The Problem

As a member of the "Chronic Disease" family, heart and blood vessel disease is directly impacted by two primary variables; biological family and lifestyle choices/behaviors. Like various cancers and diabetes, cardiovascular disease tends to run in families and can therefore be considered a genetic disease. Because of this, a family history can provide important information about your family’s risk of disease. However, recent studies have shown that "lifestyle choices" have a much greater impact on cardiovascular health than heredity.

Cardiovascular disease is the leading cause of death in the United States; statistically one in every three deaths is from heart disease or stroke, equal to 2,200 deaths per day. Unless our society sees a dramatic change in lifestyle choices, the American Heart Association estimates that by 2030, 40.5% of the US population is projected to have some form of CVD. Between 2010 and 2030, the total of direct medical costs of CVD are projected to triple, from $273 billion to $818 billion.

Heart disease takes the lives of far too many people in this country, depriving families and communities of someone they love and care for. With more than 2 million heart attacks and strokes each year (800,000 deaths), just about all of us have been touched by someone who has had heart disease, heart attack, or a stroke.

(Department of Health and Human Services Secretary Kathleen Sebelius)

Know the Terms:

1. **Aneurysm**: A weakened portion of a blood vessel that can bulge under pressure; in severe cases the bulge can rupture or burst.
2. **Angina Pectoris**: Chest pain caused by a reduction of oxygen to the heart.
3. **Angioplasty**: Surgical procedure using a balloon-tip catheter (or snake) to clear blocked arteries; it is also used to insert a stent into the blockage location.
4. **Arrhythmia**: Irregular heartbeat.
5. **Arteries**: Blood vessels that carry oxygen rich blood away from the heart.
6. **Arteriosclerosis**: Stiffening (loss of elasticity) or hardening of the arteries.
7. **Atherosclerosis**: Condition characterized by an occlusion or blockage (atheroma) on the inner lining of an artery.
8. **Capillaries**: Smallest of the body’s blood vessels with ultra-thin walls that permit exchange of gases, nutrients, and waste; they branch out from the arterioles and venules.
9. **Cardiovascular disease (CVD)**: Group of diseases involving the heart or blood vessels.
10. **Cholesterol**: Fat-soluble hormone (sterol) produced in the liver.
11. **Coronary Bypass Surgery**: Also referred to as CABG or Cabbage, an invasive surgical procedure to bypass a blocked artery.
12. **C-Reactive Protein (CRP)**: A protein found in the blood; levels of this protein rise in response to inflammation.
13. **Diastolic Pressure**: Pressure exerted on the artery wall between beats or during the relaxation phase of heart activity; the lower reading in blood pressure.
14. **Electrocardiogram (ECG)**: A measurement of the electrical activity of the heart; may also be measured during a stress test.
15. **Fibrillation**: Rapid, irregular, and unsynchronized contraction of muscle fibers.
16. **High Density Lipoprotein (HDL)**: Compounds that facilitate the transport of cholesterol in the blood to the liver for metabolism and elimination from the body.
17. **Hypertension**: High blood pressure.
18. **Ischemia**: Restriction or reduction of blood supply (and oxygen) to tissues.

19. **Low Density Lipoprotein (LDL)**: Compounds that facilitate the transport of cholesterol in the blood to the body’s cells and cause the cholesterol to build up on artery walls.

20. **Myocardial Infarction (MI)**: A heart attack; a disruption of blood flow (and oxygen) to a certain area of the heart.

21. **Stroke**: Disrupted blood flow to the brain; also referred to as a cerebrovascular accident, apoplexy, or a brain attack.

22. **Systolic Pressure**: Pressure exerted on the artery wall during the contraction of heart muscle; the upper reading in blood pressure.

23. **Transient Ischemic Attacks (TIAs)**: Often referred to as a mini stroke, a brief interruption of the blood supply to the brain causing temporary impairment or dysfunction. Believed to be a possible indicator of an impending stroke.

24. **Veins**: Blood vessels that carry deoxygenated blood from the body to the heart.

