STANDARDS FOR NUTRIENT INTAKE

Chapter 2

Intro

- This chapter, even more than the rest of the course, contains material that all nutritionists and dieticians must understand.
- It is too complex and detailed for other health workers to learn.
- It is part of what we do in nutrition education and nutrition therapy

Standards of Reference

- Uses:
  - Evaluate nutritional adequacy
    - Levels and proportions of macro- and micro nutrients and food components
  - Aid in diet planning
  - Improve nutritional and health status

Nutritional Standards

- DRIs
- Indices of diet quality
- Food Labels
- Dietary Guidelines for Americans
- Food Guide Pyramid

Intro to diet standards

- Needed to meet the public's need for simple guidance to achieve nutritional adequacy
- In the past everyone did, but now maybe ½ the world suffers from inadequate food or nutrient intake some of the time.
- Now many in Jordan, like in other rich countries, suffer from chronic disease linked to excessive intake, inadequate exercise and overconsumption of some unhealthy foods or food ingredients.

Standards intro

- Thus attention has shifted to the "toxic food environment"
- It's not enough to inform people on what they should eat more of
- We need them to understand what to eat less of, a much less popular message!

Dietary standards

- You can't solve a nutrition problem until you know what it is and how severe it is
- You can't improve someone's diet if you don't know what it is to begin with
- That's why nutritional and dietary assessment are crucial in preventing and treating chronic disease

Evolution of Early Standards and Recommendations !!!

Dietary Standards

- By World War I there was a reasonable understanding of how many calories (energy) adults needed and what proportion should come from protein and fat
- By 1939, there was some feel for how much Ca, P, Fe, I and vitamins A, thiamin (B1) and riboflavin (B2), C, and D are needed
- The RDAs (recommended dietary allowances) were published in the USA every five years or so from WW II until 1989 when it included energy, protein, 3 electrolytes, 13 vitamins, and 12 minerals, broken down for gender, age and physiological status (pregnancy; lactation)

Recommended Dietary Allowances (RDA)

A good estimate of the amount of a nutrient intake required to adequately meet the needs of most healthy people

1941-1989 (10th edition)

Under revision…….

What the RDAs were

- The RDAs were set high so that almost anyone who ate that much would avoid deficiency
- But they were always used for many other purposes including food labeling, evaluating dietary survey data, planning, designing nutrition education
- But this approach is less useful when the problem is mainly over-consumption!

Other problems with the RDAs

- There was no guidance for nutrition of the elderly
- They did not include guidelines regarding consumption of
  - Carbohydrates, Dietary fibers, Total fat, Saturated fat, Cholesterol
  - Did not include phytochemicals, aspartame, caffeine, alcohol
- Nothing on use of dietary supplements

Now: the DRIs

- It was decided to develop a new approach
- Canadian and US scientists worked from 1994-2004 developing the Dietary Reference Intakes
  - Review of the scientific literature
  - Estimate of average nutrient intakes
  - Creating a safety margin
  - Issuing the report

