



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





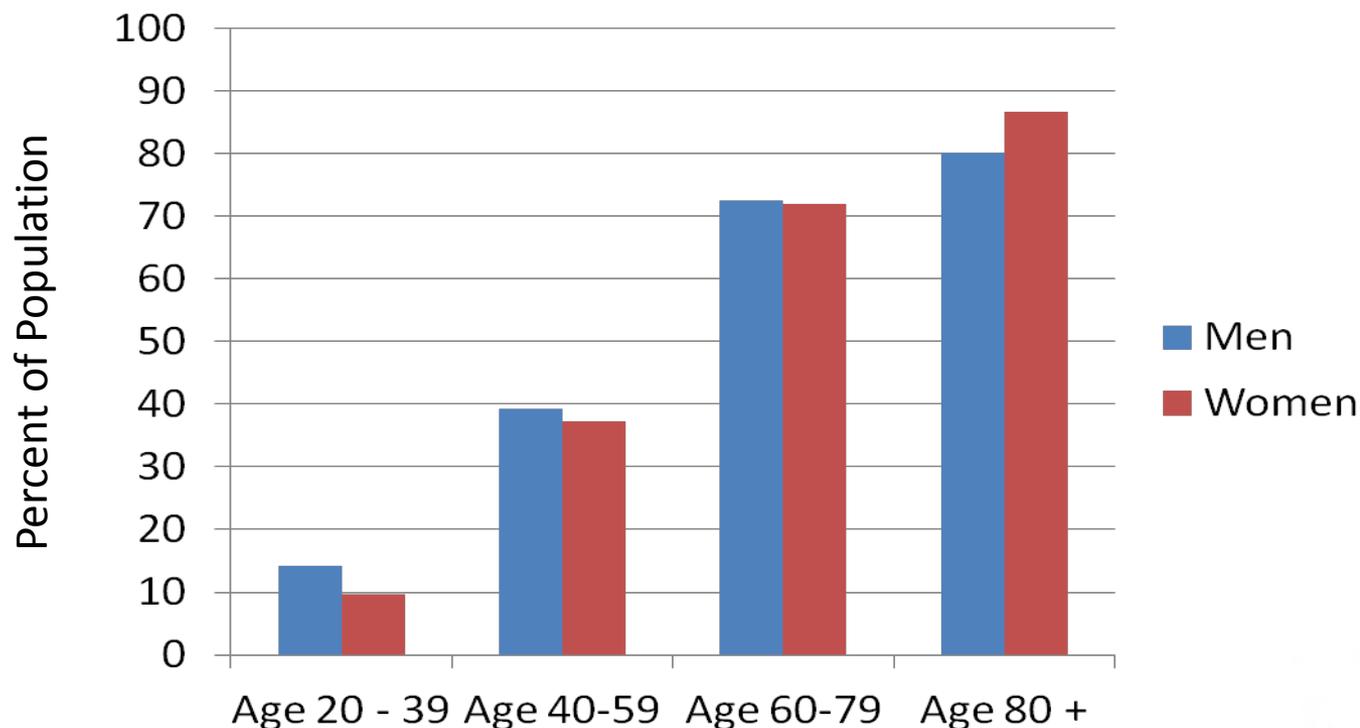
Cardiovascular Disease



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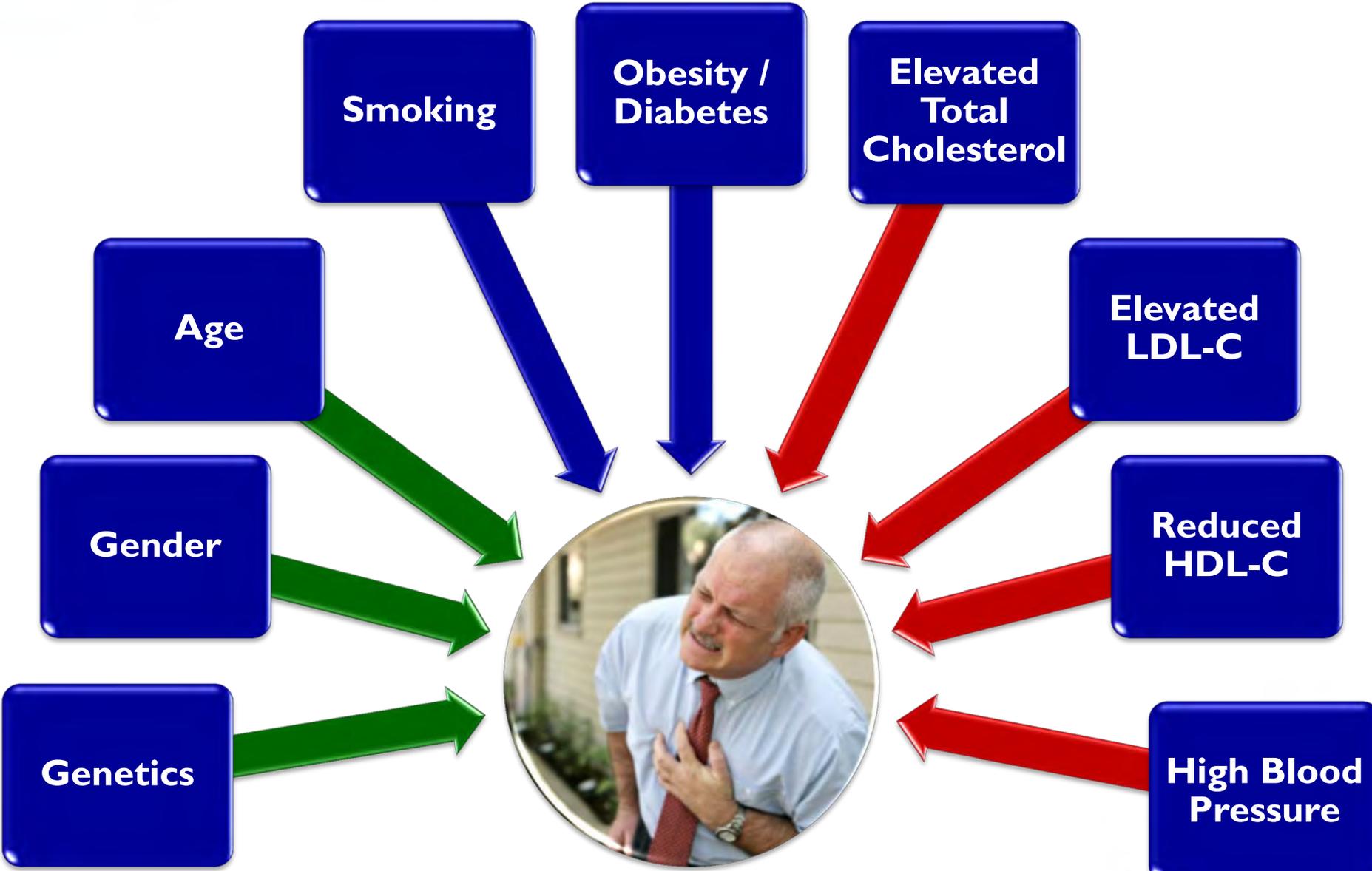
Cardiovascular Disease

