NUTRITION HOT TOPICS

CONTROVERSIES:
How to handle the tough questions and separate facts from emotion

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4 examples of “risky” topics

• Food allergies
• Sugar
• Artificial colors
• Sugar substitutes
Common thoughts…

- “Change the menu, my kid is allergic”
- Sugar is making kids
  - Fat
  - Hyperactive
  - Diabetic
  - High
More common thoughts…

• “Artificial colors make them hyperactive”

• “Sugar substitutes…
  – Cause brain tumors/cancer/liver problems”
  – Turn into formaldehyde in your body”
  – Make you crave sweets”
  – “Just HAVE to be bad – I read it on the Internet”
“OK, who doesn’t eat what?”

Food Allergies
THE BIG 8

- Peanuts
- Eggs
- Shellfish
- Fish
- Milk
- Wheat
- Soy
- Tree nuts
THE BIG 8

- Account for 80% of allergies
- Most kids outgrow food allergies
- Most are NOT life-threatening
Problems with special diets:

• Labor intensive
• Costly
• May affect very few
• Many varieties
• Most not life-threatening
Special diets: Time to put our foot down?

- First it was allergies
- Then peanut-free tables/schools/lives
- Limits of reasonable responsibility
- Budgets, budgets, budgets
- Rethinking the purpose of school lunch
GO TO HILL!

- Tell your legislators:
  We do school lunch, not hospital lunch
- Opt-out when below national average
- Optional accommodation, based on budget or other considerations
- Rally against forcing schools to outlaw allergic foods
ARTIFICIAL COLORS
What ARE they?

• Regulated by FDA
• 2 kinds of colors in food:
  – Certified color additives
  – Colors exempt from certification
9 Certified colors

- Blue #1
- Blue #2
- Green #3
- Red #2
- Red #3
- Red #40
- Orange B
- Yellow #5
- Yellow #6
Exempt colors

- Naturally derived but are still color additives, must comply with regulations
- More expensive
- May impart flavors
What are they doing in our food?

- Compensate for color losses
- Maintain uniformity when colors naturally vary
- Enhance naturally occurring colors
- Give color to colorless foods
THE BIG QUESTION:

DO COLORS IN FOOD CAUSE HYPERACTIVITY?
HISTORY

• Started with Feingold in the 1970s
• Hyperactivity caused by:
  – Salicylates
  – Artificial flavors
  – Artificial colors

Feingold, BF Delaware Med J 1977
Feingold phenomenon

• Early studies were highly criticized:
  – Lack of controls
  – Small sample sizes
  – Anecdotal reports
  – Inability to link specific colors with behavior
  – Inconsistent dosing
  – poor methodology
  – lack of subjectivity

Feingold, BF Delaware
Med J 1977
Review by Shab & Trinh (2004)

- Meta-analysis
- 15 DB-PC trials

Results:
- 5 studies: increased ADHD symptoms
- 8 studies: no significant increases in ADHD symptoms
- 2 studies: DECREASED ADHD symptoms
- Only 2 trials received the highest validity score of “A”
Shab & Trinh (2004)

- 8 crossover studies
- Some effect seen in previously diagnosed hyperactive children BUT
- Serious flaws in many studies
  - 2 had no washout period
  - 3 had “unorthodox outcome measures”
  - None had a validity rating of “A”
  - One had imperfect blinding
Problems with studies on ACs and hyperactivity

• Who’s doing the ratings?
• Does the test ask all the right questions?
• Include/exclude children on medication?
• Include/exclude non-hyperactive children?
• Include a washout period?

• Randomized, DB-PC crossover trial
• 277 4-year-olds
• 20-mg of colors + 45 mg of sodium benzoate
• Ratings by parents AND teachers

• Teacher ratings of hyperactivity:
  – No behavioral difference between placebo and AC periods

• Parent ratings:
  – Hyperactivity noted with BOTH placebo and AC periods
  – Slightly greater with AC

- Authors concluded:
  - Some effect detectable by parents but not by typical clinic setting

- Weaknesses:
  - Teachers saw no changes in classroom settings
  - Parents saw more hyperactivity even with placebo.
  - AC and Na benzoate mixed – unclear which component would explain results
  - No dose response
### Composition

<table>
<thead>
<tr>
<th></th>
<th>3 yo</th>
<th>8/9 yo</th>
<th>Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>N =</td>
<td>153</td>
<td>144</td>
<td></td>
</tr>
<tr>
<td>Mix A</td>
<td>20 mg AC</td>
<td>25 mg AC</td>
<td>4 AC + Na benzoate</td>
</tr>
<tr>
<td>Mix B</td>
<td>30 mg AC</td>
<td>62 mg AC</td>
<td>4 AC + Na benzoate</td>
</tr>
</tbody>
</table>

