The Benefits of Nutrition and Exercise on Aging

Anne and Tom Kleeman
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The Science of Aging is still new

"We don't know how to be old because old age is relatively young."

University of Illinois Professor Elizabeth Stine-Morrow on "The Science of Resilient Aging."

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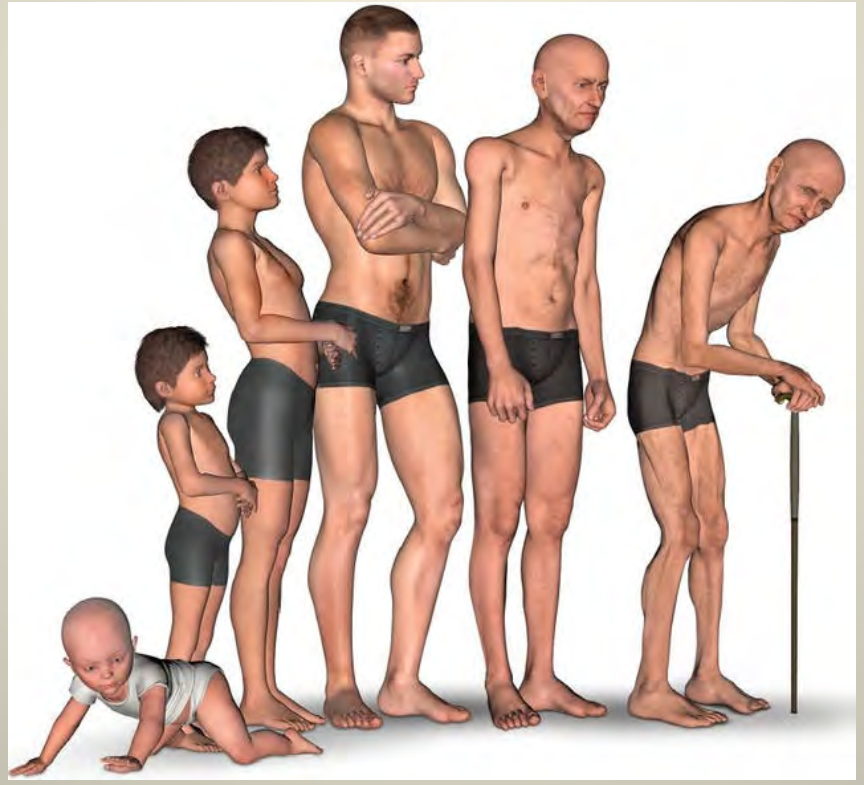
Lessons from History
The Riddle of the Sphinx

What goes on four legs at dawn, two legs at noon, and three legs in the evening?



We do.

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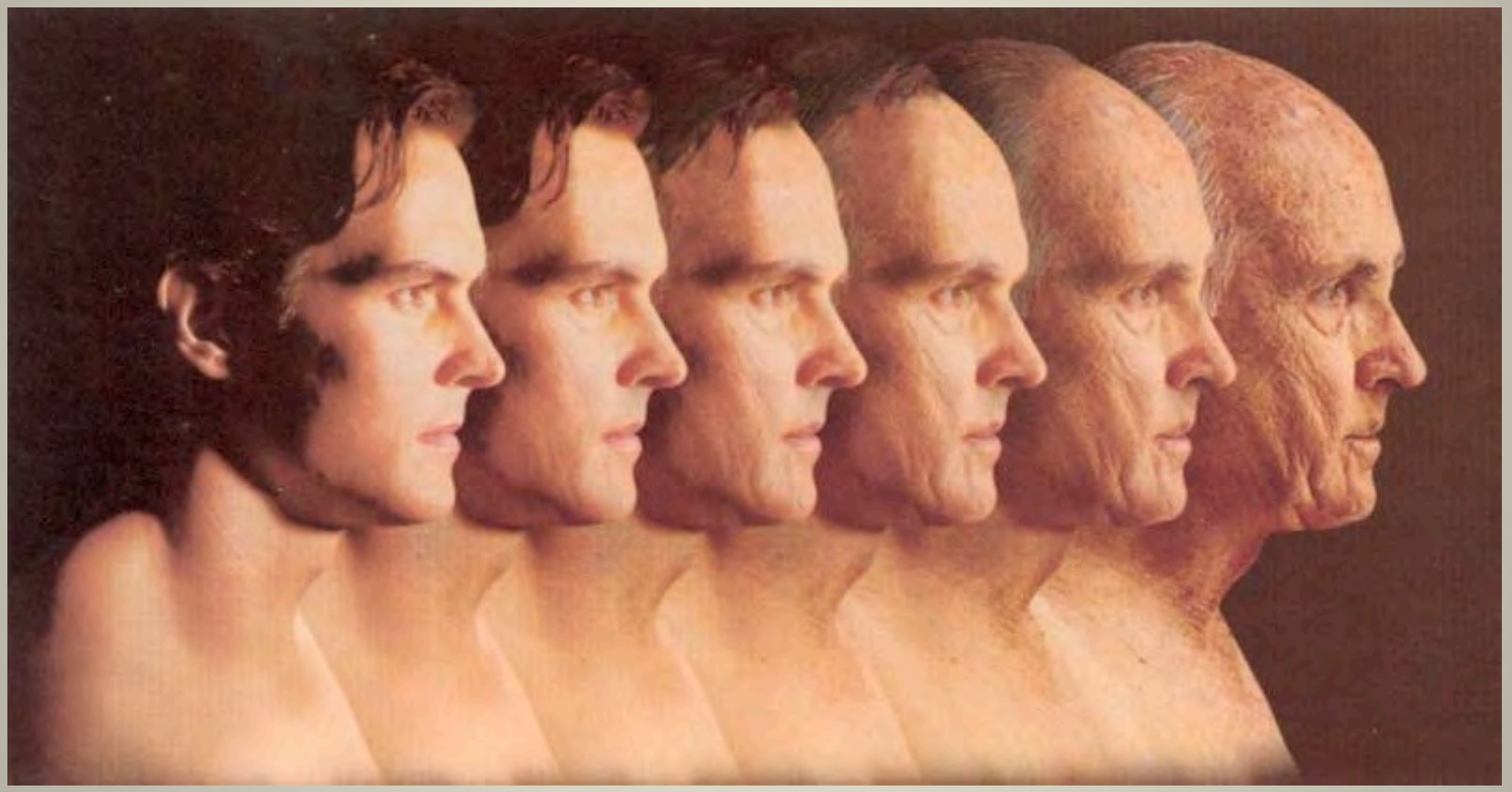
It’s a Journey



