



New Insights about Beef and Heart Health

February 2012



The Beef Checkoff through the
National Cattlemen's Beef Association

- **Cardiovascular disease**
 - Prevalence and trends
 - Current dietary guidance
- **BOLD study overview**
 - Design & Methods
 - Impact on heart disease risk factors
- **Heart-healthy eating**
 - Practical tips
 - The facts on beef nutrition





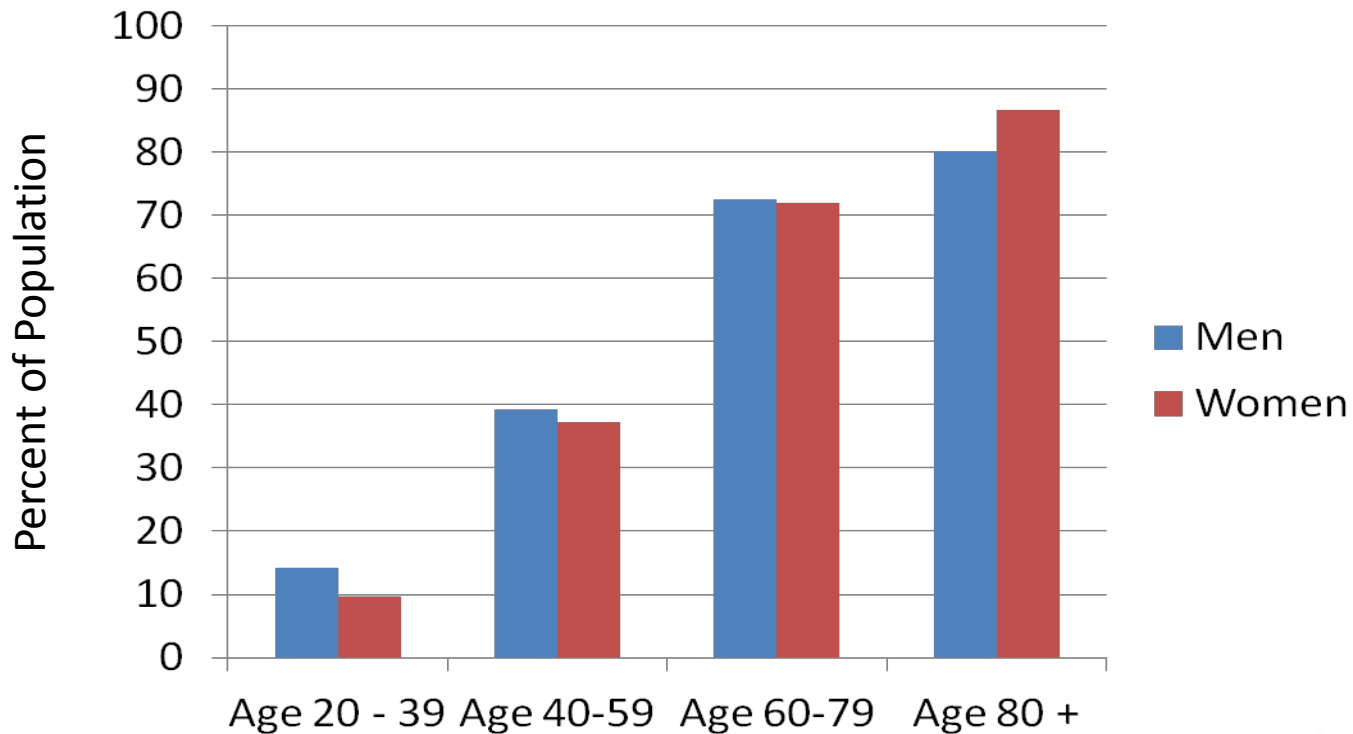
Cardiovascular Disease



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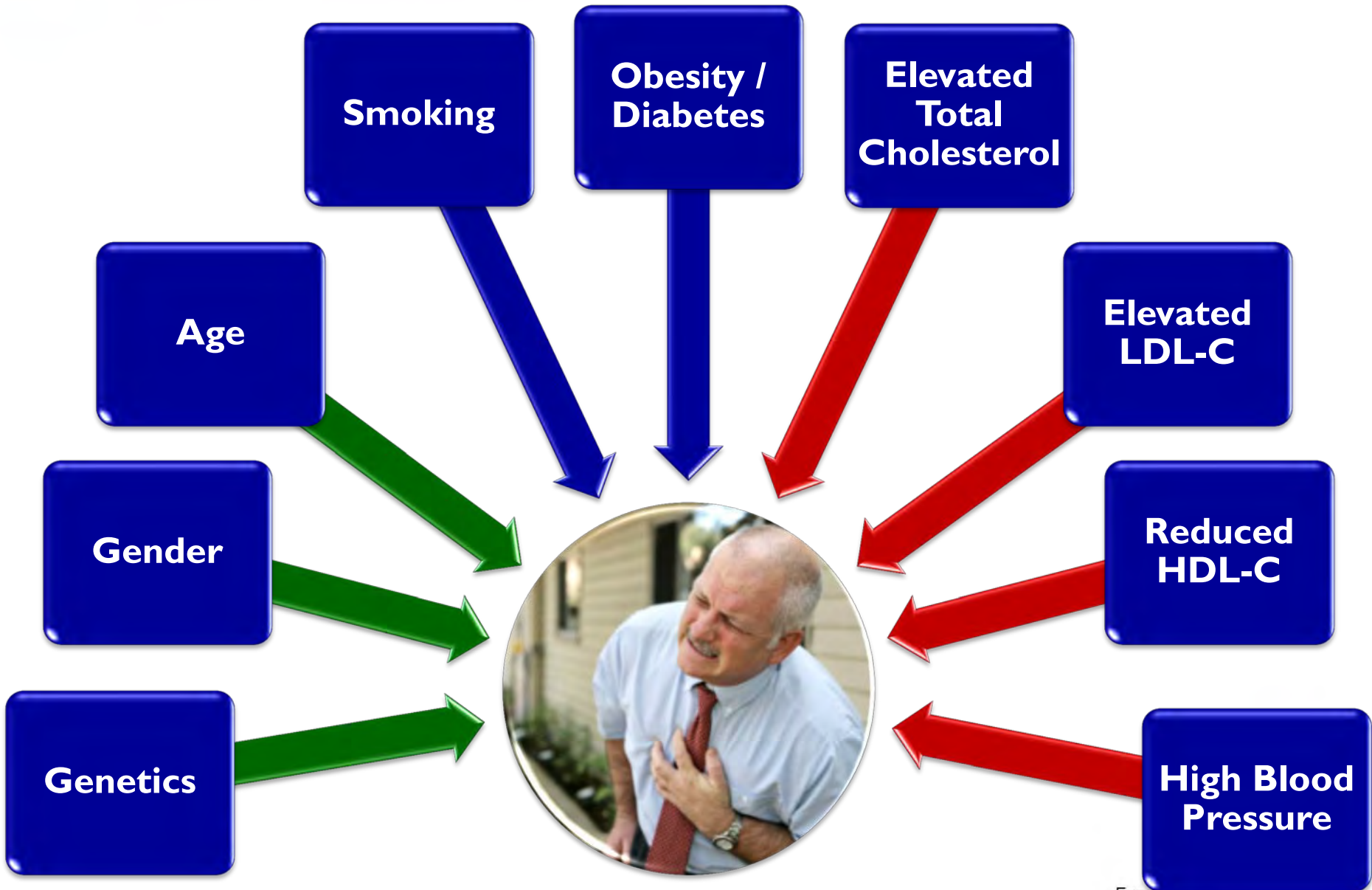
Cardiovascular Disease

- Impacts 1 in 3 Americans
- Leading cause of death in the United States
- Every 25 seconds, an American has a heart attack, with 1 fatal event every minute
- Economic cost: \$316.4 billion in 2010



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Heart Disease Risk Factors



Steps to Reduce Risk



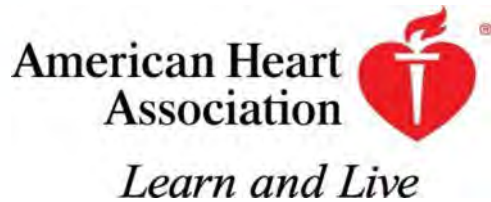
- ✓ Get Active
- ✓ **Control Cholesterol**
- ✓ **Eat Better**
- ✓ **Manage Blood Pressure**
- ✓ **Lose Weight**
- ✓ **Reduce Blood Sugar**
- ✓ Stop Smoking

What is the best diet to improve these risk factors and reduce heart disease risk?

