Focus on Fibers:
What RDs Need to Know NOW

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Webinar for Diabetes Care and Education (DCE)
Dietetic Practice Group Sept 24, 2010

Disclosures

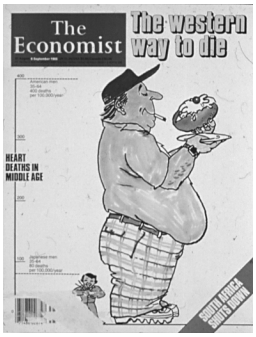
- Hope Warshaw - Consultant to National Starch, LLC
- Julie Miller Jones - Board Member/Advisory Panel: Grains Food Foundation, International Life Sciences Institute North America, Grains Industry Advisory Panel, Expert Panel on Fiber, Carbohydrates and Whole Grains, Vegetable, Plant and Health Advisory Committee, Joint Institute of Food Safety and Nutrition of the US FDA and University of Maryland Consultant: California Fig Advisory Board; Wheat Foods Council Adjunct Professor: University of Minnesota

Webinar Outline

- Fiber: a shortfall nutrient
- Current fiber intake and recommendations
- Fiber definitions and types
- Research on fiber's health benefits
- Fiber, labels, the clinician and client
- Fiber and diabetes concerns
- Q and A

Fiber and the Current Nutrition Milieu

- ↑ Obesity/overweight prediabetes and type 2
- Dietary fiber offers general and diabetes-specific health benefits
- Fiber intakes are LOW!!
- Numerous types of added fibers now available
- NOT all fibers perform all functions
- Added fibers can help people achieve higher fiber intakes



Current and Future Recommdendations for Dietary Fiber in U.S.

Polling Question #1

What percent of the currently recommended dietary fiber intake (21-38g/day) do you think Americans (across gender and age) consume?

- Approximately 50%
- Between 25 to 50%
- Between 10 to 25%
- Less than 5%

Carbohydrate and Fiber Intake

Food/Nutrient	Current Intake	Goal for Health
CHO	**45 – 52**% adults[1]	**45 – 65%** [2,3]
Fruits	~ 1 cup/day (33% adults eat 2[4])	2 cups/day
Vegetables	~ 1 cup/day (27% adults eat 3[4])	2 ½ cups/day
Whole Grains	< .9 serving/day	3 or more servings/day
Dietary fiber	11 – 15 g/day children (2–18 yo)[1] 14 – 17 g/day adults[1]	(AI) 21-38 g/day (adults)
Dairy	~1.4 cups/day	2-3 cups (8 oz)/day
Sugars (added)	~22 tsp/day (355 cals) (all)[5] ~ 34 tsp/day (549 cals) (14–18 yo) [5]	8 tsp (2000 cals) (part of discretionary cals)

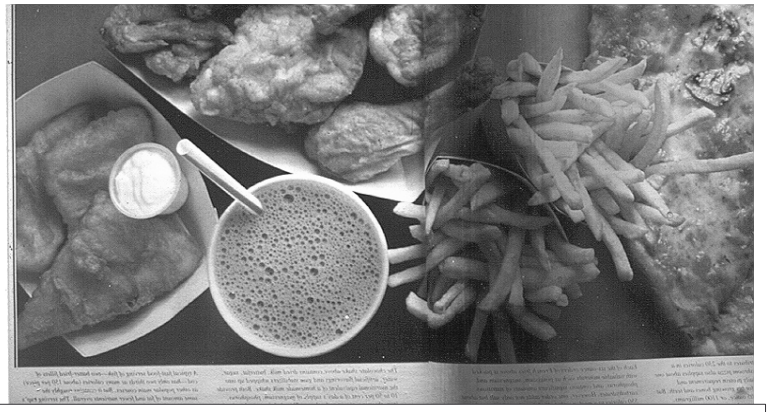
1. What we eat in America. NHANES 2005-06. www.ars.usda.gov
2. DHHS/USDA Dietary Guidelines for Americans, healthierus.gov/ dietaryguidelines.
3. ADA, Nutrition Recommendations and Interventions, Diab Care. Supp 1, S61-S78, 2008
4. Report on Fruits & Veg, 2009. www.fruitsandveggiesmatter.gov/health_professionals/statereport.html
5. Dietary Sugars Intake and CVD. AHA, 2009. circ.ahajounals.org

The Dietary Fiber America Eats vs. Recommended?

- NHANES (’03-’06) across gender and ages 4-50 yrs
  - < 4% meet current fiber requirement (21-38g)
  - 0% males 14-50 yrs
  - 13 - 15% women 51+yrs (best intake)

Marriott et al. Crit Rev Food Sci Nutr. 2010;50:228-58.

Where's the Fiber in our Foods??



White flour and white potatoes (low fiber foods) provide the most fiber in the U.S. diet, because most widely consumed.

Gargantuan, Gaseous, Greasy, Good Tasting

Fiber in Common Foods

FOOD	FIBER g/svg	Svg
Baked beans	6	1/2 c
Raisin bran cereal	5	3/4 c
Lentils	4	1/2 c
Strawberries	4	1 c
Oatmeal	3	½ c
Apple (with skin)	3	1 med
Whole-wheat bread	2	1 sl
Carrot (raw)	2	1 med
Broccoli (cooked)	2	1/2 c

ADbA Fiber Recommendations

- Like dietary fiber recs for general population
- Dietary fiber – 50g/day
  - Decreased glycemia seen in type 1 DM
  - Glycemic lowering, improved insulin sensitivity and improved lipid levels in type 2 DM
- Barriers to meeting recommendations
  - Palatability
  - Limited availability food choices
  - GI side effects
- 1st priority: achieve dietary fiber goals for general population
  - Use meal-based solutions
  - DASH, Mediterranean diet

ADA, Nutrition Recommendations and Interventions, Diab Care. Supp 1, S61-S78, 2008

Diabetes: Any Different Carb Intake?

