

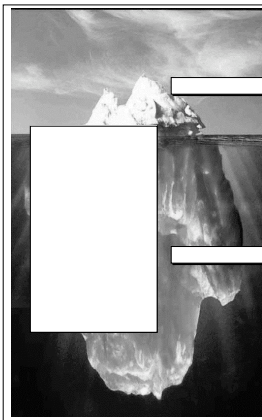
Lifestyle Approaches for Risk Reduction

Satellite Conference and Live Webcast
Wednesday, March 5, 2008
2:00-4:00 p.m. (Central Time)

Produced by the Alabama Department of Public Health
Video Communications and Distance Learning Division

Faculty

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Diabetes Educator



High Blood Sugar
High blood cholesterol
High blood pressure
High body weight

- INSULIN RESISTANCE
- PROCOAGULATION AND HYPOFIBRINOLYSIS
- OXIDATIVE STRESS
- LOW GRADE INFLAMMATION

Prediabetes

- 54 million Americans have prediabetes
- 2 million adolescents (1 in 6) have prediabetes
- 1 in 3 Americans born in the year 2000 will develop diabetes in their lifetime
 - IFT or IGT is 20-34%
 - With both IFG and IGT is 38-65%
- IFG and especially IGT substantially increases risk of CVD
- Predictive cumulative 5-6 year incidence of development of type 2 diabetes
 - With either

National Burden of Diabetes- Direct Costs of Diabetes

- Estimated at \$116 billion, including \$27 billion for care to directly treat diabetes, \$58 billion to treat diabetes-related chronic complications, and \$31 billion in excess general medical costs.
- People with diagnosed diabetes, on average, have medical expenditures that are approximately 2.3 times higher than those without diabetes.

National Burden of Diabetes- Direct Costs of Diabetes

- \$58.3 billion was spent on inpatient hospital care and \$9.9 billion on physician's office visits directly attributed to diabetes.

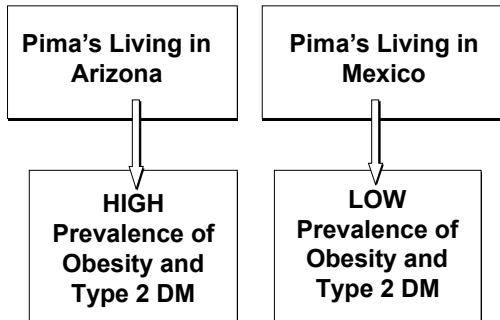
National Burden of Diabetes- Indirect Costs of Diabetes

- Estimated to be \$58 billion in 2007.
- In 2007, diabetes accounted for 15 million work days absent, 120 million work days with reduced performance, 6 million reduced productivity days for those not in the workforce, and an additional 107 million work days lost due to unemployment disability attributed to diabetes.
- Diabetes caused 445,000 cases of unemployment disability in 2007.

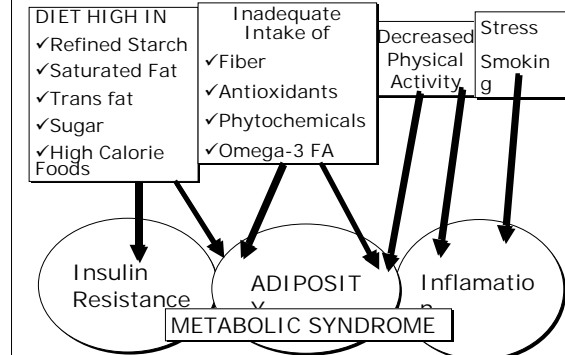
Diabetes Toll On the Individual

- Adults with diabetes have heart disease death rates about 2 to 4 times higher than adults without diabetes.
- Diabetes is the leading cause of blindness
- Diabetes is the leading cause of kidney failure
- The rate of amputation for people with diabetes is 10 times higher than for people without diabetes.

