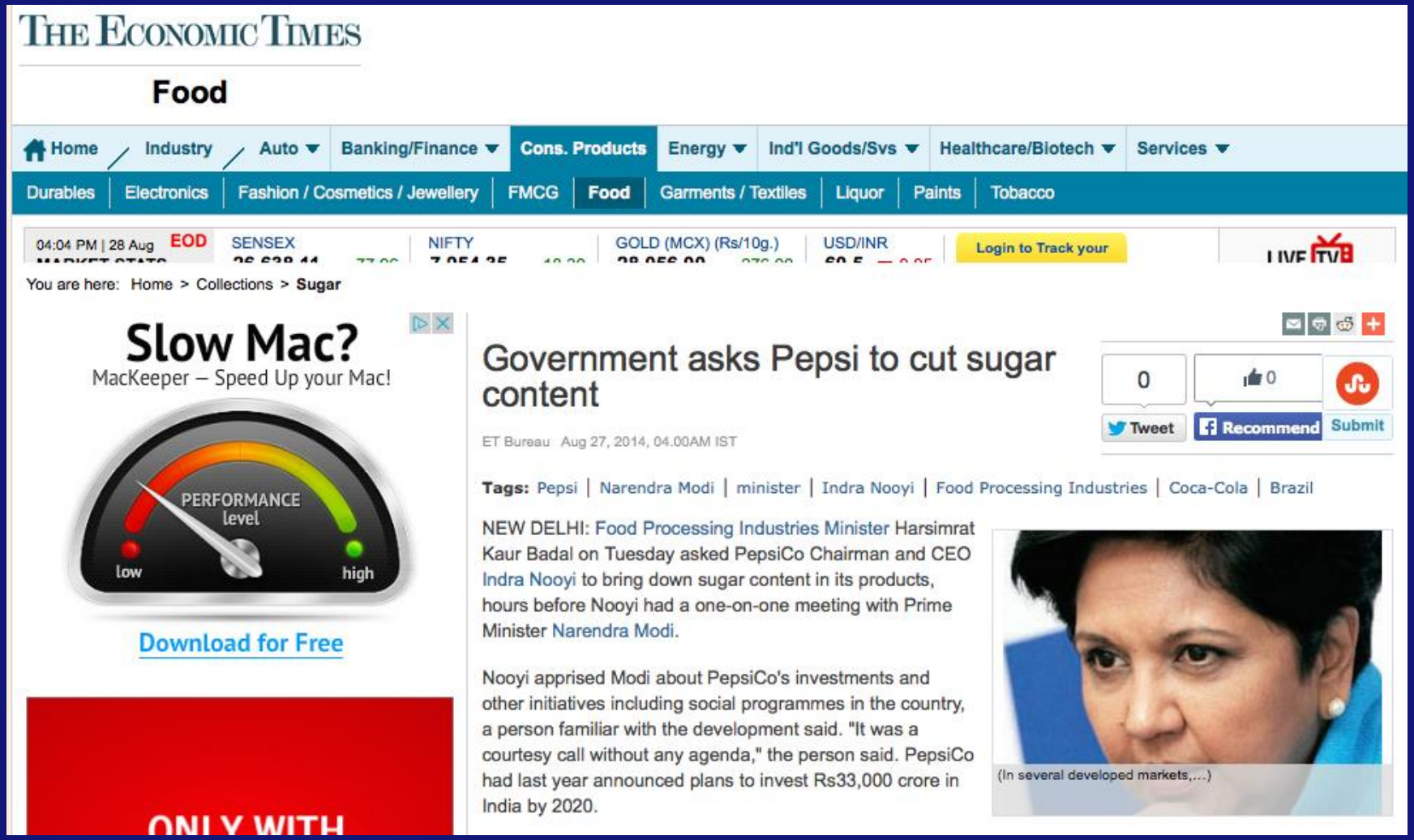
By ANNIE GASPARRO

May 8, 2015 12:01 a.m. ET

ADDED SUGARS. Mars supports the DGAC's recommendation that consumers reduce their added sugars intake to no more than 10% of daily energy intake. Further, Mars supports labeling and educational approaches, including added sugars labeling and off-label nutrition education…. At Mars, we believe it is time for all stakeholders – including industry – to engage in a constructive discussion that focuses on effective approaches to helping consumers manage their intake of added sugars.