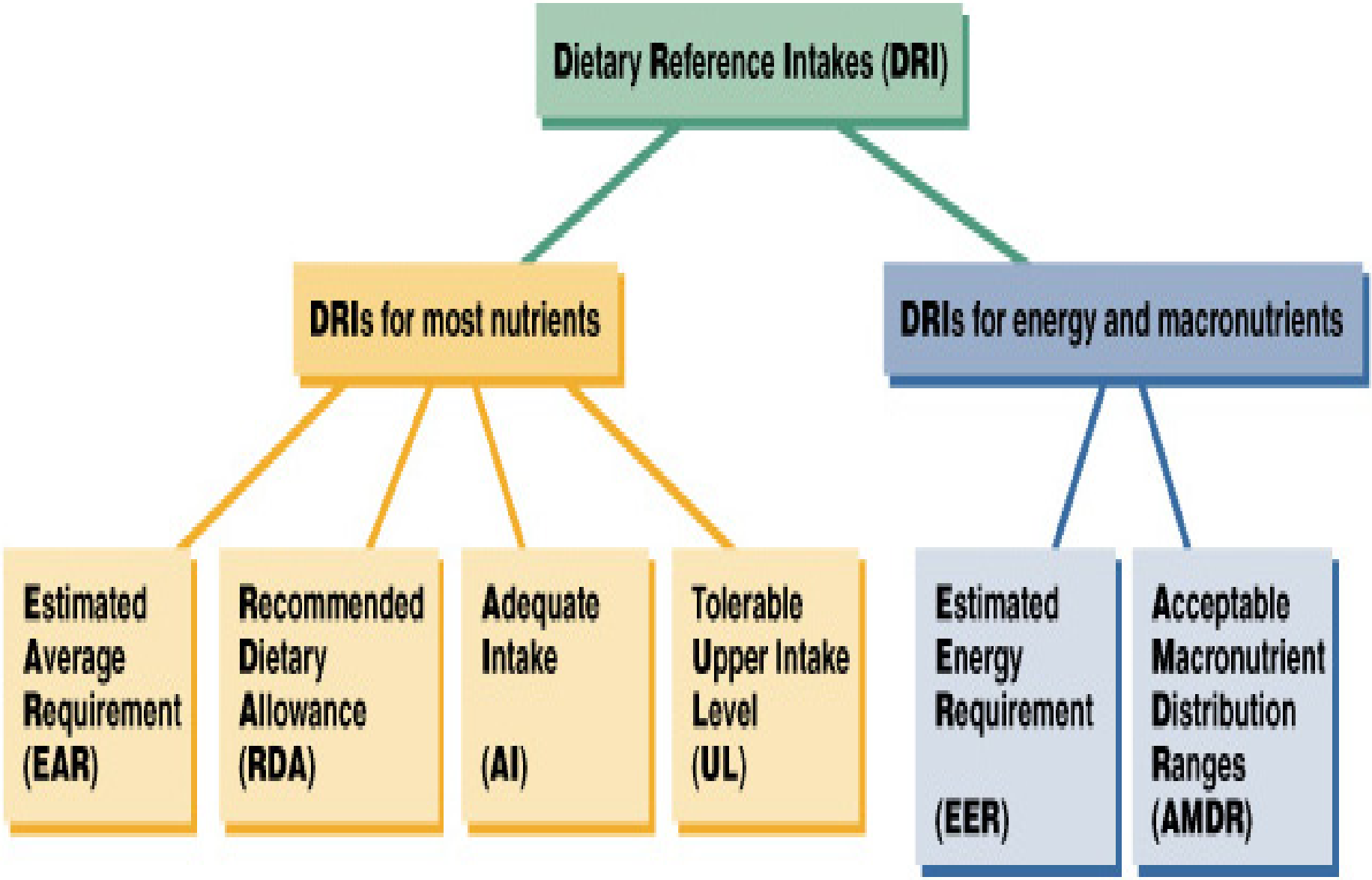
Dietary Reference Intakes (DRI)

- Goals of DRI's
  - DRI Committee in partnership with scientists from Canada worked to expand and update nutrient recommendations.
    - Has different age grouping
      - New values
        - 51 - 70 yrs
        - 70+ yrs
    - Evaluates scientific knowledge in regard to the prevention of deficiency and to the reduction of risk of chronic diseases
    - Establish safety guidelines
- FOOD and NUTRITION BOARD: the DRI

http://www.iom.edu/board.asp?id=3788
http://www.iom.edu/report.asp?id=8521

Dietary Reference Intakes (DRI)

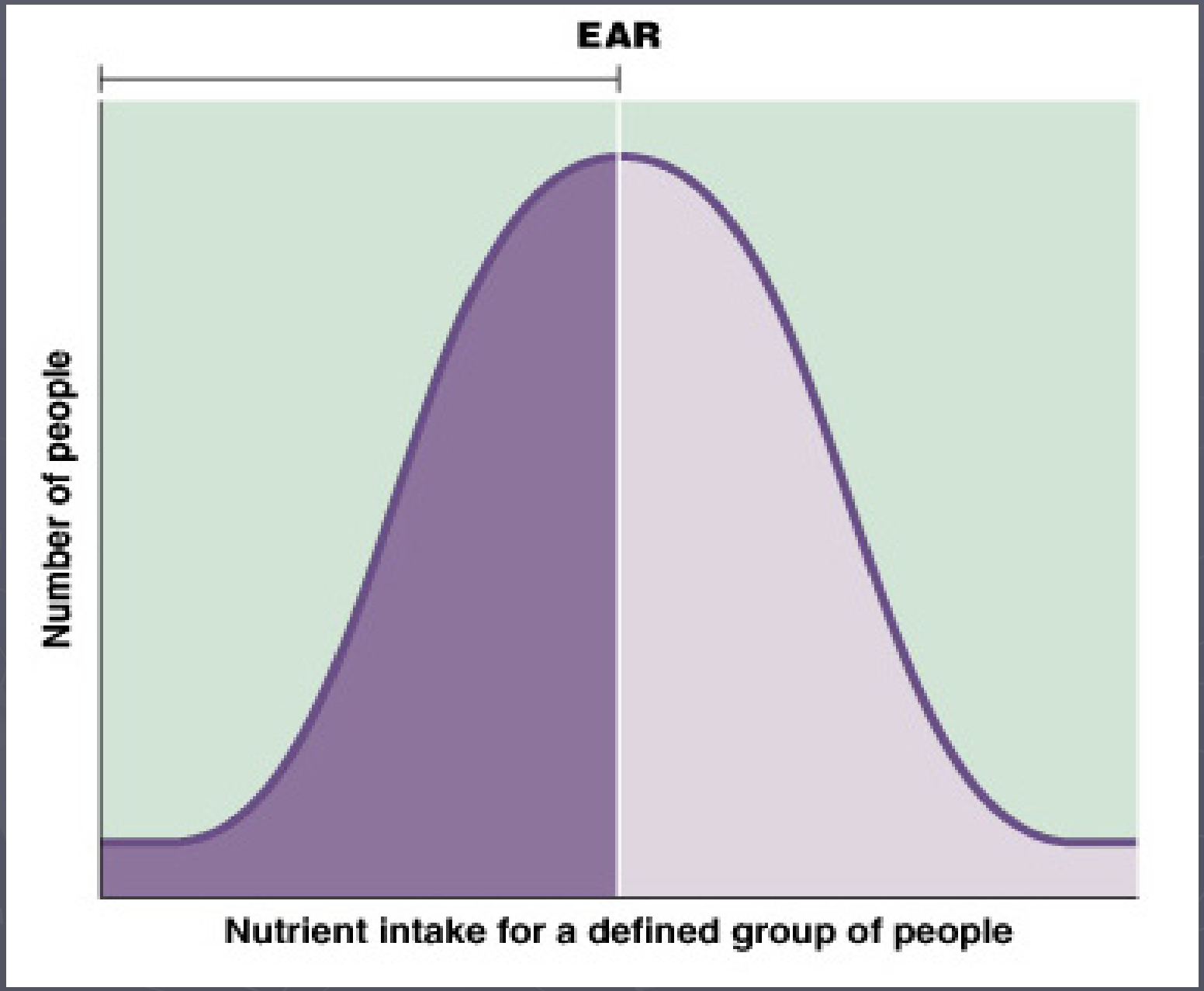
- Reference values of nutrients, primarily used by nutritionist & health professionals
- Umbrella term to include new standards for nutrient recommendations


