## The Prescription Every Cardiologist Should Give

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### Disclosures

Columbus Batiste, MD, FACC, FSCAI No relationships to disclose



## A Case That Changed Everything



Miguel Lerma: Classic angina symptoms

Chest pain on exertion



Diagnosis confirmed CAD

Cardiac catheterization revealed blockages



No surgery or stents



## The Existential Moment

"Why me?"

# You're Not Alone 1 18.2M 805K

Killer in U.S. CAD remains top cause of death nationwide Americans

Living with coronary artery disease

Heart Attacks Occur annually in the United States



## 2025 AHA Heart and Stroke Updates





Driving cardiovascular disease burden



### Diabetes Epidemic

Accelerating heart disease progression



### Hypertension Crisis

Increasing prevalence across demographics



# Preventive Care Gaps

#### Health equity gaps persist across demographics



### **Rural Communities**

28% of preventive care gaps affect rural populations with limited access to cardiovascular specialists and screening facilities.



#### Low Income

32% of preventive care gaps impact low-income individuals who face financial barriers to regular cardiovascular screening and preventive services.



### Minorities

25% of preventive care gaps affect minority populations who experience systemic disparities in cardiovascular preventive care. 15% of preventive care gaps impact elderly individuals who may face mobility challenges and complex healthcare needs.

American Heart Association. "Heart Disease and Stroke Statistics—2023 Update." Circulation, 2023; 147:e93-e621.



### Elderly

### Forecasting the Future: 2050



#### 90% CV Prevalence

Projected increase in cardiovascular disease by 2050 without intervention



### 73% Mortality Rise

Projected increase in crude mortality rates from cardiovascular conditions



#### 65% Preventable

Through modifiable risk factor intervention including diet, exercise, and lifestyle changes

### Procedures Dominate Care

Current cardiac care spending shows a significant imbalance in resource allocation:



While procedures (42%) and medications (38%) account for 80% of cardiac care spending, only 3% is dedicated to lifestyle interventions—despite their proven effectiveness in preventing and reversing heart disease.

Source: American College of Cardiology. "Resource Allocation in Cardiovascular Care: 2023 Analysis." Journal of the American College of Cardiology, 2023; 81(5):589-603.

### Our Healthcare System is Failing

### **Highest** Spending

U.S. spends more on healthcare than any nation

Ranks last in efficiency among industrialized countries



Healthcare Spending (% of GDP) Life Expectancy (years)



- Lowest life expectancy among developed nations
- Highest chronic disease burden despite spending





## "Not Everything That Can Be Counted Counts"

Procedures ≠ Healing

Interventions address symptoms, not causes

#### True restoration needs more

Focus on what brings patients back to life

#### Biomarkers ≠ Health

Numbers don't capture quality of life

### Cardiac Rehab

Moving beyond exercise to comprehensive lifestyle medicine



### Mental Health Support Addressing psychological aspects of

Isometric, cardio and resistance training

### **Exercise Prescription Specifics**







Most effective for BP reduction

### Cardio Training

Improves endothelial function and VO2 max



**Resistance Training** 

sarcopenia

#### Builds metabolic reserve and prevents



#### Sleep: The Forgotten Pillar 46% 7-8 68% CVD Risk Optimal Hours OSA Prevalence Increase For cardiovascular In CAD patients, often

With chronic sleep deprivation

protection

Grandner MA, et al. Sleep duration and cardiovascular disease risk: epidemiologic and experimental evidence. Sleep Med Clin. 2016;11(1):81-89. doi:10.1016/j.jsmc.2015.10.007

undiagnosed

### Behavioral Support Framework

Goal Setting

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SMART objectives with regular reassessment

### Habit Formation

Micro-changes building sustainable patterns

Accountability

Regular check-ins and progress tracking

Community Support Group reinforcement of positive changes



## The Role of Food in CVD

### Disease Drivers

- Processed foods
- Added sugars
- Saturated fats
- Meat-heavy diets

### Protective Factors

- Plant-based whole foods
- Fiber-rich options
- Anti-inflammatory nutrients
- Polyphenols and antioxidants



### Food Insecurity Crisis

### Definition

Limited or uncertain access to nutritionally adequate food.

Affects 1 in 8 Americans, with higher rates in minority communities.