Lifestyle Differences



Toxic Lifestyle



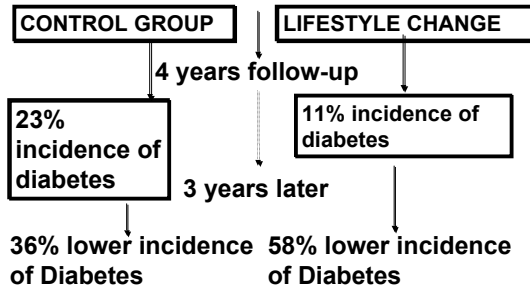
Finnish Diabetes Prevention Study

- Randomized control trial
- 522 overweight middle-aged men and women with IGT
- Lifestyle counseling group
 - 7 sessions with nutritionist in first year
 - Recommended diet: Low fat (30%), low saturated fat (10%), high fiber (15g/1000 kcal)

Finnish Diabetes Prevention Study

- Randomized control trial
- 522 overweight middle-aged men and women with IGT
- Lifestyle counseling group
 - 1 session monthly thereafter
 - 30 minutes of aerobic exercise recommended with supervised circuit type resistance training

Finnish Diabetes Prevention Results



Incidence of Diabetes Less with Greater Lifestyle Change Success

Success Score	% Occurrence of Diabetes	
	Intervention Group	Control Group
0	38%	31%
1	15%	23%
2	13%	29%
3	5%	13%
4	0%	0%
5	0%	0%

Finnish Diabetes Prevention Study: High Fiber, Low Fat Diet Benefits

- Greater weight loss
- Decreased risk diabetes

Diabetes Prevention Program



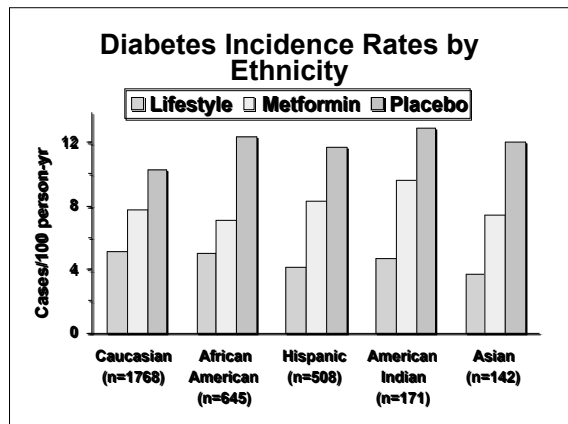
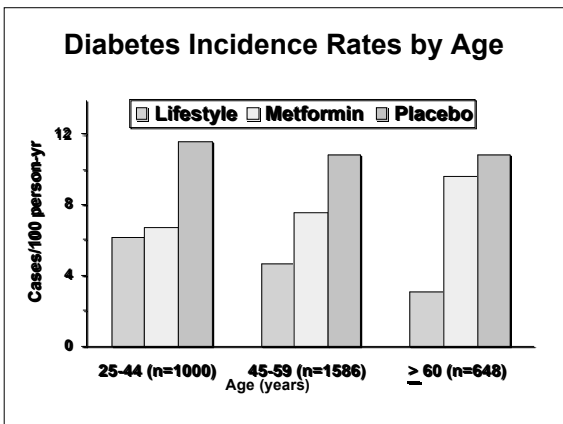
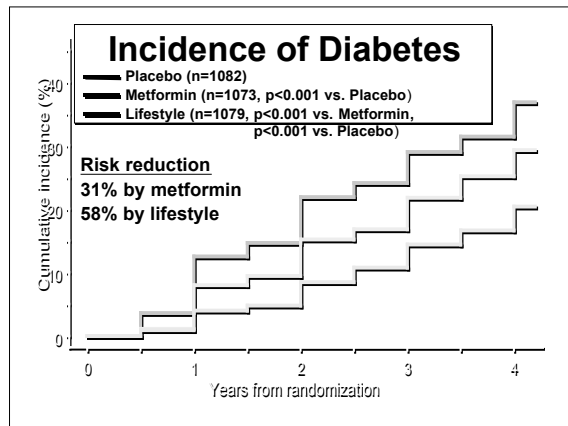
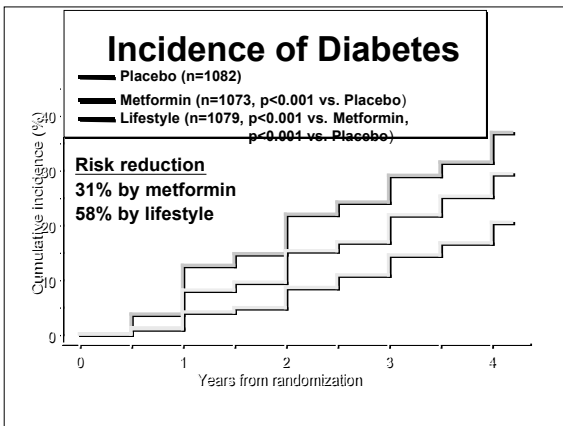
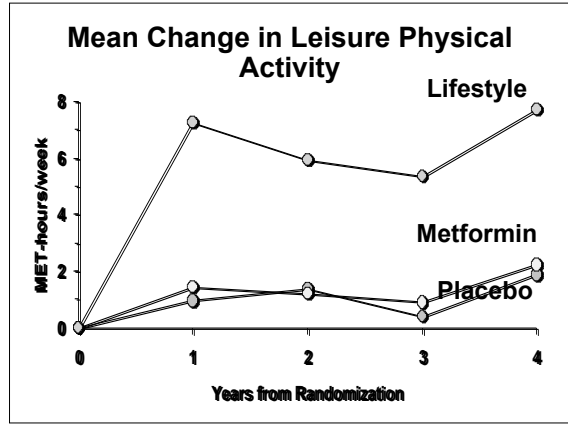
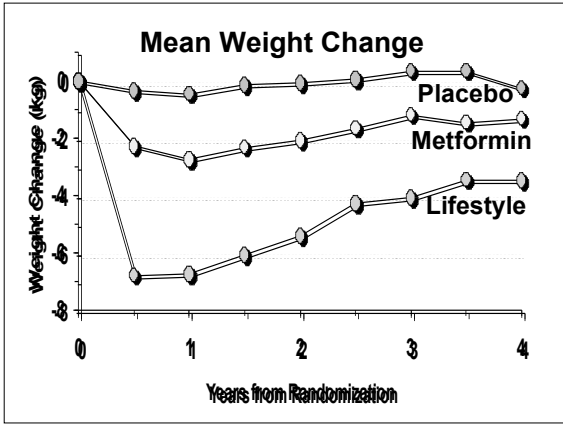
Diabetes Prevention Program

