Obesity, Metabolic Syndrome, and Diabetes
Paul Chous ~ Kimberly Reed ~ Stuart Richer
Ocular Nutrition Society presentation
Optometry’s Meeting 2014

Self-Reported Obesity Among U.S. Adults in 2012

Source of the Data
The data were collected through the Behavioral Risk Factor Surveillance System (BRFSS), an ongoing, state-based, telephone interview survey conducted by CDC and state health departments. Height and weight data are self-reported.

http://www.cdc.gov/obesity/data/adult.html

Goals of Presentation
• Review current statistics and trends in obesity in the U.S.
• Understand the psychosocial and economic impact of obesity
• Understand the pathogenesis of metabolic syndrome and diabetes
• Recognize the role of sugars in the diabesity epidemic
• Learn about nutritional interventions in diabetes

Self-Reported Obesity Among U.S. Adults in 2012

Definitions
• Obesity: Body Mass Index (BMI) of 30 or higher.
• Body Mass Index (BMI): A measure of an adult’s weight in relation to his or her height, calculated using the adult’s weight in kilograms divided by the square of his or her height in meters.

Self-Reported Obesity Among U.S. Adults in 2012

BRFSS Methodology Changes Starting in 2011
• Use of a new sampling frame that includes both landline and cell phone households
• Use of a new weighting methodology to provide a closer match between the sample and the population

Exclusion Criteria Used Starting in 2011
Records with the following are excluded:
• Height: <3 feet or ≥8 feet
• Weight: <50 pounds or ≥650 pounds
• BMI: <12 kg/m² or ≥100 kg/m²
• Pregnant women
Self-Reported Obesity Among U.S. Adults in 2012

- No state had a prevalence of obesity less than 20%.
- Nine states and the District of Columbia had a prevalence between 20–<25%.
- Thirteen states (Alabama, Arkansas, Indiana, Iowa, Kentucky, Louisiana, Michigan, Mississippi, Ohio, Oklahoma, South Carolina, Tennessee, and West Virginia) had a prevalence equal to or greater than 30%.

https://www.cdc.gov/obesity/data/adult.html

2013: Highlights

- In 2013, obesity rates remained level in every state except for an increase in Arkansas.
- Of the states with the 20 highest rates, only Pennsylvania is not in the South or Midwest.
- Mississippi is no longer at the bottom of the barrel — Congratulations, Louisiana!
- Colorado remains the state with the lowest reported obesity level.

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Prevalence* of Self-Reported Obesity Among U.S. Adults

BRFSS, 2011

*Prevalence reflects BRFSS methodological changes in 2011, and these estimates should not be compared to previous years.

Prevalence* of Self-Reported Obesity Among U.S. Adults

BRFSS, 2012

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CALCULATING THE RISK OF BECOMING OBESE
REGARDS Obesity Risk Calculator

- Estimates an obese individual's average risk of death over 5 years
- UAB School of Public Health

Parameters captured

- Age
- Gender
- Smoking status
- Alcohol use
- Diabetes
- Income
- H/O coronary artery disease
- Physical activity
- Use of physician services
- Systolic BP
F as in Fat: 2013

- Collaboration of the Trust for America’s Health and the Robert Wood Johnson Foundation
- Supported by a grant from RWJ Foundation
- Non profit, non partisan

- Obesity varies by age:
  - Highest in baby boomers
  - Lowest in 18-to-25 year olds
- Obesity varies by education:
  - >35% obesity in adults who did not graduate HS
  - <22% in college or tech college grads
- Obesity varies by income
Economic Factors

- Current cost of obesity?
  - $147-210 BILLION per year
- Job absenteeism related to obesity costs?
  - $4.3 billion per year

Physical Inactivity and Obesity
Alere Well Being

Obesity Cost Calculator

For an office with 10 eligible employees and their (7) adult dependents:

- On average, 5 will be overweight
  - Medical costs: $800
  - Productivity Costs $330 (Total $1129)
- On average, 3 will be obese cat 1
  - $2581
- 1 will be obese cat 2
  - $1455
- 1 will be obese cat 3
  - $1494

The Stigma of Obesity

- Estimates suggest that prevalence of weight discrimination has increased by 66% over the past decade
- On par to prevalence rates of racial discrimination in the U.S.
- Discrimination serves to impair disease prevention efforts and increase health disparities
- Weight stigma increases, rather than decreases, poor health consequences

“Diet” Failure and increased adiposity
What does the literature tell us?

