Special Nutritional Needs in Diabetes

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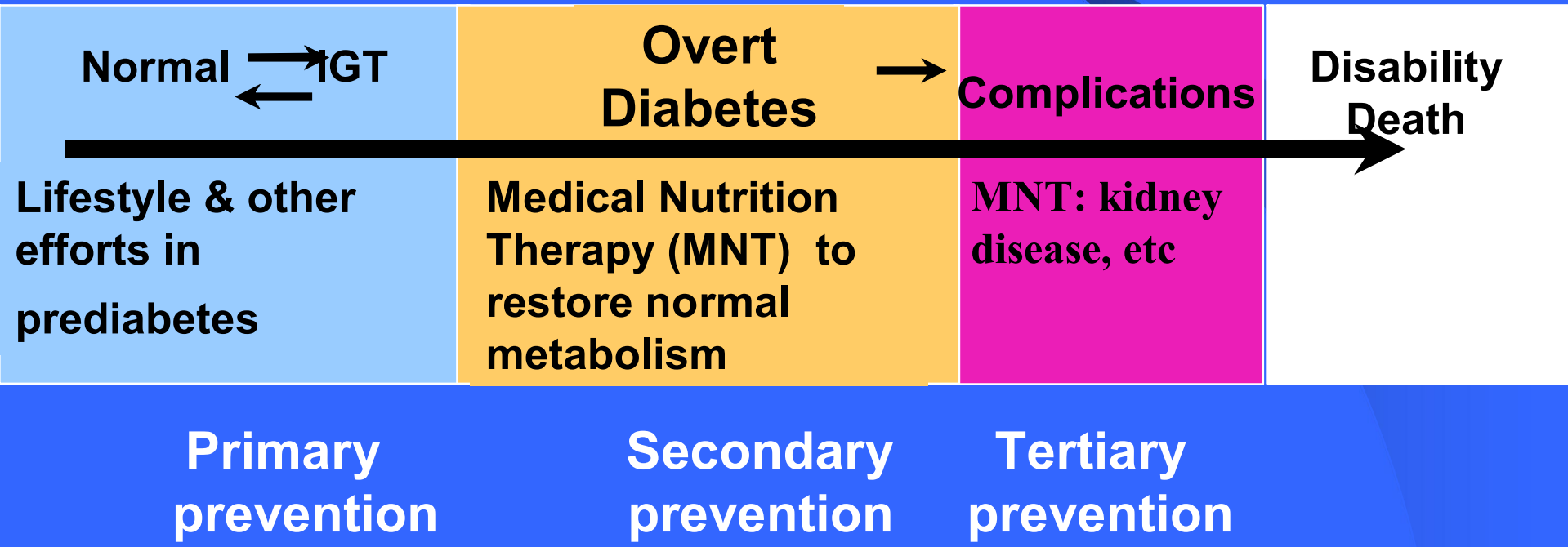
Nutrition Treatment Goal in Diabetes



American Diabetes Association (ADA) Nutrition Recommendations

Primary Prevention: 5-10% weight loss

Secondary Prevention: achieve metabolic control with~ 60-70% calories from mono unsaturated fat and carbohydrate

Tertiary Prevention: Restrict sodium, potassium and other nutrient to reduce end organ damage

World Diabetes Epidemic (millions)

1995		2025	
1. India	19.4	1. India	57.2
2. China	16.0	2. China	37.6
3. U.S.	13.9	3. U.S.	21.9
4. Russian Fed.	8.9	4. Pakistan	14.5
5. Japan	6.3	5. Indonesia	12.4
6. Brazil	4.9	6. Russian Fed.	12.2
7. Indonesia	4.5	7. Mexico	11.7
8. Pakistan	4.3	8. Brazil	11.6
9. Mexico	3.8	9. Egypt	8.8
10. Ukraine	3.6	10. Japan	8.5
all others	49.7	all others	103.6
Total	**135.3**	**Total**	**300.0**

King, et al., *Diabetes Care*, 21: 1414-1431, 1998

Overview of Past Diabetes Nutrition Recommendations

Table 1—*Historical perspective of nutrition recommendations*

Year	Distribution of calories (%)		
	Carbohydrate	Protein	Fat
Before 1921		Starvation diets	
1921	20	10	70
1950	40	20	40
1971	45	20	35
1986	Up to 60	12–20	<30
1994	*	10–20	*,†

*Based on nutritional assessment and treatment goals. †Less than 10% of calories from saturated fats.