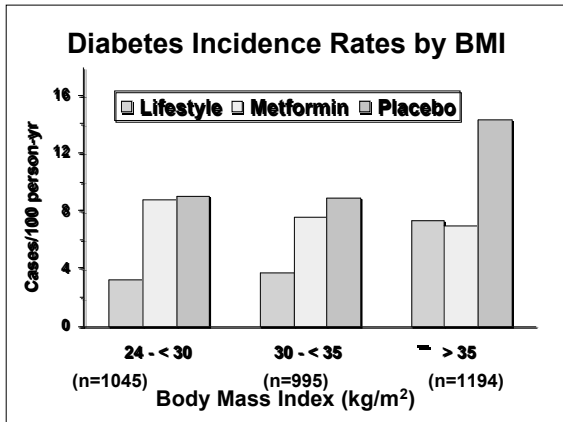
- 27 clinical sites nationwide
- 3234 subjects with IFG/IGT
- BMI > 24
- 3 group randomized clinical trial
 - 1 control group:
 - » standard lifestyle modification
 - 2 treatment groups:
 - » metformin
 - » intensive lifestyle modification

Lifestyle Intervention

An intensive program with the following specific goals:

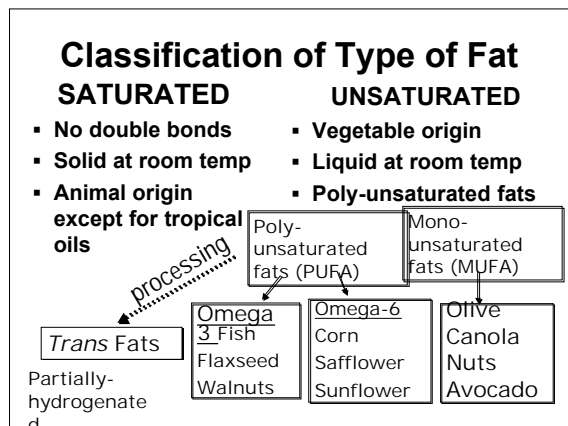
- $\geq 7\%$ loss of body weight and maintenance of weight loss
 - Dietary fat goal -- <25% of calories from fat
 - Calorie intake goal -- 1200-1800 kcal/day
- ≥ 150 minutes per week of physical activity