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### Health Impact

Forces reliance on cheaper, ultraprocessed foods.

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Creates nutritional deficits in cardioprotective nutrients.

### CVD Connection

58% higher risk of cardiovascular

economic hardship.

Food insecurity drives CVD disparities through multiple pathways: stress, inflammation, and limited access to protective foods like fruits, vegetables, and whole grains.



- disease in food-insecure adults.
- Creates cycle of worsening health and

## Food Swamps

### Fast Food Density

Food swamps have 5x more fast food outlets than grocery stores

### Access Inequity

63% fewer grocery stores in low-income food swamp areas



## Sugar-Sweetened

Heavily marketed in disadvantaged

### **Convenience Stores**

Dominate food retail landscape where grocery stores are scarce

### Food Swamps Fuel Disease



### What Are Food Swamps?

Areas where unhealthy food options overwhelm healthy alternatives. Fast food and convenience stores dominate the landscape.



### **CVD** Impact

17% higher cardiovascular disease rates in food swamp neighborhoods.



### Inequality

and minority communities.

### Disproportionately affects low-income

## Ultra-Processed Foods (UPFs)

67%

74%

### Daily Calories

Average American diet from ultraprocessed sources

### Added Sugar

Comes from UPFs in typical Western diet 89%

### Added Sodium

### Derived from ultra-processed food consumption

Source: Hall KD, et al. "Ultra-Processed Diets Cause Excess Calorie Intake and Weight Gain." Cell Metabolism, 2019; 30(1):67-77.





## UPF Health Consequences

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### Endothelial Dysfunction

Decreased flow-mediated dilation

### Systemic Inflammation

Elevated CRP and inflammatory markers

### Chronic Disease

Obesity, diabetes, hypertension, CAD

## Sugar: The Sweet Danger

### Metabolic Effects

- Raises triglycerides
- Increases CRP (inflammation)
- Elevates LDL cholesterol
- Lowers protective HDL

### Vascular Damage

- Promotes glycation
- Increases oxidative stress
- Damages endothelial cells
- Accelerates atherosclerosis



# Saturated Fat Impact



### Elevates LDL-C

Primary mechanism of atherogenic damage



### Replacement Matters

Benefits when replaced with whole grains or unsaturated fats



### Sugar Substitution Danger

No benefit when replaced with sugar or refined carbs

### Animal Protein Concerns



#### Inflammatory Triggers

- Increases inflammatory cytokines (IL-6, TNF- $\alpha$ )
- Elevates TMAO production via gut microbiome
- Activates NF-kB inflammatory pathways
- Contains pro-inflammatory arachidonic acid
- Red meat's heme iron increases oxidative stress



#### Plant Protein Benefits

- Contains anti-inflammatory polyphenols
- Rich in antioxidants that neutralize free radicals
- Lower TMAO production reduces vascular inflammation
- Supports gut microbiome diversity
- Fiber fermentation produces anti-inflammatory SCFAs

Chronic inflammation from dietary choices contributes significantly to endothelial dysfunction and atherosclerosis progression. Plant proteins offer protective effects against these inflammatory processes.

### Cardiovascular Risk by Food Choice





# The Kitchen Is the New Cath Lab

CATH: Cooking Alternative To Health

A lifestyle intervention rivaling procedural success rates



## CATH Program Components

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Hands-On Cooking

Practical skills development for patients



### Food as Medicine Education

Understanding nutrition's role in healing

### Group Support

Community reinforcement of healthy habits



### **Clinical Monitoring**

Tracking measurable health improvements



### Food as Medicine: Nature's Cardioprotection

### Therapeutic Approach

Using whole foods as primary intervention for preventing and treating disease.

### Cardiovascular Benefits

Reduces inflammation, improves lipid profiles, and enhances endothelial function.

### Clinical Application

Prescribed specific foods and eating patterns with measurable cardiovascular outcomes.

"Let food be thy medicine and medicine be thy food." - Hippocrates

## **FOOD IS MEDICINE**



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### Prescriptive Breakfast: Overnight Oats

Steel Cut Oats

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Mixed Berries



Chia Seeds



Walnuts

# Oats

# Mechanism of Action: Oat Beta-Glucan



### Viscous Gel Formation

Beta-glucan forms a thick gel in the digestive tract.

