Aggressive detection and reversal of heart disease

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Disclosures

- Speaker – Quest/Cleveland HeartLab
“A Man is as Old as His Arteries”

Dr Thomas Sydenham (1624-89)
Stenosed coronary arteries
Robs us of life, love, laughter

The vulnerable atherosclerotic plaque

- large lipid core
- thin fibrous cap
- rich in macrophages
- increased MMPs
- poor in smooth muscle cells
- low-grade stenosis
Heart disease deaths

### Leading Causes of Death

**By AMERICAN HEART ASSOCIATION NEWS**

Heart disease continues to kill more Americans than any other cause, followed by stroke at No. 5, according to 2015 federal data.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Total Deaths</th>
<th>Share of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart disease</td>
<td>633,842</td>
<td>23.4%</td>
</tr>
<tr>
<td>Cancer</td>
<td>595,930</td>
<td>22%</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
<td>155,041</td>
<td>5.7%</td>
</tr>
<tr>
<td>Accidents</td>
<td>146,571</td>
<td>5.4%</td>
</tr>
<tr>
<td>Stroke</td>
<td>140,323</td>
<td>5.2%</td>
</tr>
<tr>
<td>Alzheimer’s disease</td>
<td>110,561</td>
<td>4.1%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>79,535</td>
<td>2.9%</td>
</tr>
<tr>
<td>Flu, pneumonia</td>
<td>57,062</td>
<td>2.1%</td>
</tr>
<tr>
<td>Kidney disease</td>
<td>49,959</td>
<td>1.8%</td>
</tr>
<tr>
<td>Suicide</td>
<td>44,193</td>
<td>1.6%</td>
</tr>
</tbody>
</table>

Source: Centers for Disease Control and Prevention

Published Dec. 8, 2016
Do you have this problem?
Early Detection
Natural early: early detection

Can the Trajectories of the Natural Histories of Coronary Atherosclerosis Be Identified Prior to Adverse Coronary Events?

Opportunities for Intervention

- Quiescent, Stable plaque → no symptoms
- Fibrotic/Scarred plaque → angina
- Vulnerable, Ruptured Plaque → MI, sudden death

Snapshot to identify likelihood to develop vulnerability or progression
Snapshot to identify vulnerability
Snapshot at time of angina or MI
The 1st SHAPE Guideline
Toward the National Screening for Heart Attack Prevention and Education (SHAPE) Program

Apparently Healthy Population Men >45 yr, Women >55 yr*

Step 1

Very Low Risk†
Exit
Exit

All >75 yr receive unconditional treatment‡

- CACS
or
- CIMT & Carotid Plaque§

Atherosclerosis Test

Step 2

Negative Test
- CACS = 0
- CIMT <50th percentile

No Risk Factors¶
Risk Factors

Positive Test
- CACS ≥1
- CIMT ≥50th percentile or Carotid Plaque

< CACS <100 & <75th percentile
< CIMT <1 mm & <75th percentile & No Carotid Plaque

< CACS 100 – 395 or >75th percentile
< CIMT ≥1 mm or >75th percentile or <50% Stenotic Plaque

< CACS ≥400 or ≥50% Stenotic Plaque¶

Step 3

Lower Risk
Moderate Risk
Moderately High Risk
High Risk
Very High Risk

LDL Target
<160 mg/dL
<130 mg/dL
<130 mg/dL
<100 mg/dL
<70 mg/dL

Re test interval
5–10 years
5–10 years
Individualized
Individualized
Individualized

ABI <0.9
CRP >4 mg/dL
Optional
Optional

Follow Existing Guidelines
Myocardial Ischemia Test

Angiography

Yes
No
Clinical pearls for early detection

- Signs That May Signal Heart Attack Risk
  - Hair Loss (Crown)
  - Hair Loss (Temples)
  - Yellow Fatty Deposits on Eyelid
  - Earlobe Crease

Source: American Heart Association Scientific Sessions Abstract 15333
Clinical pearl

diagonal earlobe crease
Diagonal earlobe crease: Association with medical ailments

- Out of 6638 participants, 179 had DELC. The prevalence of bilateral DELC was 2.7%. The prevalence was significantly high among males (4%) and in the 51-60 years age group (5%). There were 408 (6.15%) participants who gave a history of CAD, 827 (12.46%) of DM, and 670 (10.09%) HTN.
- Significantly high association observed between DELC and CAD, DM, and HTN.
- Conclusions: The prevalence of bilateral DELC was 3% and is significantly associated with CAD, DM, and HTN.