- Atkins
- South Beach
- Weight Watchers
- The BL diet
- Zone
- Paleo/caveman
- Low-fat
  - LEARN
  - Ornish
- Vegetarian
- Raw
- Meal delivery plans
- Mediterranean
- Intermittent fasting
- HCG
- VLCD
- Based on food intolerances

High Intensity Interval Training

- Tabata, “new intervals,” several other nicknames
- Alternating short bursts of all-out work with periods of rest
- Interval periods and duration vary
- Wingate Protocol
  - 30 seconds of cycling at max effort (90% VO2)
  - 4 minutes of recovery
  - 4-6 times per session, 3x/week

The best diet for long term success is.....

- The one that you can stick to
- 2014 ranking on USNews.....
  - Vegan and Atkins tied for sixth place
  - Both ranked “Best” for long term success
  - WW ranked highest
- Lipid metabolism likely improved with Atkins
- Glycemic control likely improved with Mediterranean (#15)

Findings for HIIT

- Reduces subcutaneous fat
- Reduces abdominal fat and total fat
- Reduces total body max
- Improves Vo2max

And what about exercise?

- Accounts for 10% of weight loss in typical programs, on average
- 60-200+ plus minutes per week
- Weight training, ‘cardio,’ heart-rate driven, moderate intensity on average

Findings for HIIT

- Improves insulin sensitivity
- Burns more calories and increases postexercise fat burn more than steady state exercise
- Reduces total and LDL cholesterol
- Increases HDL cholesterol more than CME
Findings for HIIT

• Reduces blood pressure
• Improves lipid profiles
• Improves endothelial function
• Improves left ventricular myocardial function

Findings for HIIT

• Improves insulin signaling
• Increases mitochondrial capacity in T2 DM
• Improves glucose tolerance in T2 DM
• “Very safe” in a controlled environment

Weston conclusions

• HIIT improves critical Vo2max by 50% over continuous training
• Why does this matter?
• People with better Vo2 max levels have better survival rates irrespective of other risk factors

Weston et al, Br J Sports Med Online
First, October 2013

<table>
<thead>
<tr>
<th>Study</th>
<th>MD (95% CI)</th>
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<tbody>
<tr>
<td>Freyssen (2012)</td>
<td>2.89 (0.01, 5.51)</td>
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<tr>
<td>Fu (2013)</td>
<td>3.6 (0.15, 7.35)</td>
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<tr>
<td>Inbar (2013)</td>
<td>0.1 (-0.19, 7.35)</td>
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<tr>
<td>Moholdt (2009)</td>
<td>2.79 (1.18, 6.58)</td>
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<tr>
<td>Mölden-Hanssen (2012)</td>
<td>5.70 (4.68, 10.72)</td>
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<tr>
<td>Reijka (2007)</td>
<td>-1.20 (-4.39, 2.53)</td>
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<tr>
<td>Rampino (2004)</td>
<td>3.00 (4.06, 12.30)</td>
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<tr>
<td>Shyane (2008)</td>
<td>2.80 (-1.85, 6.45)</td>
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<tr>
<td>Tjonna (2008)</td>
<td>3.70 (-5.09, 13.36)</td>
</tr>
<tr>
<td>Weisz (2007)</td>
<td>4.69 (1.52, 8.87)</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>3.93 (2.00, 4.87)</td>
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Heterogeneity: $I^2 = 9.90\%$, $P = 0.36$
Test for overall effect $Z = 5.75$, $P = 0.001$

DIABETES UPDATE
Can We Do More to Prevent Ocular Complications?
A. Paul Chous, MA, OD, FAAO
Tacoma, WA

27 million Americans have diabetes
8 million Americans with diabetes haven’t yet been diagnosed
79 million more are at high risk

U.S. News
The Diabetes Epidemic
A killer disease—how diet and exercise can help treat it
2 MILLION NEW CASES/yr!
By 2030

500,000,000 People Will Have Diabetes

The Best Way To Prevent Vision Loss From Diabetic Retinopathy

Don’t Get Diabetes....

DR – some real numbers

- Pooled analysis from almost 23k with DM
  - 34.6% prevalence for any DR
  - 6.96% for PDR
  - 6.81% for DME
  - 10.2% for Vision Threatening DR (PDR and/or DME)
  - All DR end points increased with DM duration, A1c & BP
    - Higher in people with T1DM compared w T2DM
  - Worldwide: 93M w DR, 17M PDR, 21M DME, 28M VTDR


What Drives The Diabetes Epidemic?