Dietary Reference Intakes (DRI)
DRIs for most nutrients
DRIs for energy and macronutrients
Estimated Average Requirement (EAR)
Recommended Dietary Allowance (RDA)
Adequate Intake (AI)
Tolerable Upper Intake Level (UL)
Estimated Energy Requirement (EER)
Acceptable Macronutrient Distribution Ranges (AMDR)

What is the EAR?
Estimated Average Requirement

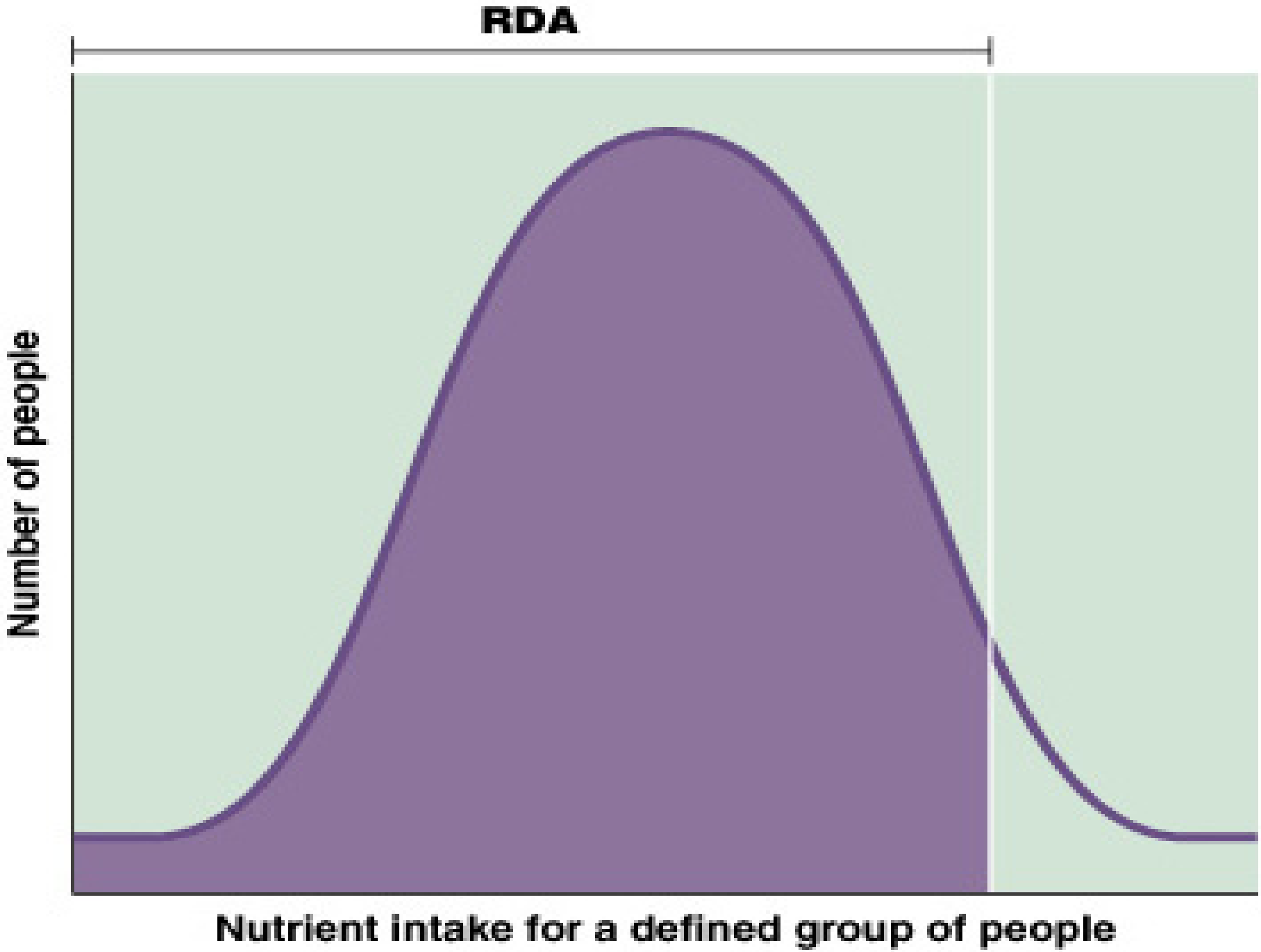
- Nutrient intake is estimated to meet the requirement of half the healthy people of an age & gender
- The MEDIAN (Think bell curve)
- Basis for establishing an RDA
  - Used to calculate the RDA