### Association between DELC and CAD

<table>
<thead>
<tr>
<th>DELC</th>
<th>CAD</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>36 (8.82)</td>
<td>143 (2.30)</td>
<td>179 (2.70)</td>
</tr>
<tr>
<td>No</td>
<td>372 (91.18)</td>
<td>6087 (97.70)</td>
<td>6459 (97.30)</td>
</tr>
<tr>
<td>Total</td>
<td>408 (100.00)</td>
<td>6230 (100.00)</td>
<td>6638 (100.00)</td>
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</table>

### Association between DELC and DM

<table>
<thead>
<tr>
<th>DELC</th>
<th>DM</th>
<th>Total</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>34 (4.11)</td>
<td>145 (2.50)</td>
<td>179 (2.70)</td>
</tr>
<tr>
<td>No</td>
<td>793 (95.89)</td>
<td>5666 (97.50)</td>
<td>6459 (97.30)</td>
</tr>
<tr>
<td>Total</td>
<td>827 (100.00)</td>
<td>5811 (100.00)</td>
<td>6638 (100.00)</td>
</tr>
</tbody>
</table>

### Association between DELC and HTN

<table>
<thead>
<tr>
<th>DELC</th>
<th>HTN</th>
<th>Total</th>
<th>Significance</th>
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<tr>
<td></td>
<td>Yes, n (%)</td>
<td>No, n (%)</td>
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<tr>
<td>Yes</td>
<td>42 (6.27)</td>
<td>137 (2.30)</td>
<td>179 (2.70)</td>
</tr>
<tr>
<td>No</td>
<td>628 (93.73)</td>
<td>5831 (97.70)</td>
<td>6459 (97.30)</td>
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<tr>
<td>Total</td>
<td>670 (100.00)</td>
<td>5968 (100.00)</td>
<td>6638 (100.00)</td>
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</table>

DELC=Diagonal earlobe crease, DM=Diabetes mellitus, HTN=Hypertension, CAD=Coronary artery disease
Canary in the coal mine

Erectile Dysfunction Is a Warning Sign of Atherosclerosis/Clogged Arteries

Clinical Presentation
- High BP
- Erectile Dysfunction
- Angina
- Heart Disease
- Heart Attack
- Mini Strokes
- Dementia
- Stroke
- Peripheral Vascular Disease

Comparative Not Actual Artery Size
- Penile Artery (actual size 1-2 mm)
- Coronary Artery (actual size 3-4 mm)
- Carotid Artery (Actual size 5-7 mm)
- Femoral Artery (Actual size 6-8 mm)

Clogged Arteries with the same wall thickness
Radical steps:
Prevent
Detect
Reverse
Lifestyle habits to prevent 85% of heart attacks

- Don’t smoke
- Walk 30-40 minutes daily/ thin waist
- Eat >5 servings of fruit/veg a day
- Sleep 7-8 hours a night
- Enjoy a few alcoholic beverages a week

Morgen Study 2013 Netherlands: 17,887 men and women
Karolinska Study 2014 Sweden 20,721 men
2. Early detection of America’s #1 killer
Tools of the heart attack prevention specialist

50% Traditional testing only identifies half of the people who will have a heart attack or stroke.
Do you know your Coronary Artery Calcium Score (CACS)?