- 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



Learn and Live

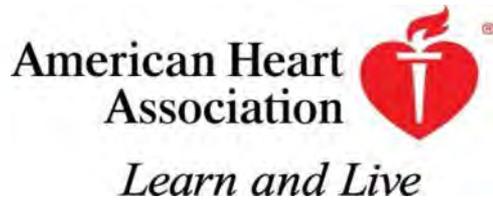


- ✓ Get Active
- ✓ **Control Cholesterol**
- ✓ **Eat Better**
- ✓ **Manage Blood Pressure**
- ✓ **Lose Weight**
- ✓ **Reduce Blood Sugar**
- ✓ Stop Smoking

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



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

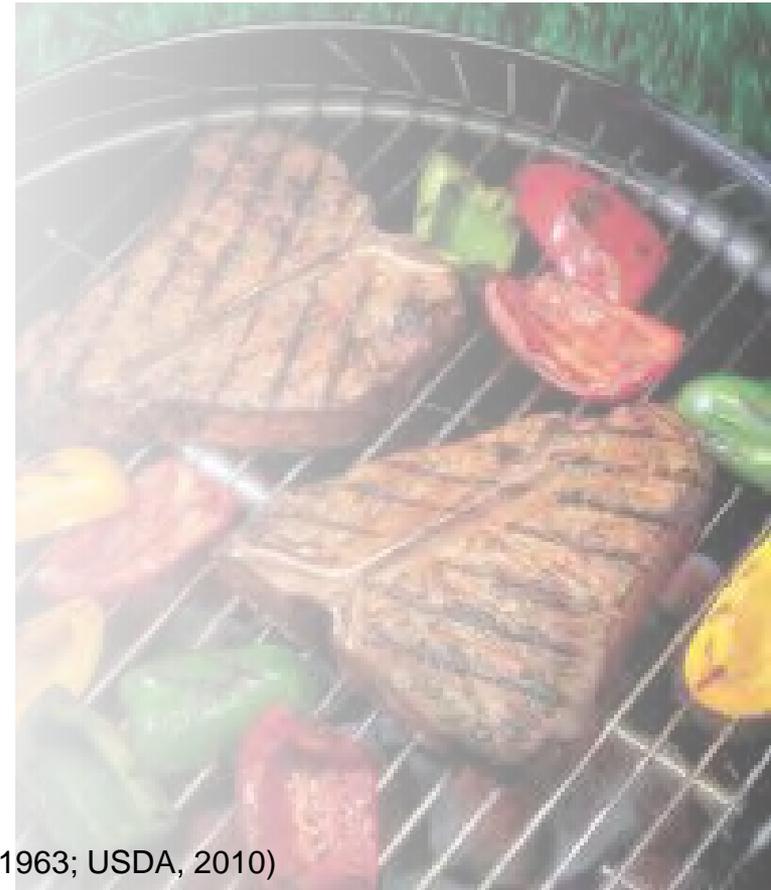
Definition of “Lean”

<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



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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 
CLINICAL NUTRITION
A Publication of the American Society for Nutrition

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EDITORIAL		Vitamin D, minerals, and phytochemicals	
1	1	Vitamin D deficiency and mortality risk in the general population: a meta-analysis of prospective cohort studies. <i>A Jansman et al</i>	91
ORIGINAL RESEARCH COMMUNICATIONS		Calcium and vitamin D supplementation is associated with increased abdominal visceral adipose tissue in overweight and obese adults. <i>JL Rossouw et al</i>	101
Obesity and eating disorders		Energy balance, but not chronic, modifies neural tube defect risk in Down's trisomy 21. <i>AF Beaudin et al</i>	109
Cardiovascular disease risk		Pregnancy and lactation	
3	9	Dynamic energy balance model predicting gestational weight gain. <i>DR Thomas et al</i>	115
17	17	Growth, development, and pediatrics	
25	25	The development of fatty liver acceptance is related to dietary experience in human infants: a prospective study. <i>LJ Stan et al</i>	123
33	33	Maternal homocysteine and small for gestational age offspring: systematic review and meta-analysis. <i>M Hegazy et al</i>	130
39	39	Cancer	
49	49	Diets high in protein and low in carbohydrates are associated with increased risk of colorectal cancer: a meta-analysis of cohort studies. <i>Y Li et al</i>	137
57	57	Soft-tissue intake and risk of gastric cancer: a population-based prospective cohort study in Japan. <i>A Hara et al</i>	147
65	65	Large prospective investigation of meat intake, related nutrients, and risk of renal cell carcinoma. <i>CF Chen et al</i>	155
73	73	Agings	
81	81	Vitamin D receptor and vitamin D gene polymorphisms and their associations with longitudinal cognitive change in US adults. <i>SA Stewart et al</i>	163
89	89	Nutritional epidemiology and public health	
97	97	Survival effects of prenatal famine exposure. <i>WJ van Rossum et al</i>	179
105	105	Fruit and vegetable consumption and prospective weight change in participants of the European Prospective Investigation into Cancer and Nutrition (EPIC)-Austria, Austria, Cohort of Women, Eating Out of Home, and Dietary Study. <i>AC Stegmaier et al</i>	184
113	113	Energy and protein metabolism	
121	121	Dietary systems is used more efficiently by children with severe acute malnutrition with edema compared with those without edema. <i>A Daniels et al</i>	184