### Cardiovascular Disease: Basic Training

1. **Cardiovascular Disease Overview**:
   - Cardiovascular Disease or CVD is a broad term used to describe diseases of the heart and blood vessels.
   - Cardiovascular Disease is the number one cause of death globally.
     - More than 80 million Americans, one out of every three adults, suffers from one or more types CVD in the United States
   - Cardiovascular Disease, Cancer, and Diabetes are referred to as Chronic Diseases.
     - Chronic Disease is an illness that is prolonged, does resolve spontaneously, and is rarely cured completely.
   - Like Type 2 Diabetes and various forms of Cancer, Cardiovascular disease is closely related to lifestyle factors (below).
     - Growing rates of obesity, high blood pressure, and diabetes have directly contributed to the high incidence of CVD.
     - The best defense against this Chronic Disease is to prevent it from developing in the first place!

2. **Your Circulatory System; Quick Facts**:
   - Oxygen keeps you (and your cells) alive.
   - Your body houses a network of freeways, highways, and side streets known as blood vessels where little automobiles or red blood cells (RBC) transport passengers called oxygen.
   - This network is referred to as your cardiovascular or circulatory system (keeps blood flowing in a circle)
   - There are three major types of blood vessels:
     - **Arteries**: The largest of all blood vessels, arteries generally carry the oxygen-rich blood away from the heart (Click here for the Arteries of the body)
     - **Veins**: Generally carry deoxygenated blood from the tissues back to the heart (Click here for the Veins of the body)
     - **Capillaries**: Allowing blood through single-file, one cell at a time, they are the smallest of all blood vessels. Capillaries enable the actual exchange of water, chemicals, oxygen, and carbon dioxide between the blood and tissues.
   - When blood vessels are clear and uninjured, traffic (blood) flows smoothly. However, several things can cause traffic congestion and deprive the body (and heart) of life-sustaining blood and oxygen.
     - **Nicks**: Factors such as high blood sugar, high blood pressure, cigarette smoking, and high homocysteine, can nick or injure the smooth inner layer of the arteries.
     - **Clogs**: When a nick forms, your body wants to repair the wound with cholesterol. During this healing process it slaps on the bad stuff (LDL cholesterol) like too much plaster over a hole. This triggers inflammation, which signals white cells to invade the area.
• **Clots:** The resulting plaque becomes irritated and ruptures, which prompts a blood clot to form. And if the clot suddenly closes off the artery problems occur; including heart attack, stroke, impotence, and memory loss.

• **Electrical Problems:** Approximately 50% of those with coronary artery disease also develop electrical problems. The effect is irregular heartbeats, such as atrial fibrillation.

• **Leaky Plumbing:** Heart valves keep blood flowing in a circle (circulatory system), and prevent blood from leaking backward into the chambers it has just left. The most common valve problem is mitral valve prolapse, in which the valve between the left atrium and left ventricle doesn't fully close. The faulty process irritates the nerves in the atrium, which can then cause palpitations and sweating.

3. **Your Heart; Quick Facts:**
   • Your heart is a four-chambered muscle the size of an average clenched fist.
   • The chambers where blood enters the heart are called the Atria.
   • The chambers where blood exits the heart are called the Ventricles.
     • The left ventricle receives oxygen-rich blood from the lungs and pumps it out to the body.
     • After traveling through the circulatory system, the blood, now depleted of oxygen, is returned to the heart through the right ventricle.
     • The blood is then sent to the lungs, where it receives oxygen and the cycle then begins again.
   • The heart contracts 100,000 times per day, and more than 2.5 billion times over the average lifetime.
   • The body contains approximately 6 quarts of blood.
   • Blood carries oxygen and nutrients to your cells and removes carbon dioxide and waste products.
   • The heart itself receives oxygen via the coronary arteries.
     • The term coronary means "crown", the coronary arteries crown or surround the heart.