American Heart Association 
Learn and Live



Dietary Recommendations



Diet and Lifestyle Recommendations for Heart Disease Risk Reduction - Summary

- Balance calorie intake
- Consume a fruit- and vegetable-rich diet
- Choose whole grain, high-fiber foods
- **Limit saturated fat to < 7% of calories, trans fat to < 1% of calories and cholesterol to < 300 mg/day**
- Consume oily fish 2 times per week
- Minimize added sugars
- Choose and prepare foods with little salt
- Consume alcohol in moderation

Consistent with National Cholesterol Education Program Guidelines



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- **Dietary Approaches to Stop Hypertension (DASH)**
- Recommended as “The Total Diet” by the 2010 Dietary Guidelines for Americans
- DASH Daily Eating Pattern:
 - 4-5 servings of vegetables
 - 4-5 servings of fruit
 - 2-3 servings low or non-fat dairy
 - 2 servings of lean meat, fish or poultry
 - plus 4-5 servings/week of nuts, seeds, legumes
- Low in saturated fat, refined grains, added sugar and red meat
- Has been shown to lower blood pressure and cholesterol in numerous clinical trials



Does beef have to be restricted in a low-saturated fat diet?

“in order to meet the saturated fatty acid recommendations...health care practitioners and the media often translate this to limit intake of all red meat.”



A Closer Look at Red Meat

- “Red meat” often used as a blanket term for hamburger, beef hot dogs, processed meats, bacon, lamb, all cuts of meat
- Composition of beef has become leaner over past 30 years
 - Total fat ↓ 34%*
 - Saturated fat ↓ 17%*
- Most of the popular cuts of beef are considered “lean” by USDA

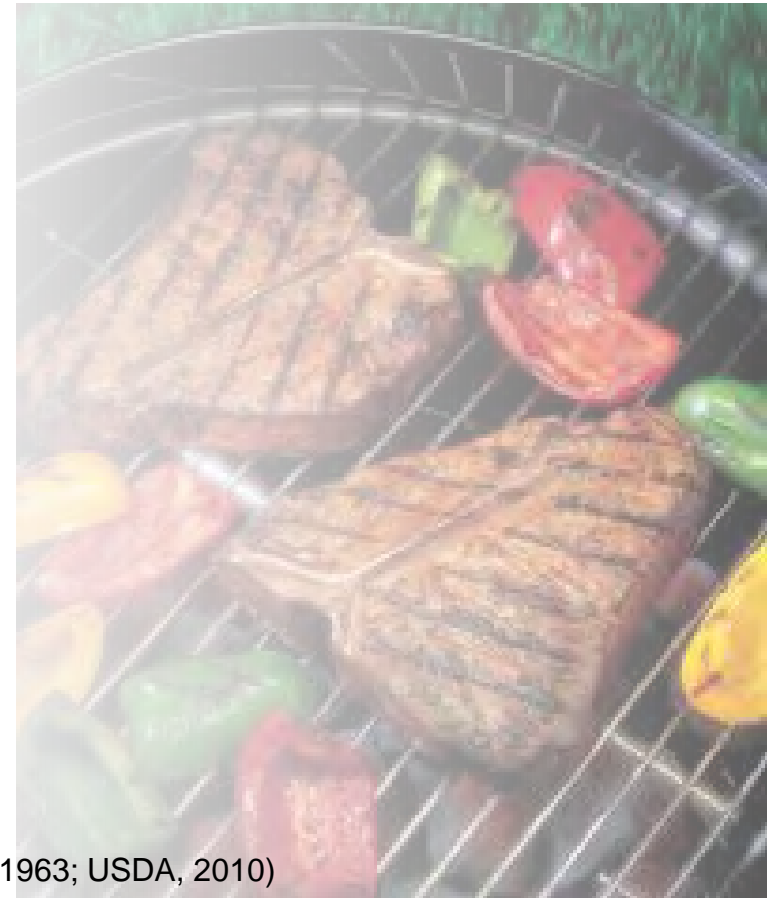
Definition of “Lean”

<10 g total fat

≤ 4.5 g saturated fat

< 95 mg cholesterol

*Per 3.5 oz serving



* Values are for 100 grams of sirloin steak, cooked via broiling (Watt and Merrill, 1963; USDA, 2010)

Lean Cuts are Easy to Find

- **17 of the top 25** most popular fresh meat cuts sold at retail are lean.¹
- **65% of all beef** in the fresh meat case is lean.¹



| Popular Beef Cuts are Leaner Than You Thought | |
|---|--|
| Most popular lean beef steaks chosen at restaurants: | Most popular lean beef steaks in the meat case: |
| Top Sirloin | Top Loin (Strip or New York steak) |
| Tenderloin (Filet Mignon or Medallions) | Top Round steak |
| Top Loin (Strip or New York steak) | Top Sirloin |
| T-Bone steak | T-Bone steak |



1. Fresh Look Marketing Group, Total US Beef, 52 Weeks Ending 9/25/2011

Beef and Heart-Health?



- What is the impact of lean beef in a heart-healthy, low-saturated fat diet?
- How does it compare to the “gold standard” DASH diet?
- Can you eat beef every day and still lower cholesterol?





Study Overview



The Beef Checkoff through the
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BOLD

Beef in an Optimal Lean Diet



- Conducted by researchers at The Pennsylvania State University, led by Penny Kris-Etherton, PhD, RD
- Published in Jan 1, 2012 edition of *The American Journal of Clinical Nutrition*

60th ANNIVERSARY

The American Journal of 
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BOLD Study Objectives

Objective

Evaluate the effects of heart-healthy diets (less than 7% of calories from saturated fat) with lean beef as main protein source on CVD risk factors versus a “Healthy American Diet” and the DASH diet.

Hypotheses

- Compared to the HAD, the BOLD, BOLD PLUS and DASH diets will decrease total and LDL cholesterol.
- The BOLD, BOLD-PLUS & DASH diets will lower total and LDL-cholesterol similarly.

Descriptions of Study Diets

Healthy American Diet (HAD)

Control diet, included more refined grains, full-fat dairy products, oil and butter to reflect current American dietary habits.

Dietary Approaches to Stop Hypertension (DASH)

Considered the “gold standard” heart-healthy diet, this plan featured vegetables, fruits and low-fat dairy and limited red meat and sweets.

Beef in an Optimal Lean Diet (BOLD)

Similar to DASH, but used lean beef (4 oz./day) as the primary protein source, whereas DASH used primarily white meat and plant protein sources.

Beef in an Optimal Lean Diet Plus (BOLD-PLUS)

Similar to BOLD, but with higher protein and lean beef intake (5.4 oz/day).



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A Day in the Life of BOLD

BOLD: 4.0 oz lean beef per day

For BOLD-PLUS, increase lean beef to 5.4 oz per day

Breakfast

- Oatmeal packet
- Blueberries
- Orange juice
- Milk

Lunch

- Meatball Sub: Beef meatballs, marinara and lettuce on a sandwich roll
- Broccoli & Baby Carrots with Dip
- Pretzels