- Trends 1988 – 2004, NHANES
  - Adults with self-reported diabetes
    - 1988-90: 1,941 cal, 209 g CHO (43%)
    - 2003-04: 2,109 cal, 241 g CHO (46%)
      - No sign. change energy, sign. inc. CHO
  - 45–65 yo:
    - 1988-90: 1,770 cal, 195 g CHO (44%)
    - 2003-04: 2,100 cal, 234 g CHO (45%)
      - Sign. change both cals and CHO
      - Similar to general population changes over yrs

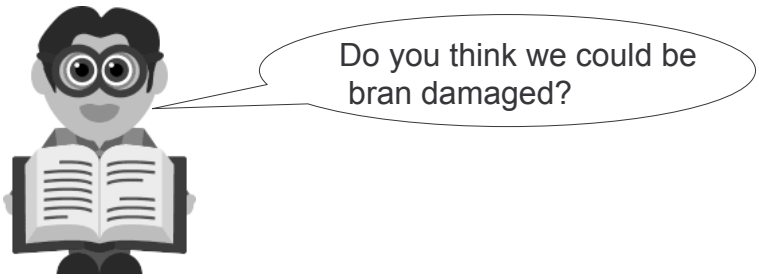
Oza-Frank R, et al Trends in nutrient intake among adults with diabetes in U.S. 1988 – 2004. JADA. 2009;109(7): 1173-78.

Type 2 DM: Look AHEAD Trial

- Overweight, type 2, baseline nutrient intake from FFQ in ~ 2,760 subjects, 36% overwt, 46% obese
- Results: Compared to nat'l nutrition guidelines and food guide pyramid:
  - 93% exceeded total fat
  - 85% exceeded saturated fat
  - **44% of cals as CHO**
  - **20% met fiber goal**
  - **< 50% met min. rec. svgs. fruit, veg. dairy, grains**
    - **7% met min. rec. svgs grains**

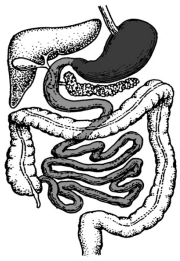
Vitolins MZ et al Action for Health in Diabetes (Look AHEAD) Trial: Baseline evaluation of selected nutrients and food group intake. JADA. 2009;109(8):1367-75.

Dietary Fiber Definitions



Dietary Fiber Concept

- Carbohydrates not digested in the small intestine and moves into the large intestine
  Burkitt, Painter & Trowell 1970s



- Nutrient – according to 2002 Dietary Reference intakes (DRIs) IOM, Dietary Reference Intakes, National Acad Press, 2002

NAS Dietary Fiber Definition

3 Categories:

Dietary Fiber: intrinsic / intact

Functional fiber: isolated or synthetic and added

Total Fiber: the sum of both

If you feel this way about fiber, maybe you need a tastier option.

IOM, Dietary Reference Intakes: Proposed Definition of Dietary Fiber (2001), Available at: http://www.nap.edu/catalog.php?record_id=10161; Accessed June 16, 2010.

Codex Fiber Definition 2009

- Dietary fibre means carbohydrate polymers with a DP not lower than 3*, which are neither digested nor absorbed in the small intestine. DF consists of:
  - Edible carbohydrate polymers naturally occurring in the food as consumed
  - Carbohydrate polymers, which have been obtained from food raw material by physical, enzymatic or chemical means (isolated)
  - Synthetic carbohydrate polymers

DP = Degree of polymerization

Definition – Codex & AACC- I

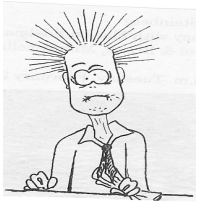
- Non-digestible polysaccharides
  polymers of glucose and other sugars
  no human gut enzymes split them
- Oligosaccharides
  3 – 20 sugar units (DP)
  3 - 10 optional by country
- Resistant starch
- Lignin & associated plant substances
- **Must have a physiological effect**

Codex (AACC) Fiber Functions

- Dietary fibre physiological properties listed in all but the final document
  - Improved intestinal transit time and increased stool bulk
  - Fermentation by colonic microflora
  - Modulates blood total and/or LDL cholesterol
  - Modulates postprandial blood glucose and/or insulin
  - More may be possible

Solubility, Viscosity, Fermentability

"Although solubility of fiber was thought to determine physiological effect, more recent studies suggest other properties of fiber, perhaps fermentability or viscosity are important parameters." [1]



1. Slavin J. Position of the American Dietetic Association: Health Implications of Dietary Fiber…Dietary Fiber, *J Am Diet Assoc. 2008;108:1716-1731.*

Dietary Fiber ≠ Whole Grain

- Deficient intake of both whole grains & dietary fiber
- Dietary fiber not synonymous with whole grain
  - Both being encouraged, creates consumer confusion
  - Foods high in whole grains not necessarily high in fiber:
    - low = brown rice; moderate = quinoa; high = barley, bulgur
  - Dietary fiber found not only in whole grains; but also legumes, fruits, vegetables; and foods with functional fibers
- Whole grains contain vits, mins, phytochemicals above and beyond fiber
  - Independent health benefits, including reducing risk of type 2

Dietary Fiber ≠ Whole Grain

- Dietary Guidelines – make ½ grain svgs whole grain
  - 16 g/serving
  - Sources whole grains: wheat, oats, corn, rice, barley
- Current food labeling difficult to find whole grains, not on Nutrition Facts. Ingredients don't clearly indicate the amount of whole grain present.
- Whole Grains Council stamp program
- Health claim for whole grain:
  - Contains all portions of the grain kernel
  - At least 51% whole grain by weight; 1.7 g DF/ sv exc brown rice
  - Meet fat, saturated fat, and cholesterol restrictions

Resource: www.wholegrainscouncil.com, www.bellinstitute.com (General Mills)

Fiber and Health

A Brief Overview

Fiber and Diabetes

- Whole-grain intake - diabetes risk
  - RR 1.0, 0.99, 0.98, 0.92, and 0.79 across quintiles
- Dietary fiber (DF) intake – diabetes risk
  - RR 1.0, 1.09, 1.00, 0.94, and 0.78
- A low-fat diet + DF intake >30g/d
  - effective preventive approach for type 2 DM

Kaline et al Horm Metab Res. 2007;39(9):687-93; Meyer et al Am J Clin Nutr 2000;71(4):921-30.