- Rising rates of obesity, NAFLD & insulin resistance
- Poor nutrition & malnutrition
- Declining physical activity

What This Means for the US

- 9.65 million with any DR
- 2.85 million Americans with Sight-threatening diabetic retinopathy

Diet to Prevent Diabetes

High adherence to a Mediterranean-type diet reduced the risk for Dx of T2DM by 83% over 53 months compared to low adherence, after adjusting for other risk factors in healthy 23-55 yo

BMJ. 2008 Jun 14;336(7657):1348-51

- Ad libitum Med Diet in older pts (55-80 yo) at high CV risk reduced diabetes risk by 52% at 4 years vs ad libitum low fat diet

What Diet Is Best to Prevent DM?
- Multiple observational studies link high meat intake to more diabetes
- FFQ of 41,387 patients showed lowest risk for vegans, especially in African-Americans – hazard ratios:
  - Vegan: 0.43 Non-Black Race
  - Lacto-ovo Vegetarian: 0.68
  - Vegan: 0.30 Black Race
  - Lacto-ovo Vegetarian: 0.47

*Nutrition, Metabolism & Cardiovascular Diseases. 2013;23:292-299*

Too Many Calories, but…..

Not All Calories Are The Same

Sugar Availability and Increased Diabetes

Myth or Fact?
High Sugar Intake Causes Diabetes?

Econometric analysis of 175 countries

Every 150kcal/person/day sugar consumption increases population diabetes prevalence 1.1%

Equivalent to 1 can of soda per day

Are All Calories Equal?

**NO!!**

- Fructose forms intra-hepatic fat and AGEs at a higher rate than does glucose
- Fructose and HFCS raise uric acid & are causally linked to diabetes and Met Synd


Is There Anything More We Can Do?

**SERIOUSLY?**

THAT’S ALL YOU GOT?

WHO 2014 Recommendations for Sugar Consumption

- Added sugars, sugar from fruit juices & honey should be less than 5% of total calories
- **≤ 25 grams/day**

3 gm 24 gm 40 gm

WHO Guideline: Sugar intake for adults and children, March 5, 2014

What Causes DR?

- Oxidative Stress
- Diabetic Retinopathy
- Neovascularization
- Macular Edema
- STR

But what if I’ve already got diabetes?

- Keep blood glucose, blood pressure and blood lipids as close to normal as possible
- Get annual dilated retinal examinations
- Get treatment if/when you develop STR

For more information, visit the American Diabetes Association and American Association of Clinical Endocrinologists.
Diabetes & DR Affect Visual Function

- Snellen visual acuity is a 150+ yr old test that does not always reflect real world visual function
- DM/DR also impair: color perception, contrast sensitivity, visual field sensitivity

Diabet Med. 2011 Jul;28(7):965-71
BJO 1996;80: 209-13
ICVS 1997; 38(9): 1819-24

Diabetic Visual Function Supplement Study (DiVFuSS)

- 6 month placebo-controlled RCCT of adults with T1DM or T2DM ≥ 5 years
- With and without retinopathy
- Daily use of a multi-component nutritional supplement
- Contrast sensitivity, color vis., macular perimetry, OCT, A1c, lipids, 25(OH) vit. D, TNF-a, hsCRP, DPNS

ClinicalTrials.gov Identifier: NCT01646047

A Few DiVFuSS Components

- The lipophilic vitamin B1 analog, benfotiamine, normalizes harmful glucose metabolites implicated in DR (AGEs, PKC, hexosamine, sorbitol)
- Curcumin normalizes retinal oxidative stress and VEGF, improves clearance of AGEs
- A patented extract of French Maritime Pine bark (Pycnogenol) lowers HbA1c & BP, inhibits MMP implicated in BRB breakdown and reduced retinal thickening in humans with DME
- Higher serum lutein & zeaxanthin associated with 65% lower risk of DR


Animal Model of DR

- DiVFuSS formula blocked early mitochondrial damage in diabetic rats
- DiVFuSS formula blocked retinal capillary apoptosis underlying DR
- DiVFuSS formula improved electroretinogram findings (retinal function)

DiVFuSS Unmasked

First 46 subjects to complete trial
Subject Characteristics (n = 46)

- 31-79 yo (mean = 56 yrs)
- 25 with NPDR & 21 with no DR
- 18 T1DM & 28 T2DM
- HbA1c range 5.8 to 9.3% (mean 7.4%)
- Mean A1c in those with DR = 7.8%
- Mean A1c in those with no DR = 7.1%
- Diabetes duration 5-52 years (mean 21.2 yrs)
- Mean 23.4 years in those with DR
- Mean 14.7 years in those with no DR

No statistically significant differences at baseline between S and P groups

DiVFuSS Unmasked Data

\[ \Delta \text{ from baseline} \]

<table>
<thead>
<tr>
<th></th>
<th>Supplement versus Placebo</th>
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<tbody>
<tr>
<td>Contrast:</td>
<td>+31%</td>
</tr>
<tr>
<td>Color Error Score:</td>
<td>-50%</td>
</tr>
<tr>
<td>5-2 MD:</td>
<td>+1.1 dB</td>
</tr>
<tr>
<td>hsCRP:</td>
<td>-65%</td>
</tr>
<tr>
<td>HbA1c:</td>
<td>-4%</td>
</tr>
<tr>
<td>OCT mean NFL:</td>
<td>unchanged in both groups</td>
</tr>
</tbody>
</table>