Effect of Treatment on Incidence of Diabetes

	Placebo	Metformin	Lifestyle
Incidence of diabetes (percent per year)	11.0%	7.8%	4.8%
Reduction in incidence compared with placebo	---	31%	58%
Number needed to treat to prevent 1 case in 3 years	---	13.9	6.9



Comparison of Dietary Fats

DIETARY FAT	Fatty acid content normalized to 100 per cent			
Canola oil	7%	21%	11%	61%
Safflower oil	10%	76%	Trace	14%
Sunflower oil	12%	71%	1%	16%
Corn oil	13%	57%	1%	29%
Olive oil	15%	9%	1%	75%
Soybean oil	15%	54%	8%	23%
Peanut oil	19%	33%	Trace	48%
Cottonseed oil	27%	54%	Trace	19%
Lard*	43%	9%	1%	47%
Beef tallow*	48%	2%	1%	49%
Palm oil	51%	10%	Trace	39%
Butterfat*	68%	3%	1%	28%
Coconut oil	91%	2%	2%	17%

*Cholesterol Content (mg/Teaspoon): Lard 12; Beef tallow 14; Butterfat 33. No cholesterol in any vegetable-based oil.
 Source: FDS Plant Corporation, Saskatoon, Saskatchewan, Canada June 1994.

SATURATED FAT
 MONOUNSATURATED FAT
POLYUNSATURATED FAT
 Linoleic Acid
 Alpha-Linolenic Acid (An Omega-3 Fatty Acid)

Influence of Type of Fat

- Insulin Sensitivity
 - SFA decrease insulin sensitivity.
 - MUFA and Omega-6 PUFA appear to improve insulin sensitivity.
 - Long chain Omega-3 fatty Acids do not seem to have an effect on insulin sensitivity.

Influence of Type of Fat

- **Inflammation**
 - **Pro-inflammatory:** foods high in SFA, Omega-6 fatty acids and *trans*-fatty acids
 - **Anti-inflammatory:** foods high in Omega-3 fatty acids

Influence of Type of Fat

- **Lipid Profile**
 - **LDL:** with SFA and *acidtrans* fats; *trans* fats also reduce size
 - **HDL:** too many PUFA and *Trans* fats
- **Adiposity**
 - *Trans* fats may trigger redistribution of fat to abdominal area.
 - Too much total fat provides excess calories.

Trans Fatty Acids

- Hydrogenation increases shelf life and flavor stability.
- Primary sources are commercially fried and baked products.
- Food label must list amount of *trans* fat in a product.
- Small amounts add up if multiple servings consumed.

Amount of *trans* fat is listed as 0 if a food contains < 500 mg

Fat Intake Recommendations

- 25%-35% total calories from fat
- Limit Saturated Fat to less than 7% of total calories
- Intake of *Trans* fats should be minimized to less than 1% of total calories (1g/1000 calories)

Fat Intake Recommendations

- Include 2 or more servings of fatty fish per week to provide omega-3 fatty acids
- 2 g/day plant sterols and stanols can be used to reduce total and LDL-cholesterol

Carbohydrate Quantity

- 45 – 65% of total energy
- At least 130 g per day
- Divide into at least 3 feedings with breakfast a must
- Limit sugar intake to 10% of caloric intake

Carbohydrate Quality

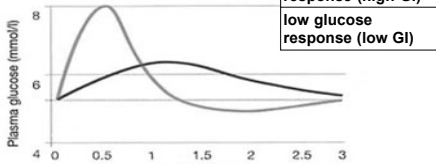
- High in total fiber
–14 g/1000 calories or 20-35 g daily
- High in soluble fiber
- Half of grain intake should be whole grains
- Lower glycemic index foods

Glycemic Index (GI)

- A scale that ranks carbohydrates by how much they raise blood glucose levels compared to a reference food.
- The increase above fasting in the blood glucose area over 2 hr after ingestion of a constant amount of that food (usually a 50g portion) divided by the response to a reference food (usually glucose or white bread).