4. **Various Diseases of the Cardiovascular System:**
   • **Coronary Artery Disease (Coronary Heart Disease):**
     • The primary culprit (or cause) of Coronary Artery Disease is condition known as Atherosclerosis, where an artery wall thickens as a result of the accumulation of plaque; this process decreases blood flow and oxygen to the heart and can lead to heart attack.
     • This biological accumulation (occlusion or blockage) occurs over time, and consists of fat, cholesterol, calcium, scar tissue, and other substances found in the blood.
     • As the disease progresses, this plaque not only limits blood flow to heart muscle, but can eventually rupture (break open), causing a blood clot to form on the surface of the plaque. This process increases the obstruction and, in some cases, completely blocks blood flow through a coronary artery.
     • **Treatment:**
       • Angioplasty:
         • A thin, flexible tube with a balloon or other device on the end is threaded through a blood vessel to the narrowed or blocked coronary artery. Once in place, the balloon is inflated to compress the plaque against the wall of the artery, partially restoring blood flow through the artery.
         • During the procedure, the doctor may put a small mesh tube called a stent in the artery. The stent helps prevent blockages in the artery in the months or years after angioplasty.
       • Coronary Artery Bypass Grafting:
         • CABG is also referred to as open heart surgery.
         • In CABG, arteries or veins from other areas in your body are used to bypass (go around) narrowed or blocked coronary arteries.
         • A highly invasive surgery, CABG can improve blood flow to your heart, relieve chest pain, and possibly prevent a heart attack.
   • **Stroke:**
     • Know as a "brain attack", or Cerebrovascular Accident, a stroke is caused by a disruption of the blood flow (supply) to the brain.
     • Two primary types of stroke:
- **Ischemic stroke**: A thrombus or clot (embolus) blocks blood flow to part of the brain.
- **Hemorrhagic stroke**: A ruptured blood vessel, such as an aneurism, causes bleeding in the brain.
- Transient ischemic attacks (TIAs) are a series of small (mini) strokes that precede many strokes.
- Stroke treatments are time sensitive, meaning it is imperative to obtain medical treatment as soon as possible following the onset of symptoms. To recognize the signs or symptoms, follow the acronym FAST below:
  - **F** - FACE: Is there weakness on one side of face? Have the person smile (smiles are generally symmetrical).
  - **A** - ARMS: Is there weakness on one side? Have the person extend both arms in front, does one arm droop?
  - **S** - SPEECH: Do they have slurred speech or trouble speaking? Can they repeat a simple sentence?
  - **T** - TIME: Always note the time of onset of symptoms. Check your watch, time symptoms began?
- **Angina Pectoris**:
  - Angina is chest pain, tightness, or discomfort that occurs when the heart muscle doesn't get enough oxygen-rich blood.
  - Angina is not a disease; it is a symptom of an underlying heart problem, such as coronary heart disease (CHD).
  - Treatment for symptoms normally involve the use of vasodilator medications (to enlarge blood vessels)
- **Arrhythmia**:
  - Irregularity in the rate or rhythm of the heart.
  - Arrhythmia can come in many different forms and are identified by where they occur in the heart. However, there are two primary types or categories of arrhythmias:
    - Tachycardia: heartbeat is too fast (more than 100 beats per minute).
    - Bradycardia: heartbeat is too slow (less than 60 beats per minute).
  - Atrial fibrillation is the most common type of arrhythmia.
    - Periods of rapid, disorganized electrical signals cause the heart's two upper chambers to fibrillate (contract very fast and irregularly).
    - Can cause the blood pools in the atria and can increase the risk of stroke.
  - Arrhythmia is most often treated with medications and possibly surgery.
- **Congestive Heart Failure (CHF)**:
  - The heart's pumping power is weaker than normal and blood does not circulate normally.
  - CHF is the single most frequent cause of hospitalization in the United States.
  - Can be caused by:
    - Coronary Artery Disease (above)
    - Having a prior Heart Attack (damage to heart muscle)
    - Cardiomyopathy (abnormal enlargement)
    - Overworked Heart (high blood pressure, kidney disease, diabetes, etc)
  - Generally treated with surgery and/or medications.

5. **Cholesterol, What You Should Know:**
- **What Cholesterol Is**:
  - Cholesterol is not a fat; Biochemically it is a sterol.
  - Unlike fat, it contains no calories and cannot be used as energy.
  - Cholesterol plays an vital role in numerous body functions:
    - Primary structural component of cell membranes.
    - Important component in our hormonal systems, including the manufacture of bile acids (for food digestion), sex hormones (estrogen, progesterone, testosterone), and vitamin D.
    - Important component of the myelin sheath (provides insulation to the nerves).
  - Only the cell membranes of animal tissue contain cholesterol.
  - Cell membranes of plants are composed of fiber, not cholesterol.
While cholesterol is essential to life, the body makes all the cholesterol it needs, i.e. you do not need dietary sources of cholesterol.