Individualizing ADA Nutrition Macronutrient Recommendations

Carbohydrate -*Reduce adverse postprandial effects*

- Fiber, Glycemic Index/Load & Resistant Starch
- Sugars & Refined Carbohydrate

  (**NOT Simple Versus Complex**)

Fat - *Reduce insulin resistance & weight effects*

- Fish and Omega-3 Fatty Acids
- Mono, Poly, Sat and Trans Fatty Acids

Clinical Care: Confusion & Controversy

Should patients with diabetes:

Restrict/modify carbohydrate intake to improve post prandial glucose levels and weight**??**

or

Restrict/modify fat intake to control weight and lipid levels**??**

ADA Recommendation: Energy Balance and Obesity

Structured Program (500-1000 kcal deficit and physical activity to achieve 5-7% loss)

Short-term improvement in glycemia, lipids and blood pressure (longer-term questions)

Exercise predicts long-term weight loss (*strong predictor of weight-loss maintenance*)

ADA Position Statement: Diabetes Care 2002; 25 (suppl 1): S 50-60.

Reprinted with permission from *Diabetes Interview*

American Dietetic/Diabetes Association Exchange System Overview

Exchange	Calories	CHO	Protein	Fat
Starches (1/2 C ,1 oz)	80	15 g	2 g	trace
Fruit (1/2 C)	60	15 g	0 g	0
Milk (8 oz)	90-160	12 g	8 g	trace - 8 g
Vegetables (1/2 C)	25	5 g	2 g	0
Meat (per oz)	35-100	0 g	7 g	1-8g
Fat (tsp)	45	0 g	0 g	5g

FREE FOOD < 15 calories per serving

Quick Carbohydrate Counting

One Carbohydrate choice = 15 grams based on the ADA's Exchange system

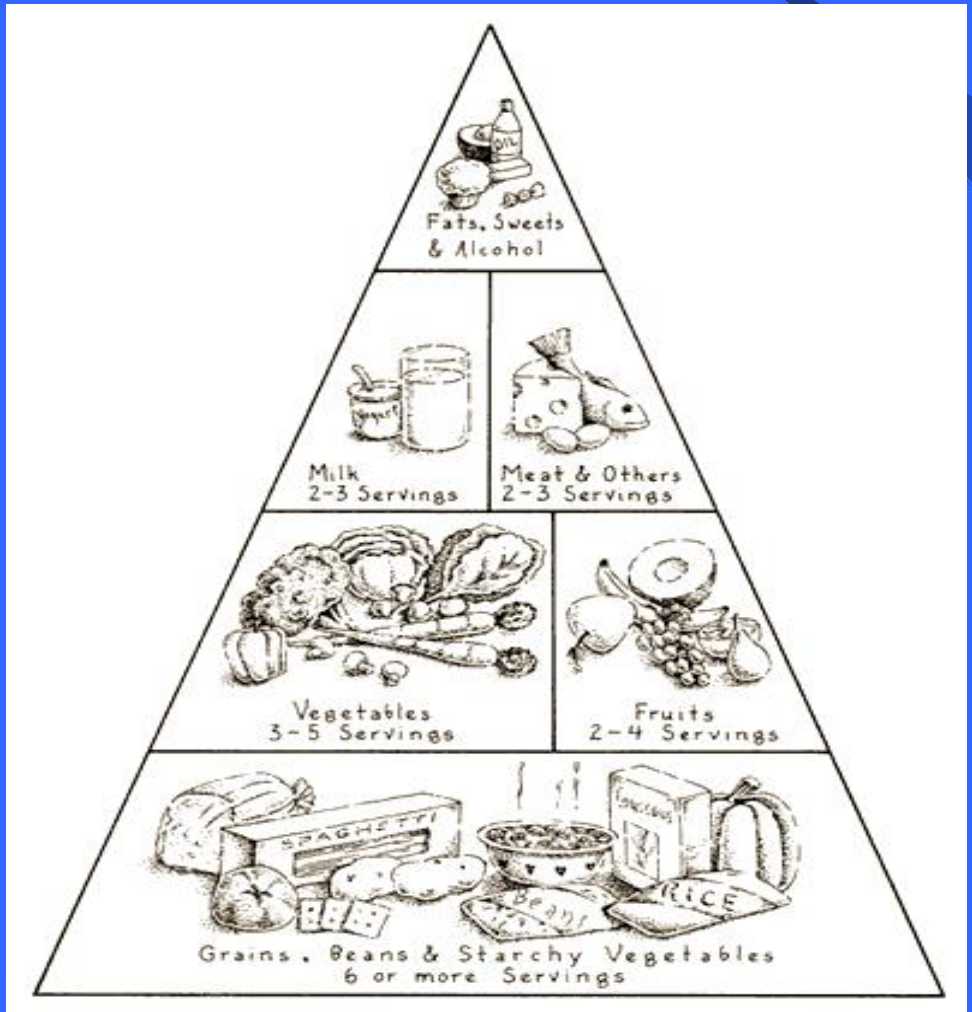
Exchange groups included are:

