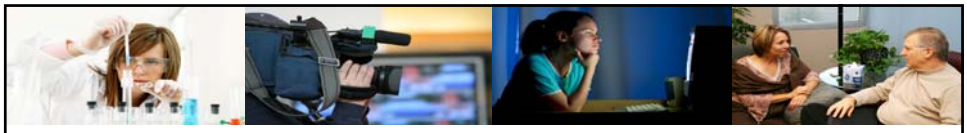


From Bench To Broadcast: Putting Research into Perspective

Adam Drewnowski, PhD
Hope Warshaw, MMSc, RD, CDE
Webinar
January 2010

Session Goals

- **Provide working knowledge of common research designs in nutrition and health studies.**
- **Provide an analytical approach to review, interpret and integrate nutrition and health research.**
- **Discuss factors impacting the media and public attention certain research studies attract.**
- **Offer a 3 R's approach to interpreting and responding to research studies – rely, reflect, and respond.**

Types of scientific evidence

- Animal models: rats and mice
- Experimental laboratory studies
- Observational studies on populations
  - Cross sectional
  - Longitudinal
  - Case control
- Multi center clinical trials
- Meta-analyses

Animal models

- Most often used in studies of:
  - Toxicity
  - Diet composition
  - Conditioned behavior
  - Food “addiction”

- Watch out for methodology:
  - Number of animals, strain, diets, exposure
- Watch out for leaps of logic:
  - Do data on rats eating saccharin sweetened yogurt apply directly to aspartame sweetened soft drinks?

Experimental laboratory studies

- Short term studies (1 day)
  - The preload paradigm
  - Satiation versus satiety
- Medium term studies (2 weeks)
  - Feeding studies
  - Energy intakes and body weight
- Watch out for assumptions and conclusions:

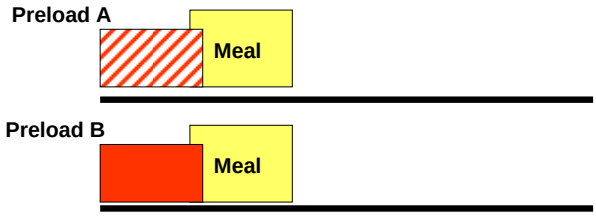
  •These types of studies are evidence for the notion that you can "feel fuller on fewer calories".
  •Allegations that "liquids have no satiating power" are also based on studies like this.

The preload study design

- Participants consume a snack or a beverage (« preload ») - that contains either sugar or an intense sweetener.
- Sometimes there is a « no snack » control.
- Participants note hunger, satiety, desire to eat.
- Then they get lunch (time interval: 15 min to 3h).
- Sometimes there is a second meal – or a third.
- Theoretically – preloads ought to suppress food consumption at the next meal.

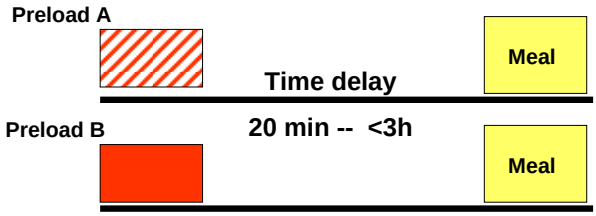
The preload study design

Satiation



Amount consumed at this meal is the measure of satiation

Satiety



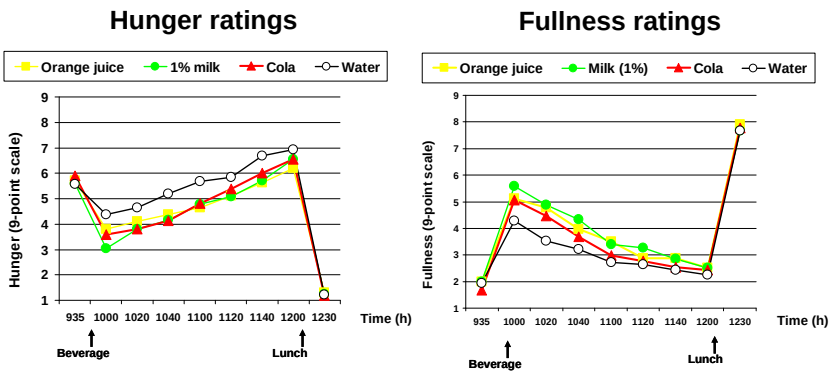
Amount consumed at the next meal is the measure of satiety