Dinner

- Sirloin w/Sugar Snap Peas & Pasta Salad with Gremolata Dressing

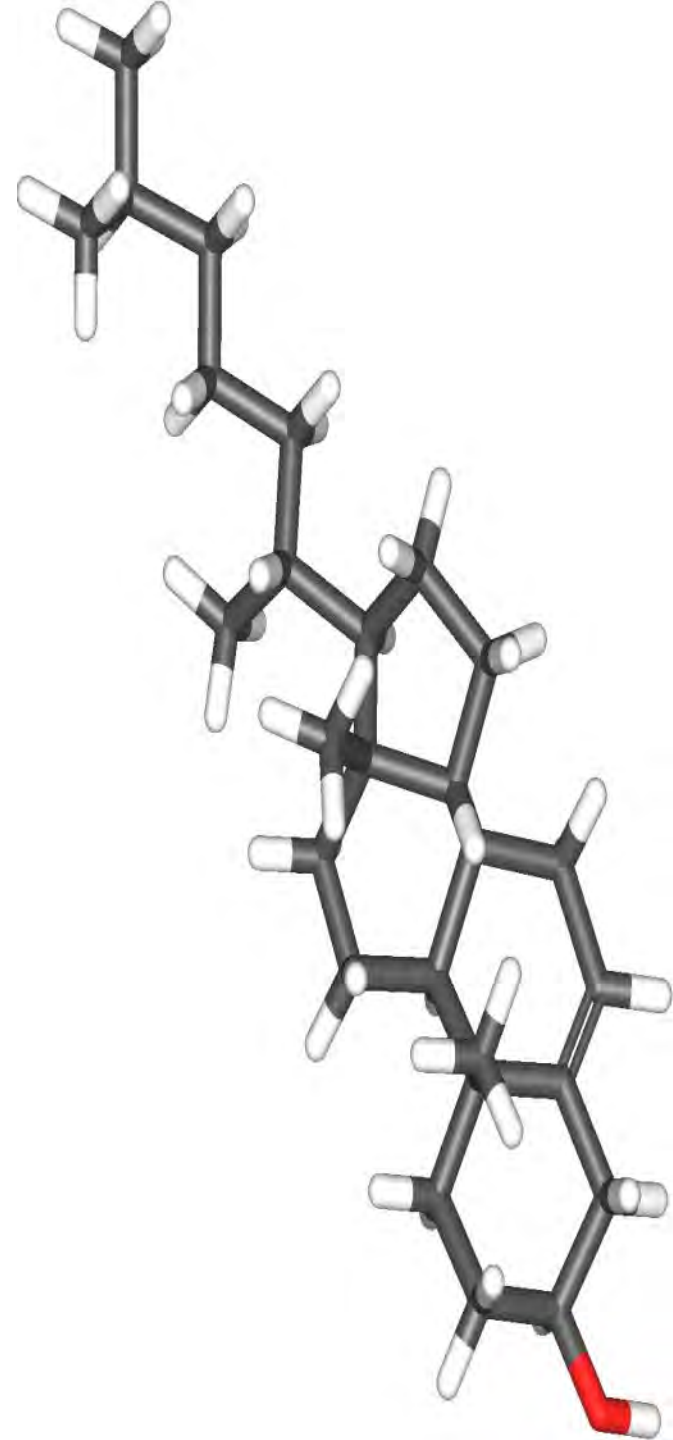
Snacks

- Peanut butter
- Apple
- Celery Sticks



BOLD Research Findings

- Participants in the BOLD study ate lean beef every day and lowered cholesterol
- Similar reductions in total and LDL cholesterol were observed
 - Total cholesterol decreased 10%
 - LDL cholesterol decreased 10%
- Benefits were also observed on emerging heart disease risk factors on both of the BOLD diets



Putting BOLD into Practice



- The BOLD study suggests that lean beef can be included as part of a heart-healthy diet that meets current recommended targets for saturated fat and cholesterol intake.

- The BOLD study suggests that lean beef can be part of a diet that beneficially affects major risk factors for heart disease.





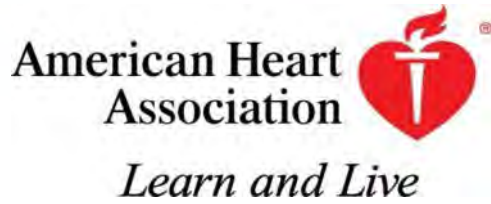
BOLD 
Beef in an Optimal Lean Diet

Heart-Healthy Eating



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National Cattlemen's Beef Association

Dietary Recommendations



Diet and Lifestyle Recommendations for Heart Disease Risk Reduction - Summary

- Balance calorie intake
- Consume a fruit- and vegetable-rich diet
- Choose whole grain, high-fiber foods
- Limit saturated fat to < 7% of calories, trans fat to < 1% of calories and cholesterol to < 300 mg/day
- Consume oily fish 2 times per week
- Minimize added sugars
- Choose and prepare foods with little salt
- Consume alcohol in moderation



Increase Fruit and Veggies



- **Keep it colorful.** Challenge yourself to try fruits and vegetables of different colors.
- **Add them on or mix them in.** Add to pasta sauce, soups, omelets, cereal, & sandwiches or into smoothies and muffins or waffles.
- **Roast veggies to bring out sweetness.**
- **Serve with healthy dips.** Low-fat plain yogurt makes a great base for all kinds of flavors.
- **Try fruit for dessert.** The natural sweetness is the perfect solution for the after-dinner sweet tooth.



Choose More Whole Grains

- Whole grains can't be identified just by their color.
- Choose foods that contain one of the following ingredients first on the label's ingredient list: whole wheat, graham flour, oatmeal, whole oats, brown rice, wild rice, whole-grain corn, popcorn, whole-grain barley, whole-wheat bulgur and whole rye.



| Instead of ... | Try ... |
|------------------------------|---|
| white bread or "wheat" bread | "whole-wheat" bread or rye bread |
| white rice | brown rice or wild rice |
| regular pasta | whole-wheat or whole-grain pasta |
| macaroni | bulgur wheat |
| corn flakes | bran flakes or other bran cereal |
| crispy rice cereals | whole-grain cereals |
| cream of wheat | old-fashioned or quick oatmeal |
| flour tortillas | Whole-grain or corn tortillas (made without lard) |

Limit Added Sugar and Sodium



- Try cutting the usual amount of sugar you add to things like cereal, coffee or tea by half and wean down from there.
- Instead of adding sugar to cereal or oatmeal, add fresh or dried fruit for natural sweetness
- Drink only calorie-free or low-calorie beverages.
- Experiment with extracts and/or sweet spices.



- Make the bulk of your diet fresh foods & cook more at home.
- Read labels carefully and choose items with the lowest levels of sodium.
- Always taste before adding any salt.
- Use spices, herbs and/or lemon juice as seasoning.
- Ask for dishes to be prepared without salt in restaurants.
- Choose foods with higher potassium.



Fat and Cholesterol

- Instead of frying foods – which adds unnecessary fats and calories – use cooking methods that add little or no fat, like stir-frying, roasting, grilling, broiling, baking, poaching or steaming.
- Whether cooking or making dressings, use the oils that are lowest in saturated fats, *trans* fats and cholesterol – such as canola oil, corn oil, olive oil, safflower oil, sesame oil, soybean oil and sunflower oil – but use them sparingly.
- Use low-fat or fat-free versions of milk, yogurt and cheese whenever possible.



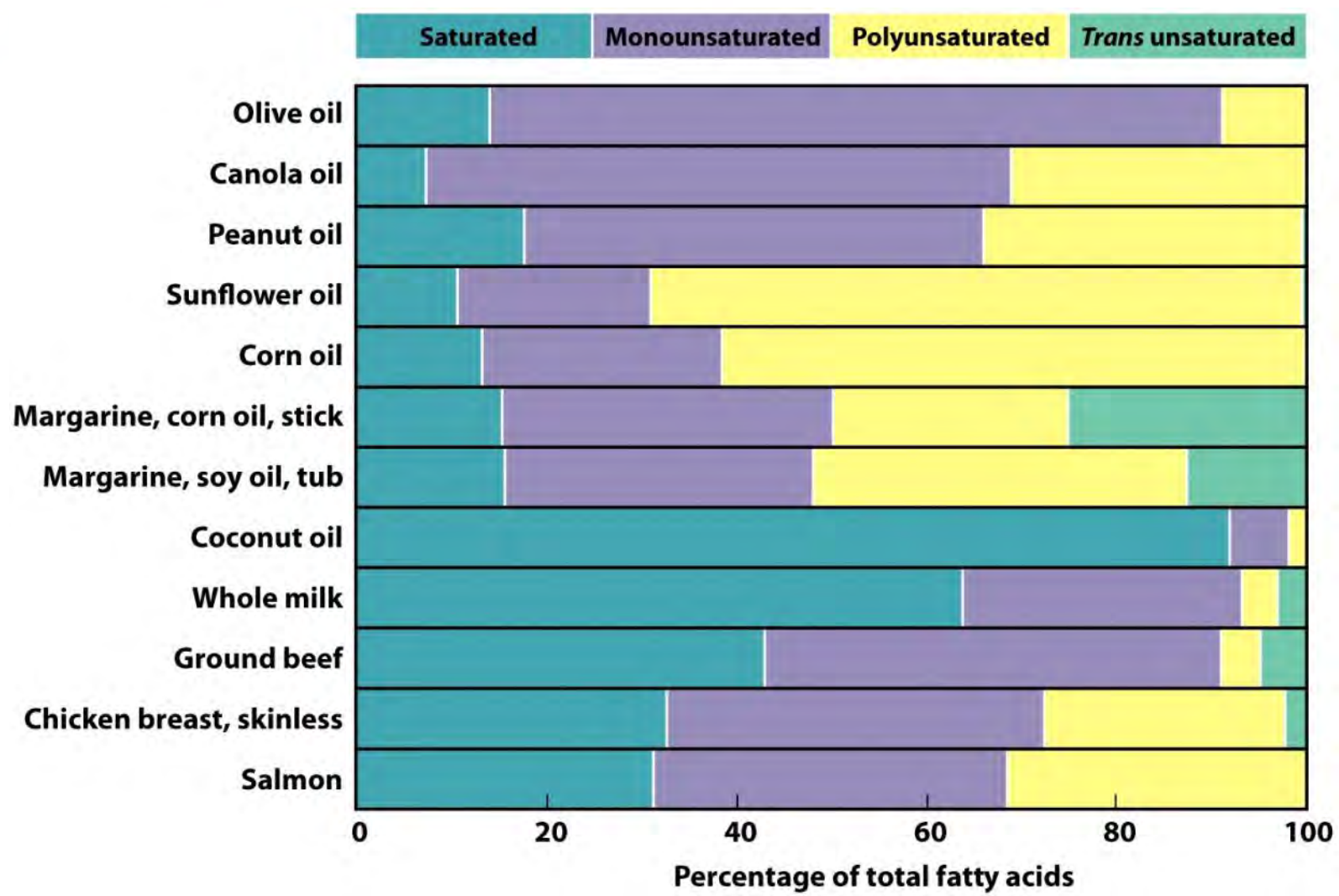
BOLD and MyPlate

- In the BOLD study, lean beef was paired with plentiful fruits, vegetables, grains, legumes and dairy – bringing the MyPlate recommendations to life.
- Make way for lean beef on MyPlate... make a ¼ of your plate lean protein



| Food group (servings/day) | BOLD | BOLD-PLUS |
|---|------|-----------|
| Fruits | 4.5 | 3.4 |
| Vegetables | 3.9 | 4.6 |
| Grains | 5.6 | 5.3 |
| Low-fat dairy | 1.8 | 4.7 |
| Legumes, nuts, seeds and vegetable protein | 1.3 | 4.2 |