Continued on Back or Contents inside



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

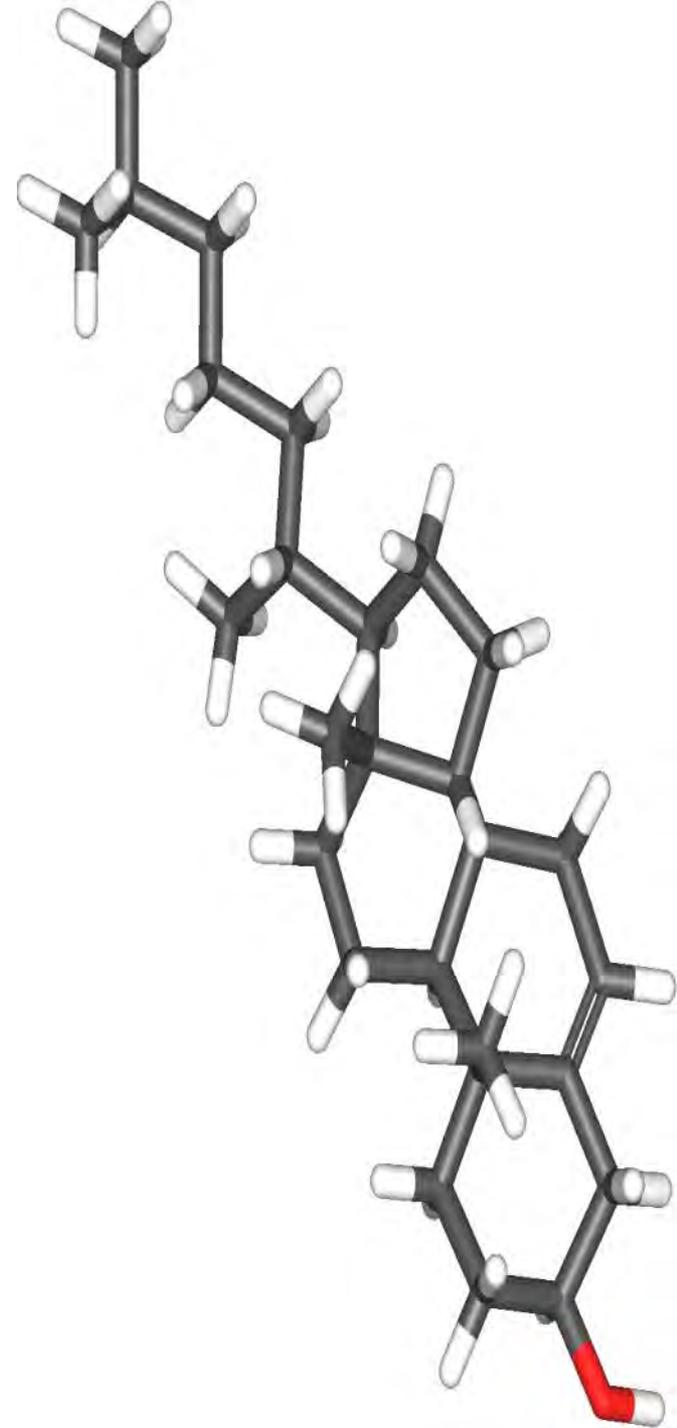
Snacks

- 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.





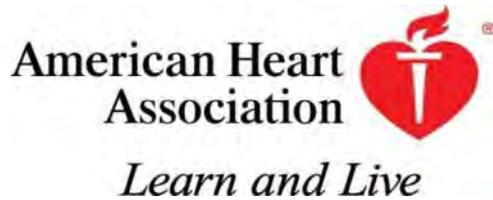
BOLD 
Beef in an Optimal Lean Diet

Heart-Healthy Eating



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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.



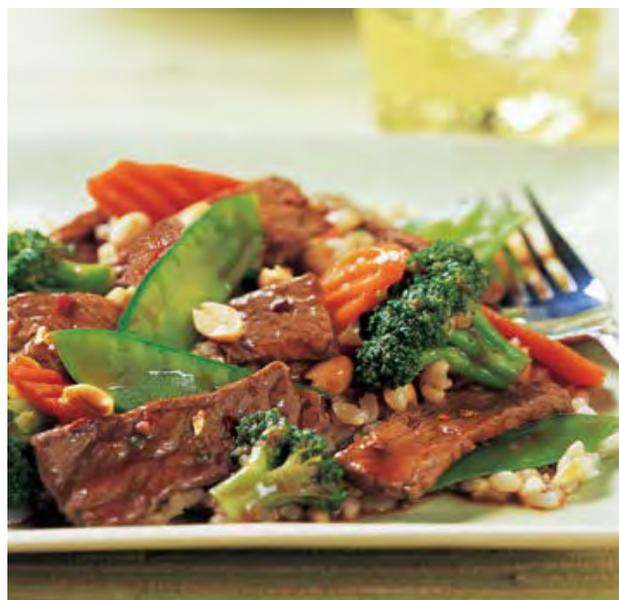
Fat and Cholesterol

- 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.