A comparison of 4 beverages

Keep volume (20 oz) and energy constant – vary the beverage

ED=0.42 kcal/g	Orange juice	248 kcal
ED=0.42 kcal/g	Milk 1%	248 kcal
ED=0.42 kcal/g	Cola	248 kcal
ED=0.0 kcal/g	Cola light/water	0 kcal

The preload study results:



Temporal profile of hunger and fullness ratings

Lunch: 1734 kcal
Ad libitum

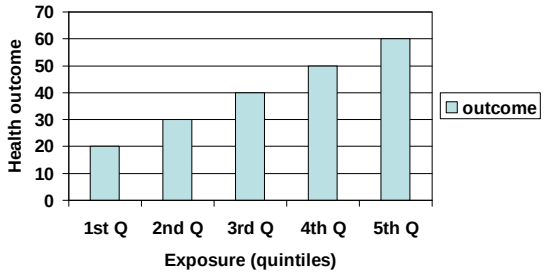
What to watch out for

- The assumption that people accurately compensate for calories – they do not
- The time lag
  - Short time lag = volume effects
  - Long time lag = calorie effects
- Design: within or between subject
- Control conditions: energy and volume
- Motivational ratings and energy intakes
- Type of food served

And now, nutritional epidemiology

- Basic study designs
  - Cross sectional
  - Longitudinal
  - Case control

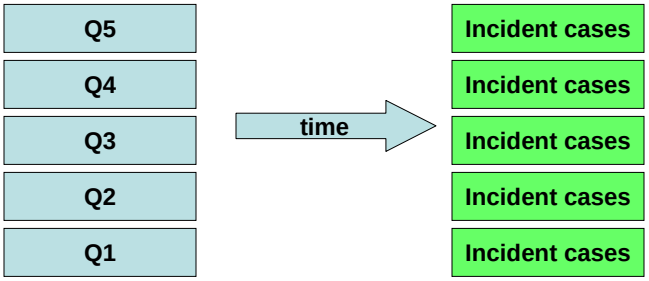
– Cross sectional studies (e.g. NHANES)
  - The goal is to link exposure with outcome



- **What to watch out for:**
  – Any suggestion of causality, ie. A *leads* to B
  – Any suggestion of dynamic change
    - A is associated with a *change* in B
    - These are associations, pure and simple

Longitudinal cohort studies

– Stratify by exposure at time 0
– Look at outcomes at time 1

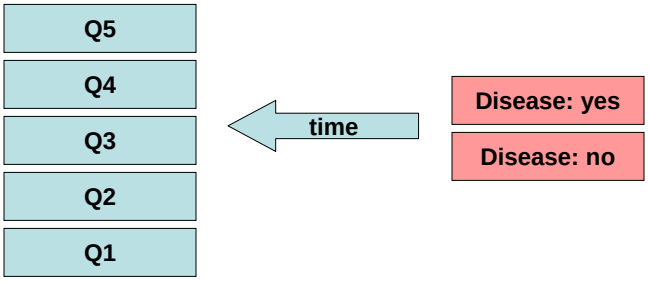


What to watch out for

- Assignment into exposure categories at time 0 is assumed to be constant forever.
  - People get older, diets change
- Adjustment for (or even mention of) socioeconomic factors
- Correction for demographic variables: age, gender, race/ethnicity

Case control studies

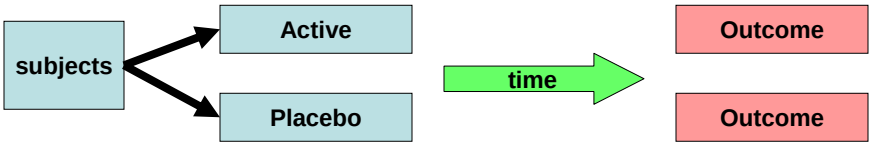
- Stratify by outcome at time 1
- Look back at exposure at time 0



- Watch out for
  - Long time interval
  - Are retrospective dietary data even reliable?