•The book provides the EARs that are known on p 20.


EAR
Number of people
Nutrient intake for a defined group of people

What is the RDA? Recommended Dietary Allowance

- Daily dietary intake to meet the requirement for nearly all (97-98%) healthy people of an age & gender
- Derived from an EAR
- EAR + 2 standard deviations


RDA
Number of people
Nutrient intake for a defined group of people

What is the AI?
Adequate Intake

- Used when an RDA cannot be established
- A recommended intake level assumed to be adequate based on observed or experimentally determined approximation of nutrient intake for a group of healthy individuals.
  - measuring how much healthy people tend to consume
- Insufficient data to determine an EAR
- The RDAs and AIs are provided on pp 20-2 (the values in **bold** are RDAs)

What is the UL?
Tolerable Upper Intake Level

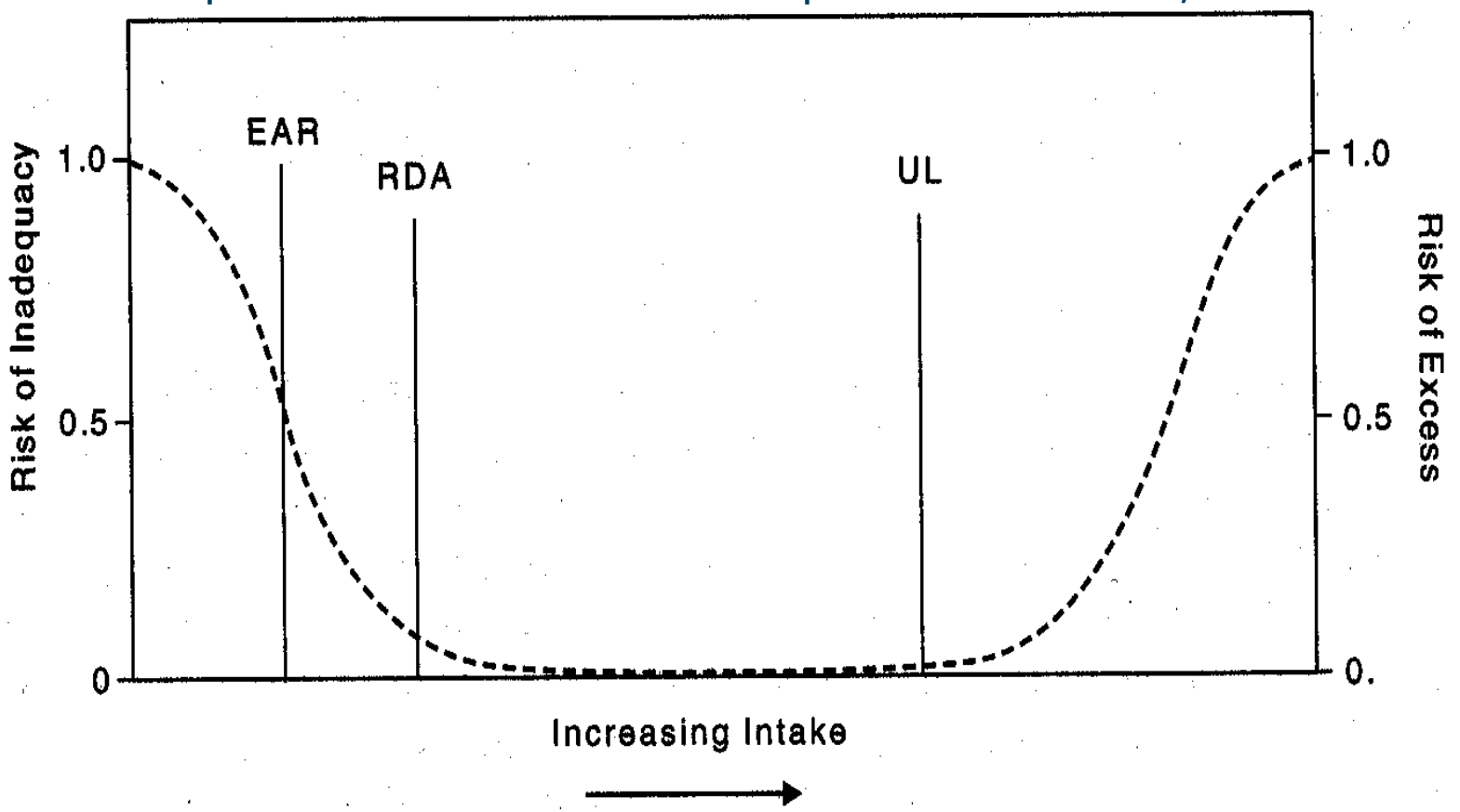
- Highest daily nutrient intake likely to pose no risk of adverse health effects to almost all individuals in the general population