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That Nobody Escapes

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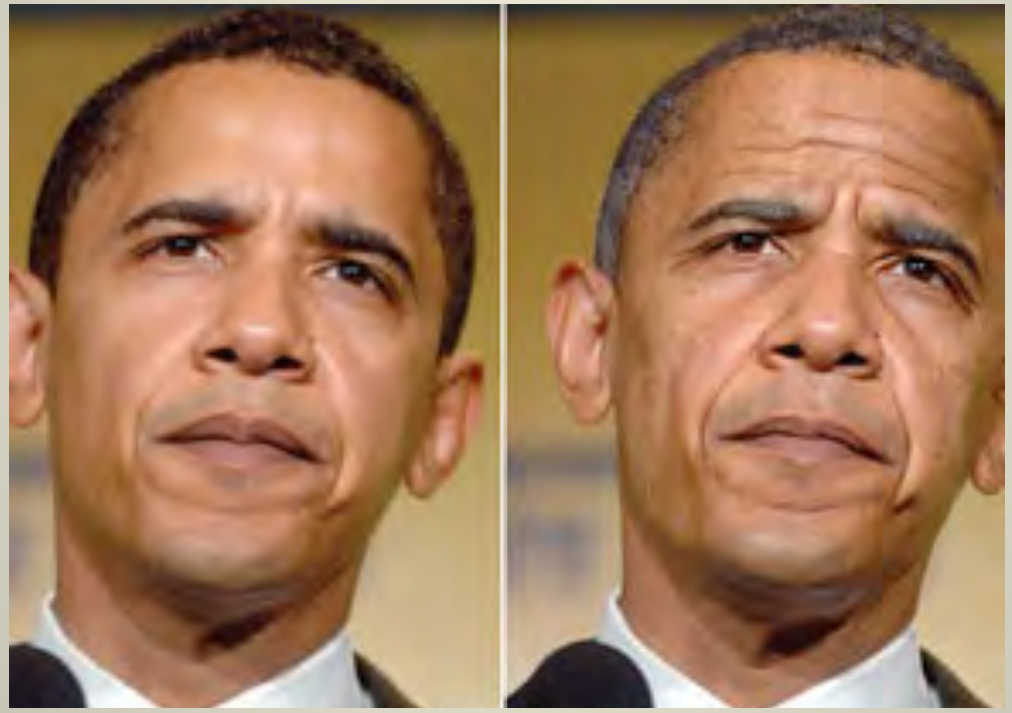
Not Presidents



2008 2011

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Not even Barbie

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So What is going on?

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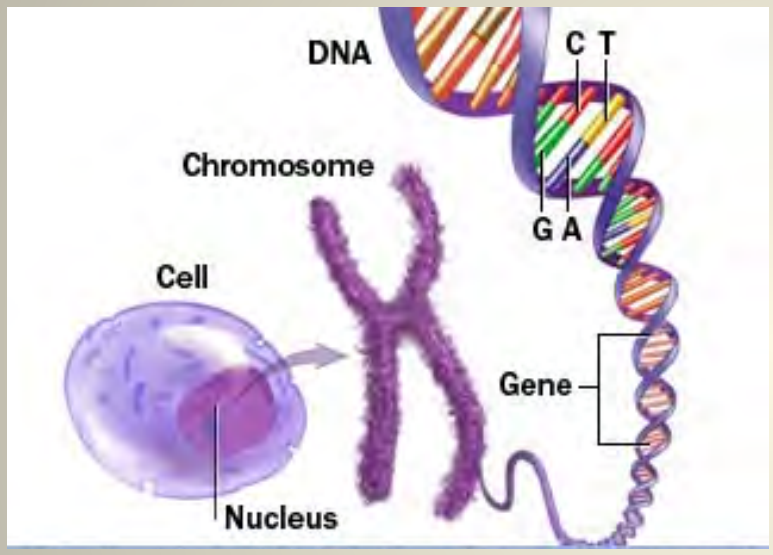
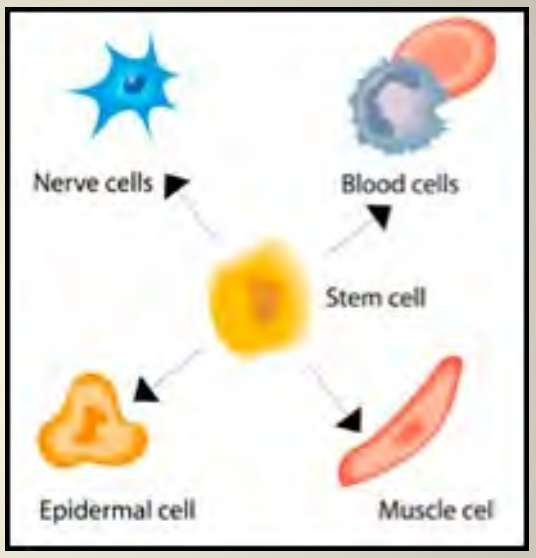
Cell Differentiation



Every cell in the body has the same number of Chromosomes



What tells it to make a nerve cell?

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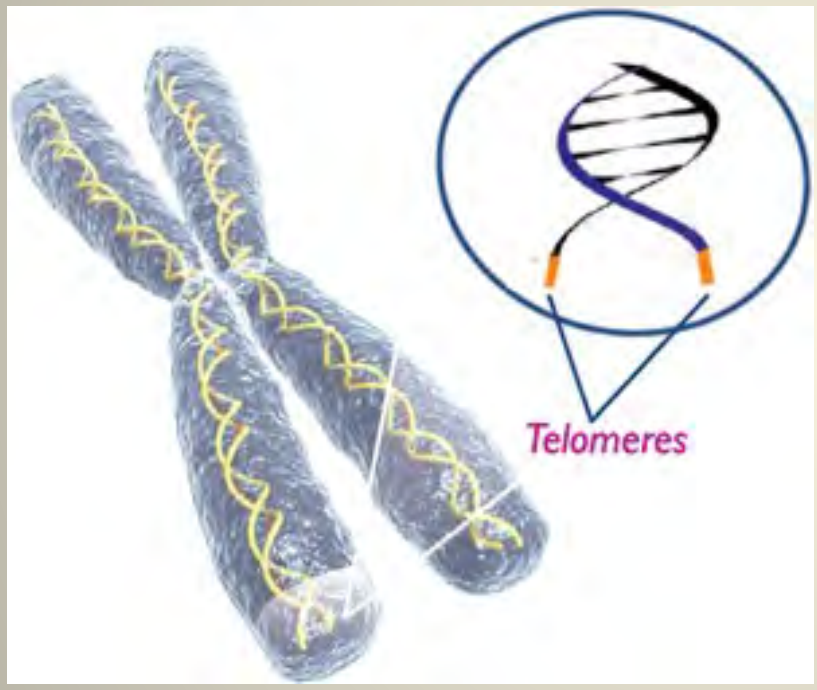
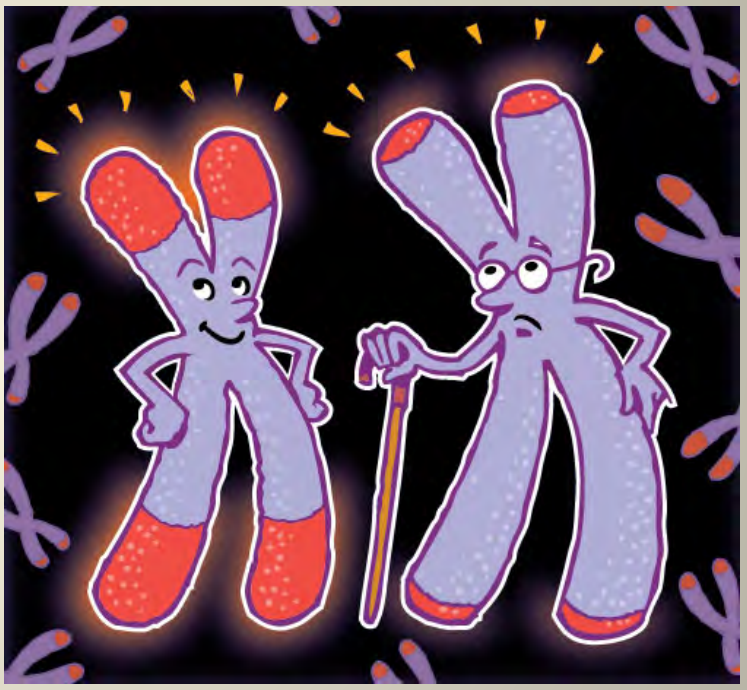
How do they age?
Telomeres are the markers