Randomized clinical trials

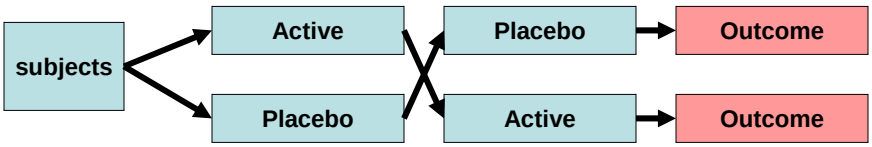
- Randomize into conditions
- Double blind placebo control



- Watch out for
  - Imperfect randomization
  - Length/strength of exposure
  - Meaningful outcomes

Clinical trials cross over design

- Randomize into conditions
- Double blind placebo control

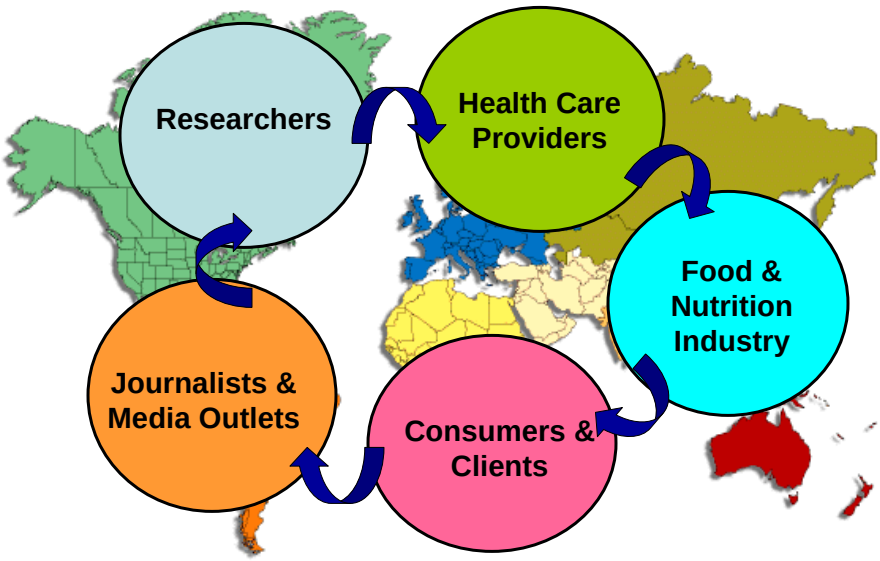


- Watch out for
  - Strength of manipulation
  - Length of exposure and/or wash out period
  - Between subject vs within subject (cross over) design

Meta analyses

- Viewed as the strategy of last resort for epidemiology
- Combined analysis of multiple studies
- Cochrane collaborations has strict rules what studies to include and what to leave out
- This is because many published studies are junk

Let's Do an 'Environmental Scan'



For Science & Scientists…

- **Competition for:**
  - publications and career advancement
  - attention to academic institution
  - funding
- **WWW evolution**
  - e-pubs, online-only pubs
- **Concerns about not publishing unfavorable results**
- **Concerns about conflict of interest**

  "So in this age of transparency, am I an expert or a conflicted participant unable to provide unbiased opinions to different constituencies?"

