The Challenge of Preventing Heart Disease

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Diabetes increased nearly 300%, from 2.5% of population to 7.2%

Obesity increased by 300%, from 11.2% of population to 35.9%

Hypertension increased 100%, from 20% of population to 44%

#1 Health Crisis Since 1990...
#2 Current Emphasis: Finding and Treating Disease... and Being “Graded” on it... Example: Case 1

- 46 y/o Asian American man, Cybersecurity expert
- + stress, no Fam Hx CAD, Regular Marathon runner, Paleo Diet
- BP 120/80  BMI 23.6
- LDL 150, TG 202, HDL 45, TC 235
- ASCVD risk 10 yr 3%, life 46%, 5% if optimize RF

- 18 months later he develops CP with running and then at rest
- + stress echo -- PCI 90% LAD, RCA/Cx <50% residual CAD
What are your next treatment plans?

1. Statin Rx, ASA, Plavix and MD advice for moderate exercise and Mediterranean diet
2. Statin Rx, ASA, Plavix and referral to Cardiac Rehab for lifestyle coaching (TLC), diet and exercise Rx, and stress management
3. Statin Rx, ASA, Plavix, and additional lab tests: Lp(a)
Interheart Trial: What Are the Risk Factors for a 1st MI?
12.5 K M/W vs 10.5 age/sex matched controls

• “Big 5” Risk Factors accounted for 80% of events
  o Smoking
  o Abnormal cholesterol
  o High blood pressure
  o Diabetes
  o Obesity

• Risk of psychosocial STRESS = HBP = obesity

• Beneficial effects of Mediterranean Diet, 150 minutes exercise/wk

• Why Participate in Cardiac Rehabilitation (ie: Secondary Prevention)?
  • Decreases CAD mortality/readmission by 20%, Stress/Depression by 50%
  • Provides health coaching and support for Therapeutic Lifestyle Change “TLC”
  • Recovery and Teachable moments
#3 Future Focus: Putting Prevention First
Approaching Illness with Medical Therapy and “TLC”

P4 Medicine  Leroy Hood MD

In the future, Medicine will be able to take into account an individual’s genetics along with environmental exposure and realize how that influences the progression to disease. This approach will provide patient and provider with “actionable” steps.

P4 Medicine is :
• Predictive
• Preventive
• Personalized
• Participatory
“Predictive”: Global Risk Factors for Heart Disease or Stroke

- Overweight
- Smoking
- Abnormal lipids
- Hypertension
- Chronic inflammation
- RA, Dental
- Previous Event
- Subclinical ASCVD
- Family History
- Cardiac Genomics
- Diabetes
- Age/Sex
“Personalized and Predictive”
Assessing Global CV Risk

- **Advanced Labs**
  - **Lipids**  LDLp, ApoB
  - **Advanced vascular inflammatory markers**
    - hsCRP – Lp-PLA2 – Myeloperoxidase (MPO)

- **Cardiovascular Genomics**
  - Lipoprotein (a), Apolipoprotein E (apo E4)
  - 9p21 SNP, MTHFR (homocysteine)

- **Noninvasive imaging for subclinical ASCVD**
  - Coronary Calcium Scanning (CACs)
  - Carotid Intimal Medial Thickening (CIMT)
  - AAA and Ankle Brachial Index (ABI)
Stroke & Heart Attack *Prevention* Evaluation
*Predictive, Personalized and Participatory*

- **Medical History and Exam**
  - Ht, wt, BP, cardiac system
- **Biochemistry**
  - Lipids, blood sugar
  - Inflammation markers
  - Genetics
- **Physiology/Imaging**
  - Carotid CIMT
  - Coronary CAC
  - ABI, AAA
- **Metabolic Fitness Testing**
  - Aerobic capacity
  - Dynamic ECG
  - Nutrition
- **Lifestyle Prescription (TLC Rx) and Monitoring**
“Personalized, Predictive and Participatory”
Assessing CV Risk  Benefits of Metabolic Testing and Monitoring
• Resting metabolic rate  *daily caloric burn rate*

