

# *Diet, Dollars, & Destiny*

*- rethinking links in the food chain-*

**David L. Katz, MD, MPH, FACPM, FACP**

*Associate Professor, adjunct, Public Health Practice*

*Director, Prevention Research Center*

*Yale University School of Medicine*

*President, Turn the Tide Foundation, Inc.*

**[www.davidkatzmd.com](http://www.davidkatzmd.com)**



**CAPI**

*Leaders Summit  
on Food*

**Montreal, Québec**

**2-17-10**



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# A look before the leap-

- Of diet & destiny
  - What food ***could*** do
  - Not just lives, but also dollars
  - Reciprocal back scratching
  - *Nu* tool for a *Nu* age problem: **NuVal**
  - The Nu value proposition
  - Money where mouths are? It's a SNAP
  - *Sustainability, Viability, Vitality; Citius, Altius, Fortius* and our Olympic moment
    - Rings, links, chains and circles
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Of diet & destiny...

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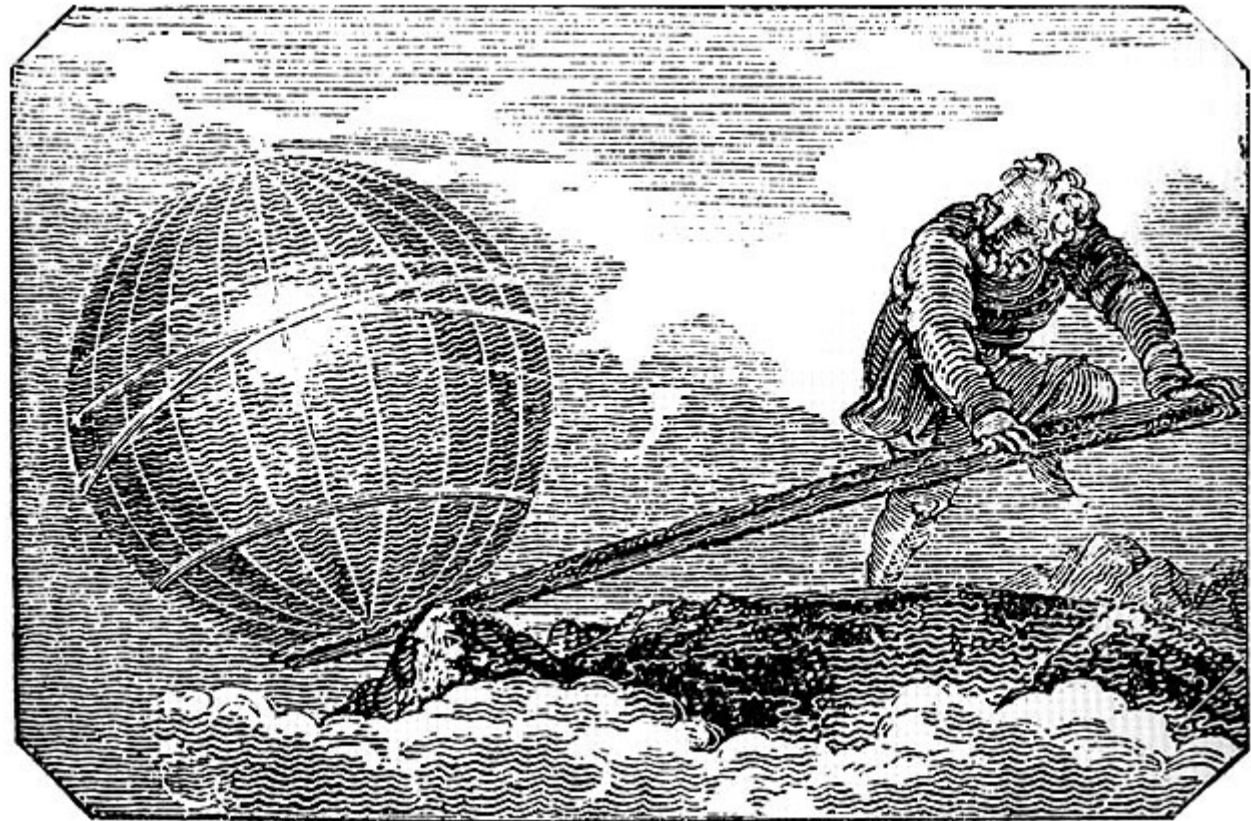
# There is **Lifestyle** . . . and everything else