**Cholesterol in our System:**
- Cholesterol travels through your bloodstream in small packages called lipoproteins, made of fat (lipid) on the inside, and proteins on the outside.
- Two kinds of lipoproteins carry cholesterol throughout your body:
  - **Low-density lipoproteins (LDL):**
    - Carries the majority of cholesterol through your bloodstream for delivery to cells of the body.
    - LDL's are larger, less dense, and less stable than HDL.
    - LDL's readily oxidize and deposit plaques on arterial walls
    - Known as the "bad" cholesterol.
  - **High-density lipoproteins (HDL):**
    - Often referred to as the "good" cholesterol.
    - HDL's act like vacuum cleaners in the bloodstream, picking up excess cholesterol in the bloodstream, and carry it back to your liver. Your liver removes the cholesterol from your body.

**Sources of Cholesterol:**
- Approximately 80% of the total cholesterol in an average person's blood is from there own body, with the rest coming from diet.
  - Since the body needs cholesterol so much it makes around 3,000 milligrams per day (ten times the maximum recommendation for daily dietary cholesterol).
- Approximately 30% of our society is sensitive to the cholesterol-raising effects of dietary cholesterol.
  - Normally, when a healthy person eats high cholesterol foods, the liver reduces its own cholesterol production to keep blood cholesterol at a healthy level.
  - In cholesterol-sensitive individuals, this internal monitoring mechanism doesn't operate, so their blood cholesterol level goes up when they eat high-cholesterol foods.

6. **Understanding Blood Pressure:**
- Blood pressure is the fluid force (of blood) against the inside wall of an artery.
- Blood pressure is often written as two numbers.
  - **Systolic Pressure:**
    - The top number: the pressure or force against the inside wall of an artery during the contraction phase (systole) of the heart; when the heart beats.
  - **Diastolic Pressure:**
    - The bottom number; the pressure or force against the inside wall of an artery during the relaxation or refill phase (diastole) of the heart; between beats.
- Three levels for blood pressure:
  - Normal Blood Pressure is a systolic pressure less than 120 mm/Hg or a diastolic pressure less than 80 mm/Hg
  - Prehypertension is a systolic pressure between 120-139 mm/Hg or a diastolic pressure between 80-89 mm/Hg
  - Hypertension is systolic pressure of 140 mm/Hg or higher or a diastolic pressure of 90 mm/Hg or higher
    - For people with Diabetes hypertension is defined as systolic pressure of 130 mm/Hg or higher and diastolic is 80 mm/Hg or higher.
  - When blood pressure rises the heart must work harder, just like hand-pumping air into a tire or basketball; the higher the pressure, the harder you have to work.
Talk’n Stats:

Overall Stats:

1. From 1998 to 2008, cardiovascular disease (CVD) death rates declined 30.6%. However, CVD is still the leading cause of death in the U.S. Declines in stroke death rates now rank stroke as the 4th leading cause of death.
2. From 2007 to 2008, the cost of CVD increased by over $11 billion.
3. Hypertension - An estimated 76.4 million U.S. adults ≥20 years of age are hypertensive.
4. Cholesterol - An estimated 98.8 million adults ≥20 years of age have total serum cholesterol levels ≥200 mg/dL; 33.5 million have total serum cholesterol levels ≥240 mg/dL. (Less than 200 mg/dL is desirable)
5. Diabetes - An estimated 18.3 million Americans ≥20 years of age have physician-diagnosed diabetes. An additional 7.1 million adults have undiagnosed diabetes and about 81.5 million adults have prediabetes.
6. Physical Activity - Only 20.7% of adults meet the federal guidelines for physical activity. Among 9 through 12 graders, only 37.0% meet the recommendations.
7. Healthy Diet – Less than 1% of U.S. adults meet the definition for —Ideal Healthy Diet; essentially no children meet the goal.
8. Smoking - 19.8% of boys and 19.1% of girls in grades 9-12 report being current smokers. Among adults, 21.2% of men and 17.5% of women over age 18 years are smokers.
9. Body Mass Index - Overall, 68% of U.S. adults are overweight or obese (72% of men and 62% of women). Thirty-two percent of children ages 2-19 are overweight or obese (32% of boys and 31% of girls).
10. When compared to previous trends for adults there have been improvements in CVD and stroke mortality, and prevalence of high cholesterol and physical activity; there have been relatively no changes in prevalence of hypertension and smoking and worsening of prevalence of diabetes and overweight.