- Starch (1/2 cup, slice of bread)
- Fruit (1/2 cup)
- Milk (1 cup)
- Other Carbohydrate (varies by concentration)

Should there be modification based on the glycemic index?

Diabetes Vs. USDA Food Pyramid Consideration of Macronutrient:

Starchy Vegetable, Legumes & Cheese



Postprandial Hyperglycemia

Acute glucose elevation after meals is associated with:

- Glucose-mediated oxidative stress
- Increase in HbA1c
- Advanced glycation end products (AGEs)

Methods to reduce postprandial glucose levels

- Alpha-glucosidase inhibitors
- Glycemic index/load potential
- Fiber(??)
- Restrict amount of carbohydrate intake

"Forget *Sugar Busters.* Forget *The Zone.* If you want the real scoop on how carbohydrates and sugar affect your body, read this book."
—**JEAN CARPER**, best-selling author of *Miracle Cures, Stop Aging Now!* and *Food—Your Miracle Medicine*

The GLUCOSE Revolution

THE AUTHORITATIVE GUIDE TO THE GLYCEMIC INDEX —THE GROUNDBREAKING MEDICAL DISCOVERY

How controlling your blood sugar level helps you to:

LOSE WEIGHT

REDUCE YOUR RISK OF HEART DISEASE

IMPROVE YOUR ATHLETIC PERFORMANCE

MANAGE DIABETES

ENJOY TOTAL WELLNESS

Jennie Brand-Miller, Ph.D. • **Thomas M.S. Wolever**, M.D., Ph.D.
Stephen Colagiuri, M.D. • **Kaye Foster-Powell**, M. Nutr. & Diet.

Review of 60-Year of Research: Dietary Fat & Glucose Metabolism

A High-fat, low-carbohydrate diets can impair glucose tolerance *(rationale for high carbohydrate preparation diet for GTT).*

The deterioration in glucose tolerance appears to be linked to a decrease in basal and insulin-stimulated glucose metabolism.

N-3 fatty acids and higher intake of other unsaturated fatty acids may reduce some adverse effects of a high fat diet.

Variability in clustering of obesity, sedentary lifestyle, and dietary fat intake may be related for inconsistencies.

Lichtenstein & Schab Atherslerosis 2000;150: 227-43.

Determients of glycemic response

Mean BMI 31.5 kg/m^2; DM2 (n=9) & NGT (n = 10); 1100 kcal diet with individual variability in macronutrient distribution

Early Effects (prediet- day 4)

- Changes in fasting glucose and macronutrients: Protein ($r = 0.36$; ns); Fat ($r = -0.54$; $P<0.05$); CHO ($r = 0.64$; $P<0.005$)
- Increased fat oxidation and basal nonesterifed fatty acids and decreased carbohydrate oxidation

Later Effects (day 4-28)

Change in abdominal fat related to fasting glucose ($r = 0.51$; $P = 0.05$) and insulin sensitivity ($r = 0.48$; $P =0.03$)

Markivoc et al Diabetes Care 1998;21:687-94.

Unsaturated Fatty Acids (omega-3) may:

direct glucose toward glycogen storage

direct fatty acids toward oxidation/ away from triglygeride synthesis by:

- Upregulating transcription of mitochondrial uncoupling protein-3)
- Inducing genes encoding proteins involved in fatty acid oxidation (acyl-CoA oxidase and carnotine palmitoyltranserase)
- Down regulating transcription of genes encoding protein involved lipid syntthesis (fatty synthase)

Clarke Br J Nutr 2000;83: (suppl 1): 59-66.