Fiber and Diabetes

- RCT T2DM high fiber foods, esp. viscous fibers and supplements
- Acute and long-term improvements
  - ↓ hemoglobin A1c
  - ↓ fasting and post-prandial glycemia
  - ↓ insulinemia
  - ↓ cardiovascular risk factors
  - weight control through promoting feelings of fullness

Vuksan et al Curr Diab Rep. 2009;9(5):405-11.

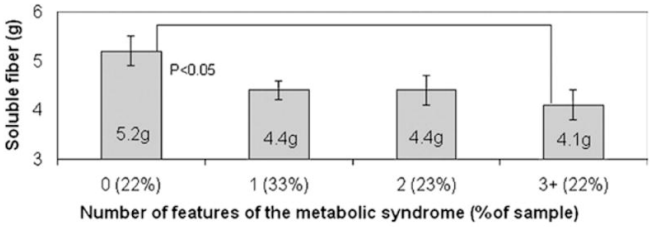
Fiber and Prevention of Diabetes

- Assume that soluble, viscous fibers most successful BUT
- Cohort studies support WG, brans and insoluble cereal fiber as protective
- Both types of fiber affect
  - Insulin sensitivity
  - Gut hormones
  - Inflammation markers

Weickert al. *J Nutr* 2008;138:439-442.

Fiber and Metabolic Syndrome

- Recent review reflects these data from 109 overweight Latino children



- Soluble fiber
- Total fiber 8.4 vs 7.5g Met S P<.09

Ventura et al 2008;108(8):1355-9, Aleixandre & Miguel Crit Rev Food Sci Nutr. 2008;48(10):905-12.

Fiber and Coronary Disease

ATBC Finnish

- Low quintile (16g/d) vs high (35g/d)
  - » rye crisp bread
  - » no difference in lipid values

- Soluble fiber RR= 0.70
- Insoluble fiber RR=0.65
- Cereal fiber RR= 0.70
- Fruit and veg ns

Anderson et al. Nutr Rev. 2009;67(4):188-205 – reviewed this Finnish Trial and other data

Fiber and Coronary Disease

LDL-C ↓

- 13.7 - full-fat rice bran
- 17.1 - oat bran
- Increased SCFA

I don't understand it…. I never drank, fooled around with women and always ate whole grain bread.

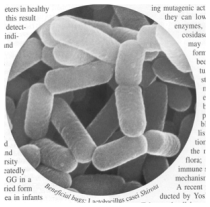
Queenan et al Nutr J. 2007;26;6:6; Gerhardt J Nutr 1998;128:5 865-9.

Mechanisms by which Fiber ↓ CHD Risk

- ↓ serum cholesterol
- Delay absorption of nutrients
  - ↑ insulin sensitivity
  - ↓ triglycerides
- ↓ blood pressure
- ↑Short chain fatty acids
- Phytochemicals attached to fibers change markers of inflammation

Fiber, Fermentability & Prebiotics

- "Dietary fibers that are fermentable carbohydrates could be considered as prebiotics" (2005 review)
- Change microbial flora
  - Promote beneficial bacteria
  - Competitively inhibit pathogens
  - Benefit the immune system
  - Obesity, metabolic disease?



Lim et al Mol Nutr Food Res. 2005;49:609-19; Cani& Delzenne Curr Opin Pharmacol. 2009;9(6):737-43

Constituents of Dietary Fiber

- Cellulose
- Hemicellulose
- Pectin
- B glucan
- Mucilages and gums
- Fructans
- Oligosaccharides
  - Fructose-OS & Galacto-OS
- Resistant starch
- Lignan
- Assoc. substances
  - Cutin
  - Suberin
  - Phytin
  - Tannin
  - Waxes phytochemicals

ILSI Monograph Series: Dietary Fibre 2006

Whole Lot of Fiber!

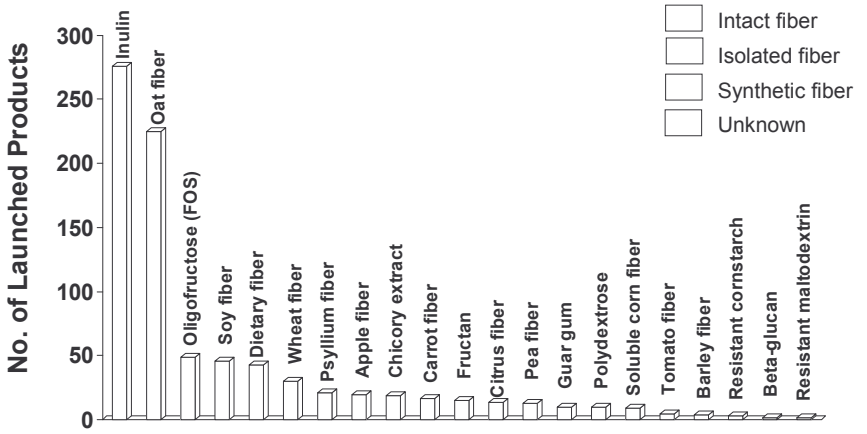
Polling Question #2

Functional and synthetic fibers now being used in a growing number of food products…

- All have similar physiologic impact and health benefits
- Can help people of all ages more easily reach their dietary fiber intake goal and derive varied health benefits
- Don’t help people achieve their dietary fiber intake goals because they aren’t real fibers from whole foods
- Are a small group of ingredients currently being used by food manufacturers to increase dietary fiber

Functional (Isolated and Synthetic) Fibers in Use in U.S. Food Products

(launches b/w 2007-2009)