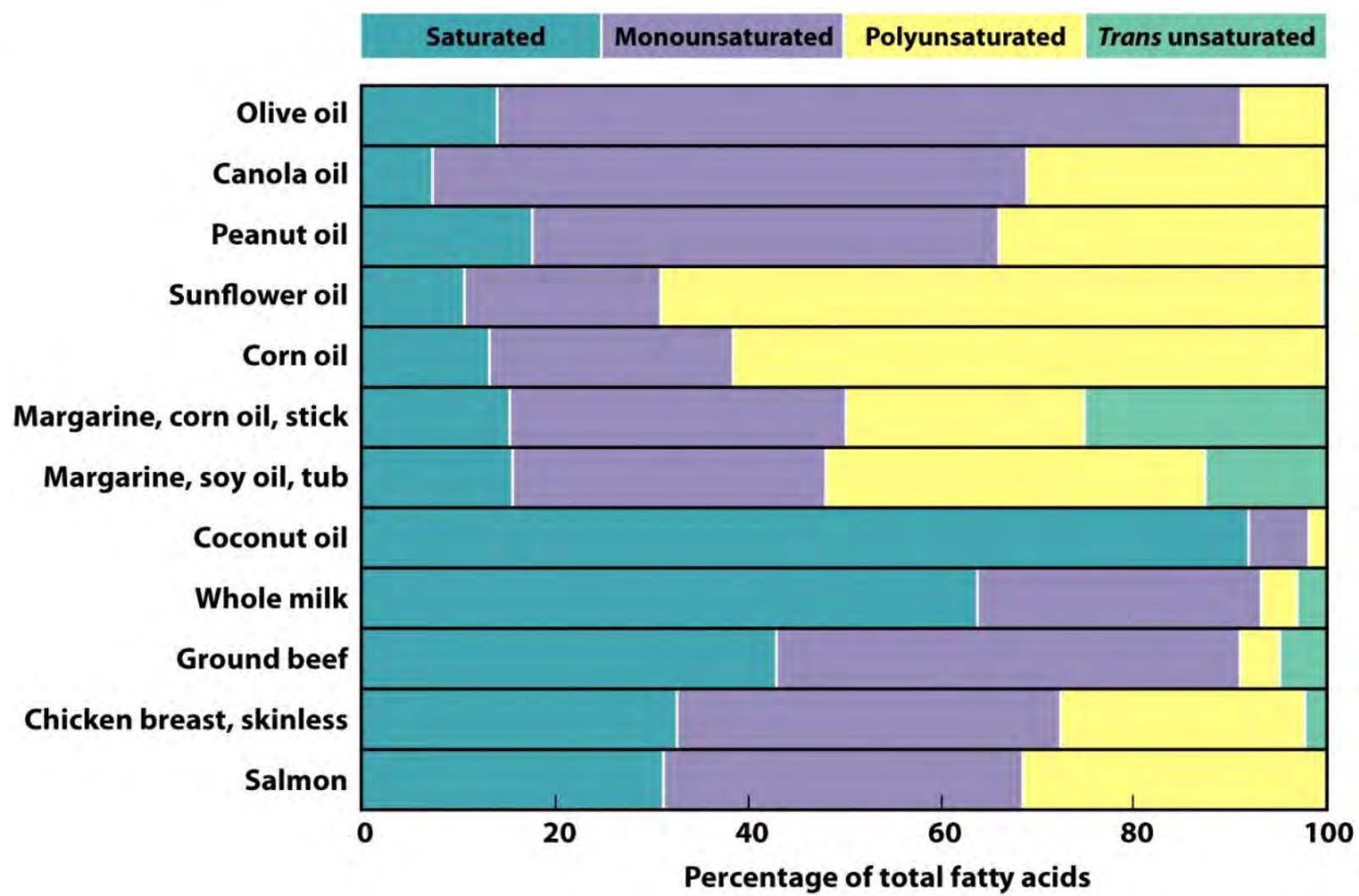
BOLD and MyPlate

- 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

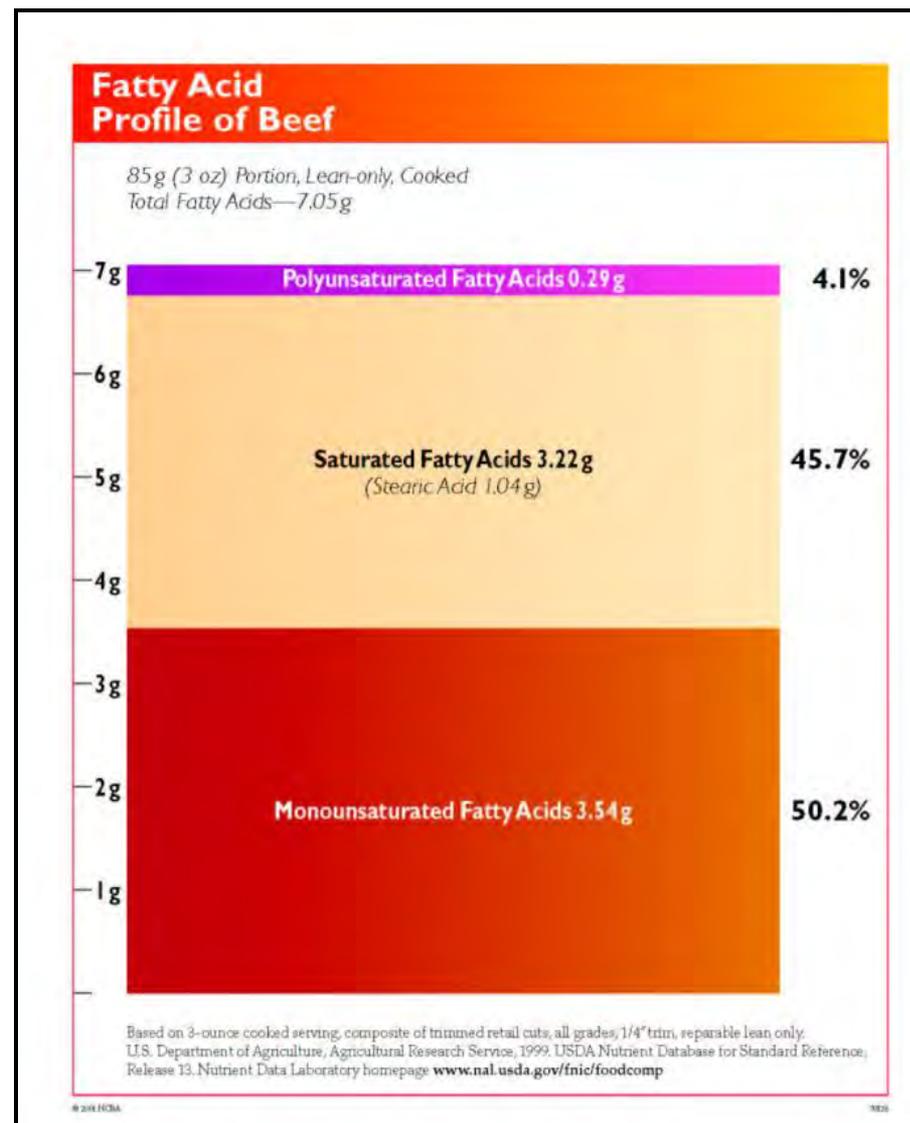
Fatty Acid Composition of Foods



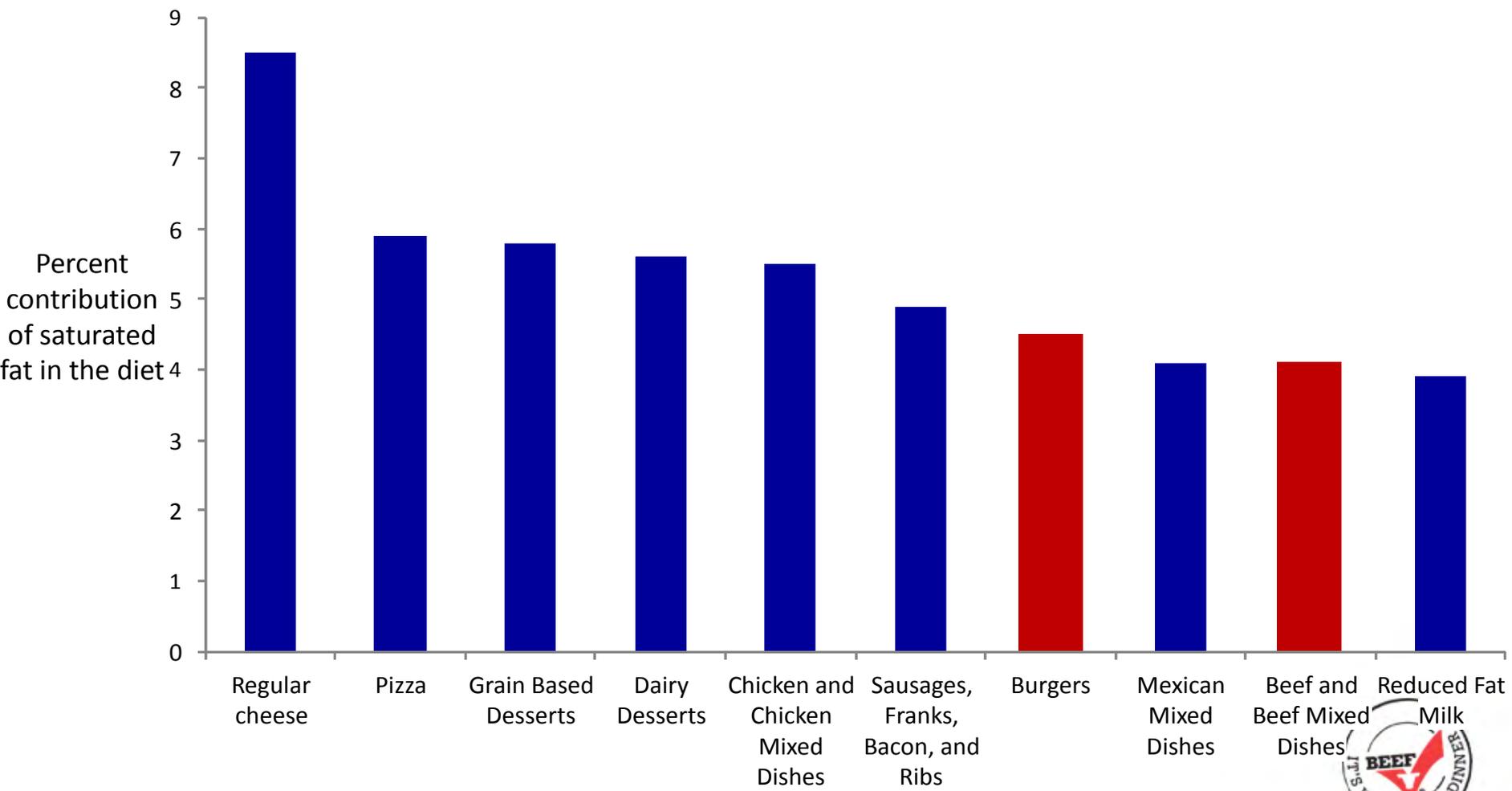
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Misunderstood Fat Profile