The bookends of the DNA message



They get smaller with age

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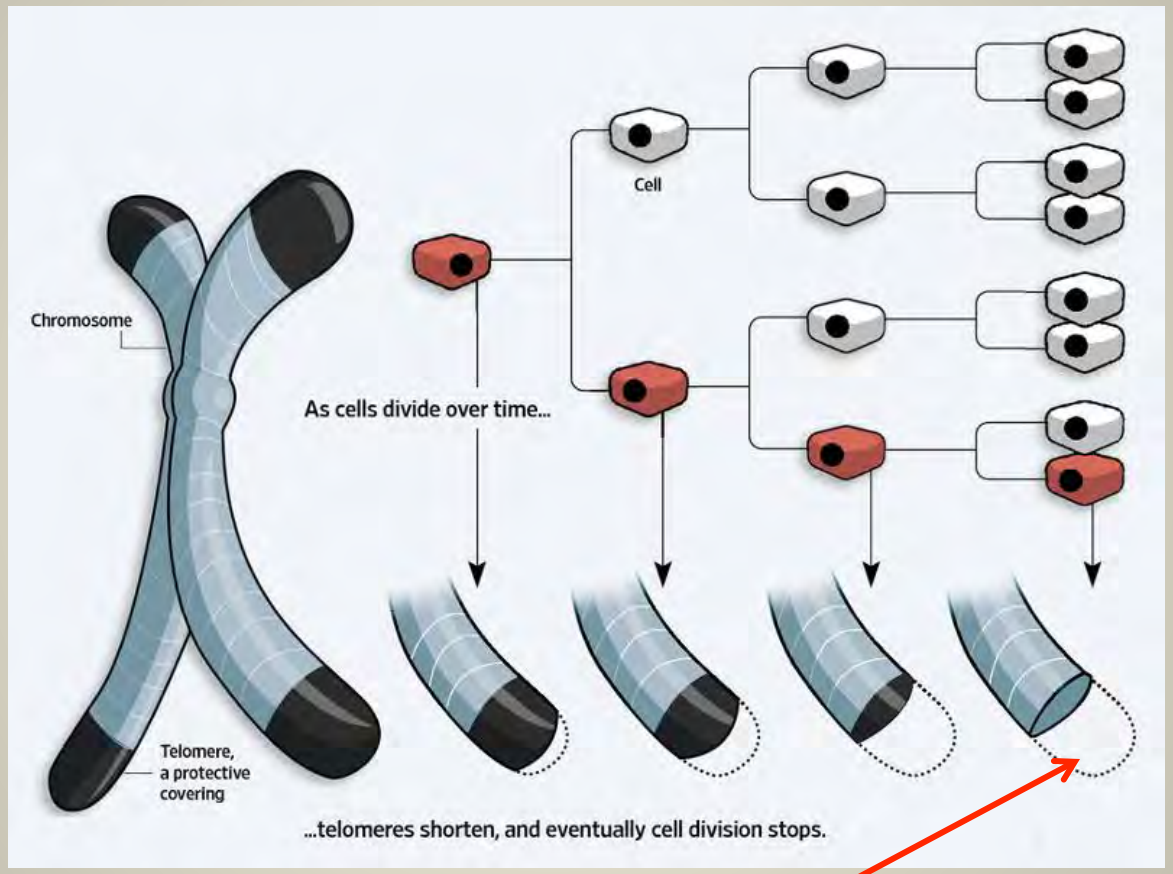
Genetic Aging



When the telomeres are gone so are we.

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There really aren't good or bad people, just good and bad Genes?

Progeria (age 13)
Bad Genes

100 yr. old Smoker
Good Genes

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The Ongoing Debate: Nature vs. Nurture

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Sometimes it's due to bad habits

Can you tell which one was a smoker?

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Sometimes it's due to bad habits

Can you tell which one was a smoker?

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Epigenetics

A new area of science looking at how genes can be altered

The effects of life experience can be passed down:
How you are raised, what you eat, habits like smoking

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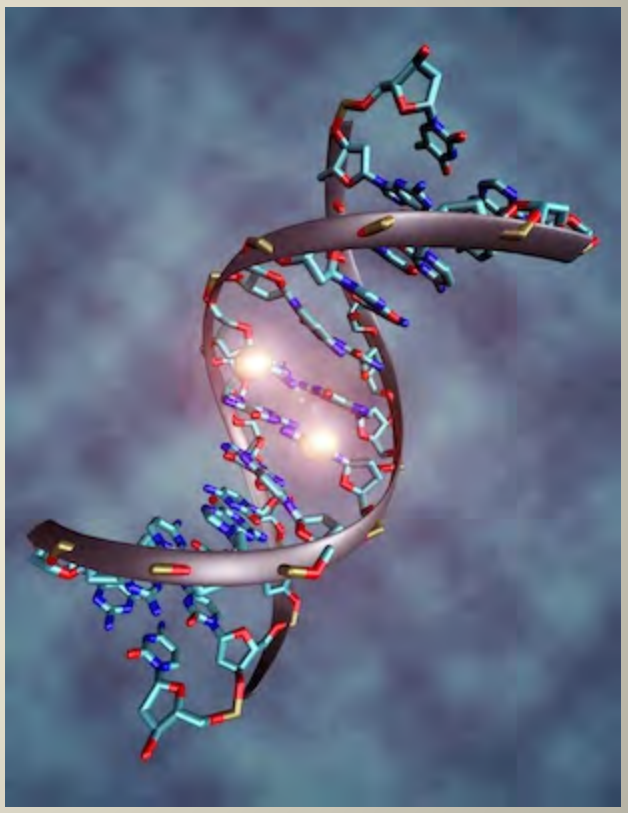
Epigenetics

Small molecules called methyl groups can attach to the DNA strand and get passed along when the strand replicates.

Think of the methyl group as an on-off switch.

It may inhibit the expression of either a good or bad gene such as a fat gene.



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Exercise changes the epigenome

A six month exercise program resulted in a marked increase in methylation of adipose (fat) tissue resulting in less fat production.

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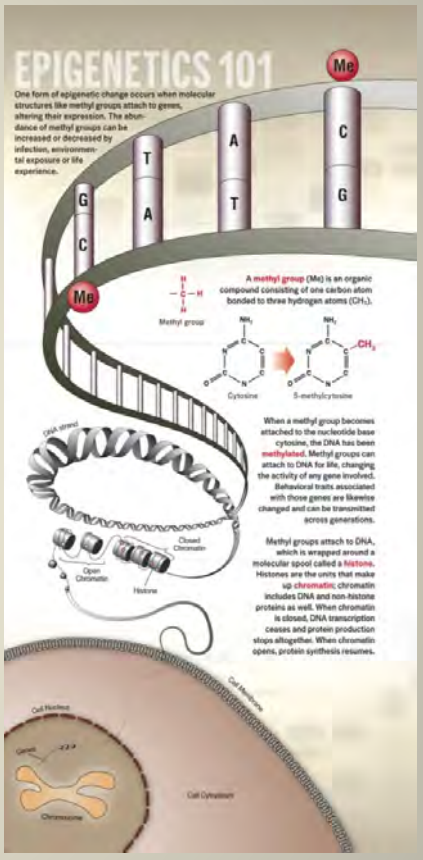
Epigenetics

Small molecules called methyl groups can attach to the DNA strand and get passed along when the strand replicates.

The DNA strand is wrapped around proteins called Histones.