This slows digestion and creates fullness.

### Bile Acid Binding

Traps bile acids containing cholesterol.

Prevents reabsorption into bloodstream.



### Microbiome Enhancement

Ferments in colon to produce short-chain fatty acids.

SCFAs reduce inflammation and improve gut barrier function.

Just 3 grams daily can reduce LDL cholesterol by 5-10%.



# Berries

### Mechanism of Action: Berry Anthocyanins



### Antioxidant Protection

Neutralizes free radicals that damage arterial walls. Prevents oxidative stress to endothelial cells.



#### Nitric Oxide Production

Stimulates eNOS enzyme activation. Increases vessel dilation and blood flow.



### Anti-Inflammatory Signaling

Inhibits NF-κB inflammatory pathway.

Reduces cytokine production in vascular tissue.

### Platelet Aggregation Inhibition

Prevents blood clot formation.

Similar mechanism to low-dose aspirin.

Just 1/2 cup of berries daily provides enough anthocyanins for measurable cardiovascular protection.



# Chia Seeds

### Mechanism of Action: Chia Seed ALA Pathways



### ALA Absorption

Alpha-linolenic acid enters bloodstream after digestion.

Requires bile salts for optimal absorption.



### Conversion Process

Elongase and desaturase enzymes transform ALA. Creates EPA and DHA in limited amounts.



### Cardioprotection

via specialized pro-resolving

Inhibits platelet aggregation

mediators.

pathways.

Reduces arterial inflammation

Supports synaptic plasticity and cognitive function.

Just 1-2 tablespoons of chia seeds daily provides 5g of ALA, meeting daily omega-3 requirements.



### Neuroprotection

Maintains membrane fluidity in neural tissues.

# Walnuts

### Mechanism of Action: Walnut Polyphenols



### Endothelial Protection

Ellagitannins coat arterial walls with protective antioxidants.

Prevents oxidative damage to endothelial cells.



### Nrf2 Pathway Activation

Triggers cellular defense gene expression. Upregulates enzymes that neutralize oxidative stress.

### Vascular Remodeling Inhibits VCAM-1 and ICAM-1 adhesion

Inhibits VCAM-1 a molecules.

Reduces plaque formation and arterial stiffening.

Just 1 ounce (28g) of walnuts daily provides 69.3mg of polyphenols, enough to demonstrate measurable improvements in vascular function within 4-8 weeks.

# Prescriptive Lunch

## Tofu Grain Bowl

### Primary Components

Flavor Enhancers

- Tofu
- Dark Leafy Greens
- Whole Grains
- Legumes

- Garlic
- Turmeric
- Cayenne
- Lemon



# Tofu

### Mechanism of Action: Soy Protein & Isoflavones



### **Receptor Binding**

Isoflavones like genistein and daidzein bind to estrogen receptors.

Creates selective modulation in vascular tissue.



### **Cholesterol Regulation**

Upregulates LDL receptor expression in liver cells.

Enhances cholesterol clearance from circulation.



### Anti-Inflammatory Action

Inhibits NF-κB signaling pathways.

Reduces expression of pro-inflammatory cytokines in arterial walls.

25g of soy protein daily can reduce LDL cholesterol by 3-5%. Combined with isoflavones, this effect increases to 5-8% within 6-12 weeks.

### Top 3 Strategies to Enjoy Tofu When You "Hate It"



Patient tip: Start with firm or extra-firm varieties. Silken tofu's custard-like texture is an acquired taste for beginners.



# Green Leafy Veggies

# Mechanism of Action: Dark Leafy Greens & Vascular Health



### Nitric Oxide Production

Dietary nitrates convert to nitric oxide in the vascular endothelium.

Promotes vasodilation and reduces peripheral resistance within 3 hours.



### Antioxidant Protection

Lutein and zeaxanthin neutralize free radicals in arterial walls.

Prevents oxidative damage to endothelial cells.



### Vitamin K Activation

Activates matrix Gla deposition.

Reduces arterial cal daily consumption.

Just 1 cup (85g) of spinach, kale, or collards daily provides sufficient nitrates and vitamin K to significantly improve endothelial function and arterial elasticity within 2-4 weeks.