- General population
- Double-blind, placebo-controlled
- Global hyperactivity aggregate scores
McCann et al (2007)

• Comparing Mix A against placebo, Mix B against placebo:
  – 3 y.o.: in both cases, Mix showed significantly greater hyperactivity scores
  – 8/9 y.o.: in both cases, Mix showed significantly greater hyperactivity scores

…but….
McCann et al (2007)

• When adjusted for:
  – Week during trial
  – Sex
  – Maternal education
  – SES
  – GHA in baseline week
  – Pretrial diet
McCann et al (2007)

- Effect in 8/9 y.o., was significant only at highest dose (Mix B)
- Effect in 3 y.o. was significant only at the lower dose (Mix A).
Among authors’ conclusions:

“…substantial individual differences in the response of children to the additives.”
Conclusions of EFSA panel

- Mixes make it impossible to know effects/lack thereof of individual colors
- Inconsistency in results re: age, sex, type of observer
Conclusions of EFSA panel

• “...the study provides limited evidence that the two mixtures had a small and statistically significant effect on activity and attention.”

• They also concluded that the McCann study did not provide an acceptable basis for altering the ADI for colors.

EFSA Journal, 2008
Guidance

• Perceived or real, some subset of children may be especially sensitive or high-responders to ACs
• Look at quantity/frequency
  – 4 oz. of candy for a 3-year-old and
  – 8 oz. of candy for an 8-y.o. is EXCESSIVE
  – Smaller amounts may matter little or none
• Assess context, setting, situation
Guidance

• Most ACs appear in “treat” foods & soda.
• Focus on limiting treats
  – and intake of ACs will decline
  – Diet quality may improve
• Only applies to Certified colors – exempt colors are not implicated
SUGAR
SUGAR
SUGAR
SUGAR
The buzz

• Sugar gets kids hyperactive
• Sugar makes kids overweight
• **HFCS: The new trans fat.** It gives you diabetes, metabolic syndrome, etc.
• Fructose causes high blood pressure.
How much sugar do we eat?

- Total added sugars eaten, per capita\(^1\):
  - 1999: 107.7 lb.
  - 2007: 97.0 lb. (=120 gm/day)

1 - ers.usda.gov, accessed 9/21/09
Sources of All Simple Sugars Present in Children’s’ Diets

- RTE cereals: 5.1%
- Fruits: 13.3%
- Milk, milk products: 22.2%
- Meat, poultry, fish and mixtures: 1.4%
- All other grain products: 5.5%
- Cakes, cookies, pies and pastries: 8.2%
- Sugars and sweets including candy: 11.9%
- Carbonated soft drinks: 16.8%
- Fruitades and other beverages: 12.6%

(15.4%)
(29.1%)
(49.5%)
What kind are we getting?

HFCS: the evil of the moment

• 2 basic kinds:
  – HFCS 42: 42% fructose
  – HFCS 55: 55% fructose

• Cane sugar (sucrose):
  – 50% fructose

• Take-away message: HFCS is really not high in fructose
What IS high in fructose:

- Apple juice:  
  - 65% fructose, 35% glucose

- Pear juice:  
  - 74% fructose, 26% glucose
Sugar, HFCS, and obesity?

- Evidence suggests otherwise
- IOM report (2002):
  - Higher intakes of sugar are associated with lower rates of obesity
  - “No clear and consistent association between increased intake of added sugars and BMI.”
Sugar & HFCS and obesity -- NOT

• Inverse relationship found between sugar intake and bodyweight or BMI:

• Inverse relationship between total sugar intake and total fat intake:
  – Gibson (1996)
Sucrose and weight loss, satiety

• 42 women – two groups
  – All on low-fat, low calorie diets
  – 1 group consumed 43% of energy as sugar

• Result:
  – No differences in weight loss, mood, hunger, stress level
  – Equal decreases in BP, %BF, plasma lipids

Surwit, AJCN 1997
Sugar & hyperactivity: How the rumors started

• Case study of 1 child by Crook (1974)
  – Sugar was removed, behavior improved

• Controlled studies unable to replicate results
Sugar and behavior

- Negative associations generally dismissed by the scientific community\(^1\)
- Perception of sugar by parents and consumers continues to defy years of sound science and logic.
- Some evidence that behavior is positively affected by sugar.

1 – IOM, Dietary carb, 2002

• 23 studies
  – Double blinded, placebo-controlled
  – Known quantity of sugar
  – Reported statistics useful for computing dependent measures

• Conclusion:
  – “Sugar does not affect the behavior or cognitive performance of children. The strong belief of parents may be due to expectancy and common association.”