The looser the wrap the more information is copied.

Think of the methyl group as an on-off switch and the histone as a volume nob.



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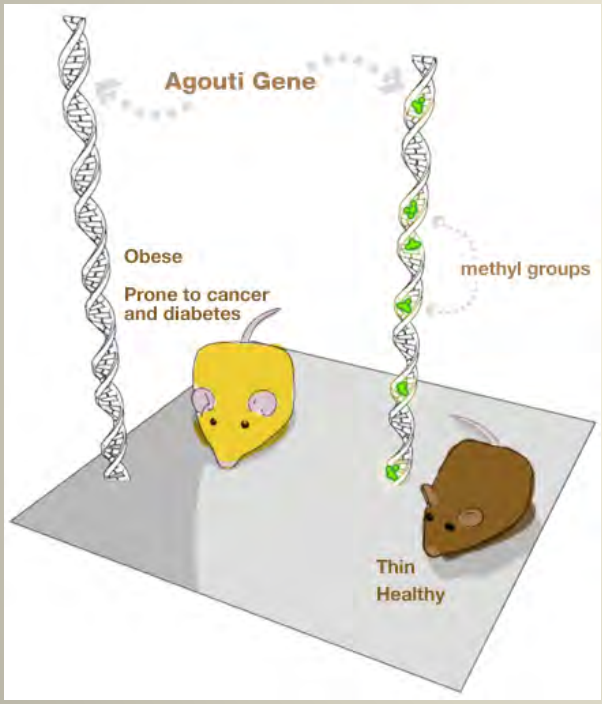
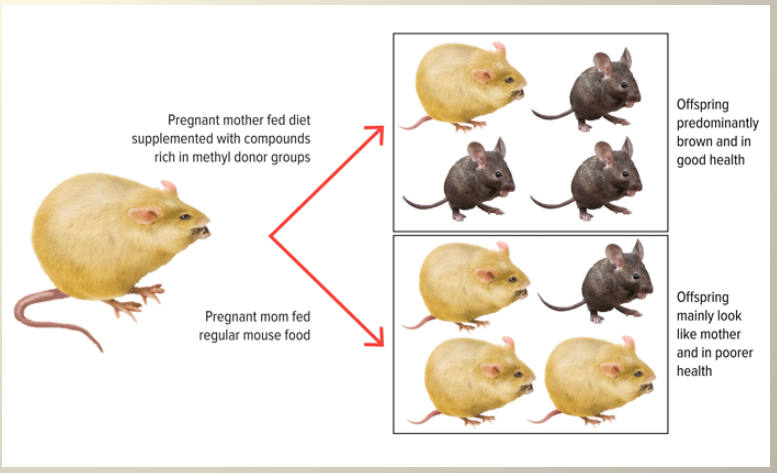
Epigenetics
The Agoutigene



Identical Twins



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Epigenetic mapping

We can now predict obesity risk factors

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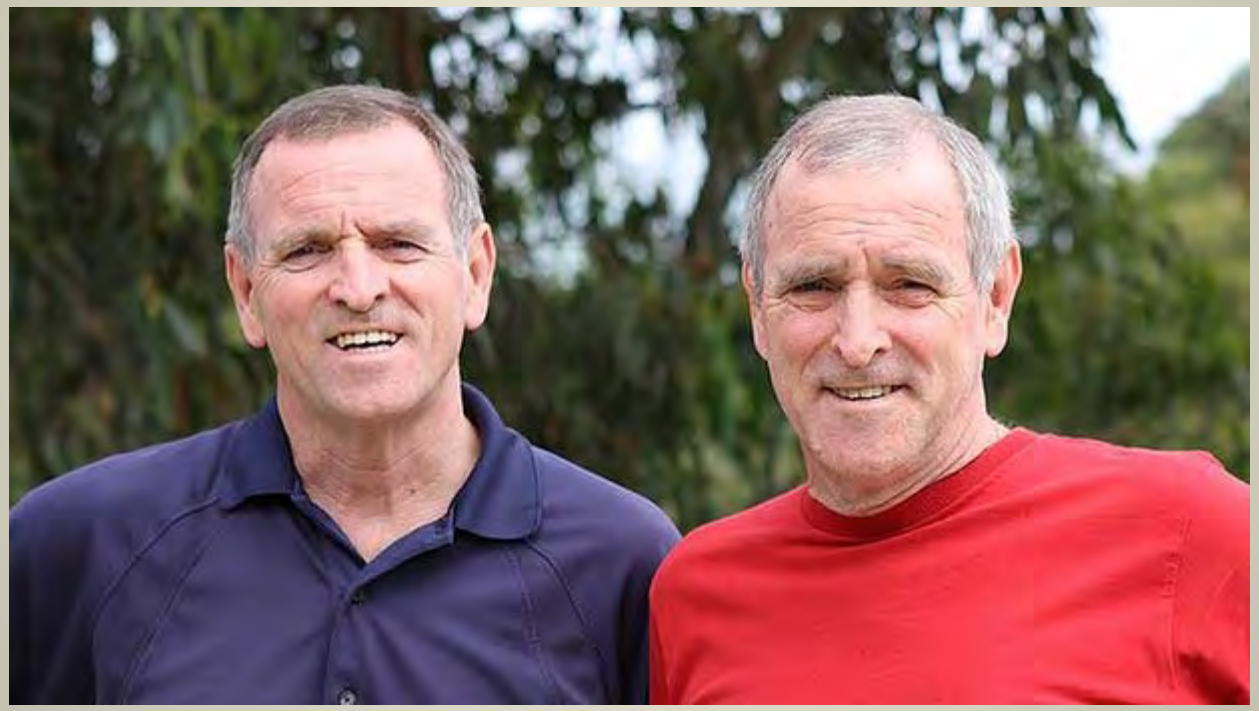
And understand why identical twins diverge with age



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Sometimes quite a bit

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Epigenetics can change the future

For better

For worse

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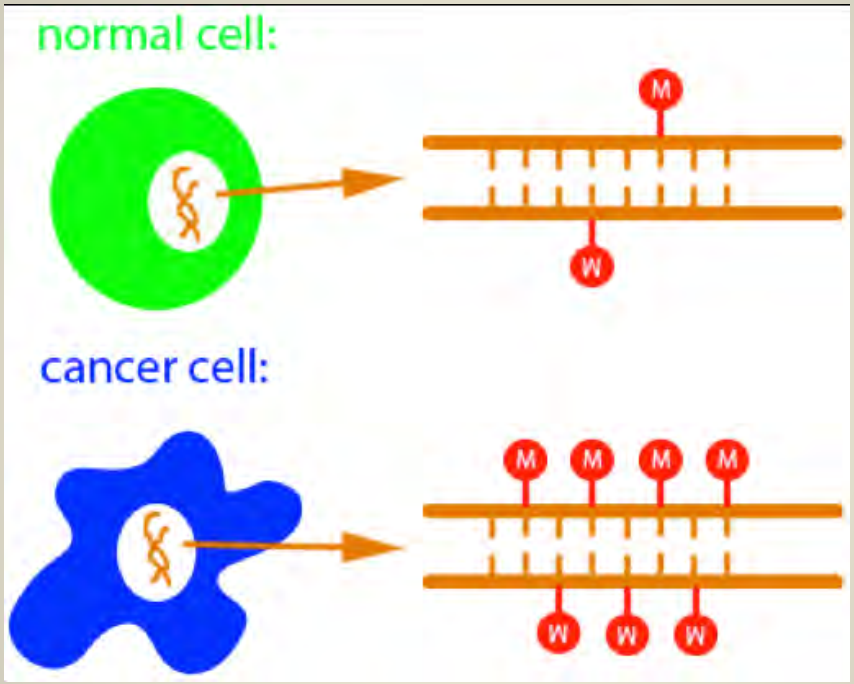
Epigenetics and Cancer



Cancer results more from epigenetic changes than gene mutations

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Epigenetics can also help cure

Cancer

Healthy

Now in remission using epigenetic treatment to block cancer cells

Over 100 drugs now in clinical trials

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Aging and Cancer
"Silver Tsunami"

WHO:

Cancer cases worldwide are forecast to rise by 75% and reach close to 25 million over the next two decades

According to the UICC (Union for International Cancer Control):

Avoiding tobacco, maintaining a healthy body weight, eating right and getting enough exercise, and getting appropriate cancer screening tests can cut this in half.