Figure 1 - Images illustrating the coronary artery calcium score of three patients with increasing calcification grades in the territory of the anterior descending artery: A. no calcification, B. mild calcification, C. severe calcification.
Prognosis by CACS:
12 Years

CIMT: Carotid Intimal medial thickening

A simple scan of your carotid arteries can indicate your potential risk.
CIMT: Prognosis

- Intima-media thickness of the carotid arteries is a strong and independent predictor of death and serious cardiovascular events in hypertensive patients with CAD referred for coronary angiography.

3. Heart disease is reversible
“Let food be thy medicine, thy medicine shall be thy food.”

- Hippocrates
• sfsdfs
100 Cases within 6 months post-infarction to either a low-cholesterol, low-fat diet or alternatively to a control not intervened upon.

After three years the test group reduced 166 lbs. in men and 141 lbs. in women to 145 lbs. and 124 lbs and cholesterol fell from 312 mg % to 220 in the diet group.

A sense of optimism, feelings of well-being and good spirits, increased exercise tolerance, increased working capacity, and decreased anginal symptoms.
Foods To Be Avoided

SOUPS: Cream Soups.

MEATS: All glandular organs, as liver, brains, kidney, sweet-breads; pork and very fat meats, fat fish, fish roe.

MILK AND MILK PRODUCTS: Whole milk, cream, cheddar, Swiss and all rich cheese and cheese spreads; excessive butter and butter substitutes.

EGGS: Egg yolks.

BREADS: Hot breads, pancakes, waffles, coffee cakes, muffins, doughnuts.

DESSERTS: Any made with cream and egg yolks; pies, frozen creams, rich cakes and cookies.

CONCENTRATED FATS: The excessive use of fats in any form, as salad dressings, olive or vegetable oils, suet, chicken or pork fat.

MISCELLANEOUS: Rich gravies, olives, nuts and avocados.
Morrison low-fat diet results
Nathan Pritikin
Pritkin lifestyle program

- 3-week residential program with exercise and ad libitum low fat (<10% of calories) plant based diet
- 4566 men and women
- Mean LDL-C reduction 25% in men and 20% in women
- Significant reductions in TG and HDL-C
- Significant 3.2% reduction in body weight
All I’m trying to do is wipe out heart disease, diabetes, hypertension, and obesity.

Nathan Pritikin
The doctor and the guru
2) Moderate exercise
3) Stress reduction
4) Smoking cessation

Original Ornish Plan

- Fats (<10%)
- Nonfat dairy products – yogurt, cheese, egg whites
- Nonfat products – cereal, soups, tofu, crackers, egg beaters
- Whole grain – corn, rice, oats, wheat, etc.
- Beans and legumes
- Fruits
- Vegetables

Excluded
- All oils
- All meats
- Olives
- Avocados
- Nuts – seeds
- High or low fat products
- Sugar – syrup – honey
- Alcohol

No calorie restriction
MEDICAL SCIENCE
Can lifestyle changes reverse coronary heart disease?

The Lifestyle Heart Trial
D. Ornish MD, a,b, S.E. Brown MD a,b, J.H. Billings PhD a,b, L.W. Scherwitz PhD c, W.T. Armstrong MD d, T.A. Ports MD e, S.M. McLanahan MD f, R.L. Kirkeeide PhD g, K.L. Gould MD g (Prof), R.J. Brand PhD h (Prof)
Intensive Lifestyle Changes for Reversal of Coronary Heart Disease

Dean Ornish, MD; Larry W. Scherwitz, PhD; James H. Billings, PhD, MPH; K. Lance Gould, MD; Terri A. Merritt, MS; Stephen Sparier, MA; William T. Armstrong, MD; Thomas A. Ports, MD; Richard L. Kirkeeide, PhD; Charissa Hogeboom, PhD; Richard J. Brand, PhD

Context.—The Lifestyle Heart Trial demonstrated that intensive lifestyle changes may lead to regression of coronary atherosclerosis after 1 year.

Objectives.—To determine the feasibility of patients to sustain intensive lifestyle changes for a total of 5 years and the effects of these lifestyle changes (without lipid-lowering drugs) on coronary heart disease.