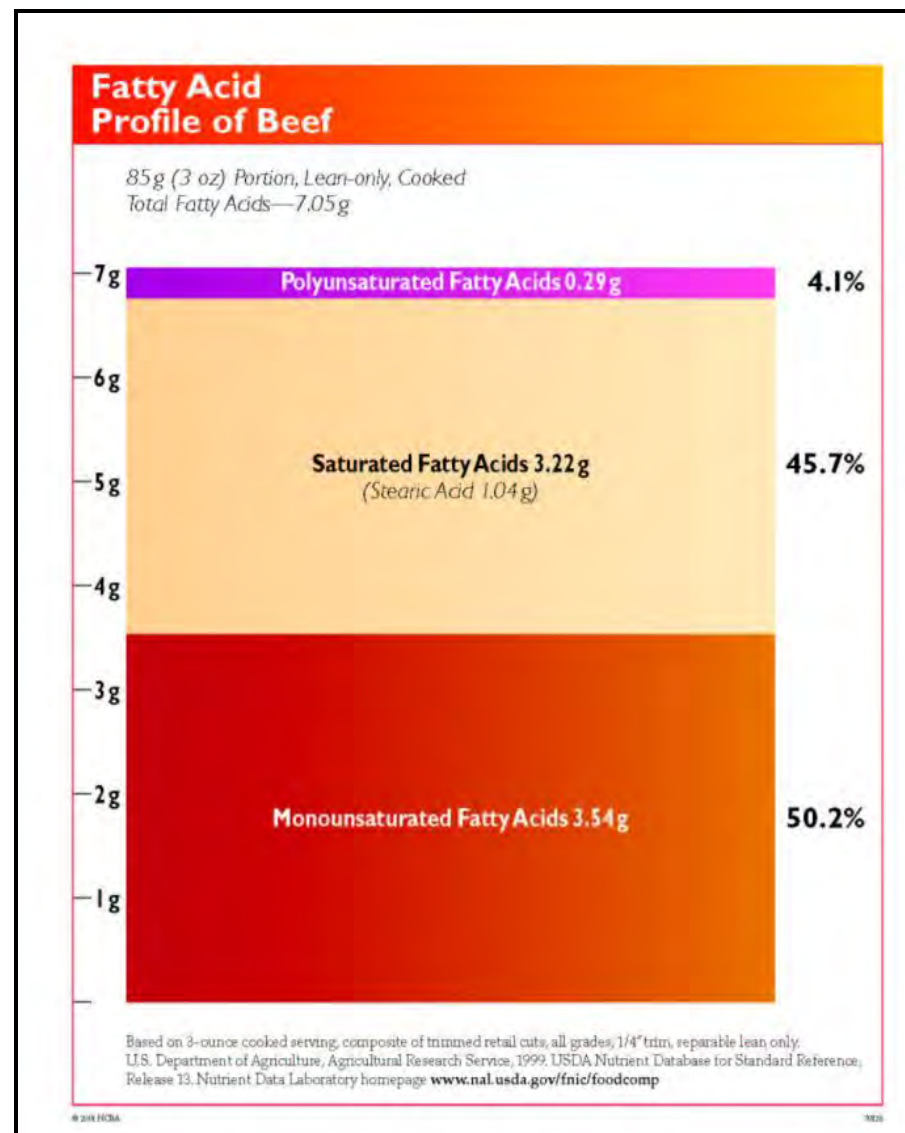
Fatty Acid Composition of Foods



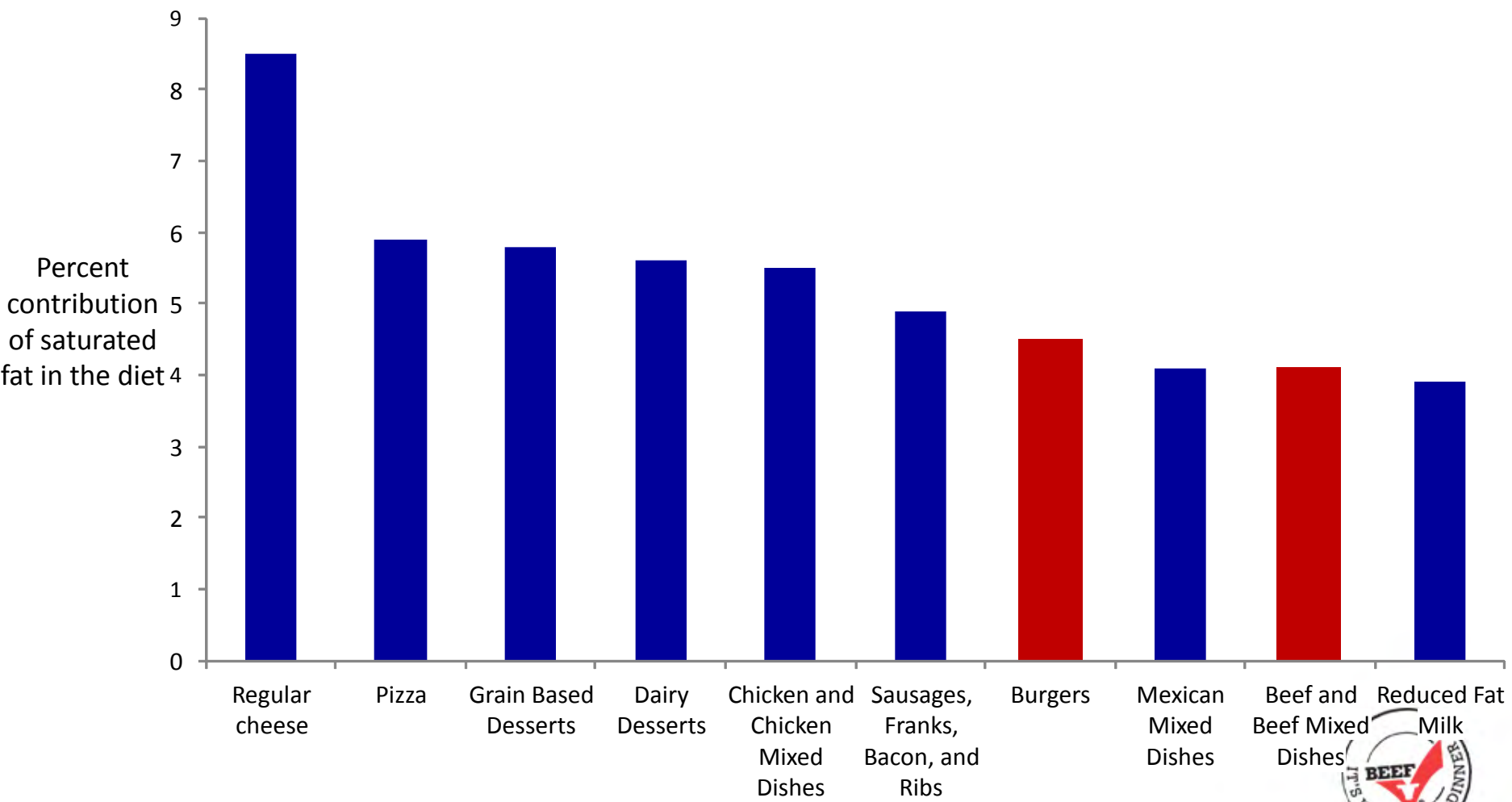
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Misunderstood Fat Profile

- More than half of beef's fatty acids are monounsaturated (good) fat – the same heart-healthy fat found in salmon and olive oil
- 1/3 of beef's saturated fatty acid is stearic acid, a neutral saturated fat



