CARDIOVASCULAR DISEASES

Sara Lynn Nicole Farwell
Bioscience in the 21st Century
Lehigh University Department of Biological Sciences
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IN EVERY YEAR SINCE 1919, CARDIOVASCULAR DISEASES ACCOUNTED FOR MORE DEATHS THAN ANY OTHER MAJOR CAUSE OF DEATH IN THE UNITED STATES.
MAJOR CAUSES OF DEATH FOR ALL MALES AND FEMALES, UNITED STATES 2014

A: Cardiovascular Diseases
B: Cancer
C: Accidents
D: Respiratory Diseases
E: Diabetes
F: Alzheimer Disease

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PERCENTAGE BREAKDOWN OF CVD DEATHS, UNITED STATES 2014

Coronary Heart Disease, 45.1%
Stroke, 16.5%
Heart Failure*, 8.5%
High Blood Pressure, 9.1%
Diseases of the Arteries, 3.2%
Other, 17.6%
By 2030, 43.9% of the US population is projected to have some form of CVD.
Direct and indirect costs attributed to CVD between 2012-2013 were more than $316 billion.
Globally, 1 in 10 people aged 30-70 die from cardiovascular disease.

CVD is the leading cause of death and disability worldwide.

It kills 17.5 million people a year.

It causes 1/3 of all global deaths and 1/2 of all NCD related deaths.

https://www.world-heart-federation.org/world-heart-federations-new-heart-health-monitor/
BUT WAIT! THERE ARE PREVENTABLE RISK FACTORS!
Go to www.menti.com and use the code 29 79 53

What are risk factors for cardiovascular diseases?
## RISK FACTORS FOR CVD

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Behaviors</th>
<th>Other Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Blood Pressure</td>
<td>Unhealthy Diet</td>
<td>Age</td>
</tr>
<tr>
<td>High Cholesterol</td>
<td>Physical Inactivity</td>
<td>Sex</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Obesity</td>
<td>Race or Ethnicity</td>
</tr>
<tr>
<td>Metabolic Syndrome</td>
<td>Alcohol Consumption</td>
<td>Genetics</td>
</tr>
<tr>
<td>Smoking / Tobacco Use</td>
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</tr>
</tbody>
</table>
AGE, SEX, RACE, ETHNICITY RISK FACTORS

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RISK FACTORS ARE INTERCONNECTED

- Unhealthy Diet
- High Cholesterol
- Obesity
- Diabetes
- Physical Inactivity
- High Blood Pressure
- Smoking
- Alcohol Consumption
- Age
- Sex
- Race
- Genetics
**OBESITY**

- The global prevalence of obesity has almost doubled between 1980 and 2014 to 640 million, resulting in more than half a billion adults worldwide classified as obese.
- The WHO global target is a 0% increase in obesity by 2025, however, the countries with the highest rates are continuing to rise substantially.
- Obesity increases the likelihood of diabetes, hypertension, coronary heart disease, and stroke.

**DIABETES**

- The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.
- Half of the people with diabetes live in China, India, USA, Brazil, and Indonesia.
- Worldwide diabetes is increasing or has remained stable, there has been no relative reduction.

**TOBACCO**

- Globally, tobacco use accounts for 10% of all CVD deaths.
- The WHO target aims for a 30% relative reduction in prevalence of current tobacco use in persons aged 15+.
- There is a lack of tobacco use data across the Africa region for both males and females.
- Nearly 80% of the world’s 1 billion smokers live in low- and middle-income countries.
- Tobacco use is higher among males than females.
Chart 3-3. Long-term trend in current cigarette smoking prevalence (%) for adults ≥18 years of age by sex.

<table>
<thead>
<tr>
<th>Trait</th>
<th>Heritability</th>
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<tbody>
<tr>
<td>ABI</td>
<td>0.21(^{57})</td>
</tr>
<tr>
<td>SBP</td>
<td>0.42(^{58})</td>
</tr>
<tr>
<td>DBP</td>
<td>0.33(^{58})</td>
</tr>
<tr>
<td>Left ventricular mass</td>
<td>0.24–0.32(^{58})</td>
</tr>
<tr>
<td>BMI</td>
<td>0.37 (mean age, 40 yr)–0.52 (mean age, 60 yr)(^{40})</td>
</tr>
</tbody>
</table>

Waist circumference
Visceral abdominal fat
Subcutaneous abdominal fat
Fasting glucose
CRP
HbA1c
Triglycerides
HDL-C
Total cholesterol
LDL-C
Estimated GFR

**Chart 9-3.** Extent of awareness, treatment, and control of high blood pressure by age (NHANES 2007–2012).
WHAT IS HAPPENING AT THE MOLECULAR LEVEL?
ATHEROSCLEROSIS

• Definition: A disease of the arteries characterized by the deposition of plaques of fatty material on the inner wall

• Blood vessels
  - Endothelial cells
  - Injury / Dysfunction

• Plaque composition
  - Fat, cholesterol, calcium
  - Dead cells
    • Immune
    • Smooth Muscle

• Progression
  - Plaque Instability
  - Ruptured artery, aneurysm
Hypertension  Dyslipidemia
Smoking
Diabetes
Obesity
Aging

Oxidative stress

Endothelial dysfunction
Reduced NO bioavailability

Leukocyte adhesion & inflammation
Lipid deposition
Vascular smooth muscle cell proliferation

Platelet aggregation & thrombosis

Vasoconstriction

Progression of atherosclerosis and cardiovascular disease
Schematic overview of key mechanisms of atherosclerosis in an evolving model.
Pro-Inflammatory Signaling

RECOMMENDATIONS

• Health screening
• Family history
• Physical activity
  - Cardiorespiratory 3-5 days/week for 20-60 min, moderate intensity
  - Muscular strength and endurance 2-3 nonconsecutive days/week for 20-60 min, muscle fatigue
  - Flexibility training at least 2-3 days/week
• Diet (RDA)
  - Limit saturated fat and trans fat
  - Consume less than 200-300 mg cholesterol/day
  - Consume less than 2300 mg salt/day
  - Balance calorie intake and expenditure
• Helps others: know signs and symptoms for heart attack, stroke
SUMMARY

- CVDs are globally prevalent and continue to create a huge economic burden
- Modifiable versus nonmodifiable risk factors
- Over time, conditions (high blood pressure, cholesterol) causes physical, chemical damage to the endothelium → oxidative stress, pro-inflammatory signaling → plaque development → vessel rupture or dislodging
- Public health recommendations
- Broad CVD research
What will you do to be healthier?
ADDITIONAL RESOURCES

- http://www.heart.org/HEARTORG/Conditions/My-Life-Check--Lifes-Simple-7_UCM_471453_Article.jsp#.WfBxMWiPLIU
- https://www.healthline.com/health/heart-disease/top-iphone-android-apps#overview1
IMAGE CREDITS


• https://ahacharlotte.wordpress.com/2013/03/20/lifes-simple-7- may-help-to-reduce-cancer-risk/