- Activates matrix Gla protein to inhibit calcium
- Reduces arterial calcification by up to 14% with

### Top 3 Strategies to Consume Green Leafy Vegetables When You "Hate Them"

#### Blend into Smoothies

Add 1 cup spinach to fruit smoothies with berries or banana.

Sweet fruits mask the veggie taste completely within seconds.

#### Chop & Hide

Finely mince kale or collards into soups and pasta sauces.

They cook down substantially and blend with existing flavors.

#### **Crispy Transformation**

Bake kale chips with olive oil and nutritional yeast.

The crispy texture eliminates the leafy mouthfeel patient's dislike.

Patient tip: Start with milder greens like spinach before advancing to stronger-flavored options like arugula or mustard greens.



## Beans

### Mechanism of Action: Legumes & Cardiovascular Protection



#### Soluble Fiber Binding

Beans' soluble fiber binds to bile acids in the digestive tract.

Forces liver to pull cholesterol from bloodstream to make new bile acids.



#### Blood Pressure Regulation

Magnesium and potassium activate sodiumpotassium pumps in cell membranes.

Reduces vascular tension and lowers systolic pressure by 4-6 mmHg.



Microbiome Enhancement

Resistant starch feeds beneficial gut bacteria that produce butyrate.

Butyrate reduces inflammation markers like IL-6 and CRP by up to 18%.

Just ½ cup of beans daily provides 7-8g of fiber and sufficient plant protein to reduce LDL cholesterol by 5-7% within 6 weeks.

### Top 3 Ways to Add Beans to Your Diet

Weekly Batch Cooking

Prepare 3 cups of beans on weekends to use throughout the week.

Store in 1/2 cup portions for quick meal additions.

#### Gradual Substitution

Replace 25% of ground meat with mashed beans in favorite recipes.

Increases fiber while reducing saturated fat by up to 15%.

#### Snack Transformation

Blend chickpeas with olive oil for homemade hummus.

Roast beans with spices for crunchy, portable protein snacks.

Patient tip: Rinse canned beans thoroughly to reduce sodium content by nearly 40%.



# Whole Grains

### Mechanism of Action: Whole Grains & Cardiovascular Protection



### **Bran Layer Protection**

Outer bran contains phenolic compounds that reduce arterial inflammation.

These antioxidants neutralize free radicals that damage endothelial cells.



### **Prebiotic Fiber Effects**

Fermentable fiber feeds beneficial gut microbiota

Increases short-chain fatty acid production by 25-30% within weeks.



### Glycemic Response

Complex carbohydrates prevent glucose spikes and insulin surges.

elevated levels.

Just 3 servings (90g) of whole grains daily can reduce cardiovascular mortality risk by 17-22% and stroke risk by 14%.

Reduces HbA1c by 0.5-0.7% in patients with

### Top 3 Ways to Add Whole Grains to Your Diet

#### Smart Swaps Strategy

Replace refined grains with whole alternatives in everyday meals.

- Brown rice instead of white (30% more fiber)
- Whole wheat pasta over regular (doubles magnesium intake)
- Ancient grains like farro in place of traditional sides

#### Breakfast Revolution

Transform morning meals with whole grain foundations.

- Steel-cut oats with nuts reduce post-meal glucose by 15-20%
- Whole grain toast with avocado provides 4g of fiber
- Quinoa breakfast bowls offer complete protein profile

#### Batch Cooking Method

Prepare multiple servings of grains for easy meal assembly.

- Cook 3 cups of mixed grains on weekends
- Store in portion-sized containers for 3-4 days
- Add to salads, soups, or as quick side dishes

Patient tip: Start with familiar options like brown rice before exploring more adventurous grains like amaranth or teff.



# Garlic & Onions

### Mechanism of Action: Allium Vegetables & Cardiovascular Protection



### Sulfur Compounds

Allicin and other organosulfur compounds inhibit cholesterol synthesis in the liver.

Reduces serum cholesterol by 7-10% with regular consumption.



### Antioxidant Defense

Quercetin flavonoids scavenge harmful free radicals throughout the vasculature.

Reduces oxidative stress markers by up to 15% within weeks.



### Platelet Protection

aggregation without bleeding risk. high-risk patients.

Just 1-2 garlic cloves or <sup>1</sup>/<sub>4</sub> cup of onions daily activates these protective pathways, reducing cardiovascular event risk by 16-22% in longitudinal studies.