In fact…….
Sugar can even IMPROVE behavior and performance

• Decrease in activity after sucrose\(^1\) or glucose\(^2\)
• Sugar-containing snack can enhance ability to stay on task\(^3\)
• Glucose enhances long-term verbal and spatial memory\(^4\)

1 – Behar et al (1994); 2- Saravis et al (1990)
3 – Busch et al (2002); 4- Sunram-Lea et al (2001)
How much is too much?

- 2005 DGA allow for added sugars and fats
- Discretionary calories include BOTH sugar and fat and assume that both are consumed

Dietary Guidelines for Americans 2005
### 2005 DGA: Discretionary calories

<table>
<thead>
<tr>
<th></th>
<th>1400 cal/d</th>
<th>2000 cal/d</th>
<th>2400 cal/d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total DC</td>
<td>171 cal</td>
<td>267 cal</td>
<td>362 cal</td>
</tr>
<tr>
<td>From fat</td>
<td>14 g</td>
<td>18 g</td>
<td>22 g</td>
</tr>
<tr>
<td>From sugar</td>
<td>16 g</td>
<td>32 g</td>
<td>48 g</td>
</tr>
</tbody>
</table>

Ref: 2005 US Dietary Guidelines for Americans
The sugar shake-down

- Sugar’s not “angel food” but it’s not “devil’s food” either
- It does NOT get kids “hyper”
  - More likely to be situational
- Not a matter of “good” or “bad” but “how much” and “how often”
Recommendations

- Spend wisely
- Quantity matters, frequency matters
- Type of sugar doesn’t matter
- Most kids need to reduce their added sugar intake
- WON’T make kids hyperactive!

Dietary Guidelines for Americans 2005
AAP Policy Statement: Prevention of pediatric overweight & obesity

“Dietary practices should be fostered that encourage moderation rather than overconsumption, emphasizing healthful choices rather than restrictive eating patterns.”
AAP Policy Statement: Soft drinks in schools

- Each 12-oz sugared soft drink consumed daily has been associated with a 0.18-point increase in a child’s BMI and a 60% increase in risk of obesity, associations not found with "diet" (sugar-free) soft drinks. Sugar-free soft drinks constitute only 14% of the adolescent soft drink market.

American Academy of Pediatrics, 2004
BOTTOM LINE

• Sugar’s OK
• Not too much
• Mostly fruit
...SUGAR ALTERNATIVES
IOM Report on School Meals

• Safe for all ages

• One of the most rigorously tested ingredients in the U.S. food supply

• Can’t use it until high school
Non-nutritive Sweeteners: Acceptable Daily Intake (ADI)

• ADI: weight of sweetener/kg bw that a person can safely consume every day over a lifetime without risk

• ADI is a conservative estimate:
  – Approximately 1/100 of maximum level that produces no adverse effects
Acceptable Daily Intake (ADI): What does this mean to consumers?

<table>
<thead>
<tr>
<th>Sweetener</th>
<th>ADI</th>
<th>ADI Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saccharin</td>
<td>15 mg</td>
<td>8.5 packets of sweetener</td>
</tr>
<tr>
<td>Aspartame</td>
<td>50 mg</td>
<td>20 cans of diet soda, OR almost 100 Equal packets</td>
</tr>
<tr>
<td>Acesulfame K</td>
<td>15 mg</td>
<td>20 cans of diet soda</td>
</tr>
<tr>
<td>Sucralose</td>
<td>5 mg</td>
<td>28 Splenda packets</td>
</tr>
</tbody>
</table>
Where we’re getting our sugar subs: 2006*

<table>
<thead>
<tr>
<th>Application</th>
<th>% of Total by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beverages</td>
<td>57.7</td>
</tr>
<tr>
<td>Tabletop sweeteners</td>
<td>12.1</td>
</tr>
<tr>
<td>Personal care products</td>
<td>11.8</td>
</tr>
<tr>
<td>Food</td>
<td>9.1</td>
</tr>
<tr>
<td>Other</td>
<td>9.3</td>
</tr>
</tbody>
</table>

* Based on low calorie sweetener sales to the processed food and beverage industry.

SRI Consulting Chemical Handbook. 2007
Aspartame: Product History

- Approved in 1981
- 180-200 times sweeter than sucrose
- In more than 6,000 products and is consumed by over 200 million people globally, including:

  - One of the most rigorously tested ingredients in the U.S. food supply

www.aboutaspartame.com
Aspartame: Metabolism & Excretion

- Aspartame is metabolized to 3 (and ONLY 3) common dietary components:
  - Aspartic acid
  - Phenylalanine
  - Methanol

- Absorption and metabolism of constituents the same whether derived from aspartame or other food products*

PHE Content of Aspartame-Sweetened Beverage Compared with Common Foods (in mg)

(Pennington and Douglass, Bowes & Church, FOOD VALUES OF PORTIONS COMMONLY USED. 18th ed., Lippencott Williams & Wilkins, 2005)