  …D. Kruger, Editor-in-chief, *Diabetes Spectrum*, 2008; 21: 69-70

For US -Health Care Providers…

- Information overload makes it challenging to stay abreast with
  - research, trends, e-blasts, blogs, list servs, etc.
- Volume of info cultivates looking for easy & accessible interpretations…and they're available
- Time/energy constraints

For Food and Nutrition Industry…

- Provide research funding
- Efforts to promote funded and supporting research
- Defend against negative research
- Work in coalitions and trade associations
- Work with nutrition and health associations
- Chime in on government policies and recommendations

For Journalists & Media Outlets…

- Traditional media outlets shrinking
- Rise of new media outlets
  - blogs, facebook, twitter, much more “chatter”
  - Content available 24/7/365
- Anyone can be a nutrition expert “reporter”
  - start a blog, website
- Competition for attention breeds sensationalism
  - Headline grabbers: to inflame or inform?
  - Fewer filters and layers – direct-to-consumers for consumption
- Information delivery in sound bites, bullets and simple, easy fixes

For Consumers & Clients…

- Information overload and saturation
- Difficult to decipher
  - experts vs. proclaimed experts
  - sensational headlines vs. trustworthy news
- Nutrition confusion is fostered
- Desire: pre-digested bullets and sound bites
  - just tell me what to do

Add Nutrition, Weight Control & Diabetes are Hot, Hot, Hot!!

The 3 R's

- **R**ely on the research
- **R**eflect on the research
- **R**espond to the research

Rely on the Research

- **Go beyond the headlines and press releases**
  - **Seek out and read the original research**
  - **Read skeptically**
- **Ask yourself:**
  - **Origins of the research?**
  - **Type of research?**
  - **Who/what is promoting?**
  - **Research support source?**
  - **Findings and existing body of research on the topic?**
  - **Do review articles exist on the topic? Findings?**

The 3 R's

- **R**ely on the research
- **Reflect on the research**
  - How does it "fit" into existing body of scientific evidence and well accepted government or association recommendations
  - Reflect on if/how story has been "spun" by promoter and/or media

We're in the Age of Evidence -Based Medicine

What are key resources to help **reflect** on the research and integrate it the existing body of evidence?

Resources within Your Reach

- American Dietetic Association:
  - Evidence Analysis Library (adaevidencelibrary.com)
  - Position statements
- American Diabetes Association
  - Standards of Medical Care for Diabetes and Nutrition Recommendations
  - Position statements, Technical reviews, Consensus statement
- U.S. Gov't resources
  - Gov't agencies, IOM, NIH institutes

The 3 R's

- **R**ely on the research
- **R**eflect on the research
- **Respond to the research**
  - Integrate it into existing knowledge with key messages/bottomlines

Integrate into Existing Evidence/Science

Consider this frame:

- Study is one more piece of the whole nutrition puzzle
  - many pieces understood
- Nutrition/food/weight loss/optimal diabetes care is an
  - ever evolving, advancing and changing knowledge base
- Research findings most often cause tweaks vs. seismic shifts

Case #1:

Effect of Non-nutritive Sweeteners on Appetite, Weight Control and Satiety

Just a few of many media headlines…

- Study: Artificial Sweeteners Increase Weight Gain Odds"
  - *Good Morning America*
- "Artificial Sweeteners May Damage Diet Efforts"
  - *WebMD*
- "Artificial Sweeteners Lead to Weight Gain"
  - *American Psychological Association Press Release*

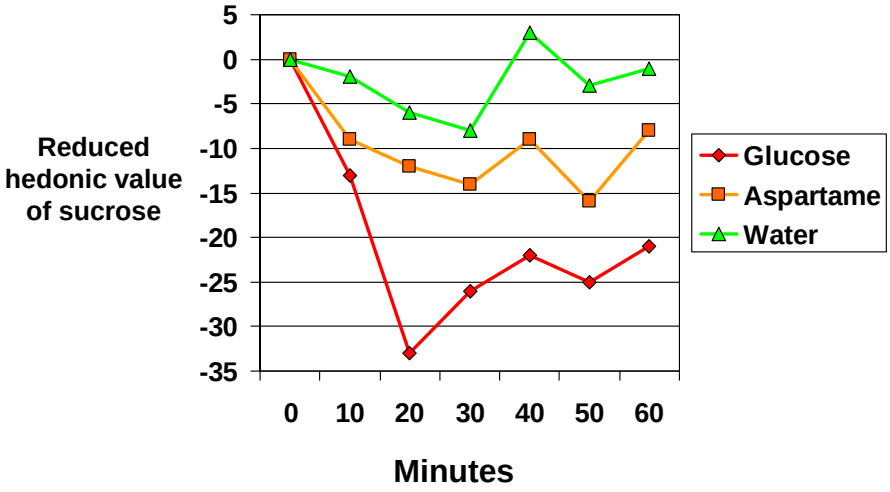
These headlines are 20 years old

How it all began….
…in 1986

Do intense sweeteners make you hungry?