- Ajoene compounds prevent excessive platelet
- Decreases thrombosis potential by 25% in



### Spices: Nature's Potent Cardioprotective Agents

### - Turmeric

Curcumin reduces arterial inflammation by 28%.

Inhibits NF-κB pathway activation in endothelial cells.

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#### Cinnamon

Lowers LDL cholesterol by 7-10% with daily consumption.

Improves insulin sensitivity by 15-20% in metabolic syndrome.

### Capsaicin

Reduces triglycerides by 8-13% in clinical studies.

Activates TRPV1 receptors to promote vasodilation.

### Ginger

Decreases platelet aggregation by 20% within hours.

Contains 12+ anti-inflammatory compounds that protect arterial walls.

Just ¼-½ teaspoon daily of these spices provides measurable cardiovascular protection. Incorporate into meals rather than supplements for optimal bioavailability and synergistic effects.



### The Gut-Heart Axis: Emerging Science

### Microbial Composition

Diverse gut flora produces SCFA metabolites that reduce inflammation by 35%.

Bacteroidetes-to-Firmicutes ratio directly correlates with cardiac health markers.

### TMAO Pathway

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Bacterial conversion of choline creates trimethylamine N-oxide.
Higher TMAO levels increase cardiac event risk by 62% in longitudinal studies.

### **Endothelial Function**

Microbiome-derived postbiotics improve flow-mediated dilation by 18%. Prebiotic fiber interventions reduce arterial stiffness within 6 weeks.

Plant-based diets promote beneficial Akkermansia and Faecalibacterium species that lower inflammatory markers IL-6 and CRP by 22-30% compared to Western diets.





### Scientific Support for Plant-Based Eating

Portfolio Diet

30% LDL reduction comparable to first-gen statins

Lifestyle Heart Study

Plaque regression with comprehensive plant-based approach

**PREDIMED Trial** 

Mediterranean pattern reduced cardiac events by 30%

Million Veteran Program

Plant-based diet adherence reduced mortality by 25% in veterans

DASH Diet

Plant-based approach lowered blood pressure by 8-14 mmHg

Lancet Global Nutrition

Plant-predominant diets optimal for cardiometabolic health

### Portfolio Diet: A Comprehensive Approach



### **Plant Sterols**

Nuts and seeds block cholesterol absorption in intestines.

Just 30g daily reduces LDL by 5-10%.



### Viscous Fiber

Oats, barley, and psyllium create cholesterolbinding gel matrix.

Contributes 5-7% LDL reduction with 10-25g daily.



Soy Protein

25g daily enhances LDL receptor activity. Provides 4-6% additional cholesterol reduction.

Combining all Portfolio Diet components achieves statin-comparable 25-30% LDL reduction while delivering additional anti-inflammatory and antioxidant benefits absent in pharmacotherapy.

Adherence improves when patients understand each component's specific mechanism rather than general recommendations.

Jenkins DJA, et al. Direct comparison of a dietary portfolio of cholesterol-lowering foods with a statin in hypercholesterolemic participants. Am J Clin Nutr. 2005;81(2):380-387.

### Lifestyle Heart Trial: First Documented Atherosclerosis Reversal

#### Ornish Intervention

Dr. Dean Ornish's 1990 landmark study showed coronary plaque regression without drugs.

- Plant-based diet with <10% fat
- Moderate exercise and stress management

#### Measurable Results

Quantitative coronary angiography verified arterial healing.

- 82% of patients showed regression
- Control group worsened by 3.4%

#### Long-Term Impact

Five-year follow-up revealed sustained improvement.

- Lower medication requirements

This groundbreaking study shattered the notion that heart disease progression is inevitable. It established comprehensive lifestyle medicine as a viable therapeutic approach for advanced coronary disease.

Ornish D, et al. Can lifestyle changes reverse coronary heart disease? The Lifestyle Heart Trial. Lancet. 1990;336(8708):129-133. doi:10.1016/0140-6736(90)91656-U



99% reduction in angina episodes

### PREDIMED: Mediterranean Diet Prevents Cardiac Events

## 30%

### **Risk Reduction**

Major cardiovascular events decreased in Mediterranean diet groups vs. control.