- McGinnis JM, Foege WH. Actual causes of death in the United States. JAMA. 1993;270:2207-12
  - Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. JAMA. 2004;291:1238-45
    - Strong K, Mathers C, Leeder S, Beaglehole R. Preventing chronic diseases: how many lives can we save? Lancet. 2005 Oct 29-Nov 4;366(9496):1578-82
    - Epping-Jordan JE, Galea G, Tukuitoronga C, Beaglehole R. Preventing chronic diseases: taking stepwise action. Lancet. 2005 Nov 5;366(9497):1667-71
-

# The Master Levers of Destiny-

- *Feet*
- *Forks*

- *Fingers*



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# Nurturing Nature: the leverage of living well-

- ❑ Ornish D et al. Intensive lifestyle changes for reversal of coronary heart disease. *JAMA*. 1998;280:2001-7
  - Ornish D et al. **Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention.** *Proc Natl Acad Sci U S A*. 2008 ;105:8369-74
-

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# The People in Pottsdam-

- Ford ES, Bergmann MM, Kröger J, Schienkiewitz A, Weikert C, Boeing H. **Healthy living is the best revenge: findings from the European Prospective Investigation Into Cancer and Nutrition-Potsdam study.** *Arch Intern Med.* 2009 Aug 10;169(15):1355-62

*But...*

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Knowledge, alas, isn't power...

- Katz DL. **Life and death, knowledge and power: why knowing what matters isn't what's the matter.** *Arch Intern Med.* 2009 Aug 10;169(15):1362-3
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## What food *could* do-

- 80% reduction in heart disease
  - 90% reduction in diabetes
  - 60% reduction in cancer
    - and so on...
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# Not JUST lives, but also dollars...

- by 2018 over 100 million Americans will be obese
  - we will be spending roughly \$340 billion annually on obesity, a tripling of current levels
  - per capita spending will rise from \$361 to over \$1400 a year
    - <http://www.fightchronicdisease.org/pdfs/CostofObesityReport-FINAL.pdf>
      - *November, 2009*
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**Reciprocal back scratching-**

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# Agriculture & Health: anybody itchy?

- ❑ Health sector needs help addressing the enormous impact of food on health
- ❑ Agriculture sector needs help addressing the needs of eaters in tandem with the needs of feeders
- ❑ So: each scratches the other's back...
  - Health sector helps subsidize agricultural innovations that promote health
  - Health sector saves more money than it spends by reducing chronic disease burden\*
  - Ag sector has infusion of support from a whole new area, and maintains or enhances current profits, while contributing to the public good
- ❑ *Everybody wins... and winds up less itchy*

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\*e.g., Diabetes Prevention Program

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To encourage the  
consumption of ‘good’  
food...

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we have to help people find it.

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# Good advice...

- “Eat food, not too much, mostly plants.”
  - Michael Pollan

*...can be hard to follow!-*

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People need to know things-  
*they never knew they never knew!...*



**Sodium content per 100 calories?**





Sodium  
73 mg



Sodium  
100 mg



Sodium  
233 mg



Sodium  
131 mg

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Added sugar per 100kcal?





Sugar  
12 G



Sugar  
11 G

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# Nutrition Quiz – Peanut Butter



**Which one of these products is the more nutritious choice?**

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# Nutrition Quiz – Peanut Butter



**Answer: Regular Peanut Butter**

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## *A little 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

NuVal SCORE





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**Nu** tool for a **Nu** age problem:  
**NuVal**

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# Introducing NuVal™

The Nutritional Scoring System



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# What FDA or IOM should 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...*
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# ONQI Scientific Expert/Development Panel

- **Chair: Dr. David Katz**, Yale University School of Medicine
  
  - **Dr Keith Ayooob**, 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
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# 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
-

# The ONQI Algorithm-

## Numerator

Fiber  
Folate  
Vitamin A  
Vitamin C  
Vitamin D  
Vitamin E  
Vitamin B12  
Vitamin B6  
Potassium  
Calcium  
Zinc  
Omega-3 fatty acids  
Total bioflavanoids  
Total carotenoids  
Magnesium  
Iron

## Denominator

Saturated fat  
Trans fat  
Sodium  
Sugar  
Cholesterol

## •Macronutrient Adjustors

Fat quality  
Protein quality  
Glycemic load  
Energy density

## •Trajectory Scores

## •Weighting Coefficients

### *Categorical stipulations*

- Pure foods vs. processed
- Intrinsic vs. added sugars
- Artificial sweeteners
- Etc.

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## 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?