- Letter to the Editor, The Lancet 1986.
- The title was: “Paradoxical effects of an intense sweetener (aspartame) on appetite” by J. E. Blundell and A. J. Hill
- Hunger and appetite weren’t even measured
- What was measured instead?
- Pleasure

Paradoxical effects of an intense sweetener (Aspartame) on appetite



Blundell & Hill. Letter to the Lancet 1986

Do intense sweeteners make you hungry?

- The Blundell and Hill argument was:
  - Aspartame did not reduce the pleasantness ratings for sucrose solutions in water
  - That meant that you were still hungry
  - If you were hungry you would eat more
  - It you ate more, you would become obese
- Therefore aspartame was responsible for the obesity epidemic

Do intense sweeteners "trick" the body?

Sweetness	Calories
Yes	Yes
	No

Uncoupling sweetness and calories:
Methodological aspects of laboratory studies on appetite control
J.E. Blundell, P.J. Rogers and A.J. Hill Appetite 11 (suppl 1), 54-66, 1988

Same argument 20y later: uncoupling solids and calories

- Providing calories as liquids rather than solids confuses the body's regulatory mechanisms
- Satiety signals are not engaged
- Reduced satiety leads to overeating
- Liquid calories are responsible for the obesity epidemic

Physical form	Calories
Solid	Yes
Liquid	

Addition versus substitution

- Adding sweetness to a plain stimulus would make you eat more
- Single exposure to a saccharin sweetened yogurt led to overeating at the next meal and next day
- Removing energy but keeping sweetness would make you eat less (unless you compensated for the missing calories)

Sweetness	Calories
Yes	Yes
No	No

The famous « paradox »…

disproved by studies conducted at the Faculty of Medicine, Xavier Bichat in Paris….. in 1992

Comparing the effects of aspartame and sucrose on motivational ratings, taste preferences, and energy intakes in humans[1–3]

Adam Drewnowski, Christine Massien, Jeanine Louis-Sylvestre, Jacques Fricker, Didier Chapelot, and Marian Apfelbaum

ABSTRACT This study compared the effec
fast preloads on motivational ratings, taste pref
ergy intakes of 24 normal-weight nondieting
women. The preloads, composed of creamy whi
age blanc), were either plain or sweetened wi
sucrose. Their energy value was either 1255 or
700 kcal). Taste preferences were measured bef
after breakfast. Motivational ratings were obtai
tervals. The subjects ate lunch, snack, and din
laboratory. The consumption of low-energy as
energy breakfasts, regardless of sweetness, led
tivational ratings and increased energy intakes
ever, intakes at subsequent meals were the same
and no overall compensation in energy was obse
did not promote hunger or lead to increased e
normal-weight subjects. *Am J Clin Nutr* 19

KEY WORDS Sucrose, aspartame, hung
preferences, energy intakes

International Journal of Obesity (1994) **18**, 570–578 © Macmillan Press Ltd 1994