- A table of ULs can be found on pp 23-4

Tolerable Upper Intake Level

- ULs vary among nutrients:
  - some apply to intake from all sources -- food, fortified food, supplements, water (eg, calcium, fluoride, vitamin D)
  - not all nutrients have ULs established presently (eg, vitamin B_{12})

Figure 2.3 on p. 27 illustrates the relationship between the EAR, RDA and UL



The risk of inadequate or excess intake varies according to the level of nutrient intake

Estimated Energy Requirement (EER)

- Average dietary energy intake that is predicted to maintain energy balance in a healthy adult of a defined age, gender, weight, height, and level of physical activity, consistent with a good health.

Recommendations for macronutrients

- RDAs (**bold**) or AIs are available for all 22 groups (table on p 29) for total water, carbohydrate (CHO), total fiber, total fat, linoleic acid, alpha linolenic acid and protein
- Water includes all beverages and the water in foods
- The CHO levels are low, as they include only glucose needs for the brain (more will be needed for energy needs of the body if acceptable levels of protein and fat are to be maintained in the diet)

Additional macronutrient recommendations

- On p 29 and 30 you see two additional tables
- The first (2.8), the Acceptable Macronutrient Distribution Ranges, gives ranges of percents of energy from each source that ensure adequate intake but decreased risk of chronic disease
- The second (2.9) presents simple recommendations to keep intakes low for cholesterol, trans fatty acids, saturated fatty acids and added sugars

Uses of the DRIs

- Box 2.3 reminds us of the four components of the DRIs (EAR, RDA, AI, UL)
- Assessing nutrient intakes of individuals* and groups
- Planning for nutrient intakes for individuals and groups
  - *Remember that Nutritional adequacy of an individual's diet should be based on various nutritional assessment method (A, B, C)
    - we cannot assess nutritional status by looking at the diet alone
    - Some people need more or less than the average

Under which conditions can the dietary intake below and the nutritional status optimal?

- The person's nutritional requirements are lower than expected.
- The person is using stored nutrients to sustain current dietary deficit. (Adequate diet was previously consumed).
- The person may be consuming other sources of nutrient (not evident in the dietary evaluation; such as dietary supplement).

Under which conditions can the dietary intake adequate and the nutritional status sub-optimal?

- The person's nutritional requirements are higher than expected.
- The person is experiencing malabsorption.
- The person may be experiencing a decreased nutrient utilization….
- Secondary to other nutrients (competitive transport), food components (↓ bioavailability of drug interaction)

Assessing Dietary Intake

- Fixed Cutoff Points: Setting adequacy at ¾ of the RDA's
- Sources of Errors:
  - False positive
    - Intake misclassified as inadequate based on RDA, but sufficient to meet requirements.
  - False negative
    - Intake misclassified as adequate based on RDA, but insufficient to meet the requirements.
- A *requirement* is the lowest continuing intake level of nutrient that, for a specified indicator of adequacy, will maintain a defined level of nutrient in an individual.

Real life example

- National survey data in the USA indicated that 11% of non-smoking females and 21% of non-smoking males have a vitamin C intake below their EAR.
- What does this tell us about the eating habits of men vs women in the USA?

Indices of Diet Quality

- High quality diet based on…
  - Adequate protein and selected nutrients for a given energy level
    - Proportions of food groups
  - Moderation of certain nutrients and food components
  - Variety of nutrients of food components.


Examples
Indices of diet Quality
Index of
Nutritional Quality
Diet Quality Index
Healthy
Eating Index

Nutrient Density

- Nutrient density (ND) refers to a food's vitamin and mineral content relative to its energy content.
  - Evaluates nutrient quantity per 1000 cal
- Related concept: *Index of Nutritional Quality*

Why nutrient quantity per 1000 kcal (particularly important in weight reducing diet 1000-1200 kcal) ?