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# Trajectory score generation-

- Sodium

- $C3 = \text{sodium} / \text{energy} / 1.2;$

- Calcium

- $Da1 = \text{calcium} / \text{energy} / 0.5;$



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# Weighting coefficients...

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

- Applied to all trajectory scores
    - $W_s$  = severity
    - $W_p$  = prevalence
    - $W_r$  = relative impact / strength of association
-



# ONQI formula

*Something like:*

$$(1+UA1) \times (1+UA2) \times (1 + \frac{WP1 \times WS1 \times WR1 \times (\text{adjustedTS1}) + \dots + WP16 \times WS16 \times WR16 \times (\text{adjustedTS16})}{(\text{adjustedTS16})})$$

$$GL \times ED \times (1 + WP1 \times WS1 \times WR1 \times (\text{adjustedTS1}) + \dots + WP5 \times WS5 \times WR5 \times (\text{adjustedTS5}))$$

♪

## ■ *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:* 20 pages of mind-numbing computer programming

# High-octane fuel for a high performance engine:

Nutrition Facts			
Serving Size 16g			
Servings per Container about 28			
Amount Per Serving			
Calories	80	Calories from Fat	40
% Daily Value*			
Total Fat	4.5g		7 %
Saturated Fat	1g		5 %
Trans Fat	0g		
Cholesterol	0mg		0 %
Sodium	135mg		6 %
Total Carbohydrate	10g		3 %
Dietary Fiber	0g		0 %
Sugars	1g		
Protein	1g		
Vitamin A	0 %	Calcium	2 %
Vitamin C	0 %	Iron	2 %
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:			
Calories: 2,000 2,500			
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholest	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carb		300g	375g
Fiber		25g	30g

“Recipe”  
Development  
(imputation)

## RECIPE

10 g WHEAT FLOUR  
1 mg NIACIN  
2 mg REDUCED IRON  
1 mg THIAMINE  
.5 mg RIBOFLAVIN  
24 mg FOLIC ACID  
1 g SOYBEAN OIL  
.75 g SUGAR  
.5 g COTTONSEED OIL  
135 mg SALT  
120 mg BAKING SODA  
100 mg HF CORN SYRUP  
70 mg SOY LECITHIN  
40 mg NATURAL FLAVOR  
10 mg CORNSTARCH

Nutrient  
Profile

**INGREDIENTS:** ENRICHED FLOUR (WHEAT FLOUR, NIACIN, REDUCED IRON, THIAMINE MONONITRATE [VITAMIN B1], RIBOFLAVIN [VITAMIN B2], FOLIC ACID), SOYBEAN OIL, SUGAR, PARTIALLY HYDROGENATED COTTONSEED OIL, SALT, LEAVENING (BAKING SODA AND/OR CALCIUM PHOSPHATE), HIGH FRUCTOSE CORN SYRUP, SOY LECITHIN (EMULSIFIER), NATURAL FLAVOR, CORNSTARCH.



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# Power in the Database

*NuVal has built a database to house scores and nutrition information unlike any other in the country (world?).*

## ■ Key content

- Product ingredients and nutritional content.
- Product images (*front, back, and nutritional panel*)
- IRI category reference
- Product scores

## ■ Key Functionality

- UPC search (*8, 11, 13 digit formats supported*)
- Brand and product name search
- Ingredient exclusion (gluten, nut, etc) searches
- Standardized data formats (*flat file import and export*)
- Automated cross reference based on nutritional profiles

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# Vrrrooommm-

## ■ Under the Hood:

- ❑ undeniable (& distinctly advantageous) complexity

## ■ At the User Interface:

- ❑ turnkey simplicity
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# A Sampling of Scores

## Beef & Poultry

Turkey Breast (skinless)	48
Chicken Breast (boneless)	39
Pork Tenderloin	35
Bottom Round Roast (Beef)	34
Flank Steak (Beef)	34
Breast	31
Veal Chop	31
Veal Leg Cutlet	31
Beef Tenderloin	30
Chicken Drumstick	30
Ground Sirloin (Beef 90/10)	30
Pork Chop (boneless center)	28
Chicken Wings	28
Ground Round (Beef 85/15)	28
Lamb Chops (loin)	28
Leg of Lamb	28
Ham (whole)	27
Ground Chuck (Beef 80/20)	26
Pork Ribs, Country Style	25
Beef Spareribs	24
Pork Baby Back Ribs	24