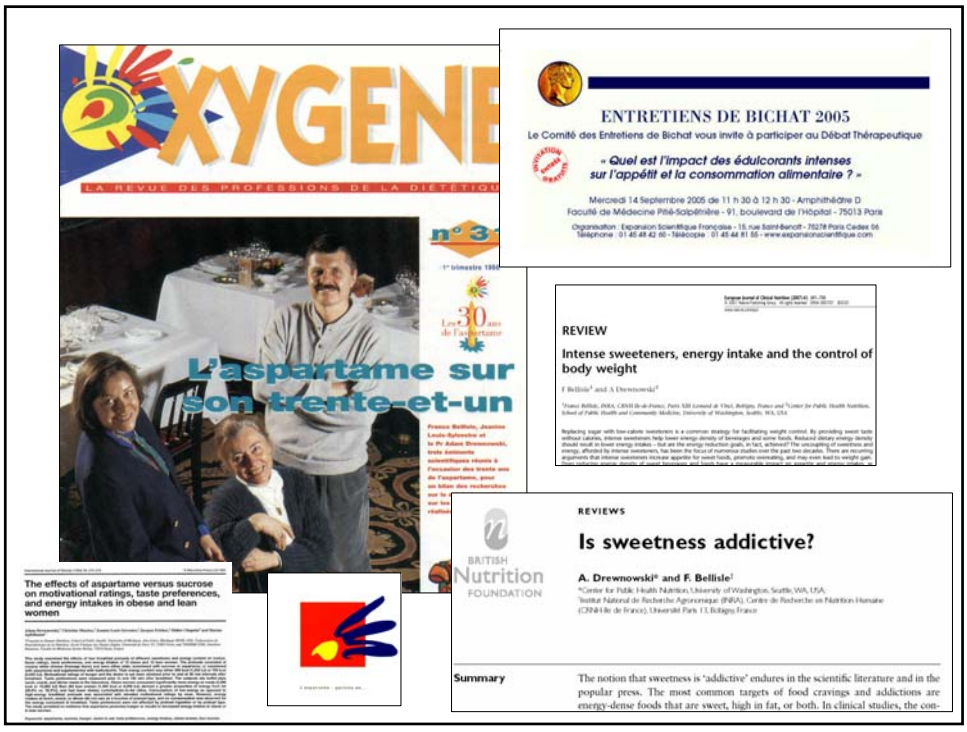
The effects of aspartame versus sucrose on motivational ratings, taste preferences, and energy intakes in obese and lean women

Adam Drewnowski,[1] Christine Massien,[2] Jeanine Louis-Sylvestre,[2] Jacques Fricker,[3] Didier Chapelot[3] and Marian Apfelbaum[3]

[1]*Program in Human Nutrition, School of Public Health, University of Michigan, Ann Arbor, Michigan 48109, USA;* [2]*Laboratoire de Neurobiologie de la Nutrition, Ecole Pratique des Hautes Etudes, Université de Paris VI, 75005 Paris, and* [3]*INSERM U286, Nutrition Humaine, Faculté de Medecine Xavier Bichat, 75018 Paris, France*

This study examined the effects of four breakfast preloads of different sweetness and energy content on motivational ratings, taste preferences, and energy intakes of 12 obese and 12 lean women. The preloads consisted of creamy white cheese (fromage blanc) and were either plain, sweetened with sucrose or aspartame, or sweetened with aspartame and supplemented with maltodextrin. Their energy content was either 300 kcal (1,255 kJ) or 700 kcal (2,929 kJ). Motivational ratings of hunger and the desire to eat were obtained prior to and at 30 min intervals after breakfast. Taste preferences were measured prior to and 150 min after breakfast. The subjects ate buffet-style lunch, snack, and dinner meals in the laboratory. Obese women consumed significantly more energy at meals (2,596 kcal or 10,862 kJ) than did lean women (1,484 kcal or 6,209 kJ); derived a greater proportion of energy from fat (39.9% vs. 35.5%), and had lower dietary carbohydrate-to-fat ratios. Consumption of low-energy as opposed to high-energy breakfast preloads was associated with elevated motivational ratings by noon. However, energy intakes at lunch, snack, or dinner did not vary as a function of preload type, and no compensation was observed for the energy consumed at breakfast. Taste preferences were not affected by preload ingestion or by preload type. The study provided no evidence that aspartame promotes hunger or results in increased energy intakes in obese or in lean women.