And now Coke has too!

Governments are slowly responding



CREDIT SUISSE

September 2013

Research **Institute**

Thought leadership from Credit Suisse Research and the world's foremost experts

Sugar

Consumption at a crossroads

We believe higher taxation on "sugary" food and drinks would be the best option to reduce sugar intake and help fund the fast-growing healthcare costs associated with diabetes type II and obesity.

CREDIT SUISSE

September 2013

Research Institute

Thought leadership from Credit Suisse Research and the world's foremost experts

Health | Wed Nov 11, 2015 7:08pm EST

Related: HEALT

Diabetes experts tell G20 to tax sugar to save lives and money

BY BEN HIRSCHLER

Diabetes experts called on world leaders on Thursday to use sugar taxes to fight obesity, arguing such a move would save lives and slash healthcare budgets.

Ahead of a meeting of G20 leaders this weekend, the International Diabetes Federation (IDF) wants the dual epidemics of obesity and diabetes to be placed on the global agenda alongside major geopolitical and financial issues.

DIABETES UK
KNOW DIABETES. FIGHT DIABETES.

Forum Membership Professiona

Menu

Home › Living with diabetes › Enjoy Food › Eating with diabetes › You and yo

Sugar and diabetes

Sugar is a carbohydrate (carb) and is often found naturally in food.

With Type 2 diabetes, we know sugar doesn't directly cause it, but you are more likely to get Type 2 diabetes if you are overweight. Sugary foods and drinks contain a lot of calories and you will gain weight if you eat or drink more than your body needs. Find out more about cutting down on sugar.

Conflicts of Interest

Diabetes UK's £500,000 tie-up with sugar giant

Jon Ungoed-Thomas and Suzie Barrett | The Sunday Times

November 24 2018, 6:00pm, The Times

Pepsi is one of the brands sold by Britvic, the soft drinks giant

GETTY IMAGES

Budget 2016

George Osborne unveils sugar tax in eighth budget as growth forecast falls

- Proceeds of levy on soft drinks to fund school sports
- Cuts to business rates, capital gains and corporation tax
- Income tax personal allowance increased
- Growth forecast down from 2.4% to 2%

Katie Allen, Anushka Asthana and Rowena Mason

Wednesday 16 March 2016 10.58 EDT

Osborne announces soft drinks sugar tax and tax-free personal allowance - budget highlights video

George Osborne has unveiled a new tax on sugary drinks, such as Coca-Cola, Red Bull and Irn Bru, pledging to use the takings to provide more sports funding for schools.