Glycemic Ranking

Glycemic response in healthy adults



Plasma glucose response (mmol/L) from a high vs. low GI food. The change in blood glucose concentration over time is expressed and calculated as the area under the curve (AUC) (Wolever et al, 1991).

Low = 0-55 Medium = 56-69 High = 70 or more

Glycemic Load (GL) CHO “Quality + Quantity”

- Glycemic load measures the degree of glycemic response and insulin demand produced by a specific amount of a specific food.
- Glycemic load reflects both the quality and the quantity of dietary carbohydrates.
- $GL = GI/100 \times CHO$ (grams) per serving
Example: GL of an apple = 40/100 x 15g = 6g

Glycemic Load (GL): Ranking

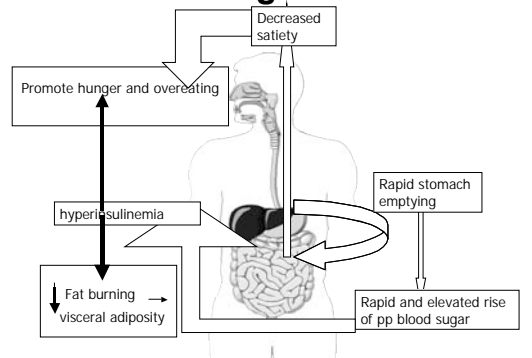
Individual food portion:

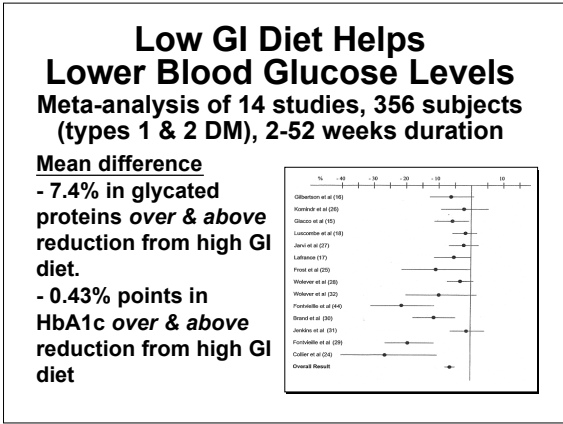
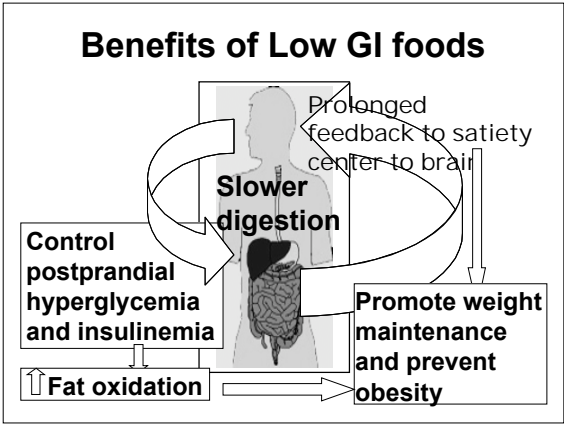
Low	0-10
Moderate	11-19
High	20+

Whole day:

Low	<80
Moderate	100
High	>120

Effect of High GI foods

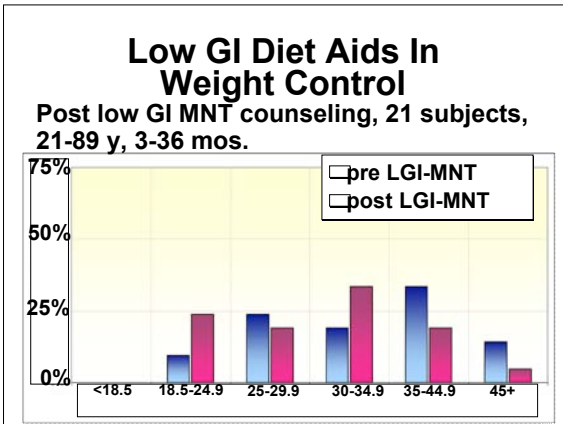




Low GI Diet Helps Lower Blood Glucose Levels

EURODIAB IDDM Complications Study, 1996
 2,054 people, 15-60 y, with type 1 DM

	GI	HbA1c
Lowest quartile	58-78	6.04
Highest quartile	86-112	6.60



Low GI Diet Aids In Weight Control

Nurses' Health Study, 1984-1996
 74,091 women, 38-63 y
 Calculated odds ratios (lowest > highest quintiles)

	BMI (≥30) n = 6,400	Major weight gain (≥25kg) n = 657
Whole grains	-19%	-23%
Refined grains	+18%	+26%
Dietary fiber	-34%	-49%

Low GI Diet Decreases Risk of Diabetes

Nurses' Health Study, 1986-1992
 65,173 US women 40-65 y, free of DM
 6 year follow-up: 915 cases of type 2 DM

	Relative risk
↑ GI	1.37
↑ GL	1.47
↑ cereal fiber	0.72
↑ GI ↓ cereal fiber	2.50

Low GI Diet Decreases Risk of Heart Disease

Nurses' Health Study, 1980-1999
78,779 women, 38-63 y, free of CVD
18 year follow-up: 1,020 stroke cases documented

	Relative risk
↑ CHO intake (all subjects)	2.05 for hemorrhagic stroke
↑ CHO intake (BMI ≥ 25)	2.13 for total stroke 3.84 for hemorrhagic stroke
↑ GL intake (BMI ≥ 25)	1.61 for total stroke
↑ cereal fiber (all subjects)	0.66 for total stroke 0.51 for hemorrhagic stroke

Low GI Diet Decreases Risk of Diabetes

Health Professionals' Follow-up Study, 1986-1992
42,759 US men 40-75 y, free of DM
6 year follow-up: 523 cases of type 2 DM

	Relative risk
↑ GI	1.37
↑ cereal fiber	0.70
↑ GL ↓ cereal fiber	2.17

Low GI Diet Improves Lipid Levels

NHANES III, 1988-1994
13,907 American adults, 20+ y

GI	HDL-C
Lowest quintile	52.51
Highest quintile	49.42

Prospective Cohort Studies

- Black Women's Health Study . 64,227 Chinese women
 - Followed for 4.6 years
 - 59,000 US black women → Dietary carbohydrate intake and consumption of rice positively associated with risk of developing diabetes
 - 8 years of follow-up
- GI positively associated with risk of diabetes

Meta-analysis

- Many studies purporting to investigate lower GI actually studied lower GL.
- Unavailable CHO (eg., fiber), independent of GI seems to have at least as big of an effect on health outcome as GI itself.
- "Lower GI and GL diets are beneficial for health in persons with impaired glucose metabolism."

Meta-analysis

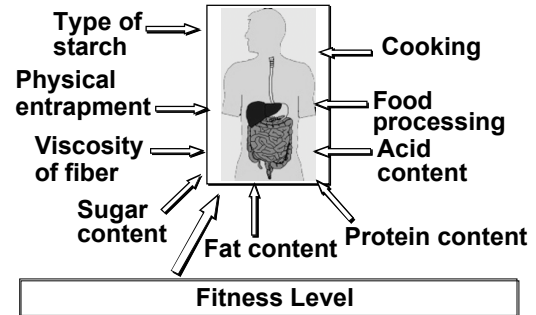
- "The best evidence of the clinical usefulness of GI is available in diabetic patients in whom low-GI foods have consistently shown beneficial effects on blood glucose control in both the short-term and the long-term."
- The larger the divergence of glucose metabolism from the norm, the larger the effect of lower GI and GL interventions.

Cautions with GI

Do not focus exclusively on achieving a low glycemic load diet with all low glycemic index food choices.

Result could be: high fat
low carbohydrate
low fiber
calorically dense

Factors Influence GI Ranking



Low vs. High GI Breakfast



How To Increase Consumption of Low GI Foods

Eat high fiber breakfast cereals (bran, barley, oats)

OR

add berries, nuts, flaxseed or cinnamon to high GI fiber cereals.

