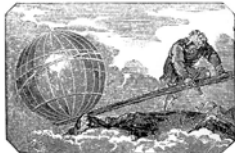


Archimedes' Lever for the World of Food:
The Overall Nutritional Quality Index
(ONQI)

David L. Katz, MD, MPH, FACPM, FACP
*Associate Professor, adjunct, Public Health Practice
 Director, Prevention Research Center
 Yale University School of Medicine*
www.davidkatzmd.com



Championing Public Health Nutrition
 CSPI / Ottawa, Canada
 October, 2008

What food can do...

- 80% reduction in heart disease
- 90% reduction in diabetes
- 60% reduction in cancer
- and so on...

Katz DL. Nutrition in Clinical Practice, 2nd Edition. 2008

How to get there from here:

- Pattern shift: 5 a day, by 3010

and/or

- Progress, one food choice at a time!
 - *but the supply of food for thought is indigestible...*

Who is even looking out for...
things they never knew they never knew?



Sodium content per 100 calories?



Sodium
73 mg

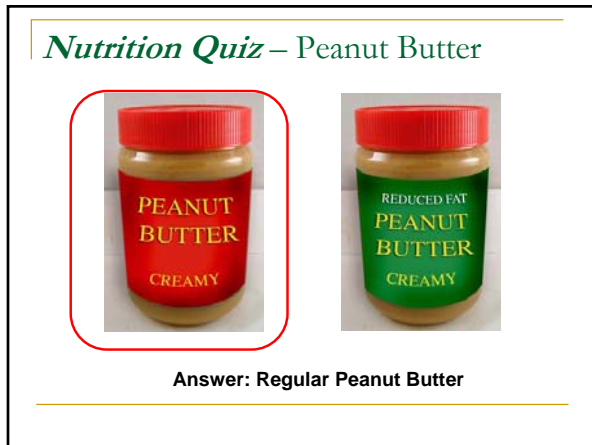
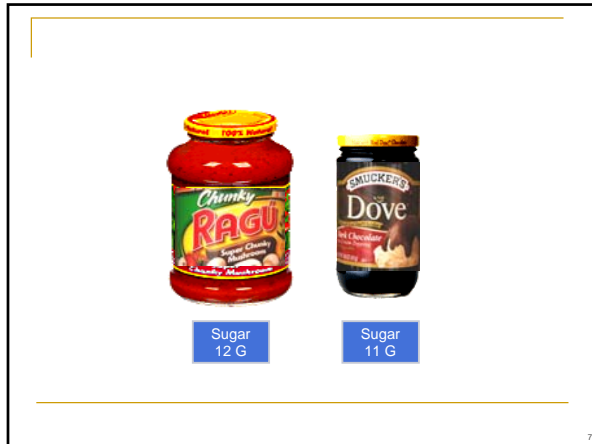
Sodium
100 mg

Sodium
233 mg

Sodium
131 mg

Added sugar per 100kcal?





Just a bit nutty-

Nutrient	Peanut Butter	Reduced Fat Peanut Butter
Sodium	150mg	250mg
Total Carbohydrate/sugar	7g	15g
Added Sugar*	3g	4g
Saturated Fat/Trans Fat	3g/0g	2.5g/0g
Fiber	2g	1g
Calories	190/32g	190/36g
ONQI Score**	23	17

*For this product comparison, total sugar rather than added sugar was considered in the score.
 **Preliminary score for illustrative purposes.

What?...FDA or IOM would have done:

- July, 2003
 - Katz DL. A food supply for dummies. Op-Ed: Hartford Courant; NY Newsday; etc. 10/03
- Feb, 2006: If you want something done...
 - and the rest is history...

- ### ONQI Scientific Expert/Development Panel
- Chair: Dr. David Katz, Yale University School of Medicine
 - Dr Keith Ayoob, Albert Einstein College of Medicine
 - Dr Leonard Epstein, University of Buffalo; inventor, Traffic Light Diet
 - Dr David Jenkins, University of Toronto; inventor, Glycemic Index
 - Dr Francine Kaufman, USC; Past President, American Diabetes Association
 - Dr Robert Kushner, Northwestern University
 - Dr Ronald Prior, Arkansas Children's Nutrition Center, USDA HNRC
 - Dr Rebecca Reeves, Past President, American Dietetic Association
 - Dr Barbara Rolls, Pennsylvania State University
 - Dr Sachiko St. Jeor, University of Nevada
 - Dr John Seffrin, President & CEO, American Cancer Society
 - Dr Walter Willett, Harvard University
 - 16 invitations extended; 14 acceptances
 - Project Coordinators: Debbie Kennedy, PhD; Zubaida Faridi, MD, MPH; PRC
 - Statistician/Data Analyst: Valentine Njike, MD, MPH; PRC
 - Dietitians: Judy Treu, MS, RD; Lauren Rhee, MS, RD; PRC
 - Others consulted