Men:

1. More than one in three adult men has some form of CVD.
3. Males represent 48.3% of deaths from CVD.
4. The 2008 overall death rate from CVD was 244.8. Death rates were 287.2 for white males, 390.4 for black males.
5. In 2009, cardiovascular disease was the first listed diagnosis of 3,230,000 males discharged from short-stay hospitals. Discharges include people alive, dead and status unknown.
6. The prevalence of CHD in men is an estimated 8.8 million. Among men age 20 and older, 8.5% of non-Hispanic whites, 7.9% of non-Hispanic blacks and 6.3% of Mexican Americans have CHD.
7. CHD killed 216,248 men in 2008. This represents 53.4% of deaths from CHD.
8. The 2008 overall CHD death rate was 122.7. Death rates were 161.7 for white males and 183.7 for black males.
9. 933,000 males diagnosed with CHD were discharged from short-stay hospitals in 2009.

Women:

1. More than one in three female adults has some form of cardiovascular disease (CVD).
2. Since 1984, the number of CVD deaths for females has exceeded those for males.
3. In 2008, CVD was the cause of death in 419,730 females. Females represent 51.7% of deaths from CVD.
4. In the US in 2008, all CVDs combined claimed the lives of 419,730 females while all forms of cancer combined killed 270,210 females. Breast cancer claimed the lives of 40,589 females; lung cancer claimed 70,070.
5. The 2008 death rate from CVD was 244.8. Death rates were 200.5 for white females and 277.4 for black females.
6. In 2009, CVD was the first listed diagnosis of 2.9 million females discharged from short-stay hospitals.
7. About 7.5 million females alive today have CHD. Of these, 3.1 million have a history of myocardial infarction (MI, or heart attack).
8. Each year new and recurrent MI and fatal CHD will impact an estimated 515,000 women.
9. The 2008 overall CHD death rate was 122.7. Death rates were 91.9 for white females and 115.6 for black females.
10. 26% of women age 45 and older who have an initial recognized MI (heart attack) die within a year compared with 19% of men. In part because women have heart attacks at older ages than men do, they're more likely to die from them within a few weeks.
11. 64% of women who died suddenly of CHD had no previous symptoms.
12. 604,000 females diagnosed with CHD were discharged from short-stay hospitals in 2009.

Statistics from the American Heart Association and Centers for Disease Control and Prevention

Know Your Numbers:

To begin taking charge of your own health, consider the primary risk factors associated with cardiovascular disease below. Risk factors are behaviors or conditions that increase your chance of developing a disease. Risk factors for cardiovascular disease are also common risk factors for other chronic diseases. Many risk factors are related, (example, a physically inactive person is often overweight and develops high blood pressure). The following risk factors are important to learn and pass on to future generations:

1. **Tobacco Use:**
   - Nicotine is a vasoconstrictor (narrows blood vessels) which reduces blood and oxygen to heart.
   - Carbon monoxide displaces oxygen in red blood cells, which reduces oxygen to all cells.

2. **Physical Inactivity:**
   - Heart is a muscle. Like a cast on your arm, when you don't use it, you lose it. Atrophy develops reducing the pumping ability of the heart.

3. **Poor Diet or Eating Habits:**
   - Excessive calorie intake
   - Excessive sugar and animal fat intake

4. **Overweight/Obesity (volume/Location):**
   - Linked to higher LDL (bad) cholesterol and triglyceride levels and to lower HDL (good) cholesterol, high blood pressure, and diabetes.
   - Triglycerides are a type of fat in the bloodstream and fat tissue; increased levels are associated with an increased risk of heart and blood vessel disease. See Talk with the Doc below.

5. **High Blood Pressure:**
   - Contributing factor in heart disease, stroke and other serious conditions, such as kidney disease and blindness.

6. **High Blood Cholesterol:**
   - Contributing factor in coronary artery disease.
   - See Talk with the Doc below.

7. **Diabetes:**
   - Contributing factor in cardiovascular disease.
   - About 75% of people with diabetes die of some form of heart or blood vessel disease.