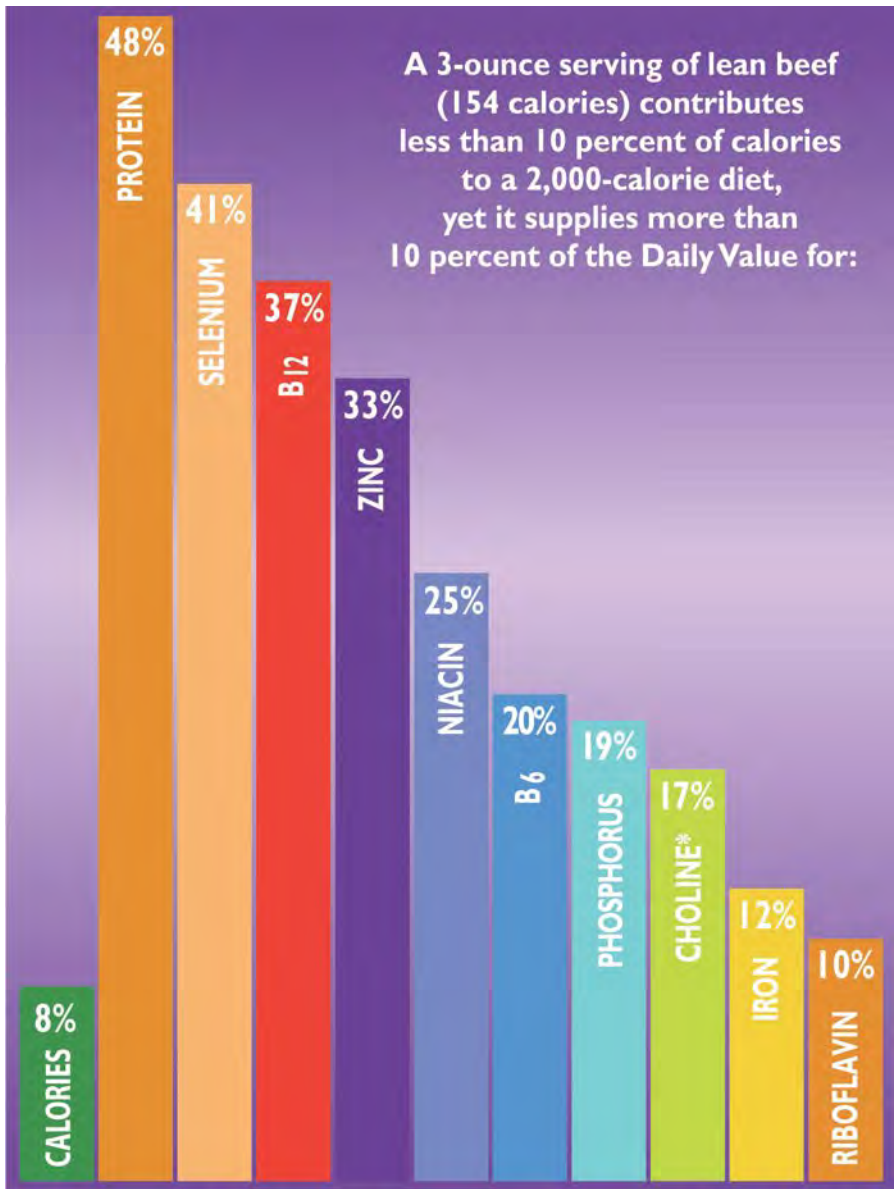
Current Intakes: Saturated Fat & Beef



2010 Dietary Guidelines for Americans



Beef: A Nutrient-rich Food



**A 3-ounce serving of Lean Beef =
154 Calories and
10 Essential Nutrients**



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Not All Proteins are Created Equal

A 3-ounce serving of lean beef offers the most amount of protein in the fewest amount of calories when compared to plant proteins such as peanut butter, black beans and tofu.



How does lean beef compare to other proteins?

- Multiple studies* demonstrate similar cholesterol-lowering results when substituting lean beef for chicken and/or fish in a heart-healthy diet.
- The Dietary Guidelines suggest choosing a variety of lean protein choices for good health.
- There are more than 29 cuts of lean beef to choose from—all with less fat than a skinless chicken thigh.¹



*Scott et al, *Arch Intern Med*, 1994; Davidson et al, *Arch Intern Med*, 1999; Hunnighake et al, *J Am Coll Nutr*, 2000; Beauchense-Rondeau et al, *AJCN*, 2003

¹USDA Nutrient Database for Standard Reference, Release 23, 2010



Does beef have to be restricted in a low-saturated fat diet?

The results from BOLD & other studies clearly show that nutrient rich lean beef, in addition to being satisfying and great-tasting, can be part of a solution to building a heart-healthy diet.



The Healthy Beef Cookbook

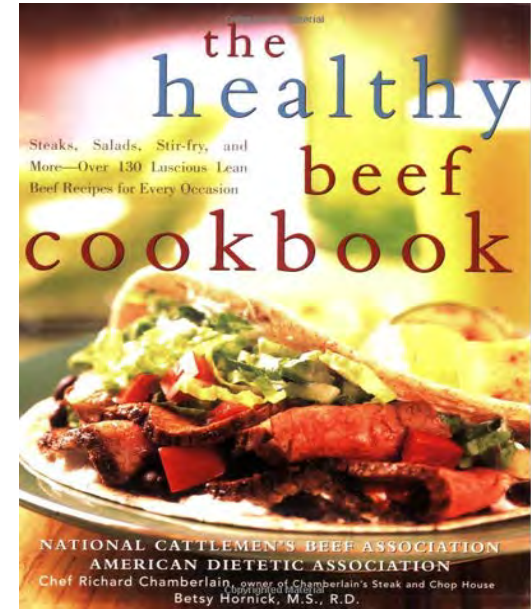
- You can follow the same diet as the BOLD study participants by using *The Healthy Beef Cookbook*, a collection of 130 delicious, nutrient-rich recipes featuring lean beef
- Here are two recipes that were used as part of the BOLD menus include



*Szechuan Beef
Stir Fry*



*Beef, Mango and
Barley Salad*



Available for purchase at
<https://store.beef.org/>





Appendix: Created for the Health Professional Audience



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More Heart-health Science

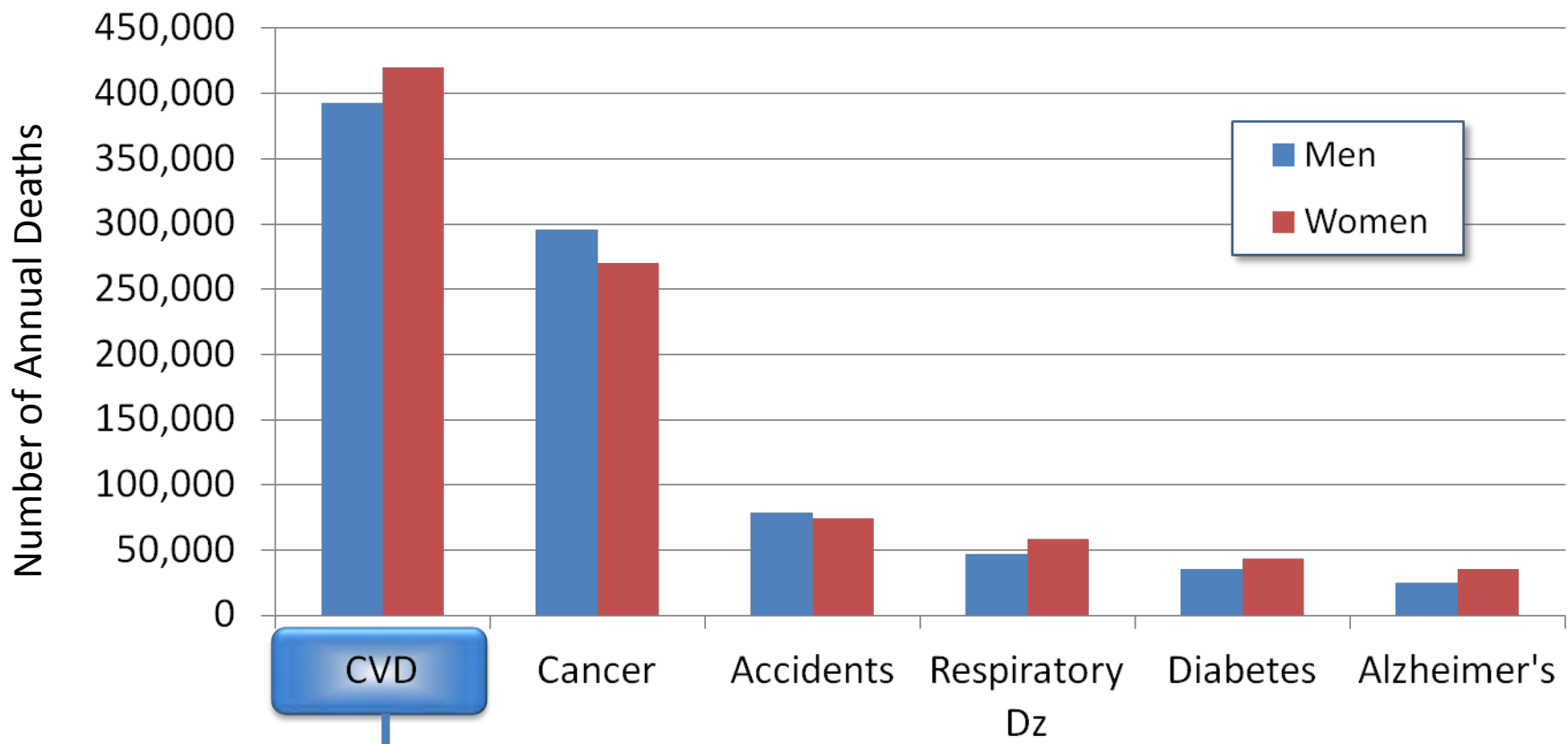


- BOLD study is just the latest addition to a growing body of evidence supporting the role of lean beef in a heart-healthy diet.
- 2010 meta-analysis of 20 studies with over one million participants showed red meat consumption is not associated with increased heart disease risk.¹
- Epidemiological studies show mixed associations, but clinical trials show no difference between chicken/fish and beef on cholesterol and other lipid risk factors for CVD.