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Weight Gain with Age:
The BIG Problem

Why do we go from this **To this**

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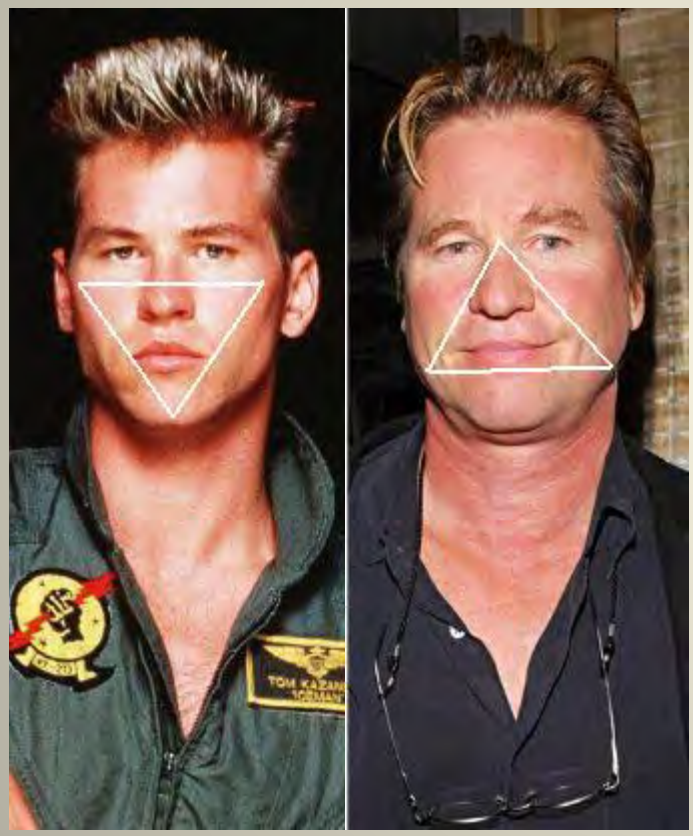
Age and Weight Gain



This To This

This To This

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Nutrition – The Problem

- 144 million adult Americans are overweight or obese
- Over a third of our children share the same problem
- For the first time in the history of our country the next generation isn't expected to live as long as their parents

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The Perfect Biologic Weapon

- 1971 The Japanese invent High Fructose Corn Syrup
- By the 1980s HFCS was the most common sweetener in the U.S.
- Between 1975 and 2005 the incidence of Type 2 Diabetes has increased over **SEVENFOLD**
- Type 2 Diabetes is deadly because it leads to cardiovascular disease increasing the risk of death by heart attack or stroke
- This cripples the Healthcare Budget and bankrupts the country

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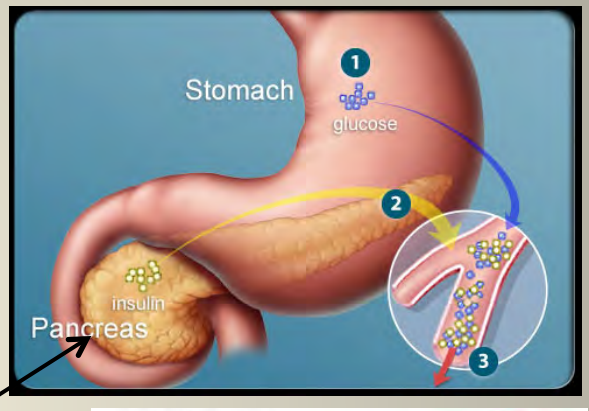
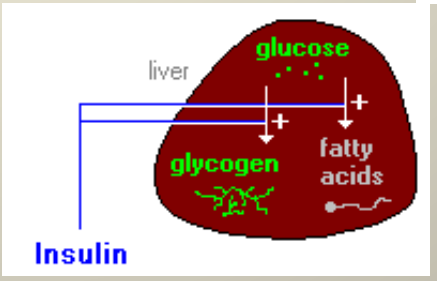
How we get Fat:
Eating Fat doesn't make you Fat!

- Carbohydrates are broken down to Glucose and Fructose
- The glucose is rapidly absorbed into the bloodstream resulting in a condition called hyperglycemia
- Your body responds to the rise in blood glucose by releasing insulin from the pancreas
- Insulin stimulates the Liver to either burn the sugar or store it as FAT
- The cycle continues





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The Vicious Cycle

- Increased sugar intake leads to more fat
- It also leads to
  - insulin resistance
  - increased craving for sugar
  - less energy to burn the calories.
- In the end this can lead to massive obesity.

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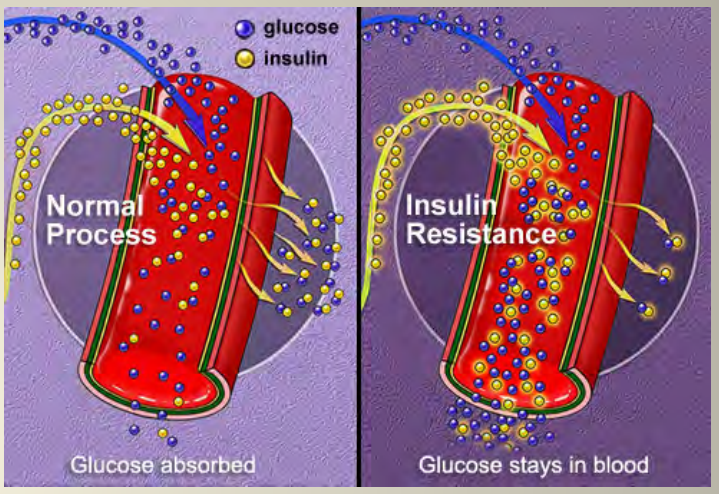
Evolution of Type 2 Diabetes

- Over time the pancreas wears out and the liver becomes insensitive to the insulin
- This results in a condition called "metabolic syndrome"
- This in turn leads to Type 2 Diabetes
- Diabetes can be <u>prevented</u> but not cured



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How about Fructose?

- Unlike Glucose, Fructose doesn't stimulate Insulin
- It is converted in the Liver to triglycerides a type of fat
- Triglycerides are deposited in the belly as Visceral FAT
- Fructose increases our hunger, and deprives us of energy

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Same End Result

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Prevention concepts

- Avoiding fructose especially HFCS may be the most important step
- Adding fiber to your diet and limiting the amount of processed carbohydrates allows the body to absorb the sugar more slowly preventing the spike in insulin that overloads the liver.
- Exercise has been shown to make the liver and other organs more sensitive to insulin while simultaneously lessening the amount of visceral or belly fat.