8. **Unmanaged Stress:**
   - Puts the body in state of “high-alert” by releasing a series of hormones can be damaging to heart muscle over time.
   - Chronic stress is associated with increased belly (visceral) fat; a common cause of systemic inflammation.
Thoughts for Living:

Heart disease is the #1 killer of Americans; In addition to the statistics above, this year, nearly 800,000 people will have their first heart attack, and as many as 500,000 will have a recurrent attack. But you do not have to be a part of these statistics, you don’t have to become one of them! You have the power to heal your heart by taking simple steps now:

1. **Stop Smoking:**
   - Dumping the tobacco is the single most important thing you can do for your health, and the health of those around you.

2. **Get Active:**
   - If you’re just getting started, set your mind on 30 minutes of walking, 3 times a week, and work up from there.

3. **Eat for Health:**
   - Simple changes in how you eat can help counteract chronic inflammation, a root cause of many serious diseases, including Heart Disease. (Dr. Andrew Weil, M.D.)
   - Click here for the "Anti-Inflammatory" food diet and pyramid.
   - **Read Labels:**
     - If something has any of the following as 1 of the first 5 ingredients, don’t buy it, or throw it out:
       - simple sugars
       - syrups
       - white flour
       - saturated fats
       - trans fats
   - **Watch Your Fats:**
     - Meat that comes from an animal with 4 legs is higher in saturated fat (the unhealthy kind) than that which comes from 2-legged animals such as chickens, or animals with no legs, such as fish.
     - Steer clear of Hydrogenated or Partially Hydrogenated oil products, as they contain "trans fats" which lower good cholesterol and raise bad cholesterol, making them the worst fats of all, and they are hiding in many processed and packaged foods.
       - Hydrogen is applied to oils to make them solid at room temperature, and extend the shelf life of a product.
     - Good sources of fat include: salmon, flax seed oil, walnuts, sunflower seeds, olive oil, and avocados.
   - **Amp Up the Fiber:**
     - Soluble fiber helps lower cholesterol levels
       - Sources include: oatmeal, beans, peas, barley, and citrus fruits, etc.
     - Insoluble fiber has been shown to decrease your risk for heart disease.
       - It also fills you up, which helps you eat fewer calories overall.
       - Sources include whole-wheat bread, wheat bran, brown rice, barley, cabbage, beets, carrots, Brussels sprouts, turnips, artichokes, and cauliflower, etc.
   - **Watch for Hidden Salt (sodium):**
     - 50% of the salt we consume comes from prepared and processed foods, which are hidden in the ingredients list.

4. **Talk with the Doc:**
   - Ask your Doc to focus on these the essential numbers below which are strong indicators or potential problems:
     - Blood pressure: 120/80 and below
     - Waist size: Woman 32.5 inches or smaller; Man 35 inches or smaller.
     - Cholesterol: HDL 50 or better; LDL under 100.
     - Triglycerides: 150 or below.
     - Weight: BMI in normal range (18.5–24.9).
     - Blood sugar: Fasting blood sugar number above 100 is considered pre-diabetic.
     - Optional items to ask your Doc about:
       - C-reactive protein levels and Vitamin D levels.
5. **Don't Waist the Fat:**
   - Weight around your midsection (apple shape) is more dangerous than other areas of storage fat because it exerts pressure on your body's vital organs and can increase your risk for heart disease and diabetes.
     - Measuring tape at your belly button, loop it around your middle keeping the tape level all the way.
     - Suck in your tummy like you’re trying to impress someone, but don't hold your breath. as you exhale, note the number.
     - Women's waists should be 32.5 inches or smaller;
     - Men's, 35 inches or smaller.

6. **De-Stress:**
   - Meditation and relaxation techniques will help weather stressful elements and reduce the body’s physical response to stress. (See Stress chapter for further information)
   - Make and maintain friendships.
     - Reach out to the friends around you, as well as those that you have not seen in a while.
     - A network of people you can depend on will help you manage turbulent times much more smoothly.
     - Happiness and laughter can actually help fight and recover from disease.

7. **Talk with the Doc about Added Extras:**
   - Baby Aspirin
   - Vitamin/Nutritional Supplements

8. **Get to Sleep:**
   - Not getting adequate sleep accelerates arterial aging, and increases the risk of a heart attack.
   - Studies show that the optimal amount is 7-8 hours a night for men and 6-7 hours for women.

9. **Know your Family History:**
   - Collect any/all medical information associated with your biological family history; and pass it on to your Doc.
   - A valuable tool to pass on to future generations.