## Seafood

Atlantic Salmon Fillet	87
Atlantic Halibut Fillet	82
Catfish Fillet	82
Cod Fillet	82
Tilapia Fillet	82
Oysters	81
Swordfish Steak	81
Prawns	75
Shrimp	75
Clams	71
Monkfish Fillet	64
Bay Scallops	51
Turbot Fillet	51
Lobster	36



## Produce

Apricots	100
Asparagus	100
Beans	100
Blueberries	100
Broccoli	100
Cabbage	100
Cauliflower	100
Kiwi	100
Lettuce	100
Mustard Greens	100
Okra	100
Orange	100
Spinach	100
Strawberries	100
Turnip	100
Carrots	99
Grapefruit	99
Pineapple	99
Plums	99
Mango	93
Potatoes	93
Red onions	93
Tangerines	93
Bananas	91
Corn	91
Grapes	91
Honeydew Melon	91
Rhubarb	91
Iceberg Lettuce	82
Bok Choy	81
Passion Fruit	78
Coconut	24

## Canned Vegetables

Del Monte Fresh Cut French Style Green Beans No Salt	100
Del Monte Fresh Cut Whole Leaf Spinach	76
Del Monte Fresh Cut Sweet Corn Cream Style No Salt Added	67
Del Monte Fresh Cut Whole Green Beans	59
Green Giant Extra Long Tender Green Asparagus Spears	56
Green Giant Cut Green Beans	52
Del Monte Organic Whole Kernel Corn	50
Green Giant Sweet Peas 50% Less Sodium	48
Le Sueur Very Young Small Sweet Peas	43
Green Giant Super Sweet Yellow & White Whole Kernel Corn	42
Del Monte Organic Sweet Peas	39
Veg-All Homestyle Large Cut Vegetables	35
Del Monte Fresh Cut Sweet Corn Cream Style	32
Green Giant Niblets Whole Sweet Corn	27
Progresso Artichoke Hearts	18
Aunt Nellie's Whole Ruby Red Pickled Beets	3

## Frozen Vegetables

Birds Eye Frozen Cauliflower Floret <i>plastic bag</i>	100
Birds Eye Frozen Chopped Spinach <i>box</i>	100
Green Giant Frozen Broccoli Cuts <i>steamable bag</i>	100
Green Giant Frozen Cut Green Beans <i>steamable bag</i>	100
Birds Eye Frozen Peas <i>polybag</i>	96
La Choy Frozen Snow Pea Pods <i>box</i>	96
Birds Eye Steamfresh Frozen Brussels Sprouts <i>steamable bag</i>	94
Birds Eye Frozen Cooked Winter Squash <i>box</i>	91
Green Giant Frozen Mixed Vegetables <i>steamable bag</i>	87
Birds Eye Frozen Asparagus Stir Fry <i>plastic bag</i>	82
Birds Eye Frozen Green Beans & Lightly Toasted Almonds <i>box</i>	68
Green Giant Frozen Cauliflower & 3 Cheese Sauce <i>plastic bag</i>	42
Green Giant Frozen Creamed Spinach in Low-Fat Sauce <i>box</i>	34
Birds Eye Steamfresh Specially Seasoned Southwestern Corn	33
Green Giant Frozen Sweet Baby Peas and Low-Fat Butter Sauce	30
Green Giant Frozen Honey Glazed Carrots <i>box</i>	26
Green Giant Frozen Green Bean Casserole <i>box</i>	23

## Cereal



Hodgson Mill Unprocessed Wheat Bran	100
Post Shredded Wheat Original	91
Kashi 7 Whole Grain Puffs	91
Kellogg's All-Bran	76
Kellogg's Special K Protein Plus	60
Quaker Shredded Wheat	56
General Mills Fiber One	52
Kashi Golean High Protein & High Fiber	47
General Mills Cinnamon Toast Crunch	40
Quaker Instant Oatmeal Original	39
General Mills Cheerios	34
Post Shredded Wheat Frosted	31
Kellogg's All-Bran	31
Post HealthyClassics Grape-Nuts	30
Post Honey Bunches Of Oats with Almonds	29
Kashi 7 Whole Grain Flakes	29
General Mills Kix	29
General Mills Wheaties	28
General Mills Whole Grain Total Raisin Bran	27
Post Healthy Classics Raisin Bran	26
Kellogg's Frosted Flakes	26
Kellogg's Corn Flakes	25
Post Fruity Pebbles	24
Kellogg's Mueslix	24
General Mills Corn Chex	24
Cream Of Wheat Instant Hot Cereal	24
Quaker Natural Granola Oats, Honey & Raisins	23
Kellogg's Rice Krispies	23
General Mills Basic 4	23
General Mills Lucky Charms	23
Kellogg's Corn Pops	20
Kellogg's Froot Loops	17
Kashi Strawberry Fields	11
Cap'n Crunch	10
Quaker Instant Grits Butter Flavor	6