- 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



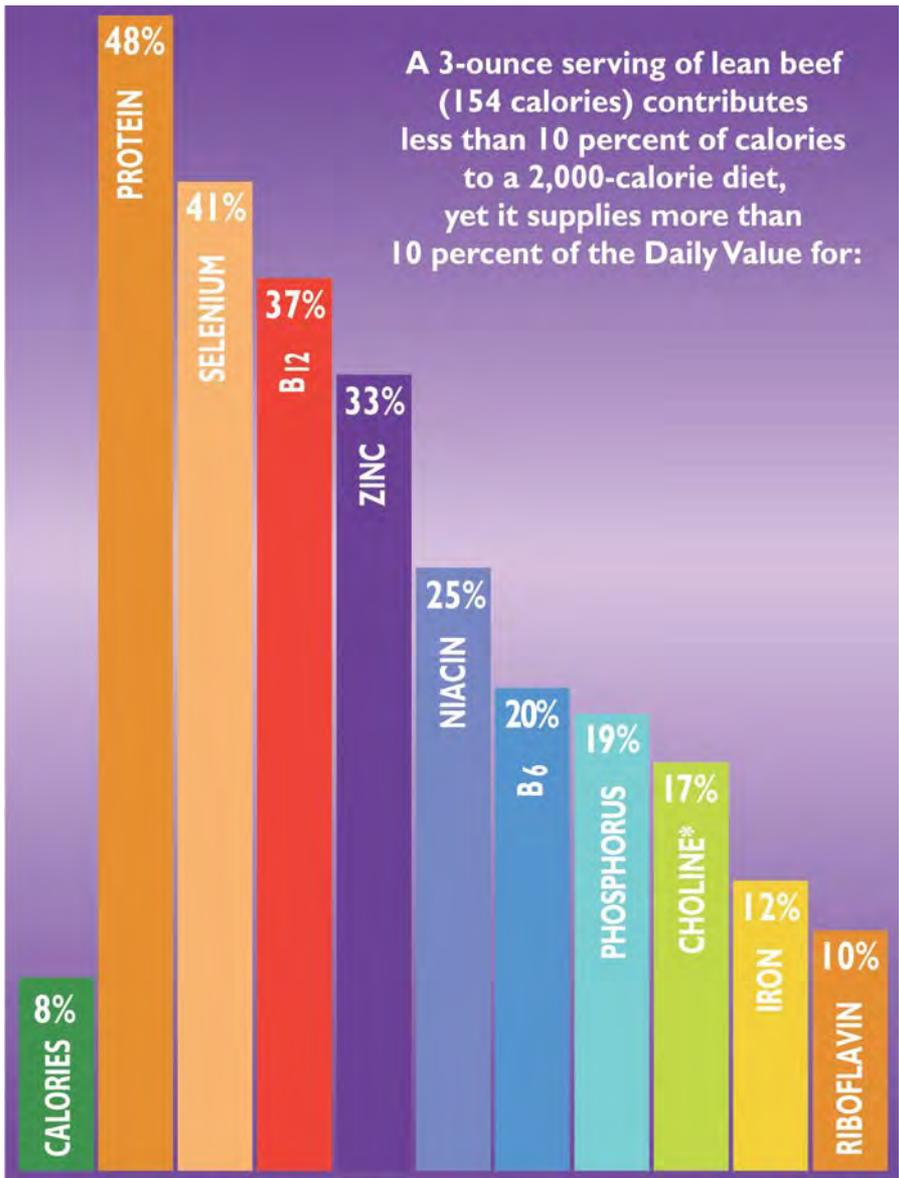
Current Intakes: Saturated Fat & Beef



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

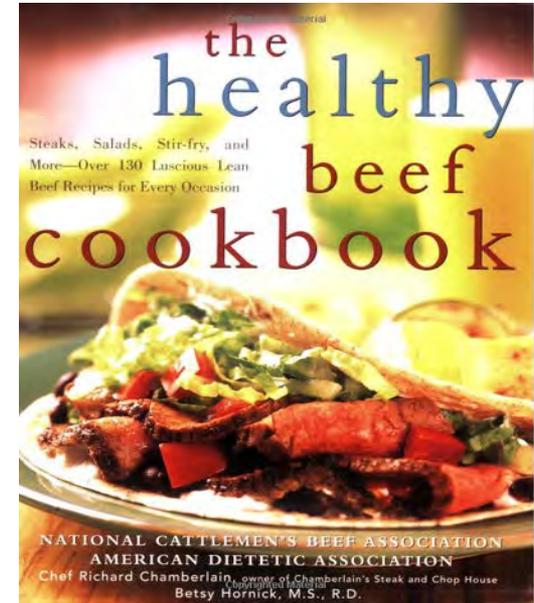
- You can follow the same diet as the BOLD study participants by using *The Healthy Beef Cookbook*, a collection of 130 delicious, nutrient-rich recipes featuring lean beef
- Here are two recipes that were used as part of the BOLD menus include