1 Micha R, Wallace SK, Mozaffarian D. Red and processed meat consumption and risk of incident coronary heart disease, stroke, and diabetes mellitus: a systematic review and meta-analysis. *Circulation*. 2010; 121:2271-2283



The #1 Cause of Death in U.S.

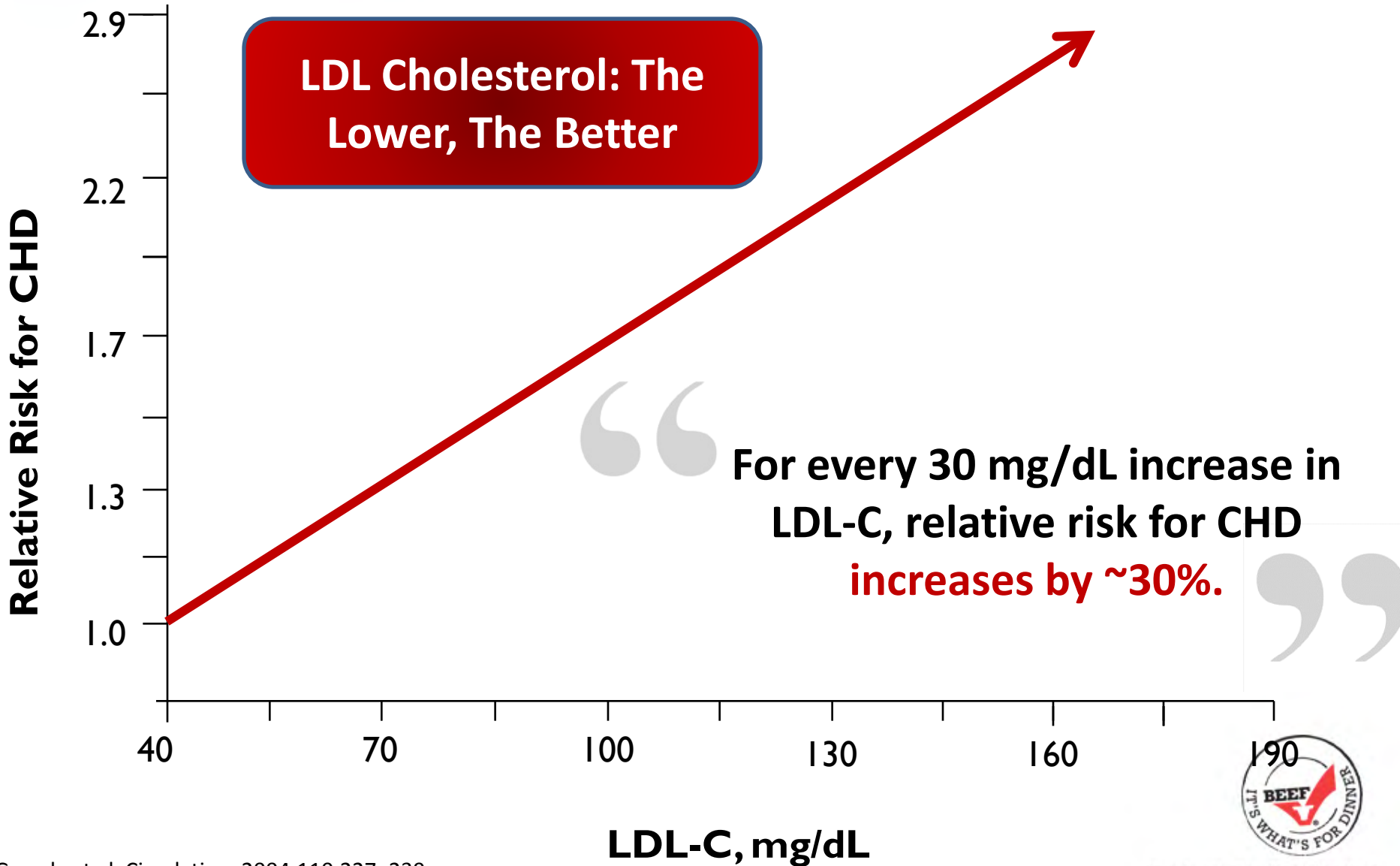


Cardiovascular disease causes more deaths than the next 5 most common causes combined.



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LDL Primary Target for Risk Reduction



Grundy et al. Circulation. 2004;110:227-239.

Dietary Composition

| Nutrient (% of total calories) | HAD (control) | DASH | BOLD | BOLD-PLUS |
|--------------------------------|---------------|------------|------------|------------|
| Protein | 19% | 19% | 19% | 28% |
| Total Fat | 33 | 27 | 28 | 28 |
| Saturated | 12 | 6 | 6 | 6 |
| Monounsaturated | 11 | 9 | 11 | 12 |
| Polyunsaturated | 7 | 8 | 7 | 7 |
| Cholesterol, mg | 287 | 188 | 168 | 193 |
| Carbohydrates | 49 | 54 | 54 | 46 |
| Fiber (g) | 24 | 36 | 32 | 38 |
| Lean Beef (oz/d)* | 0.7 | 1.0 | 4.0 | 5.4 |

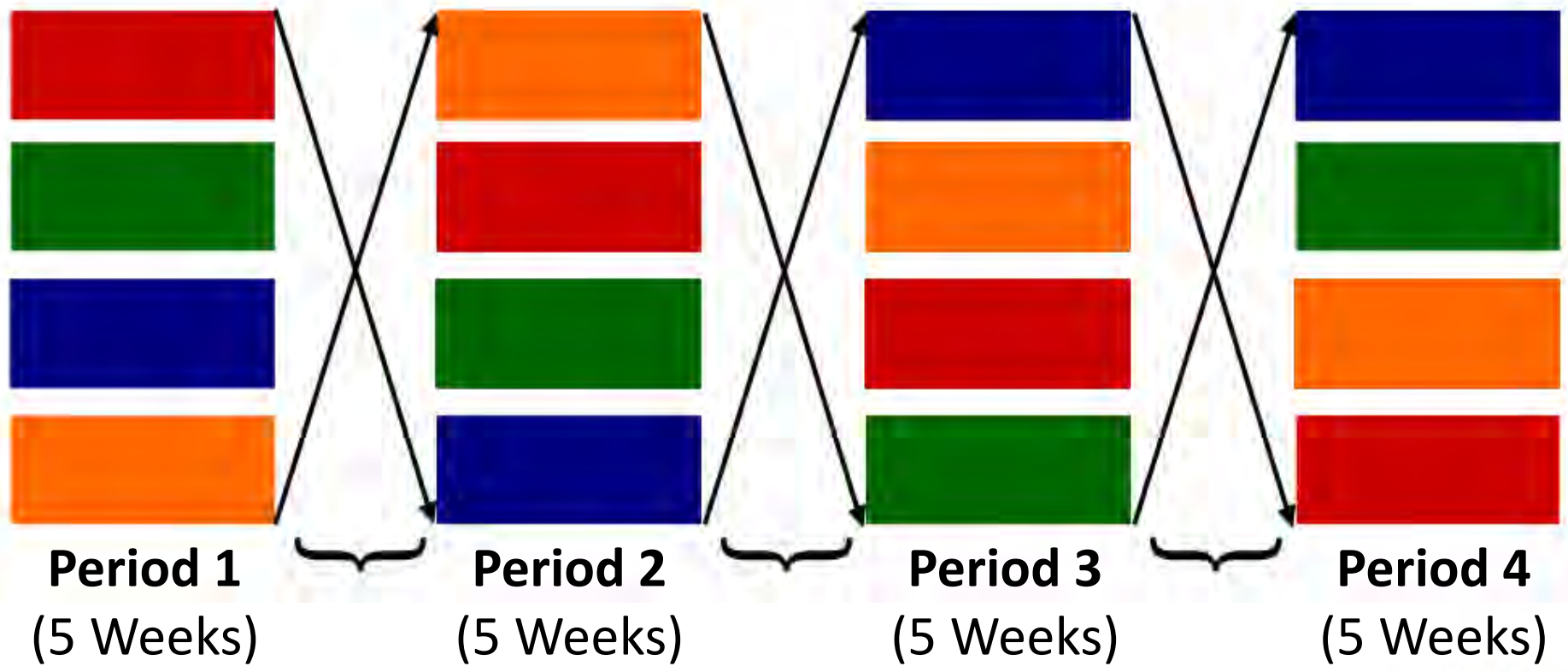


*weight before cooking



Cross-over Design

- Randomized, controlled, cross-over design = most rigorous clinical trial
- Each person serves as his/her own control, minimizing biological variability