Diabetes Medical Nutrition Therapy Metabolic Intervention Goals

- Glucose
  - Preprandial - 90–130 mg/dl
  - Peak postprandial <180 mg/dl
- Blood pressure: <130/80 mmHg
- Lipids:
  - LDL <100 mg/dl
  - Triglycerides <150 mg/dl
  - HDL >40 mg/dl

Reprinted with permission from *Diabetes Interview*

Diabetes/Obesity Medical Nutrition Therapy

Scheen Biomed& Pharmaacother 2000;54:74.

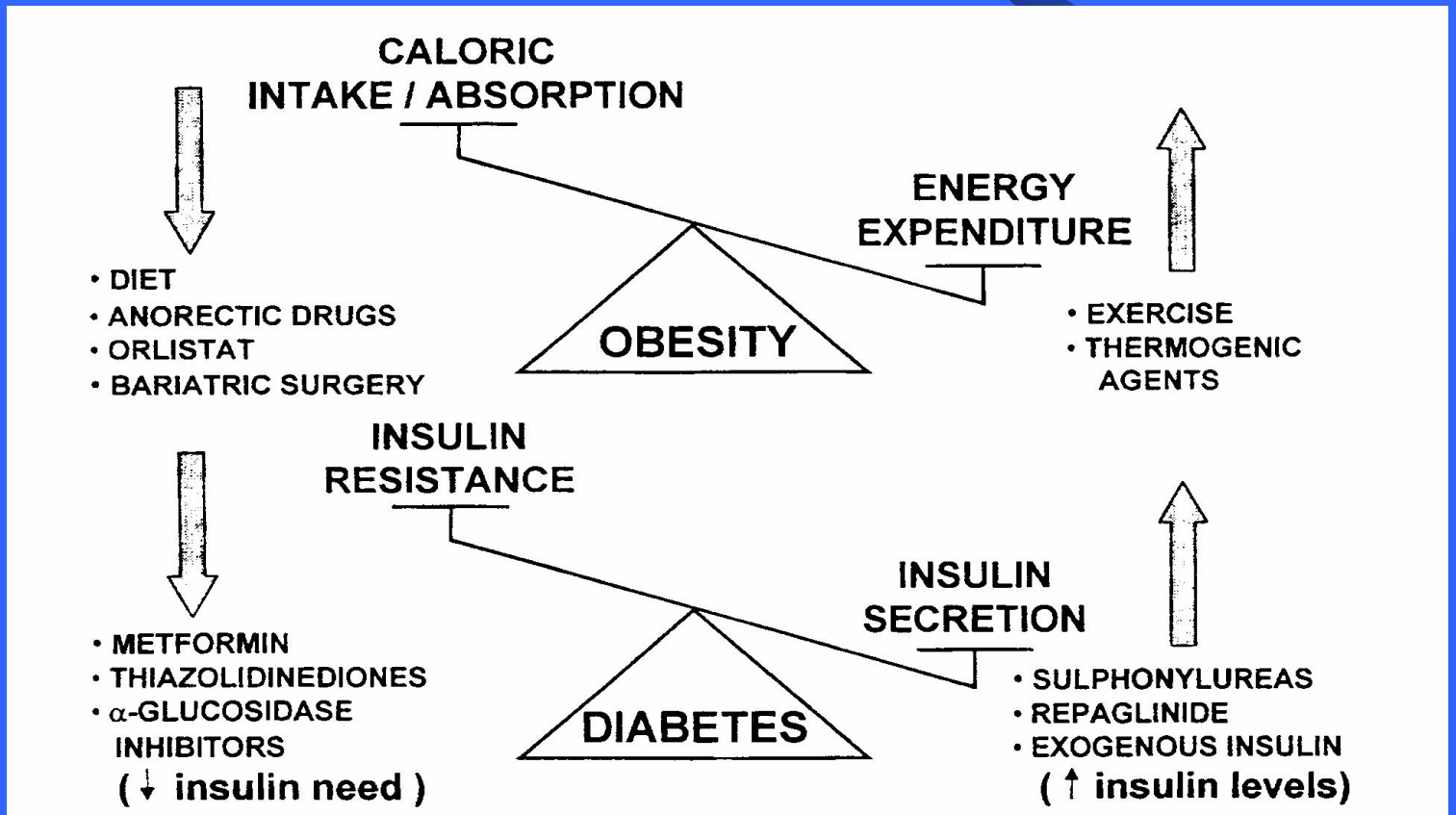
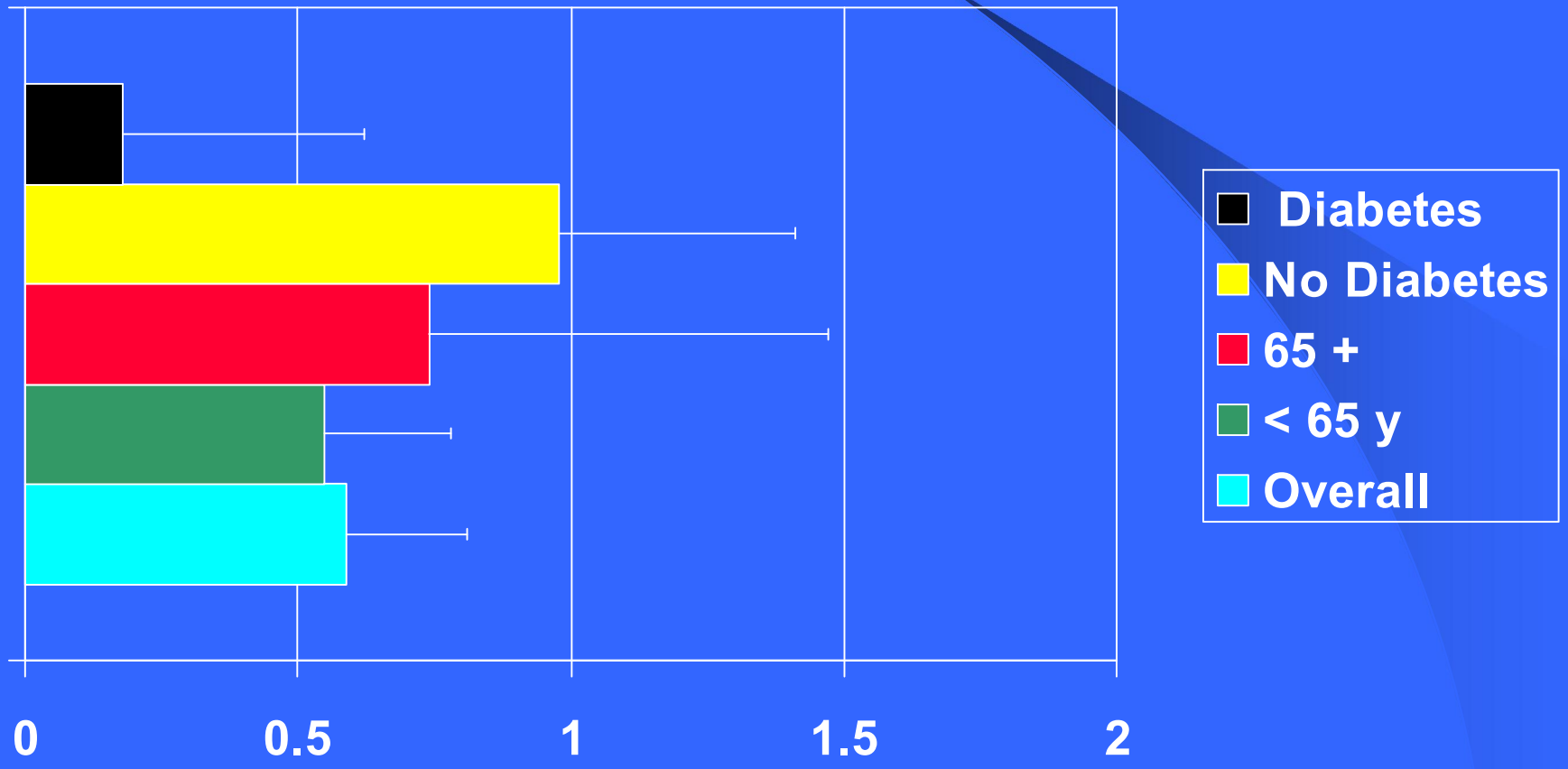