ONQI Scientific Advisory Board

- Dr. David Katz, *Ex Officio*, Yale University
- Dr. Keith Ayoob, **Chair**, Albert Einstein College of Medicine
- Dr. Leonard Epstein, University of Buffalo; inventor, Traffic Light Diet
- Dr. David Jenkins, University of Toronto; inventor, Glycemic Index
- Dr. Sonia Caprio, Yale University
- Dr. Rebecca Reeves, Past President, American Dietetic Association
- Dr. Gail Frank, California State University
- Dr. Eric Decker, University of Massachusetts; food science

Process

- Extensive review of literature; prior initiatives/formulas
- Basic formula circulated in early 2006
 - Based on DRIs; FDA Nutrition Facts; USDA MyPyramid; Dietary Guidelines for Americans; international standards
- Iterative revisions based on expert panel consensus (listserv exchanges; conference calls)
- Trust, but validate:
 - Face validity
 - Content validity testing
 - e.g., R = 0.92
 - Criterion validity testing
- Algorithm 'finalized' ~7/07

The ONQI Algorithm-

Numerator	Denominator	
Fiber	Saturated fat	• Universal Adjustors
Folate	Trans fat	
Vitamin A	Sodium	Fat quality
Vitamin C	Sugar	Protein quality
Vitamin D	Cholesterol	Glycemic load
Vitamin E		Energy density
Vitamin B12		• Trajectory Scores
Vitamin B6		• Weighting Coefficients
Potassium		
Calcium		
Zinc		
Omega-3 fatty acids		
Total bioflavonoids		
Total carotenoids		
Magnesium		
Iron		

A trajectory score answers this question:

- How does the concentration of a given nutrient in a given food compare to the **recommended concentration** of that nutrient in the diet overall?

Weighting coefficients...

because a difference, to be a difference, must make a difference

- Applied to all trajectory scores
 - Ws = severity
 - Wp = prevalence
 - Wr = relative impact / strength of association

Differentiation, in the details-

- Citius, Altius, Fortius...
- AND??

ONQI formula

Something like:

$$(1+UA1) \times (1+UA2) \times (1+WP1 \times WS1 \times WR1 \times (\text{adjusted TS1}) + \dots + WP16 \times WS16 \times WR16 \times (\text{adjusted TS16}))$$

$$GL \times ED \times (1+WP1 \times WS1 \times WR1 \times (\text{adjusted TS1}) + \dots + WP5 \times WS5 \times WR5 \times (\text{adjusted TS5}))$$

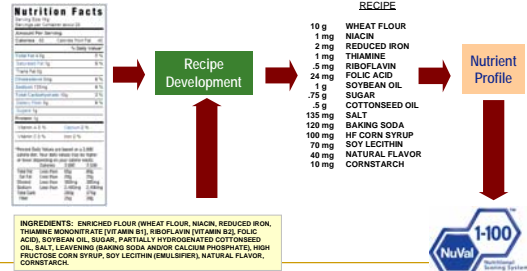
Variables in Formula

- TS = trajectory score
- Wp = weighting coefficient, prevalence
- Ws = weighting coefficient, severity
- Wr = weighting coefficient, relative impact
- UA1 = adjuster for biological quality of fat
- UA2 = adjuster for biological quality of protein
- ED = energy density adjuster
- GL = glycemic load adjuster
- Adjusted = pertinent mathematical transformations

And in all its (gore or) glory: 12 pages of mind-numbing computer programming

Data source for the algorithm

For many products, the Nutrition Facts and Ingredient Statement provides the necessary data to score products using the algorithm.



High tech input-

- Idiot-proof output:

Representative ONQI Scores

■ Mustard Greens	100	■ Scallops	51
■ Fresh Strawberries	100	■ Barley, cooked	47
■ Raw Spinach	100	■ Sunflower Seeds (dry roasted, salted)	40
■ Raw Broccoli	100	■ Orange Juice	39
■ Orange	100	■ Ground Beef, cooked at home	31
■ Apple	96	■ Canola Oil	24
■ Banana	91	■ Diet Soda	15
■ Plain Oatmeal	88	■ Bacon, center cut	13
■ Atlantic Salmon	87	■ Cheese Calzone	8
■ Tilapia (fish)	82	■ Pretzel Sticks	4
■ Almonds, raw	82	■ Regular Soda	1
■ 1% Milk	81	■ Taffy	1

ONQI Scores-

Protein

Atlantic salmon	87
Sirloin steak	44
Ground beef, 70% lean	24

Produce

Oranges	100
Grapes	91
Iceberg lettuce	82

ONQI Scores-

Dairy

Skim Milk	91
Whole Milk	52
Whole Chocolate Milk	33

Cereal

Organic Healthy Fiber Multigrain Flakes	82
Kashi GoLEAN	43
Quaker, Cap'n Crunch	3

Salty Snacks

Weight Watchers Smart Snackers Microwave Popcorn	69
Pringles Fat Free Potato Crisps - Sour Cream 'N Onion	29
Crunchy Cheetos	3

Proof in the Pudding (& elsewhere...)