2 Week Break = } Diets = **HAD** **DASH** **BOLD** **BOLD+**



BOLD Study Summary



Adult men & women ages 30-64



Moderately elevated cholesterol / No cholesterol drugs



Non smokers / No history of heart disease



Weight stable for at least 6 months



LDL ↓ 10%

- **Total and LDL cholesterol decreased 10%** from baseline on both BOLD and BOLD-PLUS

As effective as DASH

- Improvements in heart health risk factors on BOLD diets as effective as DASH and other heart-healthy diets
- Many of these emphasized plant proteins



How Does BOLD Stack Up?

| Food Groups, servings/d | Original DASH | BOLD | BOLD-PLUS |
|--|---------------|------|-----------|
| Fruit and Juices | 5.2 | 4.5 | 3.4 |
| Vegetables | 4.4 | 3.9 | 4.6 |
| Grains | 7.5 | 5.6 | 5.3 |
| High Fat dairy products | 0.7 | 0.0 | 0.0 |
| Low-Fat Dairy Products | 2 | 1.8 | 4.7 |
| Legumes, nuts, seeds, and other vegetable protein | 0.7 | 1.3 | 4.2 |
| Beef, Pork, & Ham | 0.5 | 4.5 | 5.9 |
| Poultry & Fish | 1.1 | 0.5 | 0.5 |
| Egg & Egg Products | -- | 0.1 | 0.9 |
| Fats and Oils | 2.5 | 4.3 | 1.4 |



Baseline Characteristics

- Adult men and women ages 30-64
- Moderately elevated cholesterol
- Non-smokers
- No cholesterol-lowering medications
- No history of heart disease
- Weight stable for at least 6 months

| Characteristics | Males (n=15) | Females (n=21) |
|--------------------------|-------------------------|------------------------|
| Age (y) | 49 ± 1.8 | 50 ± 2.0 |
| BMI (kg/m ²) | 27.3 ± 0.7 ^a | 24.8 ± 0.7 |
| TC (mg/dL) | 194 ± 5.5 | 222 ± 8.6 ^a |
| LDL-C (mg/dL) | 128 ± 5.4 | 146 ± 4.9 ^a |
| HDL-C (mg/dL) | 45 ± 2.1 | 56 ± 3.4 ^a |
| TG (mg/dL) | 105 ± 8.9 | 95 ± 5.9 |

^a = Significantly different (p<0.05)



Complete Cholesterol Results

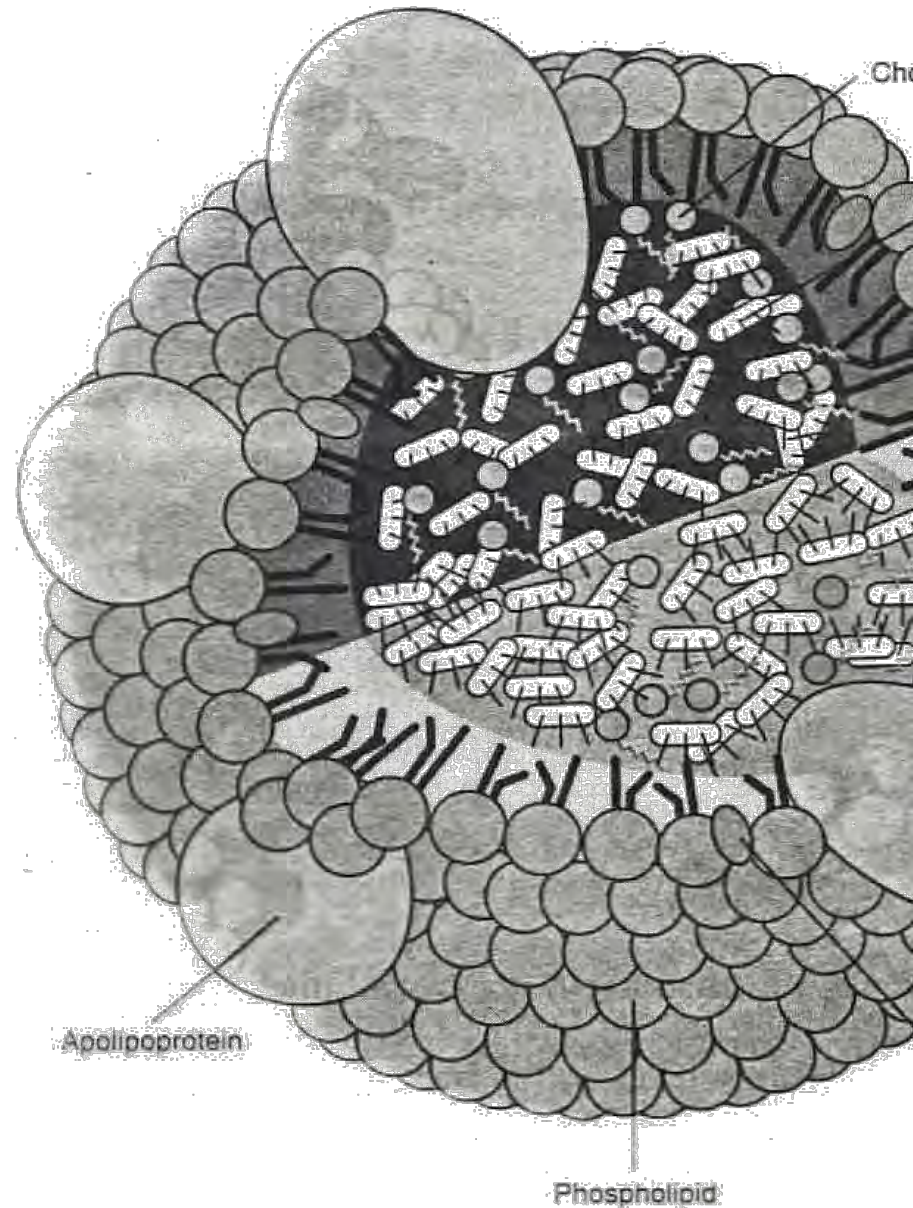
- **Total cholesterol and LDL cholesterol decreased 10% from baseline** on the BOLD and BOLD-PLUS diets
- **The improvements in heart health risk factors** seen from the BOLD diets were **as effective as those from the DASH** and other heart-healthy diets, many of which emphasize plant proteins.

| | HAD | DASH | BOLD | BOLD-PLUS |
|---------------------|-------------|--------------------------|--------------------------|--------------------------|
| TC, mg/dL | 202.9 ± 3.5 | 192.5 ± 3.8 ^a | 192.7 ± 3.6 ^a | 191.5 ± 3.6 ^a |
| LDL-C, mg/dL | 133.0 ± 3.2 | 124.6 ± 2.9 ^a | 125.0 ± 2.9 ^a | 124.7 ± 3.0 ^a |
| HDL-C, mg/dL | 51.1 ± 2.0 | 47.1 ± 1.8 ^a | 47.9 ± 1.8 ^a | 47.9 ± 1.8 ^a |
| TG, mg/dL | 94.1 ± 5.9 | 96.2 ± 5.6 | 93.6 ± 6.4 | 89 ± 5.3 |
| TC/HDL-C | 4.1 ± 0.1 | 4.1 ± 0.1 | 4.0 ± 0.08 | 4.0 ± 0.08 |