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Types of Carbohydrates

- Simple Carbohydrates (Bad)
  - Low in Fiber and Nutrients
  - High Glycemic Index
  - They are empty Calories that are converted to FAT
  - The High blood glucose makes us feel tired

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Types of Carbohydrates

- Complex Carbohydrates (Good)
  - High in Fiber and Nutrients
  - Low Glycemic Index
  - Stimulate fullness with fewer calories
  - Jumpstart the metabolism

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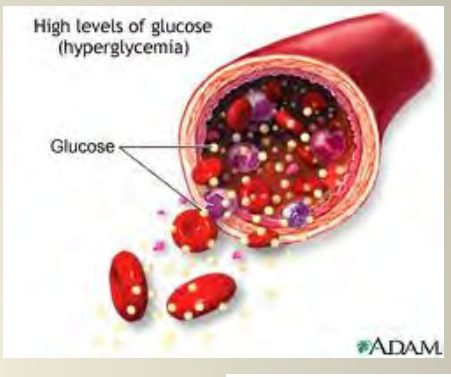
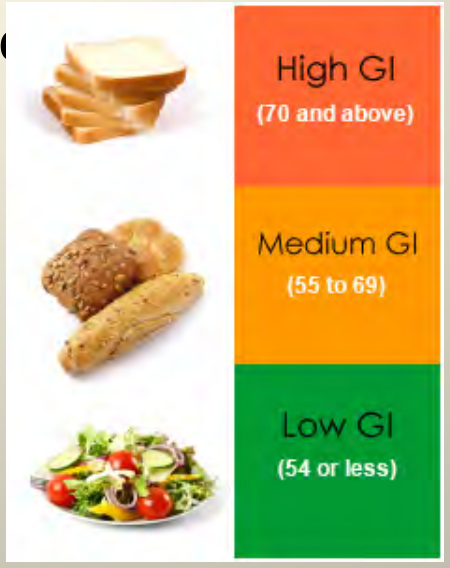
Glycemic Index

- Measure of how quickly blood glucose levels (i.e., blood sugar) rise after eating a particular type of carbohydrate
- Glucose has a glycemic index of 100
- The glycemic index compare each food to glucose
- High is above 70
- Low is below 55





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Glycemic Index of common foods

Baked Russet Potato	111
Baguette	95
Corn Flakes	93
Oatmeal	55
White Rice	89
Bagel	72
Whole Wheat Bread	71
Whole Grain Bread	51
Cranberry Juice	68
Apple Juice	44
Barley	28
Peanuts	7
Hummus	6

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A Few Popular Diets

- Vegan Diet
- Low Fat Diet
- Atkins Diet
- Paleo Diet
- Mediterranean Diet

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Vegan Diet

- Both a Diet and a Philosophy
- Vegans refrain from consuming animal products, not only meat but also eggs, dairy products and other animal-derived substances
- Some reject any use of animals including for food, clothing, entertainment or any other purpose
- Higher in dietary fiber, magnesium, folic acid, vitamin C, vitamin E, and iron
- lower in calories, saturated fat, cholesterol, long-chain omega-3 fatty acids, vitamin D, calcium, zinc and vitamin B12

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Low Fat Diet

- Restricts fat especially saturated fat and cholesterol
- Reducing fat in the diet can make it easier to cut calories
- Intended to reduce diseases such as heart disease and obesity
- Studies have given mixed results
- Hard to stay on
- People cheat with carbs

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Atkins Diet

- He felt hunger is the number one reason that low-fat diets fail
- Involves limited consumption of carbohydrates
- Does not impose caloric restriction, or definite limits on proteins
- Intended to switch the body's metabolism from metabolizing glucose as energy over to converting stored body fat to energy
- This is easier because one is satisfied with adequate protein, fat and fiber
- Often sensationalized as the all-the-steak-you-can-eat diet.
- Atkins suffered a heart attack
- Nature over Nurture

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Paleo Diet (Caveman Diet)

- Based on the premise that human genetics haven't changed since the dawn of agriculture
- Modern humans are adapted to the diet of the Paleolithic period
- Diet consists mainly of fish, grass-fed pasture raised meats, eggs, vegetables, fruit, roots, and nuts
- Excludes grains, legumes, dairy products, potatoes, refined salt and sugar, and processed oils
- The life expectancy of a caveman was 25

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Mediterranean Diet

- Inspired by the traditional dietary patterns of Greece, Spain and Southern Italy
- Include proportionally high consumption of olive oil, legumes, unrefined cereals, fruits, and vegetables,
- Moderate to high consumption of fish
- Moderate consumption of dairy products (mostly as cheese and yogurt),
- Moderate wine consumption
- Low consumption of meat and meat products

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Results of Clinical Studies

- A meta-analysis published in the American Journal of Clinical Nutrition in 2013 compared Mediterranean, vegan, vegetarian, low-glycemic index, low-carbohydrate, high-fiber, and high-protein diets with control diets.
- The research concluded that Mediterranean, low-carbohydrate, low-glycemic index, and high-protein diets are effective in improving markers of risk for cardiovascular disease and diabetes

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Results of Clinical Studies

- 2011 systematic review found that a Mediterranean diet appeared to be more effective than a low-fat diet
- A 10-year study found that adherence to a Mediterranean diet and healthful lifestyle was associated with more than a **50%** lowering of early death rates
- A 5-year study of 7,447 people reported on the Mediterranean diet compared with a low fat diet
  - Individuals on a Mediterranean diet supplemented with mixed nuts and olive oil
  - **30%** reduction in risk of having a major cardiovascular event and a
  - **49%** decrease in stroke risk
  - Study was terminated early due to such dramatic results

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New Information on Protein
Bad news for Paleo lovers

- High-Protein Diet Raises Cancer Risk As Much As Smoking
- People ages 50 to 65 who ate a diet rich in animal proteins during middle age were more than **four** times as likely to die of cancer
- Study also found that middle-age people who ate foods rich in animal proteins — including meat, milk and cheese — were 75 percent more likely to die of any cause than those who ate a low-protein diet
- People older than 65 were **less** likely to die of cancer or other causes if they consumed **more** protein
- The link between high-protein intake and risk of cancer almost vanished for participants whose protein mainly came from plants, such as beans
- The study suggests that the Mediterranean diet, which is low in animal protein and high in complex carbohydrates, may be best for extending life span

Cell Metabolism April 2014

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New Information on Saturated Fat

- Published in Annals of Internal Medicine March 2014
- Analyzed results of 72 separate studies that included over 600,000 participants in 18 different countries
- Findings:
  - Saturated Fat in diet or in bloodstream not associated with increased risk of heart disease
  - Omega-3 and omega-6 supplements showed no benefit
  - Trans fats responsible for 16% increased risk of heart disease
  - One specific fatty acid margaric acid (a dairy fat) significantly reduced the risk of cardiovascular disease
- Not to be taken as open season on cheeseburgers!
- Authors still recommend Mediterranean style diet

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How about Vegetarians?

- 2013 Study
- 73,000 people ages 25 and older
- Vegetarians were 12% less likely to die from all causes combined compared to non-vegetarians
- Lower rate of death due to cardiovascular disease, diabetes, and renal disorders such as kidney failure
- No association was detected in this study between diet and deaths due to cancer
- "This research gives more support to the idea that certain vegetarian dietary patterns may be associated with reduced mortality and increased longevity"

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The Bottom Line

- Avoid Processed Carbohydrates
- Eat more Fish especially Tuna and Salmon
- Eat more colorful Vegetables and Fruit
- Berries especially blueberries, raspberries, and strawberries
- Eat more nuts especially Almonds and Walnuts
- Use more Olive and Canola oil
- Switch to whole grain bread and pasta
- Try to find Lean grass fed meat
- Free range poultry and eggs
- Low fat dairy products including yogurt
- Enjoy a glass or two of Red Wine
- Go easy on Salt
- And remember that you still have to watch the calories

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Take Your Pick

Vegan

Caveman

Mediterranean

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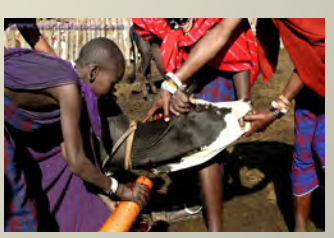
What do these People have in common?