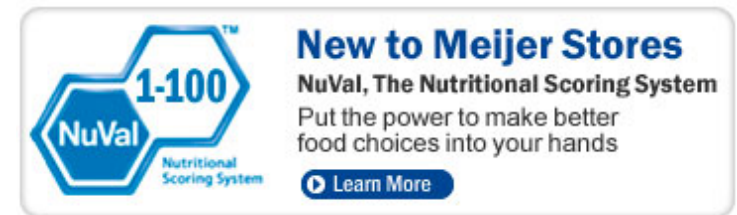
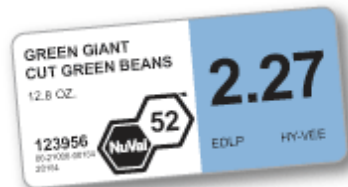
## Salty Snacks

Garden of Eatin No Salt Blue Tortilla Chips	52
Terra unsalted potato chips barbecue	41
Garden of Eatin Blue Tortilla Chips	40
Terra Gold Original Potato Chips	33
Snyder's Multigrain Pretzel Sticks Lightly Salted	31
Guiltless Gourmet Chili Lime Tortilla Chips	30
Tostitos Light Restaurant Style	28
Utz Baked Potato Crisps Original	27
Good health peanut butter filled pretzels	26
Doritos Baked Nacho Cheese	25
Frito-Lay Sun Chips Harvest Cheddar	25
Lay's Baked Potato Crisps	25
Baked Ruffles Cheddar & Sour Cream	24
Newman's Own Organic Pretzel Rounds Unsalted	24
Ruffles Thick Cut Original	24
Doritos Cool Ranch	23
Lay's Potato Chips Classic	23
Snyder's Pretzels Honey Wheat o	23
Sunshine cheez-it party mix	20
Newman's Own Organic Pretzel Rounds Salted	19
Fritos Corn Chips Original	16
Cheetos Puffs	14
Rold Gold Petzels Rods	14
Chex Mix Traditional	13
Doritos Nacho Cheese	10
Rold Gold Pretzel Sticks Fat Free	10
Pringles Reduced Fat Original	9
Ruffles Cheddar & Sour Cream	9
Cheetos Crunchy	5
Utz Potato Chips Barbecue	4
Combos Pretzel Cheddar Cheese	3
Bugles Original Corn Snack	2
Glutino Pretzel Twists Gluten Free	1

# NuVal *con tempo*



- >40,000 foods scored and audited
- Live in 526 supermarkets in 19 states; rolling out to more this year
- Searchable on-line database in April, 2010





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# Consumer Testing, because: A difference, to be a difference...

- must make a difference.
  - *Gertrude Stein*

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# Face Validity: 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%**

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## 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%**

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# Consumer Research: Key Findings

- The system is universally appealing to all sub-groups
  - Consumers overwhelmingly confirm the value of a nutritional scoring system
  - The presence of the ONQI graphic leads to higher purchase intent, versus a product that does not show the ONQI icon, *even in combination with a manufacturer's nutrition symbol*
  - The ONQI system is preferred to systems offering less 'granular' information
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## \*Consumer Testing: Knowledge, Attitudes, Behavior

- Consumer In-Store Intercepts
- Consumer Panel Online Surveys
- Retailer Receipt Surveys
- Tracking Sales Movement
  - In and across categories
  - Both generally and for NuVal-aware participants
  - Shift to higher-nutrition choices

\*conducted by NuVal independently, and in conjunction with retail partners

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# NuVal is going to school...

- Independence School District, MO
  - New Haven, CT
  - ?~ Palm Beach County, FL
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...But has already been tested:  
*validation research*

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## Construct Validity: 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

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# A quick DASH toward validation-

- 7 days of DASH study meal plan at 2300mg Na level
  - Composite recipe scoring technique
    - Mean ONQI score: **46\*** (95% CI: 40 to 53)
- NHANES 2003-2006 cohort (n = 15,900)
  - Composite recipe scoring technique
    - Mean ONQI score: **26.5\*** (95% CI: 26.4 to 26.6)
    - **Correlation with quartiles of HEI-2005: R = 0.52; p<0.0001**

\*p<0.01

**Table 1. Descriptive statistics for Overall Nutritional Quality Index (ONQI) and HundredScale (NuVal 0-100) values, and percentage of population having diets at NuVal levels<sup>1, 2</sup>**