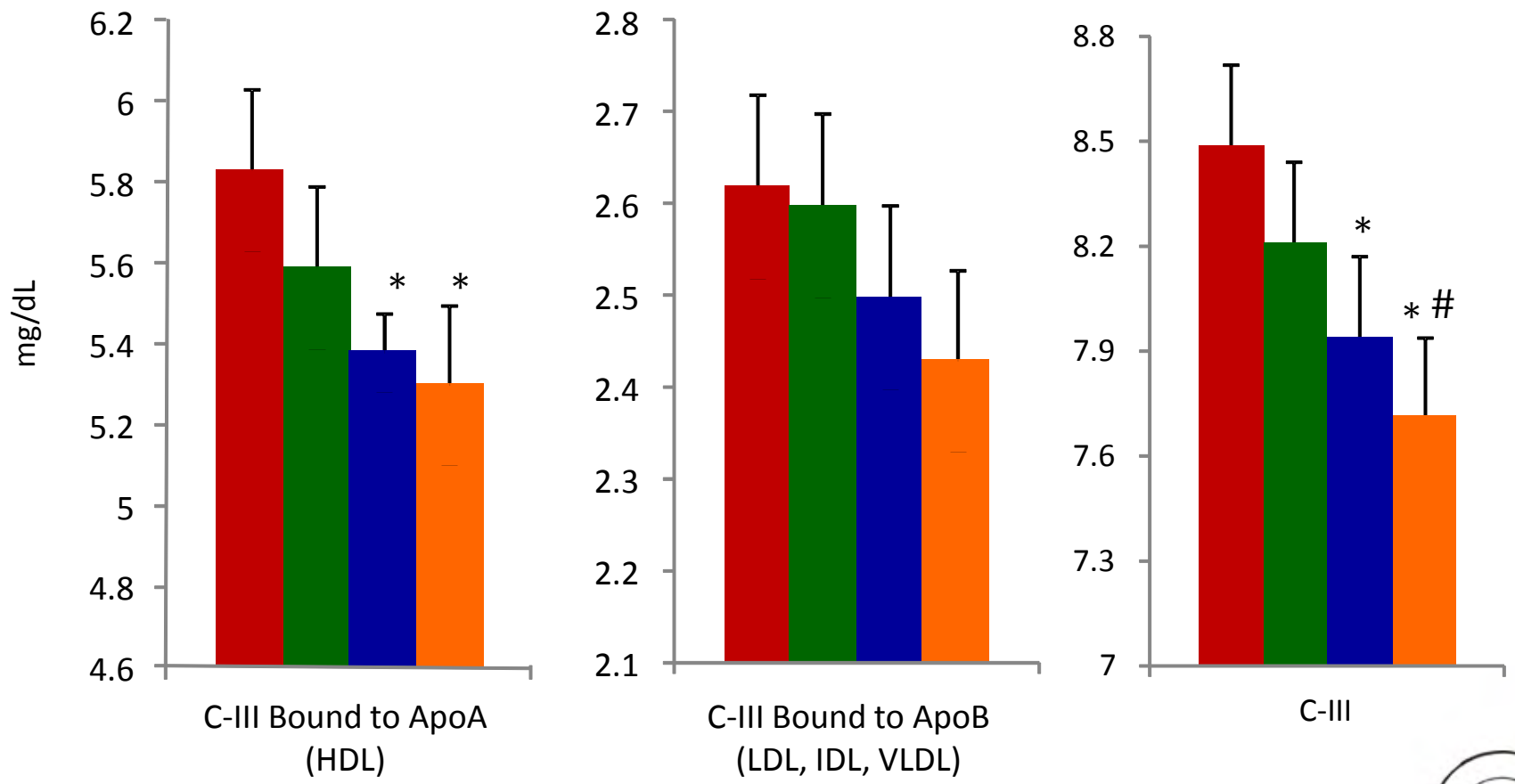
^a = Significantly different from HAD (p<0.05)

Apolipoproteins

- Apo B
 - LDL-C, VLDL, IDL
- Apo A1
 - HDL
- Apo C-III
 - Triglyceride rich particles
 - Can be bound to Apo B and Apo A1 containing particles



Apolipoproteins

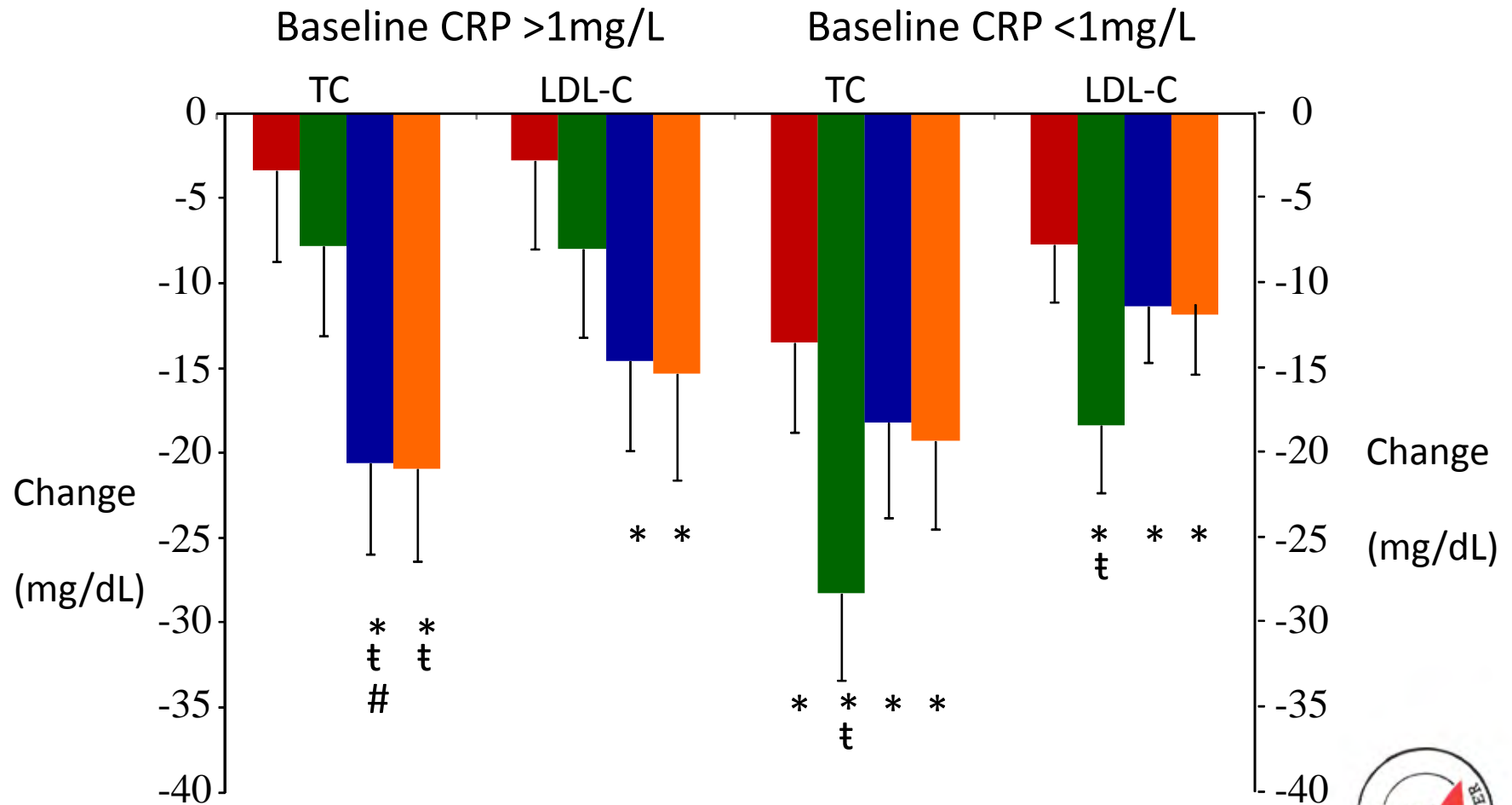


Diets = **HAD** **DASH** **BOLD** **BOLD+**

* = Significantly different vs. AAD (p<0.05)
= Significantly different vs. DASH (p<0.05)



CRP as a Modifier of Lipid & Lipoprotein Change



Diets = **HAD** **DASH** **BOLD** **BOLD+**

* = Significantly different from 0; † = Significantly different from AAD; # = Significantly different from DASH



Other Animal Proteins

Multiple studies demonstrate similar cholesterol-lowering results when substituting lean beef for chicken and/or fish in a heart-healthy diet

| Reference | Study Design | Results for Beef |
|--|---|---|
| Flynn et al, <i>AJCN</i> , 1981 | 5 oz day beef, poultry and fish | Similar lipids in men, lower TG in women |
| Scott et al, <i>Arch Intern Med</i> , 1994 | 3 oz/day beef v. chicken in a Step 1 diet | Similar lipid-lowering effects in both diets |
| Davidson et al, <i>Arch Intern Med</i> , 1999 | 6 oz/day lean red vs. white meat/day in a Step 1 diet | Similar lipid-lowering effects in both diets |
| Hunnighake et al, <i>J Am Coll Nutr</i> , 2000 | ≥ 6 oz/day as lean red vs. white meat in a Step 1 NCEP diet | Similar lipid-lowering effects in both diets |
| Beauchense-Rondeau et al, <i>AJCN</i> , 2003 | ≥ 6 oz/day as beef, chicken or fish in a Step 1 NCEP diet | Similar lipid-lowering effects of all 3 diets |