Diet Quality Index (DOI)

- Evaluates the overall diet quality of groups and risk for chronic diseases related to dietary patterns (table 2-10, pg, 33)
  - Diet is scored based on 10 indicators
  - 3 Macro-nutrients
  - 3 Food Guide Pyramid intake: fruit, vegetables, & grains
  - 2 DRI recommendations on calcium and Iron
  - I indicator of variety of food consumption
  - 1 indicator of moderate intake of sugar, fat, sodium and alcohol.
  - High score = high diet quality

Healthy Eating Index

- Assess the diet quality as defined by current dietary guidelines for Americans using a 100 points scoring system (table 2.11, p35).
- See the differences bet HEI 1995 and 2005.
- Score: >80 Good diet, 51-80 Needs improvement, <51 poor diet.

Food Labels

- What is required on the food label?
  - Product name
  - Name and address of manufacturer
  - Net contents in weight , measure or count
  - The ingredients

A container with fewer than 40 square inches of surface area can present fewer facts in this format.

Nutrition Facts

Serv. Size 1/3 cup (85g)**
Servings 2
Calories 111
Fat Cal. 23

*Percent Daily Values (DV) are based on a 2,000 calorie diet.
** Drained solids only

Amount/serving		%DV*	Amount/serving		%DV*
Total Fat	3g	5%	**Total Carb.**	0g	0%
Sat. Fat	1g	5%	Dietary Fiber	0g	0%
Cholest.	60mg	20%	Sugars	0g	
Sodium	200mg	8%	**Protein**	21g	

Vitamin A 0% • Vitamin C 0% • Calcium 0% • Iron 2%

Packages with fewer than 12 square inches of surface area need not carry nutrtion information, but they must provide an address or telephone number for obtaining more information.