Index of Diet Quality	Total Population (n = 15,900)		
<hr/>			
<u>Overall Nutritional Quality Index (ONQI)</u>			
Mean of the distribution	17.5	±	0.2
Percentiles of the distribution			
Lowest quartile breakpoint	9.9	±	0.1
Middle quartile breakpoint (median)	13.8	±	0.2
Highest quartile breakpoint	20.4	±	0.3
<u>HundredScale - NuVal 0-100 Scale</u>			
Mean of the distribution	26.5	±	0.1
Percentiles of the distribution			
Lowest quartile breakpoint	23.9	±	0.1
Middle quartile breakpoint (median)	25.4	±	0.1
Highest quartile breakpoint	28.0	±	0.1
Percentage (%) distribution for the population			
0 - 19	4.1	±	0.3
20 - 39	92.5	±	0.4
40 - 49	3.2	±	0.3
60 - 100	0.2	±	0.1

<sup>1</sup> Source: NHANES, 2003-2006, ages 4 yr and older, Day 1 (n = 15,900)  
ONQI and HundredScale values were determined without the glycemic load coefficient for diets using composite method.

<sup>2</sup> Mean, percentile breakpoints, percentage and standard errors estimated using SUDAAN.

**Table 6. Linear regression to correlate ONQI and HundredScale with Healthy Eating Index (HEI-2005)<sup>1</sup>**

Independent Variable	Beta Coeff.	SE Beta	P-value		P-value Wald F	Model R-Square <sup>2</sup> (%)
			T-test H <sub>0</sub> : B=0	Wald F		
Overall Nutritional Quality Index (ONQI)	0.53	0.02	<b>0.000</b>	588.6	<b>0.000</b>	29.30%
HundredScale - NuVal 0-100 Scale	1.12	0.03	<b>0.000</b>	1183.4	<b>0.000</b>	27.57%

<sup>1</sup> Source: NHANES, 2003-2006, ages 4 yr and older, Day 1 (n = 15,900)  
ONQI and HundredScale values were determined without the glycemic load coefficient for diets using composite method.

<sup>2</sup> Covariates include gender, age (years), and race-ethnicity

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# NuVal™ at the Harvard School of Public Health

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A **sneak preview** of findings from the  
*Nurses Health Study* & the  
*Health Professionals Follow-up Study*

*January, 2010*

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## Methods-

- Independent research by Dr. Walter Willett and his team at the Harvard School of Public Health
  - Facilitation by the ONQI team at the Yale Prevention Research Center
  - The ONQI algorithm was provided to the Harvard team
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## Methods, cont-

- ONQI algorithm used to assign a NuVal score to every food item included in the food frequency questionnaire administered in the Nurses Health Study and Health Professionals Follow-up Study in 1986
    - Data collection for subsequent years now on-going
  - NuVal scores for individual food items were then weighted by frequency (i.e., number of servings)
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## Methods, cont-

- NuVal scores were aggregated to the level of total diet, divided into quintiles
  - Multivariate models adjusted for:
    - age, calories, smoking, BMI, aspirin use, exercise, vitamin E supplementation, menopausal status, menopausal hormone use, family history of MI or cancer, and history of high cholesterol or blood pressure
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# Nurses Health Study:

## NuVal vs. HEI-2005; n = ~70,000

	NuVal, Quintile 5	HEI-2005, Quintile 5
RR of chronic disease	<b>0.86 (0.82-0.90)</b>	<b>0.88 (0.83-0.92)</b>
RR of CVD	0.77 (0.69-0.86)	0.83 (0.75-0.93)
RR of diabetes	0.79 (0.71-0.87)	0.90 (0.81-1.00)
RR of cancer	1.00 (0.93-1.07)	0.92 (0.86-0.98)

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# HPFS:

## NuVal vs. HEI-2005; n = ~40,000

	NuVal, Quintile 5	HEI-2005, Quintile 5
RR of chronic disease	<b>0.85 (0.81-0.90)</b>	<b>0.86 (0.81-0.92)</b>
RR of CVD	0.77 (0.69-0.85)	0.80 (0.72-0.89)
RR of diabetes	0.77 (0.67-0.88)	0.94 (0.82-1.08)
RR of cancer	0.99 (0.91-1.09)	0.93 (0.84-1.03)

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## Eating to live...