Mintel GNPD, 2010

All Fibers Are Not Created Equal

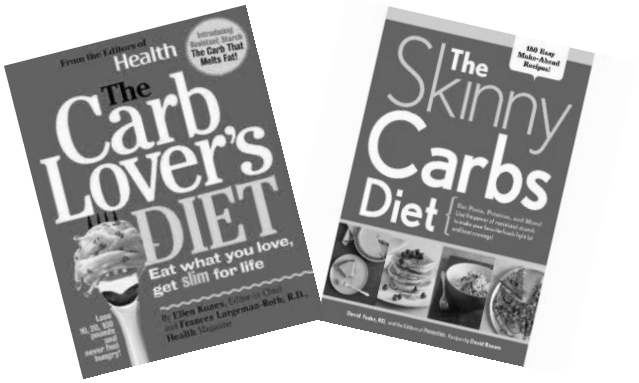
Two Fibers in the News

- Inulin
- Resistant Starch

Inulin (Fructooligosaccharide)

- Chicory root/extract; also jerusalem artichoke, agave; also manufactured sources
- Easy to add to most
  - Inexpensive
  - Add lots of fiber quickly
- Prebiotic
- Potential to cause GI distress, gas, cramps, bloating; tolerance varies with source; individual tolerances
  - Concern about cumulative effect with so many products

Heads Up: Two New “Diet” Books



Questions and Answers about Resistant Starch
http://www.resistantstarch.com/NR/rdonlyres/DE2ADBB0-FF7D-40A7-B409-03493FEFFDFA/4509/QuestionsandAnswersAboutResistantStarch1.htm

Resistant starch has been researched for more than 20 years around the world

319 Publications on resistant starch from high amylose corn (RS2):
92 human clinical trials + 168 animal studies + 59 *in vitro* studies

Resistant Starch Defined

Resistant starch (RS)

RS1 – starch that is physically inaccessible e.g. enclosed within intact cell structures in foods such as leguminous seeds and partly milled cereal grains and seeds.

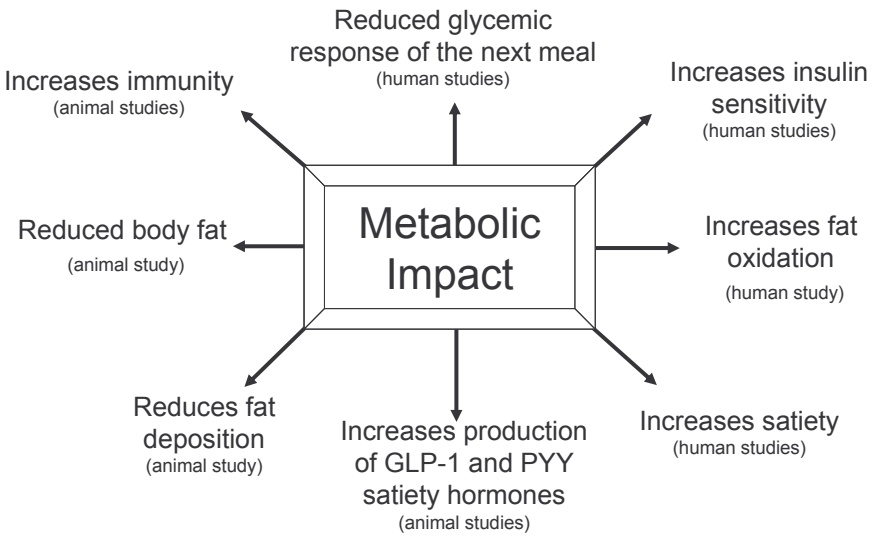
RS2 – native starch granules (of B-type X-ray spectrum), e.g. in maize rich in amylose, raw potatoes, green bananas.

RS3 – retrograded amylose (and to a lesser extent, amylopectin) in processed foods. Food starches may be rendered partially indigestible by physical or chemical processes and by cooling, e.g. in bread, cornflakes and cooled cooked potato or rice.

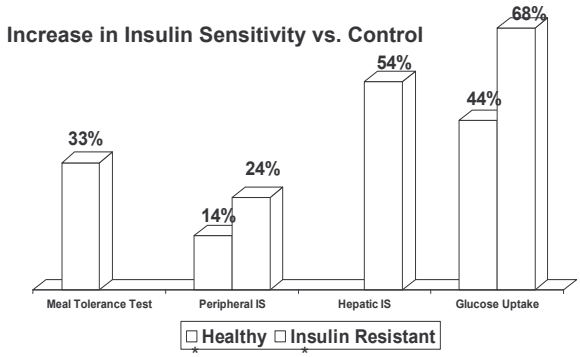
RS4 – chemically modified starch (including pyrolised, pyrodextrinated starch).

ILSI Monograph Series: Dietary Fibre 2006

Host of Health Benefits of RS2 Due to Metabolic Impact



RS2 Increases Insulin Sensitivity



Insulin resistant people were more sensitive than healthy people.

Healthy and Insulin Resistant (2005, 2009
- intervention studies 4/8 wks ~10 per group
- 30 g or 40 g fiber from RS2/day
- *Measured by hyperinsulinemic-euglycaemic clamp (gold std)

Insulin-sensitizing effects of dietary resistant starch and effects on skeletal muscle and adipose tissue metabolism[1–3]

M Denise Robertson, Alex S Bickerton, A Louise Dennis, Hubert Vidal, and Keith N Frayn

Am J Clin Nutr 2005;82:559–67

A37 (P37)

Dietary resistant starch is an insulin sensitiser

MD Robertson*, JW Wright*,†, J Batt*, D Russell-Jones‡ and AM Umpleby*

*Diabetes and Endocrinology, University of Surrey, Guildford, UK, ‡Diabetes and Endocrinology, Royal Surrey County Hospital, Guildford, UK

2009. *Diabetic Medicine*, **26** (Suppl. 1), 1–28

RS Reduced Insulin Response/Improved Insulin Sensitivity

- RCT 20 healthy young males
- 48 grams of RS2 b'fast and lunch (equal portions)