Figure 1. Schematic illustration of the various non-pharmacological and pharmacological strategies for the management of the diabetic

Randomized Controlled Trial

Vitamin/ Mineral Supplement: Infection Rates

Relative Risk



Ann Intern Med 2003;138:365

Review of Herbs and Dietary Supplements for Glycemic Control

108 Human Studies (N= 4,565); 58 clinical trials

- **36 Herb & 9 vitamin/mineral supplements**
- **76% (44/58) suggested glycemic benefit**
- **Low rate of side effects**
- ***Most promising*: American ginseng & coccina indica**
- ***Most studied*: chromium**
- **Preliminary positive findings: Aloe vera, vanadium, nopal, Momordica chaarantia, Gymnema sylvetre**

Yeh et al Diabetes Care 2003:26: 1277.

The Brief WAVE Assessment/Intervention addresses: Weight Activity Variety Excess.

The aims are to:

Facilitate provider-patient discussion of nutrition-related health concerns.

Use an easily remembered and quickly administered approach.

Identify nutrition issues that need to be addressed at the office visit or by referral to a registered dietitian.

Reinforce the important role nutrition plays in diabetes prevention and control. .

WAVE

Assessment

Weight

Assess patient's Body Mass Index.*
Patient is overweight if BMI>25.

Height	Body Weight (lbs.)	Height	Body Weight (lbs.)
4' 10"	≥ 119	5' 8"	≥ 164
4' 11"	≥ 124	5' 9"	≥ 169
5' 0"	≥ 128	5' 10"	≥ 174
5' 1"	≥ 132	5' 11"	≥ 179
5' 2"	≥ 136	6' 0"	≥ 184
5' 3"	≥ 141	6' 1"	≥ 189
5' 4"	≥ 145	6' 2"	≥ 194
5' 5"	≥ 150	6' 3"	≥ 200
5' 6"	≥ 155	6' 4"	≥ 205
5' 7"	≥ 159		

* Certain patients may require assessment for underweight and/or unintentional weight loss

Activity

Ask patient about any physical activity in the past week: walking briskly, jogging, gardening, swimming, biking, dancing, golf, etc.

1. Does patient do **30 min.** of moderate activity on **most days/wk.?**
2. Does pt do "lifestyle" activity like taking the **stairs** instead of elevators, etc.
3. Does patient usually watch less than **2 hrs. TV or videos/day?**

If pt answers NO to above questions, assess whether pt is willing to increase physical activity.

Variety

Is patient eating a variety of foods from important sections of the food pyramid? Determine **Variety** and **Excess** using a quick one-day recall: "Briefly describe everything you ate or drank yesterday (or on a typical day) beginning with the first thing you ate after waking up."

Grains (6-11 servings)
Fruits (2-4 servings)
Vegetables (3-5 servings)
Protein (2-3 servings)
Dairy (2 servings)

Excess

Look at one-day recall. Is patient eating too much:

Fat? Saturated fat?
Calories?
Salt?
Sugar?
Alcohol?

- Ask about serving/portion sizes, preparation methods and added fats, like butter, mayonnaise, sour cream, salad dressing, etc.
- Does pt. eat 4 or more meals from sit-down or take-out restaurants per week?
- Is pt's weekend eating much different from weekday eating?

- *What does pt think are pros/cons of his/her eating pattern?*
- *If pt needs to improve eating habits, assess willingness to make changes*

Apple Logo. Brown University School of Medicine Nutrition Academic Award

WAVE

Recommendations

Weight

If patient is overweight:

1. State concern for the patient, e.g., "I am concerned your weight is affecting your health."
2. Give the patient specific advice, i.e.,
   a) Make 1 or 2 changes in eating habits to reduce calorie intake as identified by one-day recall.
   b) Gradually increase activity/decrease inactivity.
   c) Enroll in a weight management program or
   d) Consult a dietitian.
3. If patient is ready to make behavior changes**, jointly set goals** for a plan of action and arrange for follow-up.
4. **Give pt education materials/resources**.