• Graded, individualized cardiopulmonary exercise test  *ECG/hemodynamic data*
  • Substrate utilization  *fat vs carbohydrate stores for conversion to ATP*
  • Maximum heart rate  *measured not estimated (drug effects OK)*
  • Aerobic capacity (VO$_2$max)  *cardiovascular fitness level predictive of event risk*
  • Aerobic and anaerobic thresholds  *metabolic efficiency*

• Nutritional analysis  *fat/CHO/protein/micronutrients in diet as “fuel sources”*

• Personal monitoring devices  *motivation/goal setting*
Metabolic Testing: Heart Rate Training Zones
64 y/o man with T2DM and Dyslipidemia

<table>
<thead>
<tr>
<th>Zone</th>
<th>Heart Rate (beats/min)</th>
<th>RPE*</th>
<th>Total Calories</th>
<th>Fat Calories</th>
<th>% Fat Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Aerobic</td>
<td>80</td>
<td>107</td>
<td>3.3</td>
<td>2.5</td>
<td>77%</td>
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<tr>
<td>Peak Aerobic</td>
<td>108</td>
<td>113</td>
<td>8.6</td>
<td>3.8</td>
<td>44%</td>
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<tr>
<td>Mixed Aerobic</td>
<td>114</td>
<td>124</td>
<td>9.9</td>
<td>2.5</td>
<td>25%</td>
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<tr>
<td>Anaerobic Threshold</td>
<td>125</td>
<td>131</td>
<td>11.2</td>
<td>1.2</td>
<td>11%</td>
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<tr>
<td>Anaerobic Endurance</td>
<td>132</td>
<td>137</td>
<td>12.1</td>
<td>0.0</td>
<td>0%</td>
</tr>
<tr>
<td>Anaerobic Speed</td>
<td>138</td>
<td>142</td>
<td>13.1</td>
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<td>0%</td>
</tr>
<tr>
<td>Anaerobic Power</td>
<td>143</td>
<td>142</td>
<td>14.0</td>
<td>0.0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Future Focus: P4 Medicine and Prevention
Case 2

• 43y/o man, Amazon exec, married, 1 child
• + stress, Family Hx early CAD father MI 46, pgf MI 50s
• BP 110/80, BMI 21
• LDL 112, HDL 66, TG 96, TC 197
• ASCVD risk 0.9% 10 yr, 36% lifetime, 5% w/optimal RF
• Runs 15-20 miles weekly with no symptoms
What would you advise next?

1. Coronary calcium scan/CT angiography
2. Repeat lipids with hs CRP level
3. Nutrition consultation
4. Statin and aspirin therapy
5. All of the above
Case 2: Reducing Lifetime CV Risk
Further Results and Recommendations

• CT CAC score 157 >80%ile for age
  • Coronary CTA 25-50% LAD, 25% Cx and RCA

• MD Rx: Crestor 40 mg, ASA 81 mg and “see me in 1 year”

• TLC based Rx:
  • Labs w/statin LDL 38, LDLp 618, + apoE4, + Lp(a)
  • Nutrition Rx plant based with fish (+apoE4 and Lp(a))
  • Metabolic Fitness assessment data for Exercise Rx:
    • No ischemia, no arrhythmias on ECG
    • AHA Rx “moderate intensity” = 50-69% max HR = 88-121
    • Measured Fuel Profile HR 60-83 42% fat RPE 2-3 “Optimum HR Zone”
    • HR 88-121 1% fat RPE 3-4
Lifestyle Medicine
Preventive Cardiology
Personal + Predictive + Participatory

Assessment + Prescription + Monitoring + Adjustment + Re-Assessment

Consult and Testing
Report and Create Personal Action Plan
Supervise and Monitor And Collect Data
Analyse Data and Modify Plan
Reassess Consult and Revise Action Plan
Reach your goal!
Thank you... Questions?

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