Keywords: aspartame, sucrose, hunger, desire to eat, taste preferences, energy intakes, obese women, lean women



Case #1: To Broadcast with 3 Rs:

- **R**ely on research:
  - Robust volume of research – 100's of varied types of studies over 60 years (from 1950s)
  - Recent meta analyses and reviews ('06 de la Hunty, Brit Nutri Found Bulletin 31), ('07 Bellisle, Drewnowski #2), ('08 Mattes, Popkin #9)
- **R**eflect on research:
  - On balance evidence demonstrates
    - small beneficial effects on weight loss/control in adults and children
    - some calorie compensation is usual
    - limited to no negative effects on appetite, hunger and weight
  - Occasional studies raise concern, attract media, consumer attention keeping issue alive

Case #1: To Broadcast with 3 Rs:

- **R**espond to the research:
  - The body of research suggests:
    - NNS and foods and beverages sweetened with them are not a magic bullet for weight loss; just one tool within comprehensive plan to aid adherence and success
    - NNS can support minimal wt loss, decrease wt regain in maintenance
  - Encourage/educate
    - Use NNS and foods and beverages to replace calorie containing/regularly sweetened products.
    - Don't overestimate calories saved or use as excuse to eat other foods

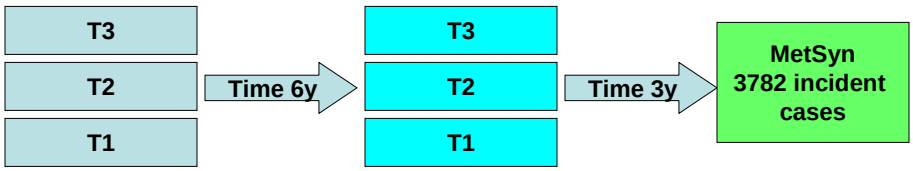
Case #2:
I.D. of Dietary Factors as Cause of Metabolic Syndrome

A few headlines from the media…

- "Burgers, Fries, Diet Soda: Metabolic Syndrome Blue Plate Special"
  - *AHA Journal Report*
- "Red Meat Linked to Higher Metabolic Syndrome Risk"
  - *CNN.com*
- "Symptoms: Metabolic Syndrome is Tied to Diet Soda"
  - *NYTimes.com*
- "Two Hamburgers, an Order of Fries, and the Metabolic Syndrome to Go, Please!"
  - *Medscape Medical News (for CME physician credit)*

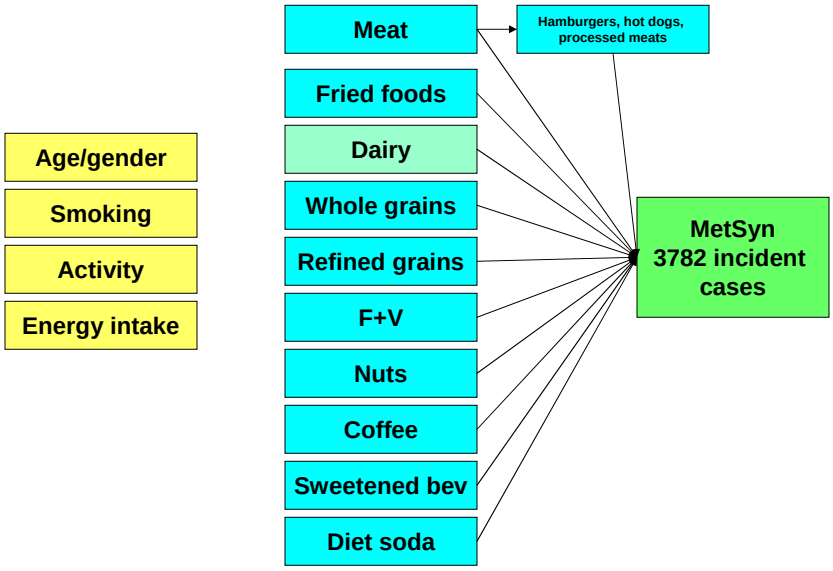
The *Circulation* study

- **FFQ (66 item) used to stratify exposure**
- **9 levels of frequency**
- **66 foods, two patterns, 29 food subgroups, 5 major groups**