- Inuit of Greenland
  - High Fat Diet
- Indigenous peoples of southern Africa
  - Low protein, high-carb diet
- People of Loetschental Valley in Switzerland
  - Diet high in raw milk and cream
- Massai of Kenya and Tanzania
  - Diet high in animal blood



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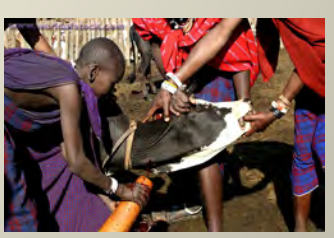
What do these People have in common?

- Their diets are based on whole foods with minimum processing
- Their diets are extremely low in sugar content
- They have minimal incidence of
  - Heart disease
  - Diabetes
  - Obesity
  - Osteoporosis
  - Alzheimer's disease
  - Cancer



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What are Superfoods?

- Foods that have earned the distinction of a great nutritional value for the amount of calories
  - Unprocessed or minimally processed
  - Flavorful
  - Low in unhealthy fats
  - Boost the metabolism
  - Heart healthy
  - Help prevent obesity
  - Reduce the risk of Cancer

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My Top 25 Superfood List

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Heart Healthy Foods

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Coffee Facts

- **More antioxidants from coffee than both fruits and vegetables… combined**
- **Nutrients, include Riboflavin, Pantothenic Acid, Manganese, Potassium, Magnesium and Niacin**
- **Much lower risk of getting type II diabetes**
- **Much lower risk of getting Alzheimer's disease**
- **60% lower risk of getting Parkinson's disease**
- **Much lower risk of developing cirrhosis**
- **Lower the risk of developing depression and may dramatically reduce the risk of suicide**
- **Liver and colorectal cancer are the 3rd and 4th leading causes of cancer death worldwide. Coffee drinkers have a lower risk of both**
- **Coffee drinkers live longer and have a lower risk of premature death.**

- The most expensive coffee in the world comes from civet poop
- Kopi Luwak are coffee beans that come from Civet (a cat sized mammal) poo.
- The animals gorge on only the finest ripe berries, and excrete the partially-digested beans, which are then harvested for sale.
- Kopi Luwak is the most expensive coffee in the world, selling for between $120 and $600 USD per pound.
- The question is: who first discovered that it tasted good?

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Quinoa (pronounced keen-wa)

- One of the most protein-rich foods we can eat
- It is a complete protein containing **all nine essential amino acids**
- Almost twice as much fiber as most other grains
- Rich source of Iron, lysine, magnesium, riboflavin, manganese

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Cinnamon

- Used by the Egyptians 2000 B.C. for embalming perfume
- Mentioned in the Old Testament
- Used to help treat
  - muscle spasms
  - Vomiting
  - Diarrhea
  - Infections
  - the common cold
  - loss of appetite
  - erectile dysfunction
- Reduces
  - serum glucose
  - Triglyceride
  - LDL cholesterol
  - total cholesterol in people with type 2 diabetes
- Cinnamon may potentially be effective against HIV
- Cinnamon may help stop the destructive process of multiple sclerosis (MS)

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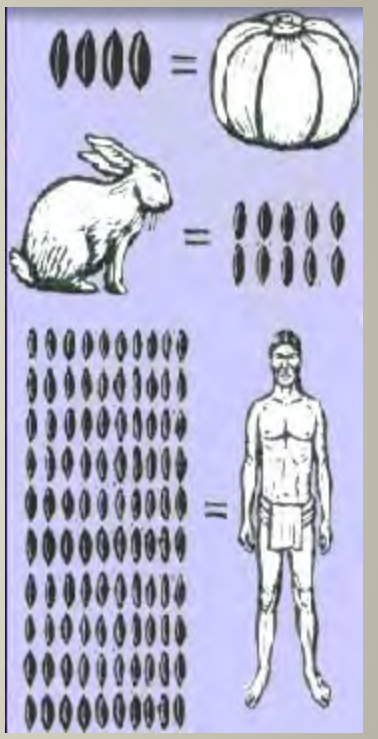
Dark Chocolate

- The Aztecs and Maya's used chocolate as currency.
  - 10 beans could buy a rabbit, or even a prostitute.
  - 100 beans were enough to buy a slave
  - some people actually created counterfeit beans using clay
- Chocolate contains phenylethylamine (PEA), the same chemical your brain creates when you feel like you're falling in love
- Dark chocolate contains theobromine, which has been shown to harden tooth enamel
- All of this in addition to it's beneficial effects on
  - Heart
  - Vessels
  - Brain
  - Cancer



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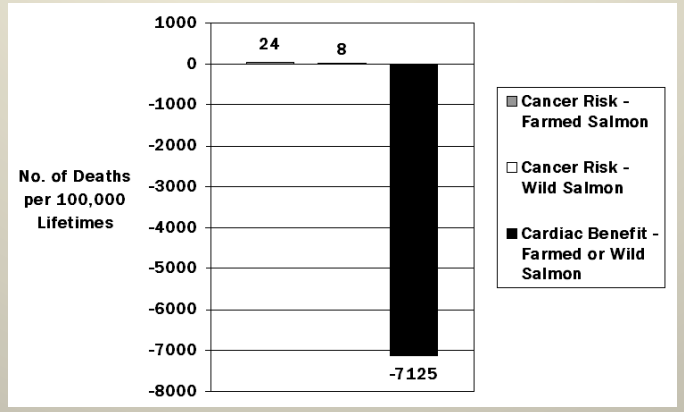
Salmon Facts

- Salmon are among only a few creatures on earth that are "anadromous" - meaning they live part of their life in freshwater and part of their life in saltwater
- They migrate up to 4,000 miles from the ocean to freshwater areas to spawn
- We still don't know how they navigate across the ocean
- They will return to the exact part of the river where they were born
- Pacific Salmon die after spawning while Atlantic Salmon live to spawn again
- Most of the Salmon we eat comes from "fish farms"
- This has lead to a controversy about the risk vs. benefit of Farmed Salmon
- The cancer risk is estimated to be 24/100,000 for farmed Salmon and 8/100,000 for Wild Salmon
- The Cardiac Benefit for both types of Salmon is 7125/100,000 saved
- The risk of farmed Salmon is probably negligible compared to the benefit



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Cherry Bounce

- **“Cherry Bounce” is one of this country’s oldest libations. Martha Washington even included her own special recipe in her writings**
- **She had to do something with the tree her husband chopped down**
- **Cherries have a high concentration of Melatonin (a sleep aid)**
- **My godmother made it during the prohibition**
- **She slept like a baby (maybe it was the Bourbon?)**

TRADITIONAL CHERRY BOUNCE

- 2 qts Cherries, unpitted (sweet, sour, or the traditional wild)
- 1 qt Bourbon
- 3 C sugar (less if using sweet cherries.)
- 2 sticks cinnamon
- Combine the cherries, sugar and cinnamon in a glass container or earthen crock. cover with cheesecloth or screen and sit in warm place for two weeks to two months. There’s no rule here. Just look for a sticky brown syrup to develop.
- Then pour bourbon into mixture and let set for at least a week, and up to another month. Then strain all ingredients into bottles, and either drink immediately, or seal and wait until Christmas.