#### Key Intervention Components

- Mediterranean diet + extra-virgin olive oil
- Mediterranean diet + mixed nuts ٠
- Both outperformed low-fat control diet

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#### Participants

High-risk individuals without cardiovascular disease at baseline.

Multicenter trial duration before early termination due to clear benefits.

#### Specific Benefits

- Reduced stroke incidence
- Improved lipid profiles
- Enhanced endothelial function

### 4.8

### Years

### Lancet Global Health: Plant-Based Diets Save Lives

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Global Impact	Optimal Composition	Cardiovascul
Comprehensive analysis across 195 countries showed plant-forward diets could prevent 11 million premature deaths annually.	Tripling legume consumption and doubling fruits, vegetables, and nuts produced greatest benefits.	Plant-predominant disease mortality by follow-up studies.

These findings reinforce prior evidence from the Million Veteran Program and Lifestyle Heart Trial, establishing plant-based nutrition as a cornerstone of comprehensive cardiovascular care.

Willett W, et al. Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. Lancet. 2019;393(10170):447-492. doi:10.1016/S0140-6736(18)31788-4

### $\bigcirc$

#### ar Protection

diets reduced heart y 22-25% in long-term

### Million Veteran Program: Plant-Based Diets Save Lives

### 32%

### **CVD** Risk Reduction

Highest adherence to plant-based eating showed dramatic decrease in cardiovascular events.

# 402K

### Veterans Studied

Largest cohort study of military personnel tracking dietary patterns and health outcomes.

Plant-predominant eaters showed significantly lower inflammatory markers and improved lipid profiles. Benefits appeared regardless of age, gender, or pre-existing conditions.

Veterans with highest plant food consumption experienced better medication response and required fewer pharmaceutical interventions.

## 8.1 yrs

### Follow-up Duration

#### Long-term observation revealed sustained

#### benefits across diverse veteran populations.

### DASH Diet: Plant-Based Foundation for Blood Pressure Control

#### Mineral-Rich Foods

Potassium, magnesium, and calcium work synergistically to relax blood vessels.

Just 8-10 daily servings of fruits and vegetables lowers BP by 8-14 mmHg.

#### Sodium Reduction

DASH limits sodium to 1,500-2,300mg daily.

Each 1,000mg reduction decreases systolic pressure by 5-6 mmHg.

#### Nitrate-Rich Vegetables

Beets, arugula, and spinach boost nitric oxide production. Improves endothelial function and vascular tone within 3 hours of

consumption.

DASH interventions show clinically significant results within 14 days. Effects magnify when combined with Portfolio Diet components for comprehensive cardiometabolic protection.

Appel LJ, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. N Engl J Med. 1997;336(16):1117-1124. doi:10.1056/NEJM199704173361601



### Miguel's Outcome

28%

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LDL Reduction

Pounds Lost

Angina Episodes

Without medication in first 3 months

Through dietary changes and movement

### After 6 months on lifestyle program

## Miguel's Journey Timeline

### Month 1 Initial plant-based diet transition, walking program 2 Month 3 Cooking classes, stress reduction techniques 3 Month 6 Expanded exercise, community garden volunteer Year 1

Leading patient support group, off most medications



### Primary Prevention Impact



#### CAD Prevention

Potential through optimal lifestyle factors1



Stroke Prevention

Through lifestyle optimization2



1 Khera AV, et al. N Engl J Med. 2016;375:2349-58.
2 O'Donnell MJ, et al. Lancet. 2016;388:761-75.
3 Djoussé L, et al. Circulation. 2009;120:1640-5.

#### Heart Failure Prevention

With comprehensive lifestyle approach3

### Secondary Prevention Potential

32%	47%	
Event Reduction	Hospitalization Decrease	Medication Re
Recurrent cardiac events with lifestyle	Among adherent lifestyle program	Average decrease ir
intervention	participants	needs



#### Reduction

#### in pharmaceutical



### The Prescription Every Cardiologist Should Give: Cardiac Rehab

#### Nutrition as Foundation

Plant-based whole foods as primary intervention

#### Structured Exercise

Supervised cardiac-specific movement therapy

#### Lifestyle Modification

Stress management and sleep optimization

#### **Educational Support**

Nutritional counseling and group reinforcement