Low/High GI Lunch



GI = 85 GL = 48

GI = 39 GL = 22

Low/High GI Dinner



GI = 80 GL = 32

GI = 61 GL = 12

How To Increase Consumption of Low GI Foods

Eat 5-9 servings of fruits and vegetables

OR

No ifs ands or buts, just do it
(Mom was right all along)

Low/High GI Snack



Using GI Effectively

- Although there is debate regarding the potential role of low GI diets in preventing diabetes, the GI is a useful adjunct in making carbohydrate food selections.
- GI is a measure and not meant to be a “diet” to follow. Thus, A low GI diet should NOT be used as the sole diet to follow.
- A food's GI value is NOT to be the only criterion by which it is judged as fit to eat.

Using GI Effectively

- Primary emphasis needs to be on high fiber foods
- Use GI as a tool to choose the best of the best
- Use GI to widen array of grain choices

Choose Whole Grain Breads, Cereals, and Grains

- Choose items with:
 - 2 or more grams of fiber
 - Less than 3 g fat
- Foods with a higher GI include wheat and whole wheat foods, rice and potatoes

Choose Whole Grain Breads, Cereals, and Grains

- Choose lower GI starches:
 - multi-grain whole grain breads, stone ground wheat or pumpernickel
 - Basmati rice and brown rice
 - Legumes
 - New white potato, sweet potato and yams

Using GL Effectively

- Aim for a balanced diet that includes at least one low GI food per meal
- Balance high GI food choices with low GI foods
- Control portion size
- Attenuate postprandial glycemia by increasing acid content of meal by eating grapefruit, adding lemon or vinegar

Physical Activity



Benefits of Exercise

Daily walking > 30 minutes is association with a 20 – 45% reduction in diabetes risk.



Benefits of Exercise

- Reduces abdominal and visceral fat
- Reduces inflammation
- Improves insulin sensitivity
- Enhances fat oxidation
reduce intra-myocellular lipid accumulation

F.I.T.T Type: Cardio

- | | |
|--|-----------------------------------|
| • Frequency | • Time |
| –Minimum 3 times per week | –20-30 minutes at high intensity |
| –Ideally most days of the week | –45-60 minutes at lower intensity |
| • Intensity | –60-90 minutes for weight loss |
| – Moderate (40-55% VO ₂ max) to Vigorous (60-85% VO ₂ max) | –10,000 steps daily |
| –(220-Age)=Max Heart Rate | |

F.I.T.T. Type: Strength Training

- | | |
|--|--|
| • Frequency | • Time |
| –2 times per week (full body) | –2 sets of 10-15 reps |
| –Ideal 3-5 times per week (splits) | –8-10 exercises of major muscle groups |
| • Intensity | • Type |
| –Enough weight to fatigue by last rep, then add more weight/resistance | –free weights and machines, |
| | –resistive machines |
| | –calisthenics |
| | –stretch tubing |

Modest Weight Loss

- Can reduce waist circumference
- 5-10% total body weight loss could mobilize 30-40% of visceral fat
- Greatly improves metabolic profile
- Slow is still best

A Healthy Lifestyle

- Is a race that can be run
 - Make wise food choices
 - Avoid “bad” fats
 - Moderate intake of good fats
 - Choose wide variety of high-fiber whole grains
 - Eat plenty of fruits and vegetables
 - Be more active
 - Increase leisure physical activities
 - Exercise
- A race worth the run

**And a race that can be won
one step at a time!**

Upcoming Programs

The Reasons For & Key Elements of
Continuity of Operations Planning
Thursday, March 27, 2008
12:00 - 1:30 p.m. (Central Time)

Generation Rx: The Adolescent
“Pharming” Phenomenon
Thursday, April 3, 2008
11:00 - 1:00 p.m. (Central Time)

HIV/AIDS Update 2008 for
Home Health Aides & Attendants
Wednesday April 30, 2008
12:00 - 1:30 p.m. (Central Time)

**For complete list of upcoming programs
visit: www.adph.org/alphn**