- RR of all-cause mortality, top vs. bottom quintile of NuVal scores
  - NHS:  $RR = 0.88$ ;  $p < 0.001$  ( $n \sim 70,000$ )
  - HPFS:  $RR = 0.87$ ;  $p = 0.001$  ( $n \sim 40,000$ )

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# Conclusions:

- Despite limitations in the analysis that bias the performance of NuVal toward the null, **NuVal was a slightly better predictor of total chronic disease risk & all-cause mortality than the HEI-2005 in 70,000 women and 40,000 men**
  - ❑ To the best of our knowledge, this is the highest validation standard achieved by any nutritional profiling system
  - ❑ Additional data analysis at Harvard is on-going
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## Other research collaborations-

- UCLA
  - University of Iowa; STAR Registry
  - University College Cork, Ireland
  - Michigan State University
  - Oxford University, England
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# The Nu value proposition

- Not dollars earned per calorie (supply)
  - Not calories purchased per dollar (demand)
  - But...
    - *overall nutrition per dollar, and dollars per overall nutrition*
-

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Less far-fetched than urban legend  
would suggest...

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**Table 1.** Mean costs of more nutritious and less nutritious items

Item Type	Type	N	Mean	SD	<i>p</i> value
<b>Bread</b>	<b>Less nutritious</b>	8	\$2.56	\$.80	0.03
	More nutritious	9	\$3.36	\$.28	
<b>Cereal Bars (cost/serving)</b>	Less nutritious	9	\$.64	\$.48	0.05
	<b>More nutritious</b>	8	\$.53	\$.04	
<b>Cereal</b>	Less nutritious	9	\$3.50	\$.30	<0.01
	<b>More nutritious</b>	9	\$2.46	\$.69	
<b>Chips</b>	Less nutritious	9	\$2.87	\$.79	0.06
	<b>More nutritious</b>	8	\$2.17	\$.58	
<b>Cookies</b>	Less nutritious	9	\$3.40	\$.37	<0.01
	<b>More nutritious</b>	8	\$2.76	\$.50	
<b>Crackers</b>	Less nutritious	9	\$2.56	\$.62	0.70
	More nutritious	8	\$2.69	\$.36	
<b>Juices (cost/serving)</b>	<b>Less nutritious</b>	8	\$.26	\$.09	0.07
	More nutritious	7	\$.83	\$1.39	
<b>Peanut Butter</b>	<b>Less nutritious</b>	7	\$2.37	\$.24	0.07
	More nutritious	6	\$3.67	\$1.40	
<b>All Categories (cost/item)</b>	<b>Less nutritious</b>	<b>68</b>	<b>\$2.29</b>	<b>\$1.26</b>	<b>0.76</b>
	<b>More nutritious</b>	<b>63</b>	<b>\$2.31</b>	<b>\$1.24</b>	

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# Money where mouths are? It's a SNAP

- Directly link measure of nutritional quality to purchasing power of food stamps
  - In any given food category (e.g., bread), use NuVal scores to stratify into quartiles
  - For foods purchased in bottom quartile of overall nutritional quality, \$1 of vouchers would be worth \$1
    - \$1.25 in next quartile
    - \$1.50 in next quartile
    - \$2 in top quartile
  - Concept applicable to any assistance program *or to public at large* via public/private partnership involving retailers and loyalty card programs
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Sustainability, Viability, Vitality;  
*Citius, Altius, Fortius* and our Olympic  
moment

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*of rings, links, chains and circles*

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# Rethinking the links in the food chain...

- To create a virtuous circle:
    - ❑ More wholesome foods are readily identifiable by all
    - ❑ Incentives encourage selection of more wholesome foods; nutrition per dollar is the new measure of value
    - ❑ Incentives from health sector lower care costs, and support shift in sales to keep Ag profits steady
    - ❑ Shift to less processed foods ('mostly plants') enhances sustainability, benefits environment
  - *Sustainability, viability, vitality*: everybody wins
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## *The falsely alluring alternatives to eating well...*

Pharmacotherapeutic Phantasies  
& Cold Hard Steel-

- ❑ **EU suspends sales of rimonabant: 10/24/08**
  - ❑ **Tesofensine shows promise, but...**
  - ❑ **And then there's brown fat:**
    - April 12, 2009 *The New York Times*
    - Editorial: **Cool Way to Lose Weight?**
  - ❑ **Obesity Surgery Increases by 600 Percent**
    - *Safer Techniques, More Insurance Coverage and Celebrity Patients Make It More Appealing* **ABC News Medical Unit, May 31, 2006**
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# *Beware our Birthmark...*

- Like Hawthorne's hapless heroine, we all are marked from birth...