British Journal of Nutrition (2009), page 1 of 6 doi:10.1017/S0007114509992534

Acute ingestion of resistant starch reduces food intake in healthy adults

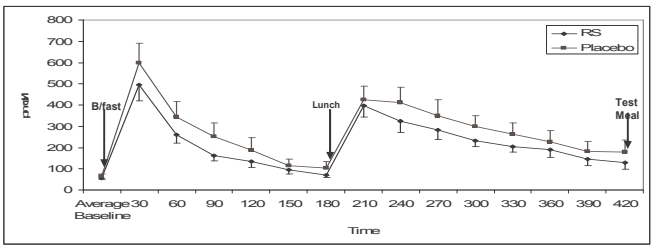
Breakfast Lunch

Caroline L. Bodinham[1], Gary S. Frost[2] and M. Denise Robertson[1]*

[1]*Diabetes and Endocrinology, Postgraduate Medical School, University of Surrey, Guildford, Surrey GU2 7WG, UK*

[2]*Imperial College London, London W12 0NN, UK*

(*Received 23 March 2009 – Revised 17 September 2009 – Accepted 21 September 2009*)

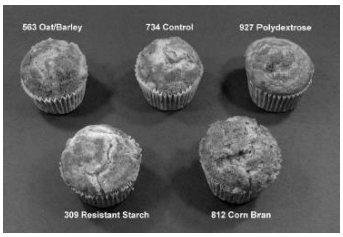


P=0.029

RS2 Increases Satiety

Study Design:

- 20 healthy adults
- 175 kcal muffins for breakfast



Result:

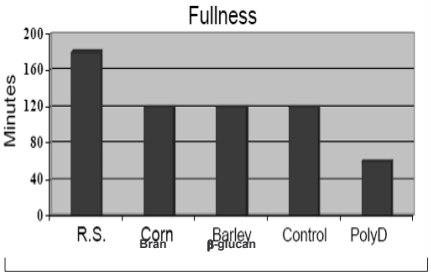
- RS had stronger satiety than other fibers

Greater satiety response with resistant starch and corn bran in human subjects

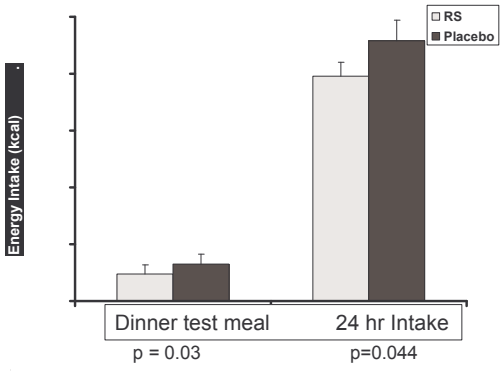
Holly J. Willis[a,*], Alison L. Eldridge[b], Jeannemarie Beiseigel[b], William Thomas[c], Joanne L. Slavin[a,*]

[a]Department of Food Science and Nutrition, University of Minnesota, MN 55108, USA
[b]General Mills Inc, Bell Institute of Health and Nutrition, Minneapolis, MN 55426, USA
[c]Department of Biostatistics, University of Minnesota, Minneapolis, MN 55414, USA

Received 24 November 2008; revised 16 January 2009; accepted 20 January 2009



Long-term Satiety with RS2



RCT 20 healthy men

- 48 g of fiber from RS2 over b'fast & lunch (equal portions)
- Placebo received glycemic equivalent

Results:

- 6.6% fewer cals consumed at dinner
- 10% fewer cals consumed over 24 hrs
- Subjects reported no difference in feelings of hunger, fullness or prospective food consumption

British Journal of Nutrition (2009), page 1 of 6

doi:10.1017/S0007114509992534

Acute ingestion of resistant starch reduces food intake in healthy adults

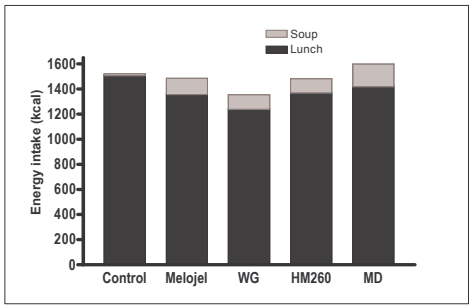
Caroline L. Bodinham[1], Gary S. Frost[2] and M. Denise Robertson[1]*

[1]Diabetes and Endocrinology, Postgraduate Medical School, University of Surrey, Guildford, Surrey GU2 7WG, UK
[2]Imperial College London, London W12 0NN, UK

(Received 23 March 2009 – Revised 17 September 2009 – Accepted 21 September 2009)

Impact of RS1 & RS2 on Short-term Satiety in Healthy Men

Energy Intake at 2 hrs Post Lunch



RCT 17 healthy men

- 5 different starch ingredients delivered in tomato soup 2 hrs before lunch meal
- RS1 (Whole Grain) reduced lunch intake by 244 kcal
  - 15% lower than high glycemic maltodextrin
- RS2 reduced lunch intakes by 116 kcal,
  - 7% lower than maltodextrin

Relation between estimates of cornstarch digestibility by the Englyst in vitro method and glycemic response, subjective appetite, and short-term food intake in young men[1–3]

G Harvey Anderson, Clara E Cho, Tina Akhavan, Rebecca C Mollard, Bohdan L Luhovyy, and E Terry Finocchiaro

AJCN. First published ahead of print February 17, 2010 as doi: 10.3945/ajcn.2009.28443.

Summary of Tolerance Data: Varied Fibers

- Dietary fiber
  - up to 80 g/d in vegetarians; no UL
- Polydextrose
  - 50 g
- Resistant starch
  - up to 80 g
- Inulin/Fructo-oligosaccharides
  - 10-15 g; diarrhea at 40 g

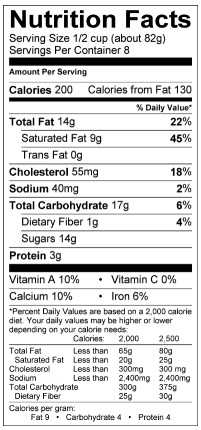
Grabitske & Slavin. *Cr Rev Food Sci Nutr* 2009; 49:327-360. Bonnema AL, Kolberg LW, Thomas W, Slavin JL. Gastrointestinal tolerance of chicory inulin products. *J Am Diet Assoc.* 2010;110(6):865-868.