Health

Tax on sugary foods and drinks backed by World Health Organisation

7 hours ago | Health

Share

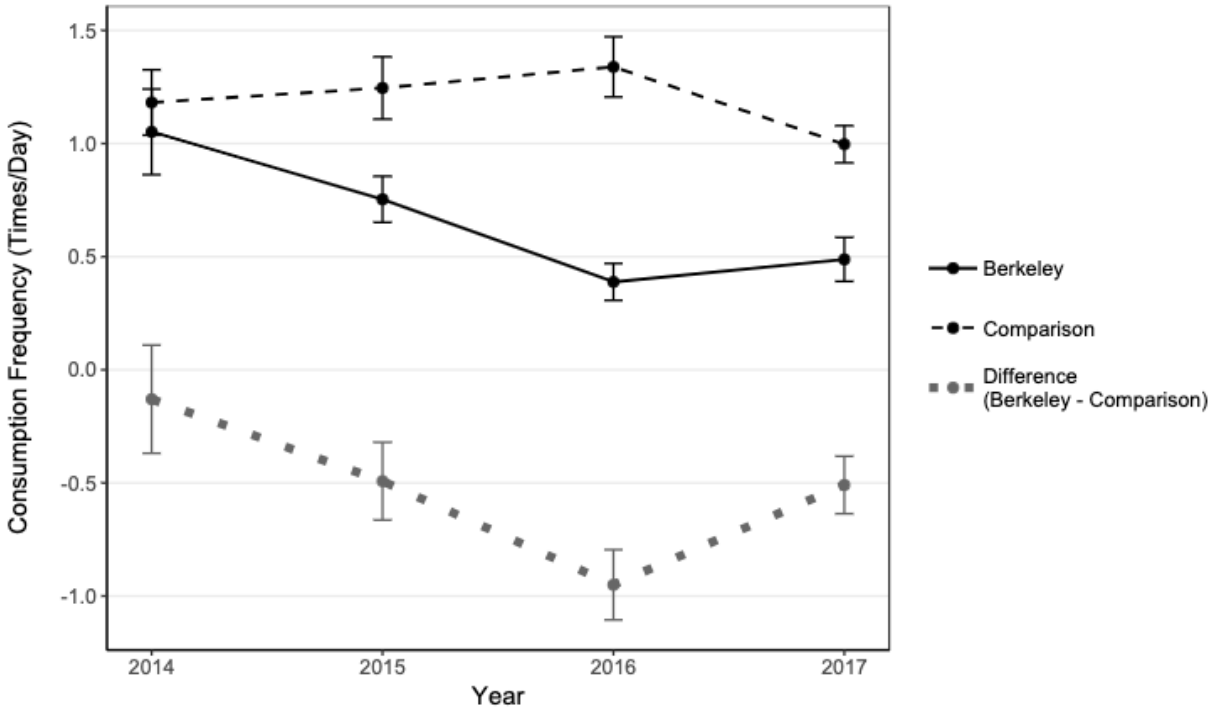
AP

A new report claims a price increase of 20% or more will lower sugar consumption from soft drinks

The World Health Organisation (WHO) has added its support to countries which place a "sugar tax" on soft drinks.

Efficacy of the Berkeley Soda Tax
3 years since inception

Figure 1: Adjusted within-group frequencies and between-group differences in sugar-sweetened beverage consumption, 2014-2017



Lee et al. Am J Public Health epub April, 2019

Sugary Beverage Taxes– World

Barbados
Chile
Dominica
Fiji
Finland
France
French Polynesia
Hungary
Ireland
Mauritius
Mexico
Nauru
Norway
Philippines
Portugal
Samoa
Saudi Arabia
South Africa
Tonga
United Arab Emirates
United Kingdom
USA

Question 1:

Can our “toxic environment” be changed without government/societal intervention? Especially when there are potentially addictive substances involved?

Question 2:

Can we afford to wait to enact public health measures when healthcare will be bankrupt due to chronic metabolic disease?

Advancing the public health

- Public education about REAL FOOD
- Business and insurance
- Government agency action
- Legal recourse

Conclusions

This is an oral and systemic public health crisis,
because it is the same “exposure”, even in normal weight people