*Szechuan Beef
Stir Fry*



*Beef, Mango and
Barley Salad*



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





Appendix: Created for the Health Professional Audience



More Heart-health Science

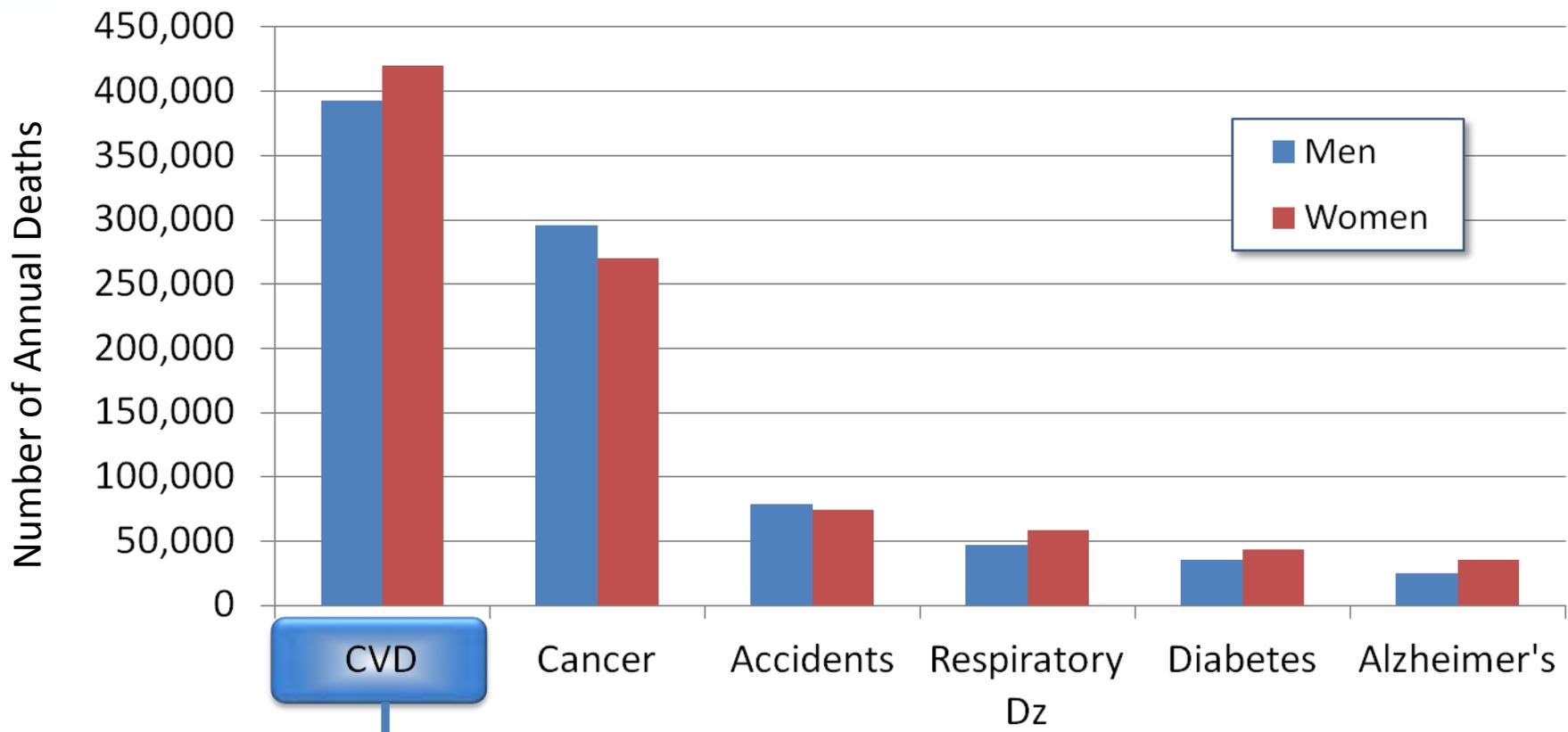


- BOLD study is just the latest addition to a growing body of evidence supporting the role of lean beef in a heart-healthy diet.
- 2010 meta-analysis of 20 studies with over one million participants showed red meat consumption is not associated with increased heart disease risk.¹
- Epidemiological studies 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.



CVD

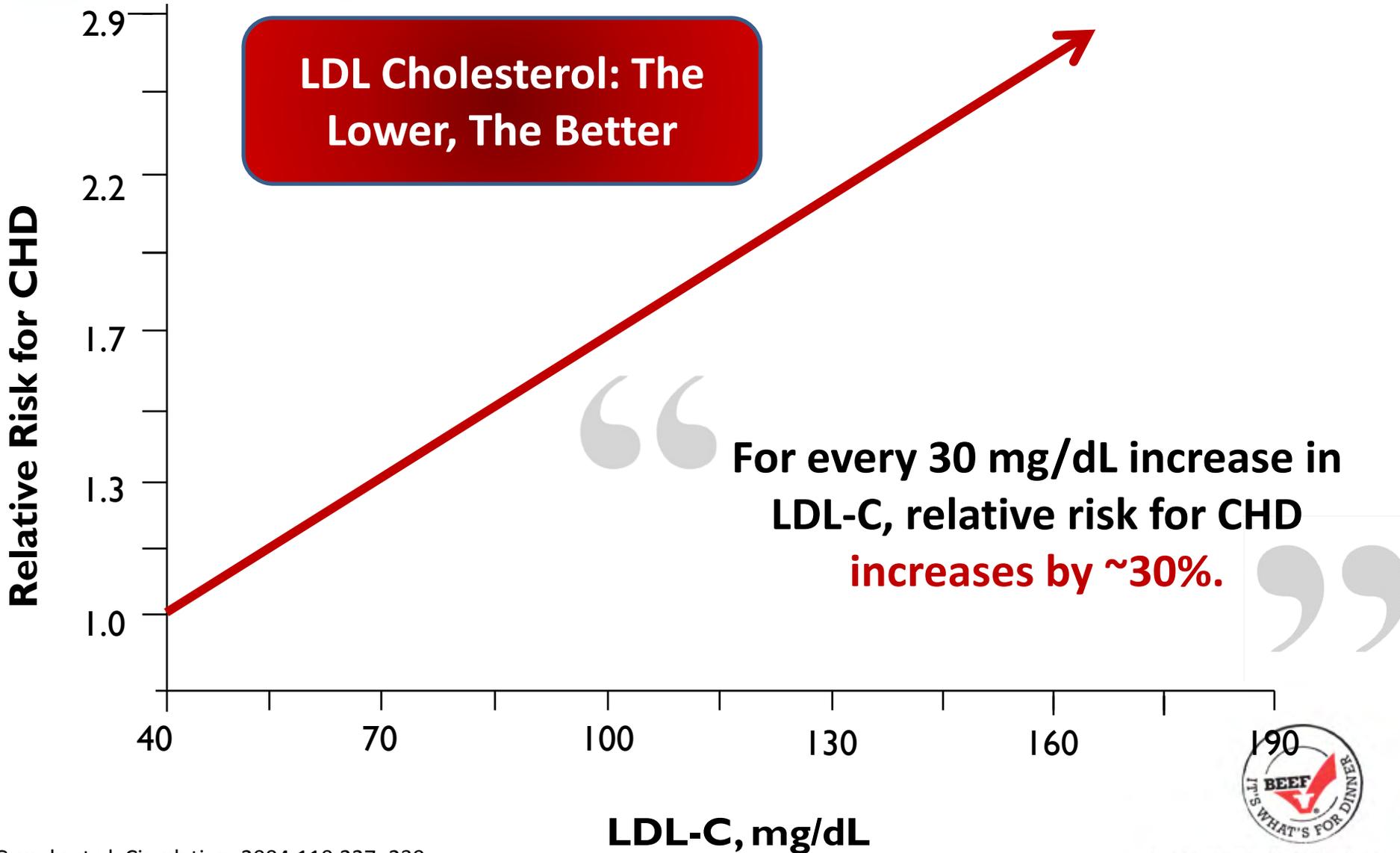


Cardiovascular disease causes more deaths than the next 5 most common causes combined.