Activity

Examples of moderate amounts of physical activity:

- Walking 2 miles in 30 minutes
- Stair-walking for 15 minutes
- Washing and waxing a car for 45-60 minutes
- Washing windows or floors for 45-60 minutes
- Gardening for 30-45 minutes
- Pushing a stroller 1 1/2 miles in 30 minutes
- Raking leaves for 30 minutes
- Shoveling snow for 15 minutes

1. If patient is ready to increase physical activity, jointly **set specific activity goals** and arrange for follow-up.
2. **Give pt education materials/resources.**

Variety

What is a serving?

Grains (6-11 servings)
1 slice bread, 1 oz. ready-to-eat cereal, 1/2 cup cooked cereal, rice or pasta
Is patient eating whole grains?

Fruits (2-4 servings)
1 medium fresh fruit, 1/2 cup chopped or canned fruit, 3/4 cup fruit juice

Vegetables (3-5 servings)
1 cup raw leafy vegetables, 1/2 cup cooked or chopped raw vegetables, 3/4 cup vegetable juice

Protein (2-3 servings)
2-3 oz. poultry, fish, or lean meat, 1-1 ½ cup cooked dry beans, 1 egg equals 1 oz. meat, 4 oz. or 1/2 cup tofu

Dairy (2 servings)
1 cup milk or yogurt, 1 1/2 oz. cheese

See instructions 1-4 under Excess.

Excess

How much is too much?

Too much fat, saturated fat, calories
- >6 oz/day of meat
- Ice cream, high fat dairy products
- Fried foods
- High fat snacks and desserts
- Eating out > 4 meals/wk

Too much sugar, calories
- High sugar beverages
- Sugary snacks/desserts

Too much salt
- Processed meats, canned/frozen meals, salty snacks

1. **Discuss pros and cons** of pt's eating pattern keeping in mind Variety and Excess.
2. If patient is ready, jointly **set specific dietary goals** and arrange for follow-up.
3. **Give pt education materials/resources**.
4. **Consider referral** to a dietitian for more extensive counseling and support.

Weight Activity Variety and Excess (WAVE)
Quick Assessment & Intervention

Integral Care Components

Ask

Advise

Assist

- *Make referrals to address issues in-depth based on readiness to make changes*

Weight

Ask about weight history, goals, and competing demands

Advise related to metabolic control and cardiovascular risk factors

Assist in setting stage appropriate goals & refer to RD or program if ready

Activity

Ask --about activity and inactivity (TV etc)

Advise – tailor your advice to risks and discuss concept of working *in activity* to daily routine if exercise or *working out* are not realistic

Assist -- Provide information about & referral if testing is needed

Variety

Ask – About vegetables, sources of fiber (legumes and high fiber cereals, calcium (dairy products, calcium fortified foods or supplements)

Advise – Focus on personal risk, e.g., markers related to metabolic control

Assist –Discuss relevant options considering personal values etc, negotiate . Try to establish simple doable goals. Refer, if appropriate

Excess

Ask – Focus questions about common problem area –High sugar foods, e.g., Sweetened beverages/juices, High fat foods, e.g., fries, snack foods, and supersizing of portions

Advise – Discuss how these food may affect metabolic control

Assist – Provide information about resources and refer when ready to make changes

Diabetes Nutrition Referral Issues

- **Integrate nutrition into your overall diabetes workup by briefly address: Weight, Activity, Variety and Excess.**

- **Refer patients with diabetes to RD for in-depth *Medical Nutrition Therapy:***

  - **For identified nutrition-related issues**

  - ***When*** **patient is ready to address the identified issues.**

Medicare Coverage

- **Diabetes Medical Nutrition Therapy**
  - **3 hours of nutritional counseling in the first year**
  - **2 hours in subsequent years**
  - **additional hours, if ordered by physician**
- **Diabetes Self-Management Training**
  - **10 hours in the first year**
  - **2 hours in subsequent years**

Special Nutritional Needs in Diabetes Conclusions

1. Goal: Diabetes Medical Nutrition Therapy to achieve metabolic control
2. Weight loss goal ~ 7% based on evidence for primary prevention of diabetes
3. Dietary composition flexible (~ 70% calories from mon and carbohydrate)
4. Carbohydrate counting & other strategies used to control postprandial glucose (15 g starch, fruit & milk)
5. Diabetes Medical Nutrition Therapy **NOT** Meds when diet fails