Food Category	Rho	p-value
■ Diverse (n=21)	0.92	<0.001
■ Bread and Crackers (n=10)	0.66	0.04
■ Cereals & Granola Bars (n=10)	0.89	<0.001
■ Dairy Products (n=9)	0.92	<0.001
■ Fat/Oil (n=10)	0.71	0.02
■ Fruits (n=10)	0.33	0.36
■ Meat/Protein (n=10)	0.93	<0.001
■ Snack Foods (n=9)	0.93	<0.001
■ Spreads and Condiments (n=10)	0.95	<0.001
■ Vegetables (n=10)	0.70	0.02

Under Review: Am J Health Promotion

The advantages...

- of continuous truth:
 - For retailers
 - For manufacturers
 - For consumers-

Consumer Testing

- Qualitative: focus groups
- Quantitative: Affinova
 - Group 1: women, n = 454
 - Group 2: men and women, n = 350
- Percent of Respondents Answering “strongly agree” or “agree” (n=454)
 - The system would be useful in helping me make my purchasing decision: **93%**
 - The rating system would affect the decisions I make about which foods to purchase in the grocery store: **86%**
 - I would be more likely to purchase a product that used the system versus one that did not: **74%**
 - I would be more likely to stop at a grocery store that used the system versus one that did not: **66%**

Consumer Testing: ONQI vs. Alternative (best, better, good, no score)

- Which store would consumers select if both systems were available nearby? (n = 350)
 - Definitely/Probably ONQI **75%**
 - Either Store **20%**
 - Definitely/Probably Alternative **2%**
 - Neither Store **3%**

When science means business... *it needs to **do** business*



One number.
One decision.
One food at a time.

Expert nutritional knowledge
in a single score - *allowing*
people to make well-informed
choices, one food at a time.



NuVal LLC



Company Overview

- NuVal LLC officially formed in March 2008
 - ✓ Originally named ONQI LLC
 - ✓ Headquartered in Boston
- NuVal LLC jointly owned by Topco Associates in Skokie, Illinois and Griffin Hospital in Derby, Connecticut
- **ONQI Science remains the property of Griffin Hospital and is licensed to NuVal LLC**
- Objective of NuVal LLC: Commercialize scores from ONQI Science

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The NuVal Vision

Empowering people to eat better,
one well-informed food choice at a time,
wherever and whenever food is
purchased

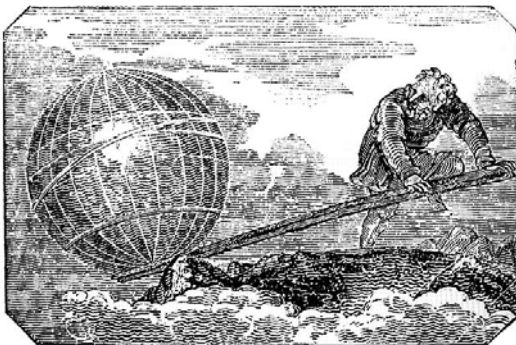
NuVal *con tempo*



- Initial launch in supermarkets & on web: September, 2008
 - Lead market launch: **Price Chopper; HyVee**
 - www.nuval.com
- Ramp up: 9/08-3/09
 - 15 committed retailers, representing ~5,000 stores
 - Finalizing contract with one of top 5 US retailers
 - Talks on-going with dozens of other retailers in US and Canada, representing thousands of additional stores
- Book series planned; Hachette Publishing
- Adaptations for total dietary scoring
 - Condition-specific ONQI variants for diabetes, hypertension, heart disease, weight management, etc.
 - ONQI variants tailored to particular dietary needs and preferences, e.g., vegetarian, gluten-free, nut-free, etc.
- Validation research: On-going; Harvard School of Public Health
- Initial scientific manuscript: *Am J Health Promotion*, under review
- Other Applications in the works: schools, federal programs
- Engagement of food manufacturers: on-going

UoNIQUE_r

- Completely objective; totally independent science
- Comprehensive: *beyond citius, altius, fortius*
- Continuous: fine differentiation
- Holistic: of checkout counters, & annual check-ups
- High performance engine, turn-key simplicity
 - *So what?...*



Thank you!

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