



Beef in an Optimal Lean Diet (BOLD) Study

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Human
Nutrition
Research





Funded by
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Background & Objective of Study

- A recommended approach to lower LDL cholesterol is to reduce saturated fatty acid (SFA) in the diet.
- Commonly held misperception: beef is high in SFA and beef consumption leads to heart disease and other health issues.
- The gold standard of heart-healthy diets is the DASH (Dietary Approaches to Stop Hypertension) diet.
 - focuses on vegetables, fruits and low-fat dairy and limits red meat and sweets



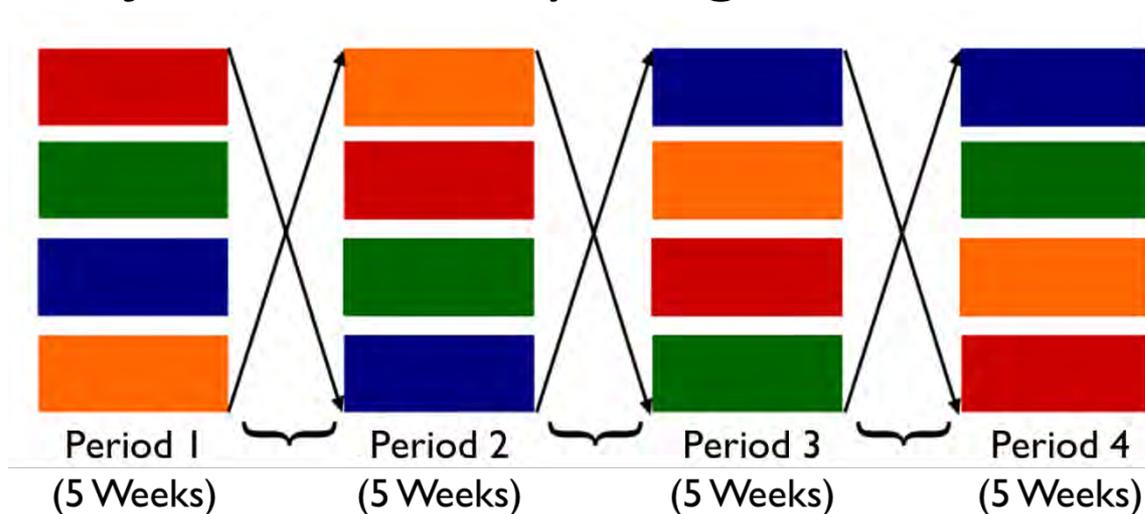
Background & Objective of Study

- Objective: To evaluate the role of lean beef as the main protein source in heart healthy diets (SFA <7%) in lowering cardiovascular disease risk in individuals with moderate hypercholesterolemia compared to a Healthy American Diet (HAD) and a DASH Diet.



Study Design

- 4-period randomized, crossover, controlled-feeding study
- 36 healthy men and women with elevated LDL-cholesterol levels
- Subjects randomly assigned to a diet order





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.

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



Study Diets

- **Beef in Optimal Lean Diet (BOLD)**
 - Similar to the DASH diet (rich in vegetables, fruits, whole grains, nuts and beans) and protein amount, but used lean beef (4 oz/d) as the primary protein source, whereas the DASH diet used primarily white meat and plant protein sources.
- **Beef in Optimal Lean Diet Plus (BOLD-PLUS)**
 - Similar to the BOLD diet, but with higher protein and lean beef intake (5.4 oz/d).



Diet Compositions

	Total Fat	Saturated Fat	Protein	Lean beef
BOLD	28%	6%	19%	113g
BOLD-PLUS	28%	6%	27%	153g
DASH	27%	6%	18%	28g
HAD	33%	12%	17%	20g