For contrast, color, visual field, hsCRP, p < 0.02

Summary of Early Findings in Human Subjects

- DiVFuSS formula significantly improved visual function, including contrast sensitivity, visual field sensitivity and color perception
- DiVFuSS formula significantly reduced hsCRP and DPN scores

Final Thoughts

- Diabetes and DR rates continue to grow at alarming rates
- Preventing DM (and DR) by reducing added sugars (especially HFCS) will save lives, vision and a lot of money
• Though improved metabolic control has a major impact on incidence of DR, many patients do not achieve this goal.

• Targeting the pathways that drive DR with science-based supplements makes biologic sense.

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Defining the Problem

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Added sugar, like excess alcohol is the problem
• 600,000 grocery items
• 80% have added sugar (sucrose, HFCS)

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Thank You!
Sugar (hfcs): The Bitter Truth
(a CALORIE IS NOT A CALORIE)

It's about hepatic fat (fatty liver disease) and metabolic dysfunction

Veteran Diabesity Epidemic

- ETOH
- PTSD
- SMOKING

EAT!

ADDICTION - exorphins (candida overgrowth)
- Sugar, HFCS
- Fe+ and gluten laden Carbohydrates
- Artificial sweeteners
- DYSBIOSIS & Candida overgrowth

http://experiencobaja.com/mexicos-soda-wars/

And HFCS is 7x more destructive to the liver than glucose

Sickingly Sweet
56 types of sugar & HFCS are the hidden vector for the "metabolic syndrome " epidemic

http://www.in5d.com/high-fructose-corn-syrup-side-effects.html

http://experiencebaja.com/mexicos-soda-wars/

http://hypnosishealthinfo.com/skinny-obesity-ep-2/

Why this matters

www.cravingsugar.net

“Obesity doesn’t cause metabolic dysfunction – it is the marker of metabolic dysfunction” - Robert Lustig, MD

Metabolic Syndrome

http://carbsanity.blogspot.com/2012/05/review-critique-skinny-on-obesity-part.html

“Modern” Medicine

Where are you when we need you to pressure the USDA to label processed food accurately for sugar and HFCS content?

Inclusive view of obesity & metabolic dysfunction (Robert Lustig, MD)

– 124 million Americans are sick with fatty liver disease (metabolic dysfunction)

SOLUTIONS
Eliminate Brain Fog
(read these physician authored books)


DOCTOR THYSELF
Fewer refined carbohydrates and increase plant food w vitamins, minerals and fiber

http://doctorthyself.com/images.png

BONUS – VITAMINS / MINERALS & BETTER HEALTH

14 Nutrients Most Lacking in U.S. Diet

- Zinc = 73.3 %
- Calcium = 65.1 %
- Magnesium = 61.6 %
- Vitamin A = 56.2 %
- Vitamin B6 = 53.6 %
- Iron = 39.1 %
- Vitamin C = 37.5 %
- Folate = 33.2 %
- Vitamin B1 = 30.2 %
- Vitamin B2 = 30.0 %
- Vitamin B3 = 25.9 %
- Protein = 20.5 %
- Vitamin B12 = 17.2 %

* Percentage of All Individuals (2 yrs & older) Not Meeting 100% of 1989 RDAs in US (1994-96)

Pharmanex Biophotonic® Scanner
Surrogate Measure of Plant Food Consumption

The 83 Scanner

Measures Antioxidant Density in Tissue
Utilizes iPad technology
Battery Powered

Nutritional Supplements for low intake and health challenges – especially the poor

% body fat matters
Controlling Sugar / Carb Craving in a stressful world is key

www.cravingsugar.net

urine organic acids test for candida

Elevation of yeast metabolites such as tartaric acid and arabinose are found in many of the same disorders and are even more common in autism, SLE, Alzheimer’s disease, fibromyalgia, attention deficit hyperactivity, and chronic fatigue syndrome.

Kat James
Total Transformation® programs
www.informedbeauty.com

Conquer these twins
• Insulin Resistance
• Leptin Resistance

controlling chronic candida infection after nystatin tx
(urine organic acids test to diagnose)

Decrease systemic candida load Re-establish gut bacterial balance

Combating Thrush & Sugar Craving

http://allencentre.wikispaces.com/Dinolite+Bird+Tongues
http://allencentre.wikispaces.com/Bug/inf/Thread

Health Promoting Sugars

Similar to Tagatose Med for Diabetes With Magnesium for anxiety