4297 men; 5317 women, followed over 9 y
Diets averaged over 6y

The *Circulation* study



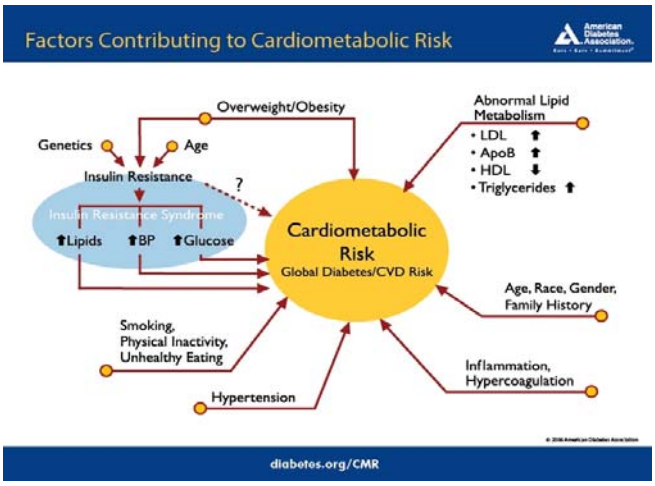
What to watch out for

- The 66 item FFQ
- Intakes "averaged" over baseline and yr 6
- Low consumption of diet soda
- Lack of adjustment for SES
- The likelihood that diabetics consume diet soda (diabetes is associated with metabolic syndrome)
- Multiple comparisons – how many were made?

Case #2: To Broadcast with 3 Rs

- **R**ely on the research:
  - Newer area of research, few studies
  - Type of studies: reviews and analyses of data sets of larger observational studies on human populations
  - Data extracted from: Food Frequency Questionnaires
- **R**eflect on the research:
  - Metabolic Syndrome/Cardiometabolic Risk has been well defined by: WHO, AHA/NHLBI, ADbA as cluster of risk factors which are multifactorial in pathogenesis
  - Existing literature points to dietary pattern consistent with DGs for Americans to prevent metabolic syndrome rather than identifying a solo dietary factor

Metabolic Syndrome
Multiple Risk Factors and Causes



Case #2: To Broadcast with 3 Rs

- **R**espond to the research:
  - Metabolic Syndrome caused by multiple risk factors some modifiable (wt, lack of PA, smoking); others non-modifiable (family hx).
  - Unlikely one culprit (eg diet soda)
    - Diet soda can satisfy thirst and desire for something sweet but people need to use as part of a healthy and calorie conscious eating plan to aid weight loss or maintenance.
  - Research continues to show small amount of wt loss lowers BG, improves modifiable risk factors.

Remember the 3 R's

- **R**ely on the research
  - Review original research; avoid pre-digested sources and sound bites
  - Review discussion for integration into body of research, weaknesses and confounders
- **R**eflect on the research
  - How does study "fit" into existing body of scientific evidence ("whole puzzle"), well accepted government or association recommendations
  - Think if/how story has been "spun" by promoter/media
- **R**espond to the research
  - Integration it existing evidence base
  - Formulate and provide brief and easy-to-digest messages
- **And a 4th R**:
  - **R**eady yourself to be proactive with media, use your outlets, clients, responses on list serv
  - Today we are all nutrition communicators with potential broad reach

Thank you and now to
Your Questions…

1 CPE will be awarded for attending the webinar. In order to receive the CPE certificate, you MUST sign in on the site roster that will be available during the webinar. If you do not sign in on the site roster, you will not receive a CPE certificate as we will have no way to verify that you actually attended the webinar. Instructions to access the CPE certificate will be provided during the webinar.

If you have questions, please contact Lynn Grieger, RD, CDE, cPT; Weight Management DPG Professional Development Director at lynn@lynngrieger.com or 802-362-2810.

Thank you for attending this event.

Today's event features an online, post-event evaluation form. To send us your feedback, please click on the link below, or type the URL into your web browser's address bar.

http://eval.krm.com/eval.asp?id=16385

Your feedback and comments are very important to us. Thank you in advance for taking the time to complete this evaluation!