Design.—Randomized controlled trial conducted from 1986 to 1992 using a randomized invitational design.

Patients.—Forty-eight patients with moderate to severe coronary heart disease were randomized to an intensive lifestyle change group or to a usual-care control group, and 35 completed the 5-year follow-up quantitative coronary arteriography.

Setting.—Two tertiary care university medical centers.

Intervention.—Intensive lifestyle changes (10% fat whole foods vegetarian diet, aerobic exercise, stress management training, smoking cessation, group psychosocial support) for 5 years.

Main Outcome Measures.—Adherence to intensive lifestyle changes, changes in coronary artery percent diameter stenosis, and cardiac events.

THE LIFESTYLE Heart Trial was the first randomized clinical trial to investigate whether ambulatory patients could be motivated to make and sustain comprehensive lifestyle changes and, if so, whether the progression of coronary atherosclerosis could be stopped or reversed without using lipid-lowering drugs as measured by computer-assisted quantitative coronary arteriography. This study derived from earlier studies that used noninvasive measures.12

After 1 year, we found that experimental group participants were able to make and maintain intensive lifestyle changes and had a 37.2% reduction in low-density lipoprotein (LDL) choles-
Lifestyle Heart Trial: 5 Year QCA Data
Ornish and Pritikin Programs Approved by CMS

In August 2010, the Centers for Medicare and Medicaid Services (CMS) approved the Ornish Program for Reversing Heart Disease and the Pritikin Program for Reversing Heart Disease and the Pritikin Program for a specific dietary and lifestyle intervention for patients with heart disease. The CMS approval was based on evidence that these programs can lead to significant improvements in cardiovascular health. The Ornish Program includes a comprehensive lifestyle intervention that focuses on nutrition, physical activity, stress management, and social support. The Pritikin Program is a weight loss program that emphasizes a plant-based diet, regular exercise, and stress management.

Criteria
To be considered a best practice, the model program, or intervention must have been used for more than three years and be based on documented patient outcomes. Please include information on the following in the submission:

- Name and contact information of the program developer
- Name and description of clinic, center, or hospital where the program is in use
- What kind of healthcare providers deliver the best practice and how they are credentialed
- How patients are recruited or selected for the program
- Patient intake and assessment forms used
- Patient outcomes data
- Cost-effectiveness data
- A description of how the program or practice interfaces with the larger organization

Braavewell Seeks Best Practices
The Braavewell Collaborative has launched a new program to recognize and highlight best practices from integrative medicine centers and programs throughout the United States. The submission process is open to anyone. Best practices are reviewed by a committee of experts and, if approved, posted on the Braavewell website to share with the field.

"By documenting best practices and making them easily available to those working within health care, we hope to bring attention to how integrative medicine can improve patient care," said Terry Bone, vice president of programs for the Braavewell Collaborative.

Best practices should be submitted to info@braavewell.org. Please put "Best Practices" in the subject line.
A STRATEGY TO ARREST AND REVERSE CORONARY ARTERY DISEASE: A 12-YEAR LONGITUDINAL STUDY OF A SINGLE PHYSICIAN’S PRACTICE

Caldwell B. Esselstyn, Jr., MD
Foods to be included

- Whole grains
- Legumes, lentils
- Vegetables
- Fruit
Foods to be excluded

- Added oils
- Fish
- Fowl
- Meat
- All dairy
Diet – 11% fat – plant based
Cholesterol lowering medication
Unstructured exercise
Some people think plant-based diet, whole foods diet is extreme. Half a million people a year will have their chests opened up and a vein taken from their leg and sewn onto their coronary artery. Some people would call that extreme.

— Caldwell Esselstyn —
Additional Reversal Strategies

Chelation and vitamins

TACT Primary Endpoint in Diabetes Subgroup

CIMT to document reversal

Carotid - IMT

Your average Carotid-IMT is 0.946
You are a 76 year old with arteries of a 79 year old Male.

This graph indicates your percentile score for similar sex and age.

A C-IMT of less than 0.80mm is generally considered healthy.