Dietary Fiber & Food Labeling

From Nutrition Facts to Ingredients and Diabetes Specific Concerns

Dietary Fibers: Current Nutrition Labeling

- **Past:** FDA based on analytical methods approved by Assoc of Official Analytical Chemists (AOAC) which were based on substances thought to have physiological functions
  - Some fibers such as inulin and resistant starch weren't captured by this method
- **Present:** AOAC method revised to include functional/synthetic fibers (eg: polydextrose, resistant starch, inulin, others) (CODEX accepted), being used by food industry, FDA accepting but no formal regulation
  - Need for standardized analytical method for labeling



Nutrition Facts

Serving Size 1/2 cup (about 82g)
Servings Per Container 8

Amount Per Serving

Calories 200	Calories from Fat 130
	% Daily Value*
Total Fat 14g	**22**%
Saturated Fat 9g	**45**%
Trans Fat 0g	
Cholesterol 55mg	**18**%
Sodium 40mg	**2**%
Total Carbohydrate 17g	**6**%
Dietary Fiber 1g	**4**%
Sugars 14g	
Protein 3g	

Vitamin A 10% • Vitamin C 0%
Calcium 10% • Iron 6%

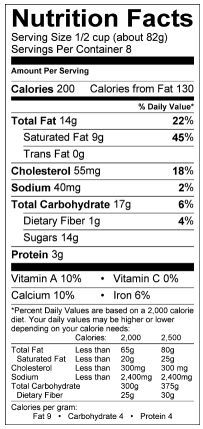
*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

		Calories:	2,000	2,500
Total Fat	Less than		65g	80g
Saturated Fat	Less than		20g	25g
Cholesterol	Less than		300mg	300 mg
Sodium	Less than		2,400mg	2,400mg
Total Carbohydrate			300g	375g
Dietary Fiber			25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Dietary Fibers: Future Nutrition Labeling

- May move towards physiologic approach for labeling
  - This would require companies to prove health benefits associated with specific functional fibers
- May revise reference value as part of mandatory nutrition labeling changes[1]
  - concerns about effect on nutrition, health claims



Nutrition Facts
Serving Size 1/2 cup (about 82g)
Servings Per Container 8

Amount Per Serving

Calories 200 Calories from Fat 130

	% Daily Value*
Total Fat 14g	**22**%
Saturated Fat 9g	**45**%
Trans Fat 0g	
Cholesterol 55mg	**18**%
Sodium 40mg	**2**%
Total Carbohydrate 17g	**6**%
Dietary Fiber 1g	**4**%
Sugars 14g	
Protein 3g	

Vitamin A 10% • Vitamin C 0%
Calcium 10% • Iron 6%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

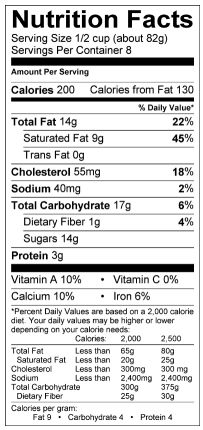
	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300 mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

1. Fiber Fact Sheet, International Food Information Council (IFIC)
http://www.foodinsight.org/Content/6/FINAL%20IFICFndtnFiberFactSheet%2011%2021%2008.pdf

Dietary Fibers: Nutrition Labeling

- Dietary Fiber as component of Total Carbohydrate
  - Reported rounded to nearest full gram
    - Less than 1 g reported as “less than 1 g”, less than 0.5g reported as 0
  - Insoluble/soluble fiber is voluntary
    - If a claim made ➔ not voluntary
- Accuracy ?
  - Margins of error for Total Carbohydrate
  - If inspected 80% of sample must contain 80% of amount on label



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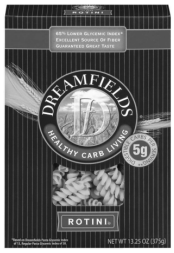
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Dietary Fibers: Ingredients List

- Listed in descending order by weight
- Accurate, non-fraudulent representation

- Fibers:
  - No specific FDA requirements to date
  - Softer, generic fiber ingredient declarations are being used instead of more specific chemical names for some functional fibers (eg inulin, (vegetable fiber, chicory root)
  - Blend of ingredients for combined effect:
    - eg Dreamfields: proprietary matrix of fibers and protein combine to blunt BG rise; Glucerna products: blends of fibers and carbohydrate sources to blunt BG rise



Ingredients
Enriched Semolina, [Semolina, Iron (Ferrous Sulfate), and B Vitamins (Niacin, Thiamine, Mononitrate, Riboflavin, Folic Acid)], Inulin (Vegetable Fiber), Wheat Gluten (Plant Protein), Xanthan Gum (Food Fiber), Pectin (Fruit Fiber), Potassium Chloride.

From Nutrition Facts to Ingredients: Interpolation Required

- What insights can we (clinicians) gather/teach by looking at the ingredient list in comparison to the dietary fiber count?

- Observe:
  - dietary fiber count
  - Ingredients
    - learn/teach words for whole food “intact” fibers, functional fibers
    - where on ingredients list (how far down?)

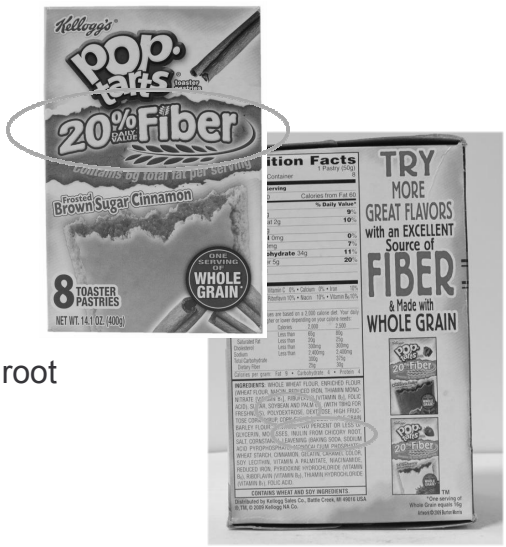
Fibers in Foods

- Nutrition Facts:
  - ¾ cup/svg
  - Total carb: 25 g
  - Dietary fiber: 5 g
- WHEAT BRAN, RAISINS, WHOLE WHEAT FLOUR, SUCROMALT, FRUCTOSE, CORN BRAN, ..