Introducing a Food Label—Can of Chicken and a Roll of Candy Rings

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Food Labels

SEE BOX 2.11 page 46

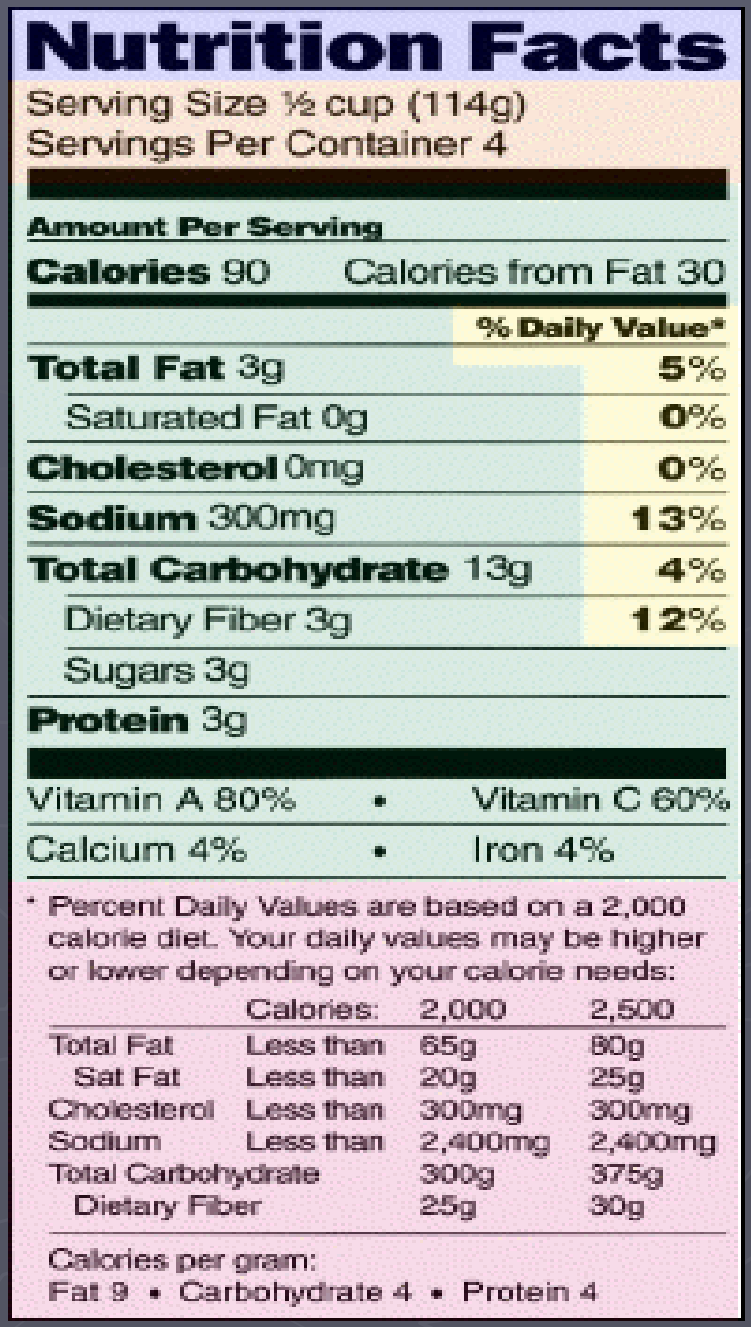
Box 2.12 page 47

Daily Values

- Dietary reference values intended to help consumers use food label information to plan healthy diet.
- They are to be used for regulatory purpose only and are not intended to serve as recommended intakes.
- The basis for calculating the Daily Values are two separate sets of nutrient reference value:
  - Daily Reference value (DRV): reference values for nutrients and food components for which no set of standards were available
  - Reverence Daily Intake (RDI) references value for vitamins & minerals also known as the U.S. RDA
  - Based on 2000 Calories
  - Derived from RDAs and other sources
  - One value for all groups

* 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
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g



Nutrition Facts

Serving Size ½ cup (114g)
Servings Per Container 4

Amount Per Serving

Calories 90 Calories from Fat 30

	% Daily Value*
Total Fat 3g	**5**%
Saturated Fat 0g	**0**%
Cholesterol 0mg	**0**%
Sodium 300mg	**13**%
Total Carbohydrate 13g	**4**%
Dietary Fiber 3g	**12**%
Sugars 3g	
Protein 3g	

Vitamin A 80% • Vitamin C 60%

Calcium 4% • Iron 4%

* 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
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

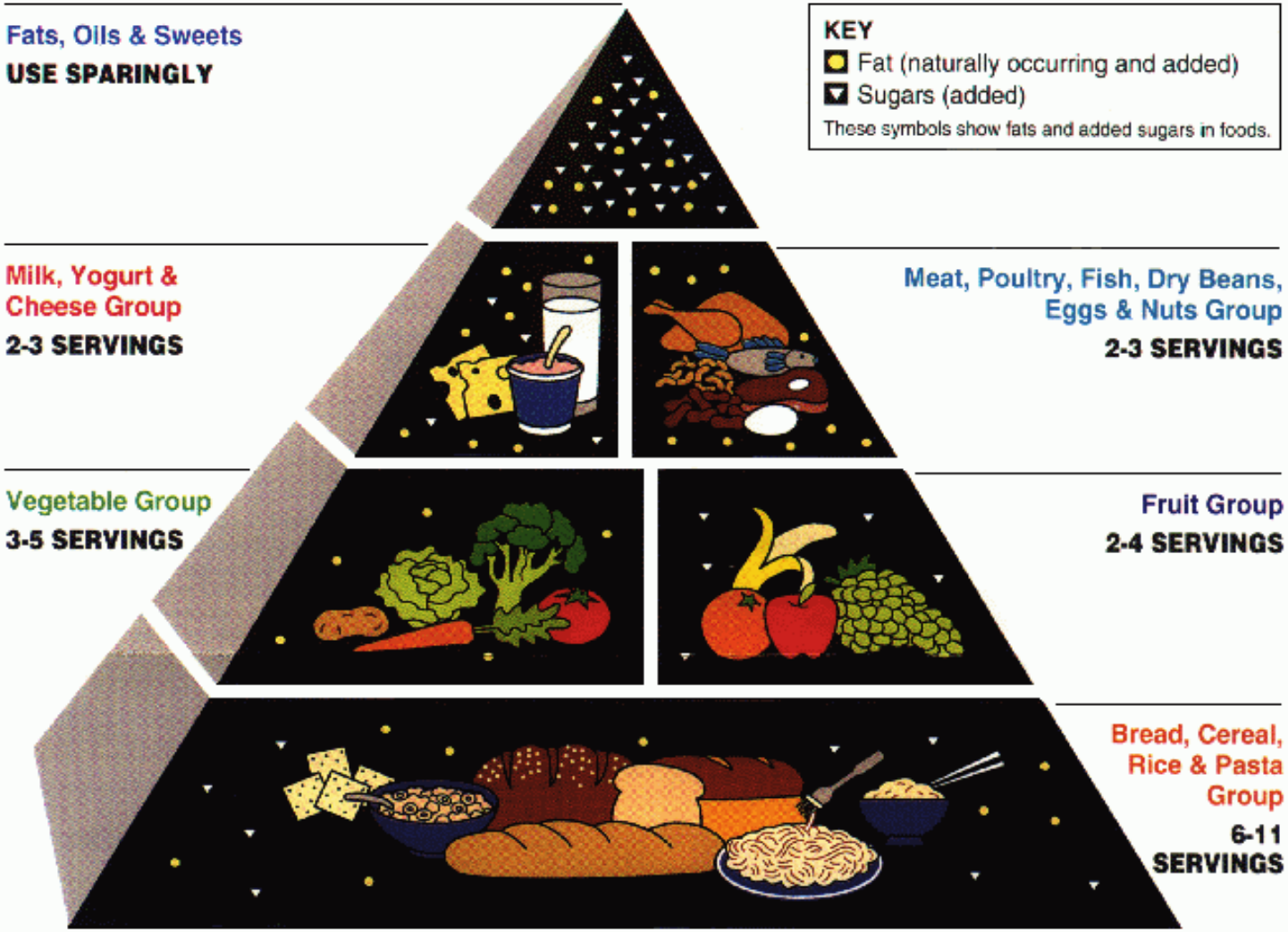
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