Technical Notes:
76 year old Male for cardiovascular risk stratification.

Physicians Notes:

Current and Previous CIMT Measurements

<table>
<thead>
<tr>
<th>Date</th>
<th>Age</th>
<th>CIMT</th>
<th>Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 2017</td>
<td>76</td>
<td>0.946</td>
<td>57th</td>
</tr>
<tr>
<td>Mar 2017</td>
<td>75</td>
<td>1.013</td>
<td>72nd</td>
</tr>
<tr>
<td>Nov 2016</td>
<td>75</td>
<td>1.049</td>
<td>76th</td>
</tr>
<tr>
<td>May 2016</td>
<td>74</td>
<td>1.115</td>
<td>82nd</td>
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<tr>
<td>Dec 2015</td>
<td>74</td>
<td>1.048</td>
<td>77th</td>
</tr>
</tbody>
</table>

Mean Distal 1 cm CCA IMT of General Population with No Coronary Heart History

1.15
Nutrient sensing pathways

• Valter Longom, Ph.D., USC – pioneer of nutrient sensing pathways
• Showed that the IGF-1, TOR and PKA pathways are critical for promoting aging
• Activation of nutrient-sensing pathways accelerates aging processes and their inhibition slows is
• Low levels of IGF-1 are found in centenarians
Conserved Cellular Pathways

Wei et al., 2008; Cheng et al., 2014

Yeast
- Dietary restriction
- Glucose
- Amino acids
- Gcr1
- RAS
- Sch9 (S6K)
- Sch9
- RIM15
- Nucleus
- GIS1
- Protective and metabolic activities that increase life span
  - Glycogen accumulation (except flies and mammals)
  - Glycerol accumulation (only yeast)
  - Fat accumulation (except yeast)
  - Antioxidant enzyme SOD, catalase (except flies)
  - HSPs (except mammals)
  - Autophagy, translation, ER stress, other?
- Anti-aging

Worms
- Dietary restriction
- Ins/IGF-1-like
- DAF-2
- Inhibition of nutrient-sensing pathways
- AOE-1 (PI3K)
- RSK-1 (S6K)
- Activation of anti-aging transcription factors
- PI3K
- AKT
- Protective and metabolic activities that increase life span
- Anti-aging

Flies
- Dietary restriction
- Ins/IGF-1-like
- INR
- CHICO
- Protective and metabolic activities that increase life span
- Anti-aging

Mammals
- Dietary restriction
- IGF-1
- GH
- GHR
- Protective and metabolic activities that increase life span
- Anti-aging
FMD in humans

“The stomach receives food, while the metabolism fasts”

- Consists of soups, bars, teas, drinks, and snacks
- Five consecutive days/month, up to 12 times/year
- Demonstrated to rejuvenate the body, induce fast fat loss without decreasing muscle or bone mass, and prevent (and potentially reverse) age-related metabolic changes
Effect of FMD on biomarkers

Participants lost an average of 5 lbs (Fig. 1) coming mostly from abdominal fat shown as reduction in abdominal fat mass (Fig. 2) and >1-inch loss in waist circumference (Fig. 3) while preserving lean body mass (Fig. 4). IGF-1, a marker associated with increased mortality and DNA damage in human cells, was reduced by 14% (Fig. 5).

Blood pressure (BP) was significantly reduced from 117.4 to 113.6 mm Hg (systolic) and 75.7 to 72.8 mm Hg (diastolic) (Fig. 6 & 7). Total cholesterol was reduced nearly 10 mg/dL with significant reductions of LDL from 104.9 to 99.2 mg/dL (Fig. 8). C-reactive protein (CRP) levels decreased from 1.5 mg/L to 1.0 mg/L after participants had resumed their normal diet for 5–8 days after cycle 3 (Fig. 9). A transient, major and significant elevation of stem cell/regenerative markers was also observed (Fig. 10).

Circulating stem cells in humans undergoing FMD

The best kept secret in medicine is that under the right conditions, the body can heal itself...

- Dr. Michael Greger