Processed food is the vehicle, fructose is the payload

The food industry has adulterated our food supply for profit

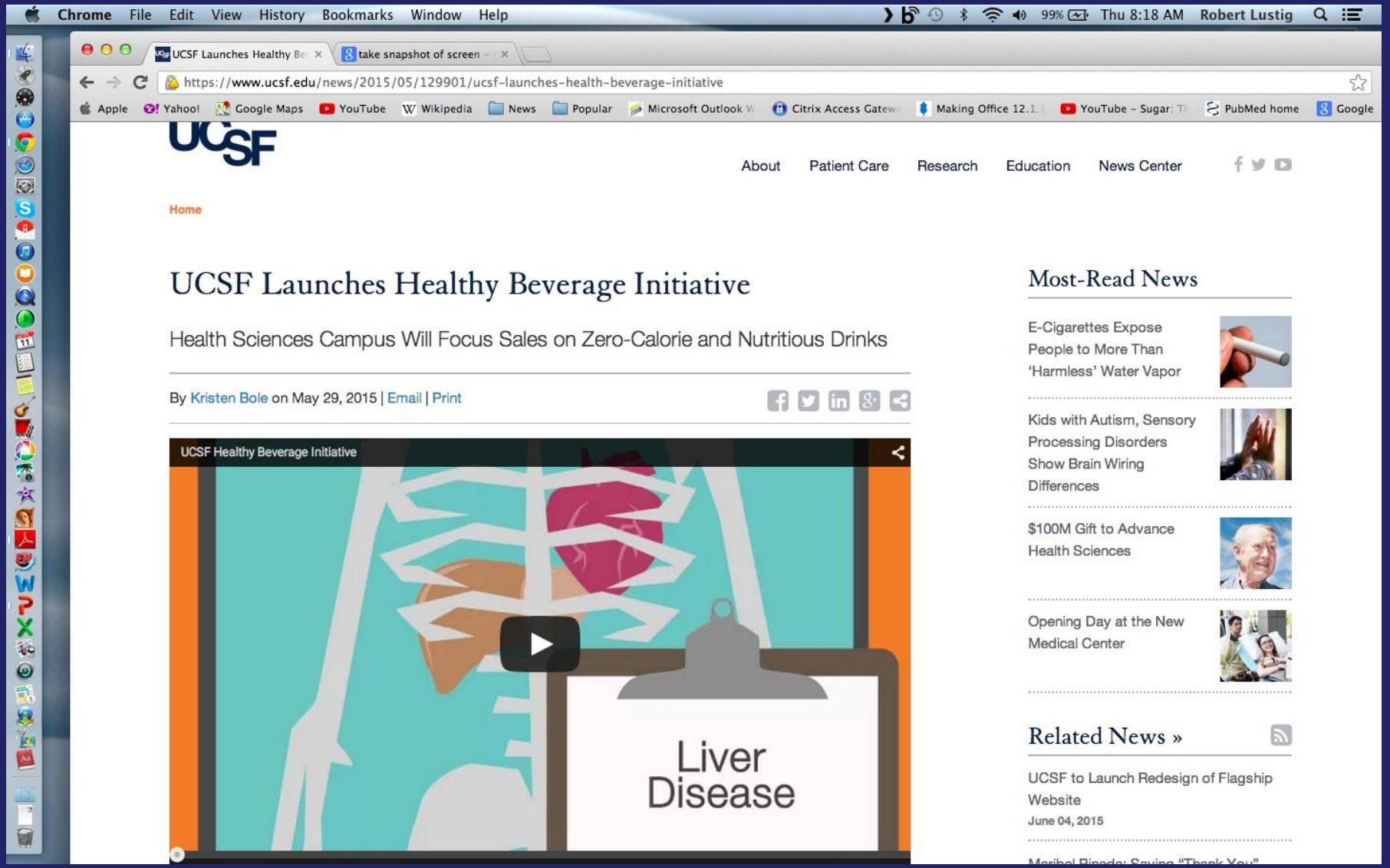
The industry has bought off scientists and co-opted critics

Most of the checks and balances have been eroded

Government has been complacent, and in some cases complicit

Our best chances: public education, business, legal action

Proposal #1
UCSF Healthy Beverage Initiative



NHS set to ban sale of sugary drinks and fatty snacks in hospital cafes and canteens

Proposal #2

Type 2 Diabetes should be renamed:

PROCESSED FOOD DISEASE

Proposal #3

Rollback the subsidies for processed food:

CORN
WHEAT
SOY
SUGAR

Proposal #4

Eat REAL
(Responsible Epicurean and Agricultural Leadership)
<eatreal.org>

SUGARSCIENCE.ORG

Outdoor

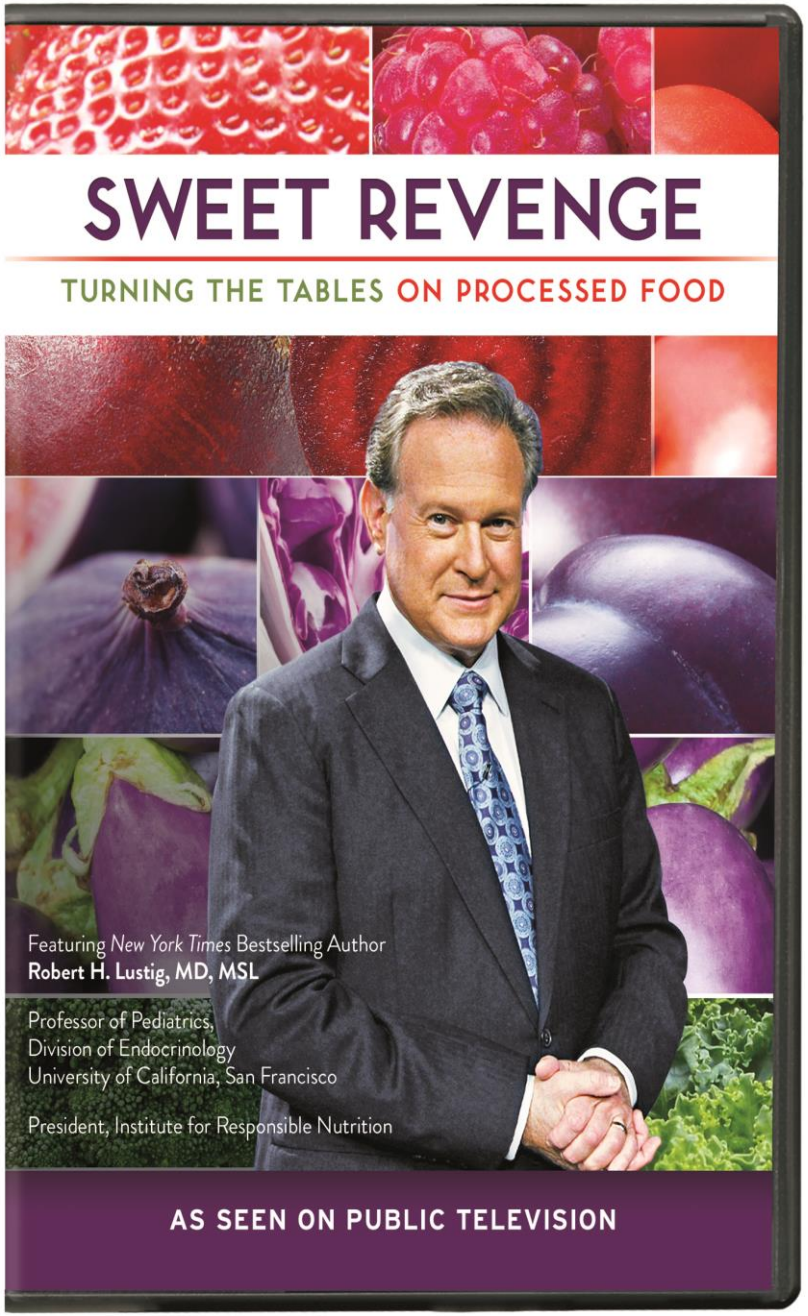
FED UP

A FILM BY STEPHANIE SOECHTIG

sundance

Fed Up blows the lid off everything we thought we knew about food and weight loss, revealing a 30-year campaign by the food industry, aided by the U.S. government, to mislead and confuse the American public, resulting in one of the largest health epidemics in history.


Sugar Coated
HOW THE FOOD INDUSTRY SEDUCED THE WORLD ONE SPOONFUL AT A TIME


SWEET REVENGE
TURNING THE TABLES ON PROCESSED FOOD
Featuring New York Times Bestselling Author
Robert H. Lustig, MD, MSL
Professor of Pediatrics,
Division of Endocrinology
University of California, San Francisco
President, Institute for Responsible Nutrition
AS SEEN ON PUBLIC TELEVISION