Food Labels

- Health Messages on Labels
- Guidelines by FDA
  - Claims
    - See Table 2.15 page 46

Food Guides: USDA Food Guide Pyramid

- Simple



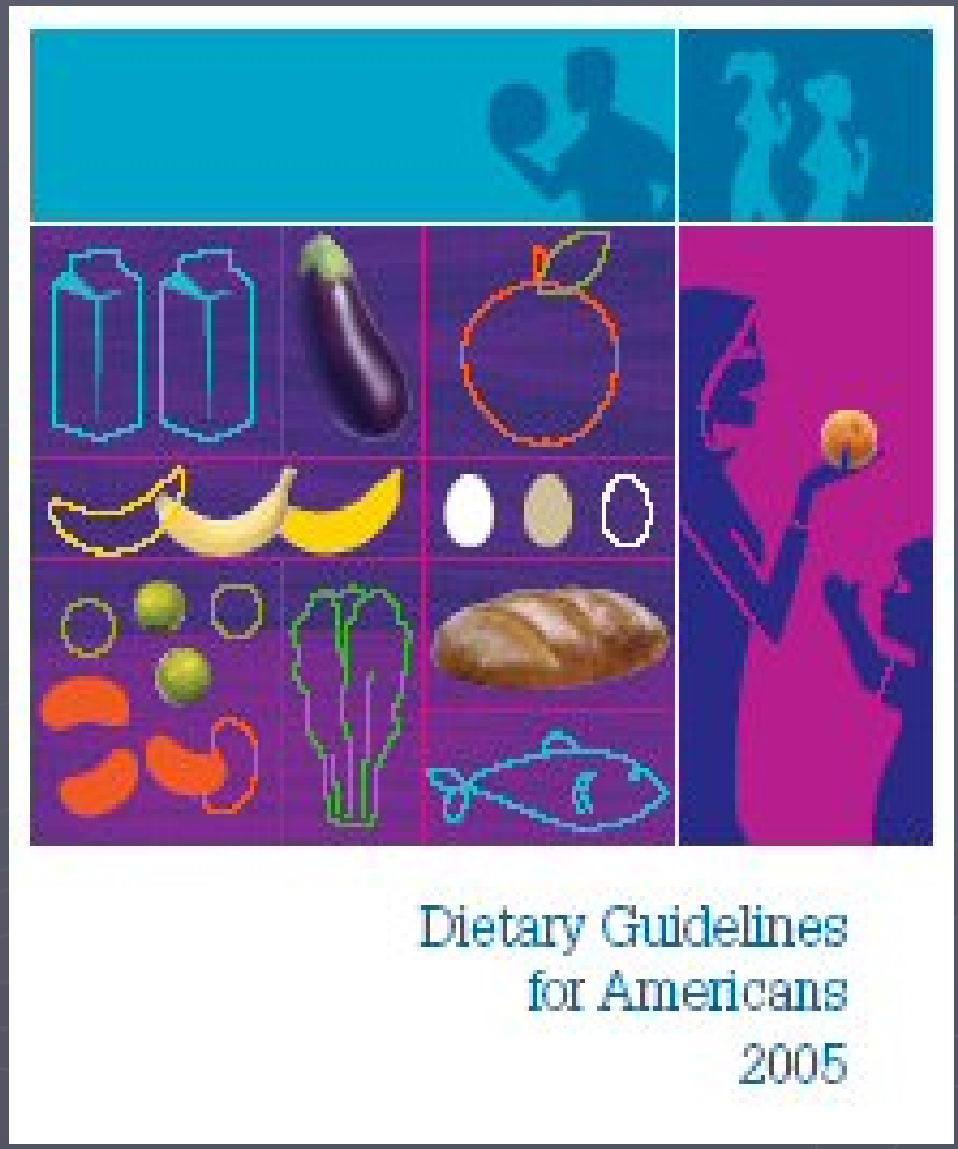
http://www.mypyramid.gov/

See Box 2.13 page 55

- Make half your grains whole
- Vary your veggies
- Focus on fruit
- Get your calcium rich foods
- Go lean with protein
- Find your balance between food and physical activity
- Know your fat

What are the *Dietary Guidelines for Americans, 2000*?

- Brief science-based statements & text published by federal government
- Provide advice for healthy Americans, age 2+ yrs, about food choices & physical activity to promote health & prevent disease.
- Published every 5 years



http://www.healthierus.gov/dietaryguidelines

Other tools to Evaluate dietary Intake

- See Table 2.15 page 44