Funded by The Beef Checkoff

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

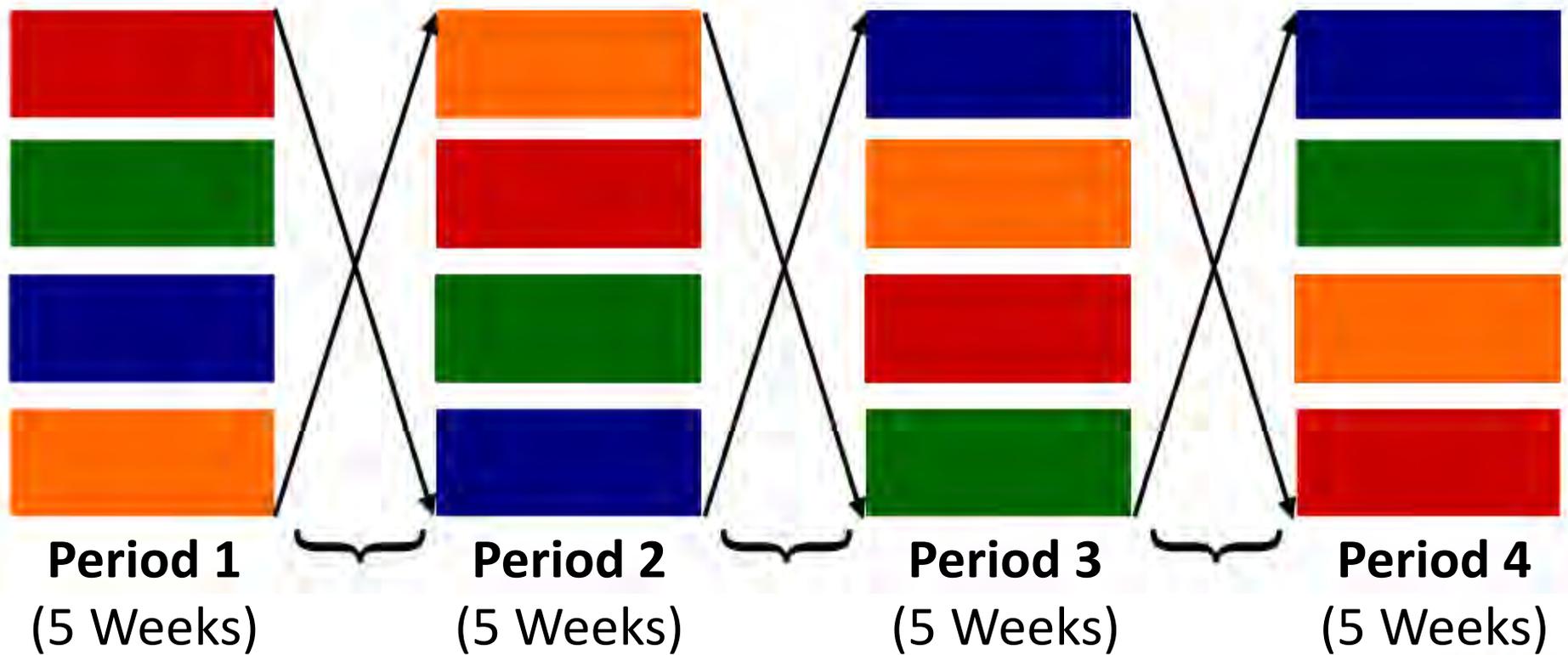


*weight before cooking



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

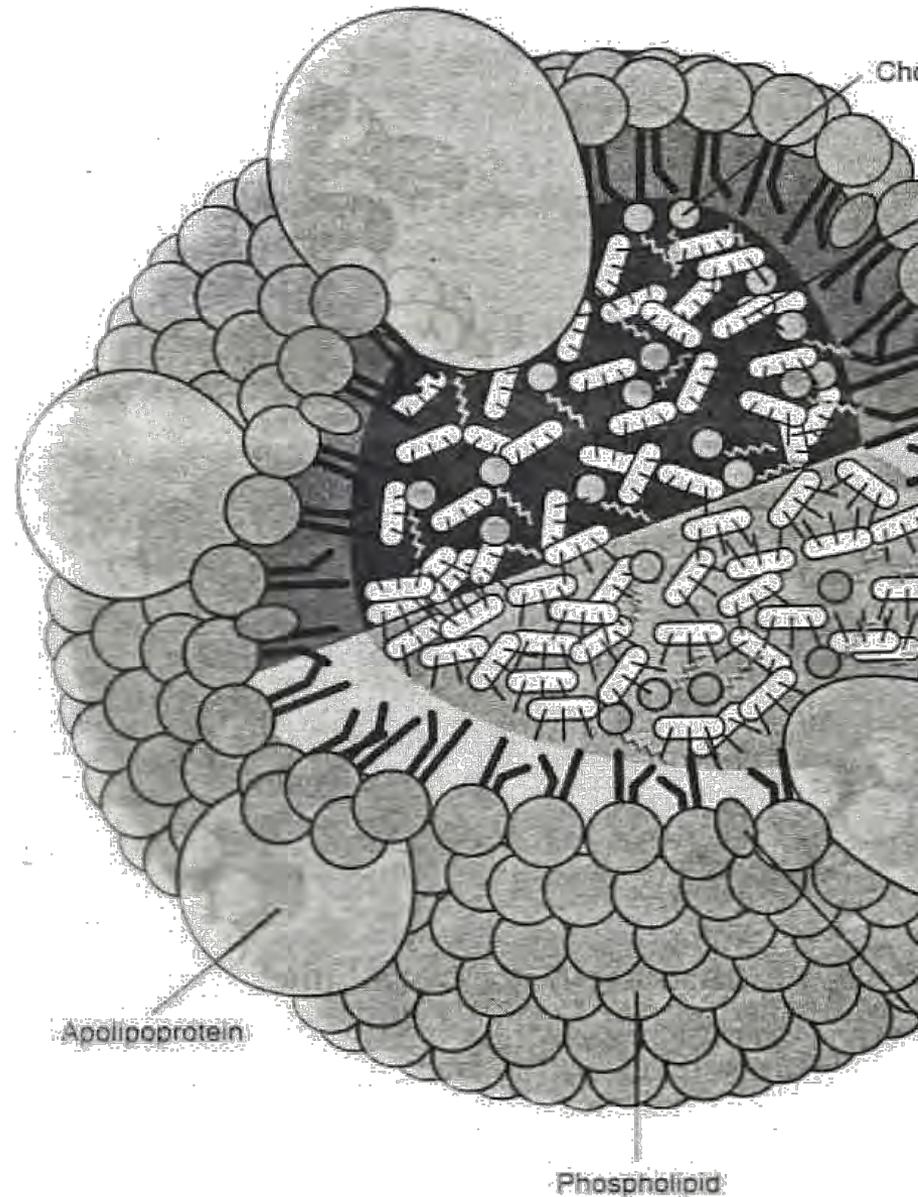
- **Total cholesterol and LDL cholesterol decreased 10% from baseline** on the BOLD and BOLD-PLUS diets
- **The improvements in heart health risk factors** seen from the BOLD diets were **as effective as those from the DASH** and other heart-healthy diets, many of which emphasize plant proteins.

