The Challenge of Preventing Heart Disease in 2017

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Challenge #1 is the Health Crises since 1990

Challenge #2 is the Emphasis on Finding and Treating Disease and "Being Grade on It"

Challenge #3 is Putting Prevention First and Approaching Illness with Medical Therapy and Therapeutic Lifestyle Change “TLC”

This is represented in the concept of P4 Medicine introduced by Leroy Hood MD, of the Institute for Systems Biology in Seattle

I paraphrase... 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

Cardiovascular Disease is particularly well suited for this approach because 80% of whether or not one develops the 5 major risk factors for ASCVD is determined by our lifestyle practices and decisions and how those decisions can affect our genetics.

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
  Smoking
  Abnormal cholesterol
  High blood pressure
  Diabetes
  Obesity
• Risk of psychosocial STRESS = HBP = obesity
• Beneficial effects of Mediterranean Diet, 150 minutes exercise/wk
• If you have already had a cardiac event you will still benefit from a lifestyle approach combined with medical therapy
• 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”, exercise, diet, stress management, self monitoring
  Recovery and Teachable moments

P4 Approach to Cardiac Disease
“Personalized and Predictive”
CVD Risk “Advanced” Labs
• Advanced lipids
  LDLp = particle number – increased risk relative to LDLc level
  Apo B level – total number atherogenic lipid particles (LDL, IDL, VLDL, Lp(a))…
  non fasting… 95% is LDLp
• Advanced vascular inflammatory markers
  hsCRP – vascular endothelial inflammation -- disease initiation and growth
  Lp-PLA2 – enzyme released during LDL oxidation -- plaque formation
  Myeloperoxidase (MPO) – released by white blood cells indicating plaque vulnerable for rupture

Cardiovascular Genomics
• Lp (a) Lipoprotein - independently associated with atherosclerosis, 20% of family risk, 4x RR increase in healthy people, LDL Rx goal <70
• Apolipoprotein E (Apo E) – indicates how person metabolizes any fat; apoE4 = 42% increased CAD risk & risk for Alzheimer’s
• Methylene tetrahydrofolate reductase (MTHFR) – causes elevated levels of homocysteine in blood stream that can cause an increase in vascular inflammation
• 9p21 Chromosome SNP – independent increase in lifetime risk and premature risk of coronary artery disease and AAA 50% prevalence in Caucasians and Asians

CVD Risk Imaging
• Coronary Calcium Scan – measures calcified plaque in coronary arteries; no false positives as calcium = plaque = risk low-intermediate ASCVD/MESA risk scores or early family history of CAD
• Carotid Intima-Media Thickness (CIMT) – variance with age-associated curve for thickness and early plaque is highly predictive of stroke, TIA, heart attack can monitor Rx efficacy
• Abdominal Aortic Aneurysm (AAA) – recommended for men with HTN >65 and all with family Hx, can also detect plaque
• Ankle Brachial Index (ABI) – arm/leg variance of blood pressure indicative of peripheral artery disease and predictive of stroke

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

Metabolic Testing and Monitoring
  • Resting metabolic rate  
  • Graded, individualized cardiopulmonary exercise test  
  • Substrate utilization  
  • Maximum heart rate  
  • Aerobic capacity (VO₂max)  
  • Nutritional analysis  
  • Personal monitoring devices 

Thank you,
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