Sample lunch menus

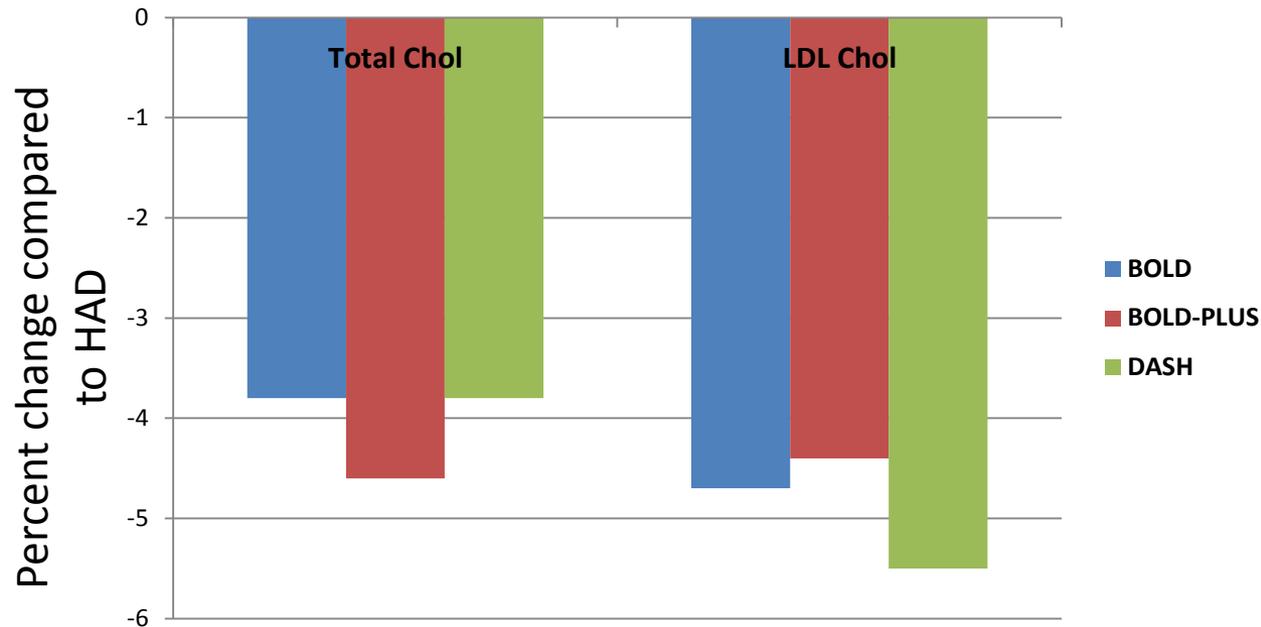
HAD	DASH	BOLD	BOLD-PLUS
<ul style="list-style-type: none">• Tuna salad• Pita bread• Baby carrots• Pretzels	<ul style="list-style-type: none">• Vegetarian chili• Whole wheat crackers• Low-fat cheddar cheese• Peaches, canned in juice	<ul style="list-style-type: none">• Meatballs, marinara sauce• Sandwich roll, lettuce• Broccoli, baby carrots, & ranch dressing• Pretzels	<ul style="list-style-type: none">• Beef chili w/ shredded cheddar cheese• Whole wheat crackers• Peaches, canned in juice





Study Results

- Consumption of the BOLD, BOLD-PLUS and DASH diets all resulted in a decrease in total cholesterol and LDL cholesterol levels *compared with after consumption of the HAD*





Study Results

- How did LDL cholesterol levels change from baseline (start of study)?

	HAD	DASH	BOLD	BOLD-PLUS
Δ LDL Cholesterol from baseline(%)	-3%	-10%	-10%	-10%



How does BOLD stack up to other heart-healthy diets that focus on plant protein?

	Original DASH	OmniHeart Protein Diet	BOLD	BOLD-PLUS
Total Cholesterol (mg/dL)	-13.7	-19.9	-10.2	-10.0
LDL Cholesterol (mg/dL)	-13.3	-14.2	-15.8	-16.2





Study Results

- Apo A-I, Apo C-III were significantly reduced in the BOLD, BOLD-PLUS and DASH diets versus HAD
- Apo C-III bound to Apo A1 containing particles was significantly reduced on the BOLD and BOLD-PLUS diets.



Conclusions

- Beef can play a beneficial role in a cholesterol-lowering heart healthy diet.
- The study found that diets including lean beef every day are as effective in lowering total and LDL cholesterol as the gold standard of heart-healthy diets (DASH).
- Lean beef can be included in a heart-healthy diet while meeting recommended **current** targets for saturated fat intake.