- Aspartame sweetened beverage (12 oz): 1059 mg
- Nonfat milk (12 oz): 934 mg
- Chicken breast (3 oz): 906 mg
- Boiled egg (1): 63 mg
- Ground beef (3 oz): 61 mg
- Other common foods: 90 mg
Methanol in Aspartame-sweetened Beverage vs. Common Foods (mg)

(Wucherphennig et al. Flussuges Obst. 348-354, 1853).
Some of the safety concerns listed on the Internet

- Possibility of toxicity from methanol
- Elevations in plasma concentrations of phenylalanine and aspartic acid (altering brain’s neurochemical composition)
- Possibility of neuroendocrine changes
- Possible carcinogenic risk
- Postulated link with epilepsy and brain tumors
- Allegations of ailments from infertility to baldness
Highlights of Global Safety Confirmation

- Over 500 toxicological and clinical studies conducted over 30 years confirm safety
- Regulatory authorities in more than 100 countries have approved aspartame for use:
  - European Food Safety Authority (EFSA) Re-Confirms Safety of Aspartame (May 2006)
  - Scientific Committee on Food (SCF) of European Commission Reconfirms Aspartame’s Clean Bill of Health-(December 2002)
  - U.K. Food Standards Agency supports conclusions of SCF-(December 2002)
  - French Food Safety Agency Supports Safety of Aspartame-(May 2002)
Highlights of Global Safety Confirmation

• Regulatory authorities in more than 100 countries have approved aspartame for use:
  – Health Canada Reaffirms Aspartame’s Safety-(February 2003)
  – Joint Expert Committee on Food Additives of the WHO concluded that Aspartame is safe
  – The UN’s Food and Agricultural Organization (FAO) has concluded that Aspartame is safe
Safety Confirmation: USA

- American Diabetes Association
- American Dental Association
- ADA Position Paper, “Use of Nutritive and Non-Nutritive Sweeteners”
- American Medical Association Council on Scientific Affairs
- American Academy of Pediatrics, Committee on Nutrition
- American Cancer Society
Assessed Across Many Subgroups
2007 Expert Panel on Aspartame

- Goal = convene an independent international panel of toxicology experts to review all scientific studies and assess the safety of current consumption of aspartame.

- Blinded study with Ajinomoto funding: Panelists identity unknown (each side); no conflicts of interest or contact with company

- Experts: Food toxicology, metabolism, carcinogenesis, pathology, neurotoxicology, epidemiology, toxicology of methanol & formaldehyde

- Panel spent 11 months reviewing > 500 scientific articles and reports on aspartame from over the past 30 years

- NHANES data to determine how much aspartame consumed by average person

Expert Panel Findings-
Safe across Population Groups

- No credible evidence aspartame is carcinogenic or has any cancer-causing properties
- Extensive human studies: No link to memory loss, learning problems or any other neurological effects
- No effect on behavior, brain function or seizures in any of the groups studied
- No adverse effects on reproduction or lactation
- Safe for use by people with diabetes and may help them adhere to a lower-carbohydrate diet program to better control blood sugars

The Ramazzini Study

- Largest (and worst) animal study ever done on Aspartame.
- 1,800 (male and female) 8 wk old rats
- Very low to very high concentrations:
- “Statistically significant dose-related increase in lymphomas and leukemias in females”
- No significant increase in brain tumors

The Ramazzini Study: 
*International Response*

- Study widely criticized by experts due to numerous flaws in design, implementation and data reporting
- Conflicts with large body of credible studies thoroughly reviewed by regulatory authorities around the world
- Not a single regulatory body endorsed findings; cite large database of credible evidence showing absence of a carcinogenic effect
- Design and execution did not follow international protocol for animal carcinogenicity studies (or that of the National Toxicology Program)
- UK Committee on Carcinogenicity of Chemicals in Food criticized study design: statistical approach used did not fully adjust for age-related effects
- Would not provide access by outside pathologists to analyze all of the tissue samples where cancerous tumors were found (standard practice)
2006 NIH/NCI Research

- Conducted independently of any funding or ties to industry groups
- Subjects included 556,990 men and women
- Five years of follow up -1995-2005

• Increasing consumption NOT ASSOCIATED with any risk of cancer

• NO ASSOCIATION with subtypes of cancers reported in the Ramazzini study

Aspartame & better diet quality

• “Reported Use of Reduced-Sugar Foods and Beverages Reflects High-Quality Diets”
  – “Reduced-sugar food users” consistently reported significantly higher intakes of fruit, similar or higher micronutrient intakes, lower energy intakes and lower intake of discretionary fat and added sugars.

So…

Going forward, there are challenges…
The challenge

• Acknowledge there’s difference between philosophy/ideology and sound science
• Provide the facts about high-emotion topics, based info on SOUND science
• Advocate for science-based legislation!