- Nutrition Facts:
  - 8 oz/svg
  - Total carb: 19 g
  - Dietary fiber: 3 g
- WATER, CORN MALTODEXTRIN, FRUCTOSE, MILK PROTEIN CONCENTRATE, GLYCERINE, HIGH OLEIC SAFFLOWER OIL, COCOA POWDER (PROCESSED WITH ALKALI), **LESS THAN 1% OF:** SODIUM CASEINATE, CANOLA OIL, SOY PROTEIN ISOLATE, FRUCTOOLIGOSACCHARIDES, SOY FIBER,

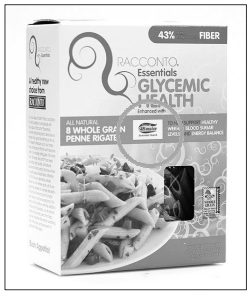
Fibers in Foods

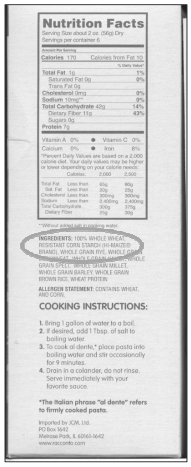
- Nutrition Facts:
  - Dietary fiber: 5g/1 pastry (svg)
- Functional fiber source(s):
  - polydextrose
  - inulin from chicory root



Fibers in Foods

- Nutrition Facts:
  - Dietary fiber: 11g/2 oz dry
- Functional fiber source(s):
  - resistant corn starch (Hi-maize brand) logo on front





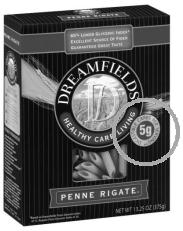
Dietary Fiber: Nutrition Claims

- % Daily Value (DV) for Dietary Fiber: 25 g/2000 cals
- Excellent/High: > 5g/ref svg; at least 20% of DV
- Good source: 2.5 – 4.9g/ref svg; at least 10% of DV
- More/added fiber: >2.5 grams more per ref svg (compared to reference food)

Labeling Terms – Not FDA Approved

- "Net carbs"
- "Effective carbs"
- "Protected carbs"
- "Digestible carbs"

- Advice: use Nutrition Facts label info unless research to support others, or there are changes in FDA regulations



Dietary Fiber: Health Claims

- **Health claims – background:**
  - Confirm relationship b/w food component and health or disease/risk of
  - FDA approves/not and dictates what can be said/not said, products must meet certain criteria and only model statements can be used.

- **3 fiber-related health claims:**
  - Fiber-containing grain products, fruits, and vegetables and cancer
  - Fruits, vegetables and grain products that contain fiber, particularly soluble fiber, and risk of coronary heart disease
  - Soluble fiber from certain foods and risk of coronary heart disease

Model health claim: "Low-fat diets rich in fiber-containing grain products, fruits, and vegetables may reduce the risk of some types of cancer, a disease associated with many factors."

Structure / Function Claims

Allowed on foods or supplements under DSHEA (Dietary Supplement and Health Education Act)
- Can't mention impact/relation to a disease
- Can say eg: "supports healthy blood sugar"

HEB Glycemic Health Bread

- Both breads
  - Contain Hi-maize resistant starch
  - State "supports healthy blood sugar".

Aunt Millie's Potato Bread

Factoring in Fiber

- Popular question among DEs
- Recommendation changed in Choose Your Foods (ADtA/ADbA), 2008, for consistency with IOM DRI for energy, etc. 2002 guidelines which indicate that in deriving energy value for food labeling, fiber is calculated as having about half the energy (2 kcal/g) of other carbohydrates (4 kcal/g) as follows:
  - "If a food contains more than 5 grams of fiber, subtract half the grams of fiber from the carbohydrate grams to get the total carbohydrate grams."
  - Apply same logic to total fiber content of meals/snacks with greater than 5 grams.
- Still valid based on newer functional fibers and higher fiber foods?

Wheeler ML et al. *Choose Your Foods: Exchange Lists for Diabetes.* 6th Edition, 2008: description and guidelines for use. *J Am Diet Assoc* 2008;108:883.

Factoring in Fiber

- Why not teach to most people w/ diabetes (T1, T2)?
  - Carb counts, total fiber on food labels have margin of error
  - People not that accurate in carbohydrate counts
  - Average fiber intake: 11 – 17 g/day, average meal ~ 4 - 5g
  - Too much math for most people and too many other higher diabetes/nutrition priorities

Warshaw, Bolderman: Practical Carbohydrate Counting: A How-to guide for healthcare professionals, American Diabetes Association, 2008.

Factoring in Fiber

- Why teach some T1/T2 on insulin, who:
  - Demonstrates excellent accuracy in carbohydrate-counting skills and a willingness to consistency use them vs. WAG
  - Eats high-fiber diet (>20 g/day) and/or regularly eats specifically high-fiber foods individually or cumulatively > 5 g of fiber per food (e.g., high fiber cereal) or meal (e.g., brown rice, beans with whole grain tortillas)
  - Able to easily and quickly do the math
  - Uses BG lowering medication that can be adjusted (eg insulin)
  - Could put at risk for hypoglycemia if don't subtract

Warshaw, Bolderman: Practical Carbohydrate Counting: A How-to guide for healthcare professionals, American Diabetes Association, 2008.