- Katz DL. The Scarlet Burger. *Wall Street Journal*, Op-Ed. 11/19/03



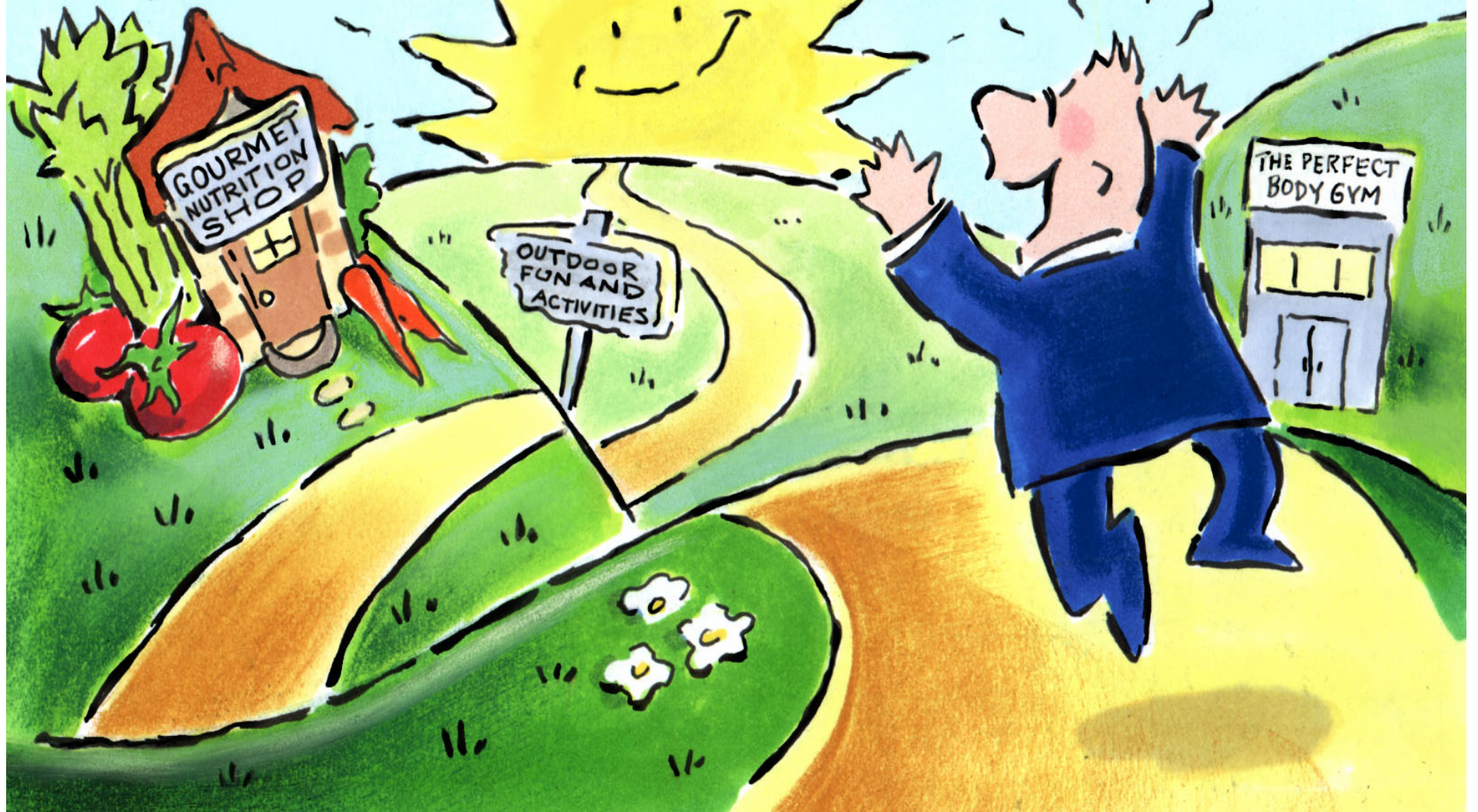
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*The one TRUE Path-*

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*Health. Weight Control. Happiness with Food!*





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*Thank you!*

David L. Katz, MD, MPH, FACPM, FACP  
Director, Yale Prevention Research Center  
President, Turn the Tide Foundation, Inc.  
130 Division St.  
Derby, CT 06418  
(203) 732-1265  
[David.katz@yale.edu](mailto:David.katz@yale.edu)

*[www.davidkatzmd.com](http://www.davidkatzmd.com)*

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