	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

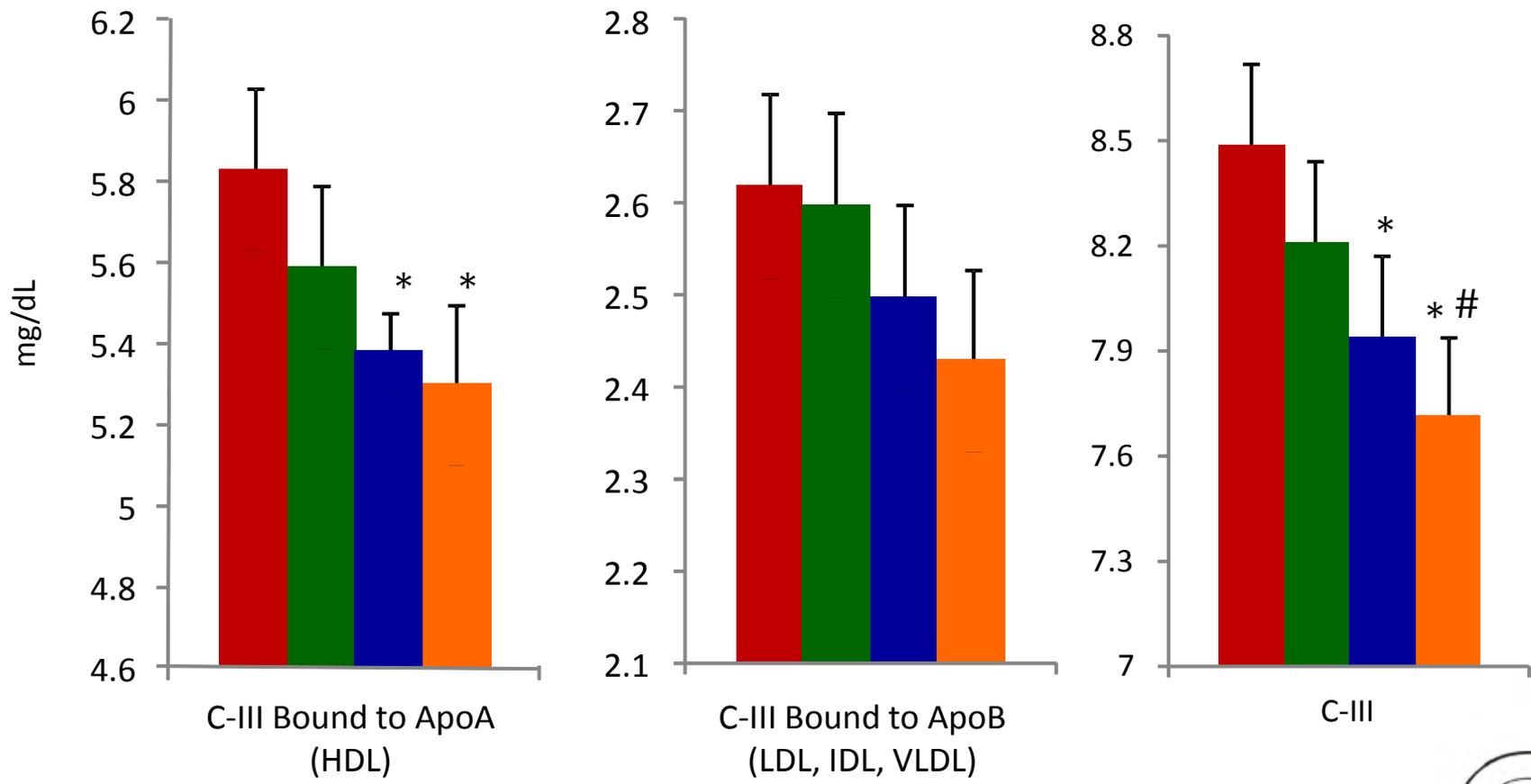
^a = Significantly different from HAD (p<0.05)

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

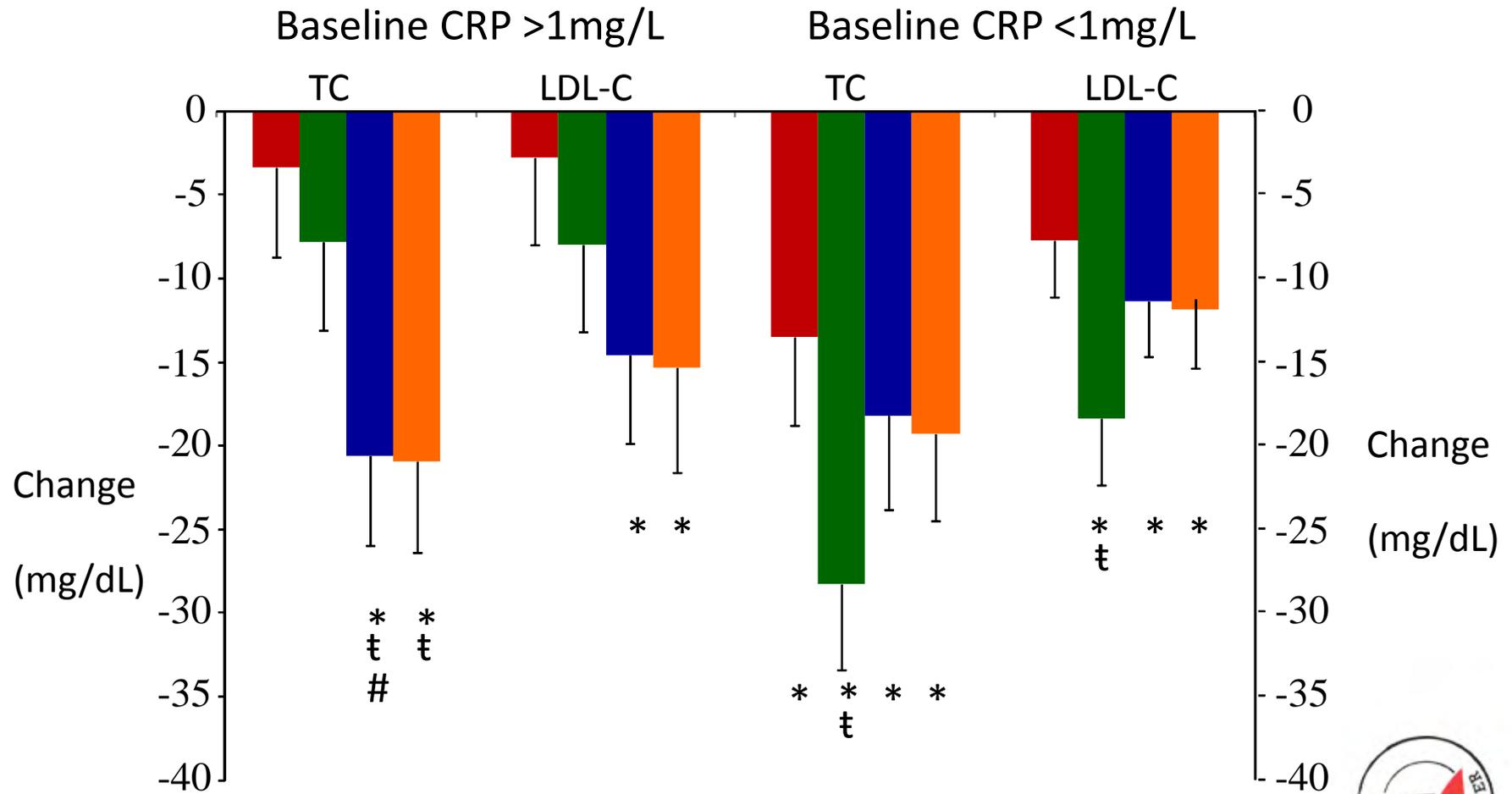


Diets = HAD DASH BOLD BOLD+

* = 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