How to Help Clients Maximize Dietary Fiber Intake

Eat More Fiber From Whole Foods

Carb Containing Foods	Tips to Increase Intake
Whole grains	Purchase/eat whole grain breads, cereals, crackers, pasta, corn, brown rice, grains – millet, couscous, barley, etc
Legumes, beans, peas	Side dishes, vegetarian main courses, soups, stews, salads, hummus/others dip or sandwich spread
Fruits	Carry along, include at breakfast, keep cut up, stock canned
Vegetables	Use fresh, frozen, canned; buy pre-cut/washed; fit in stealthily;

Eat More Fiber from Resistant Starch

Resistant Starch
Current Intake vs. Recommended

	Current Intake	Recommended
Resistant Starch	**Average in U.S.: 4.8g/day[1]** **Range in U.S.: 2.7 – 8.0 g/day[1]** **Worldwide: 3-10g/day[2]**	**15 – 20 g/day[2]**

1. Murphy M, Douglass JS, Birkett A. Resistant starch intake in the United States. *J Am Diet Assoc. 2008;108: 67-78.*
2. Baghurst PA, Baghurst KI, Record SJ. Dietary fibre, non-starch polysaccharides and resistant starch: a review. Supplement to Food Australia 1996;48(3):S3-S35.

Foods with High Natural RS Content

Food	Serving Size	Resistant Starch (g)[1]
Oatmeal	1 cup, cooked	0.5g
Potato, cold (in salad)	1, 2” diameter	1.0g
Pasta, cold (in salad)	1 cup	1.4g
Barley, pearl	3/4 cup, cooked	2.8g
Navy beans	1/2 cup, cooked	3.8g
Banana, under ripe	1 medium, peeled	4.6g
Lentils	3/4 cup, cooked	5.0g

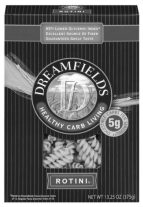
1. Murphy M, Douglass JS, Birkett A. Resistant starch intake in the United States. *J Am Diet Assoc. 2008;108: 67-78.*

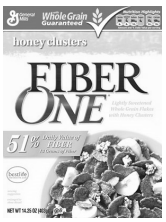
Tips to Increase RS

- Sprinkle **ground flax and/or sesame seeds** on dry cereal or salads. Mix them into meat loaf, casseroles, or stir-fries.
- **Enjoy more legumes** – lentils; navy, black or kidney beans. Soups, casseroles, side dish, salads. Salsa (bean/corn).
- Use **cooked and cooled rice, pasta or potatoes** in or on salads, as side dish.
- Stock **corn instead of flour tortillas**. Use them to make quick meals or snacks like quesadillas or burritos. Fill them with rice and beans.
- **Eat more bananas** (under ripe). Slice them into cereal or onto a P & J sandwich. Top sliced bananas with no fat yogurt or sour cream. Eat bananas as a quick and portable snack.
- Choose and use **whole grain breads and cereals** (oats, rye and wheat).
- **Substitute Hi-maize** for 10-25% of the flour in recipes for muffins, quick or yeast breads, cookies, smoothies, pancakes or waffles (1T = 6.5g fiber).*

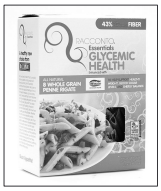
*King Arthur Flour: www.kingarthurflour.com: Substitute Hi-maize RS (#1587) for ~20-25% of flour in recipes. Or use High Fiber Flour with Hi-maize RS (#3511) in place of regular flour for 100% flour replacement in recipes. (Products not guaranteed gluten-free). Celiac Specialties: www.celiacspecialties.com: Hi-maize RS. Substitute Hi-maize RS for up to 20-25% of flour in gluten-free recipes. (Guaranteed gluten-free).

Eat More Fiber From Foods with Added Fibers





- Choose if:
  - Enjoyed!
  - Beneficial (health/nutrition/glycemic)
  - Tolerated (no GI effects)
- Assured of science behind the fiber source
- Consider all products. If overall healthy, achieves vs. defeats nutrition/diabetes goals:
  - Cereal, bread, crackers
  - Pasta
  - Yogurt
  - “diabetes-specific”



Adding Up Fiber: Guidance to Clients

- Eat a variety of fibers different fibers have different benefits
- Focus on fiber from whole foods – will increase intake of variety of types of fibers
- But, will also need to choose foods with functional/synthetic fibers to reach dietary guidelines goals
- Give people #s – average current intake; child/woman/man goal.
- Trust/use Nutrition Facts and ingredients list vs. advertisements/hype/unapproved wording

Adding Up Fiber: Guidance to Clients

- Teach meaning of nutrition claims, Daily Value as way to help choose products
- Discuss/make aware of possible GI side effects of some dietary fibers in large amounts, watch for cumulative effect with several products/day (plus medication effects?)
- Don't use a food just b/c of it's "high fiber" if you don't enjoy it – "spend" calories wisely
- Try, Test, Evaluate it! - personal response: enjoyment? glycemic? digestive?

Dietary Fiber Resources & References

- DHHS/USDA *2005 Dietary Guidelines for Americans*, healthierus.gov/ dietaryguidelines.
- DHHS/USDA *2010 Dietary Guidelines for Americans*, http://www.cnpp.usda.gov/DietaryGuidelines.htm
- Institute of Medicine: *Dietary Reference Intakes: Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. "Dietary, Functional, and Total Fiber." Pp 339-421. Washington, DC, National Academies Press, 2002*
- Slavin J. Position of the American Dietetic Association: Health Implications of Dietary Fiber, *J Am Diet Assoc. 2008;108:1716-1731.*
- ADA, Nutrition Recommendations and Interventions, Diab Care. Supp 1, S61-S78, 2008
- IFIC. Fiber Fact Sheet. 2008 www.foodinsight.org/Content/6/FINAL%20IFICFndtnFiberFactSheet%2011%2021%2008.pdf
- American Dietetic Association, Evidence Analysis Library, Dietary Fibers (initial ongoing 4/10); www.adaevidencelibrary.com
- Resistant Starch: www.resistantstarch.com
- Fiber pe-dia: A comprehensive look at fiber, www.kelloggsnutrition.com/files/fiber.pdf
- www.bellinstitute.com (General Mills)
- CPE Self Study ADtA (2 CEUs): Fiber and Beyond – There's More to Know about Fiber http://www.kelloggsnutrition.com/files/cpe-test/HP_module_final_042210.pdf
- FDA www.fda.gov

- Brand websites: (use either product line or company)

Q and A