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French Paradox

- The paradoxical epidemiological observation that French people have a relatively low incidence of coronary heart disease (CHD), while having a diet relatively rich in saturated fats
- It was felt to be do to their consumption of <u>RED WINE</u>
- The elements of Red Wine felt to be responsible are:
  - **RESVERATROL** which has been linked to longevity and cancer prevention
  - **PROCYANIDINS AND POLYPHENOLS** which reduce the absorption of malondialdehyde, implicated in arteriosclerosis, cancer, diabetes and other diseases
- in 1991, an early account of the then-novel concept of the French paradox was aired in the United States on "60 Minutes"
  - Within a year, the consumption of red wine in the United States had increased 44%
- Vive La France!

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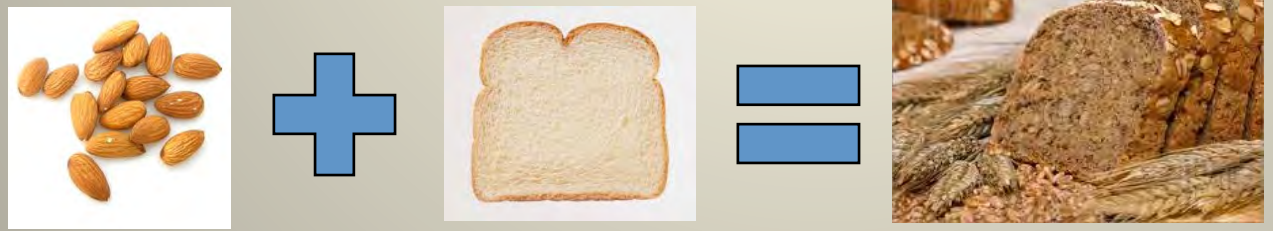
Almonds and Glycemic Index

- Eating almonds along with a high glycemic index food significantly lowers the glycemic index of the meal and lessens the rise in blood sugar after eating
- 3 ounces of almonds with White bread lowered the GI from 105.8 to 45.2—less than half the GI of the white bread only meal
- Other nuts shown to do the same
- Lessening after-meal surges in blood sugar helps protect against diabetes and cardiovascular disease



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The Future – lower the GI

1. Start with regular pasta with GI of 38
2. Adds a prebiotic fiber to create a matrix within the pasta
3. Lowers the GI to 13 (65%)
4. Tastes as good as regular pasta

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My own journey

MD Fitness (nutrition + exercise)

2006
190 lbs

2010
200 lbs

2013
180 lbs

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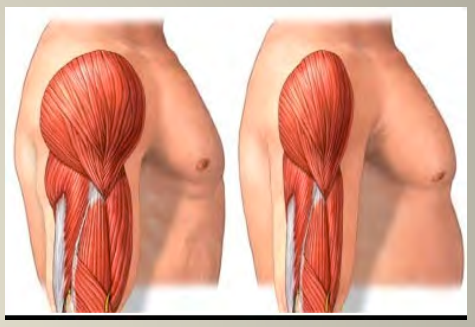
Sarcopenia

- Muscle mass starts to decline in your twenties
- After age 40 you lose 8% every 10 years
- You also gain about 1lb per year after 25
- Signs include
  - sagging and wrinkled skin
  - hair loss
  - trembling extremities
  - loss of coordination
  - stooped posture
- This leads to disability linked to
  - poor balance
  - gait speed
  - falls
  - fractures



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Sarcopenia - Causes

- Linked to changes in certain hormones
  - Growth hormone
  - Testosterone
  - Estrogen
- Lower BMR (basal metabolic rate) means fewer calories burned
- Lifestyle changes (becoming more sedentary)

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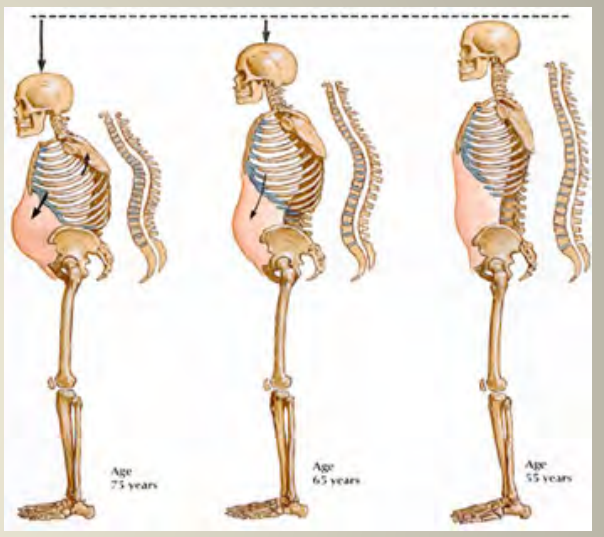
Osteoporosis

- Bone loss starts in the thirties
- It accelerated after menopause
- Worldwide, osteoporosis causes more than 8.9 million fractures annually, resulting in an osteoporotic fracture every 3 seconds
- It is a preventable disease



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Other Effects of Aging

- Heart muscles thicken (Cardiovascular disease)
- Blood vessels become stiffer (Hypertension)
- Lungs become less elastic (Respiratory failure)
- Joints lose synovial fluid (osteoarthritis)
- Brain loses nerve cells (memory loss)
- Kidneys lose efficiency (renal failure)
- Eye lens loses elasticity (Presbyopia)
- Ear drums stiffen (hearing loss)

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Why am I telling you this?

- Because it is preventable
- Exercise has been shown to improve all of these organ systems and more

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I am over 40 and want to exercise: What are my options?

Jack

Jane

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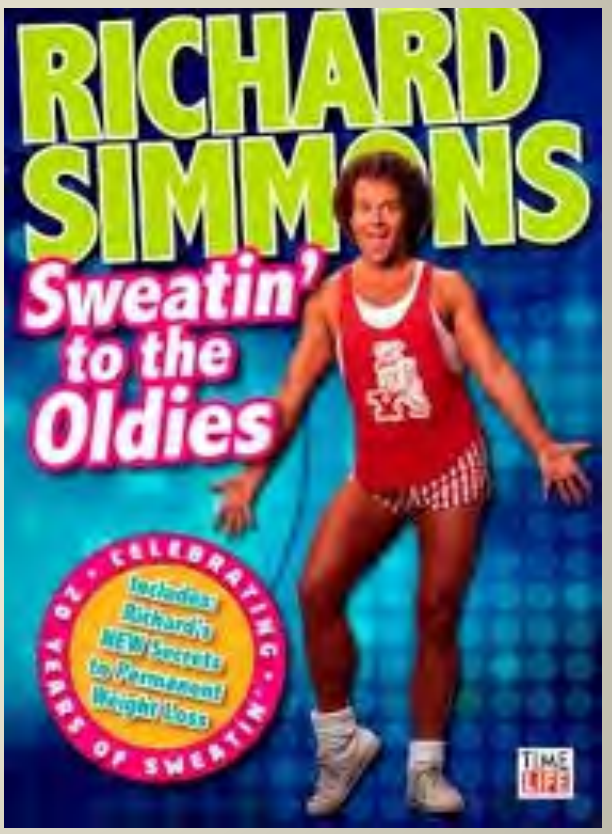
I am over 40 and want to exercise: What are my options?



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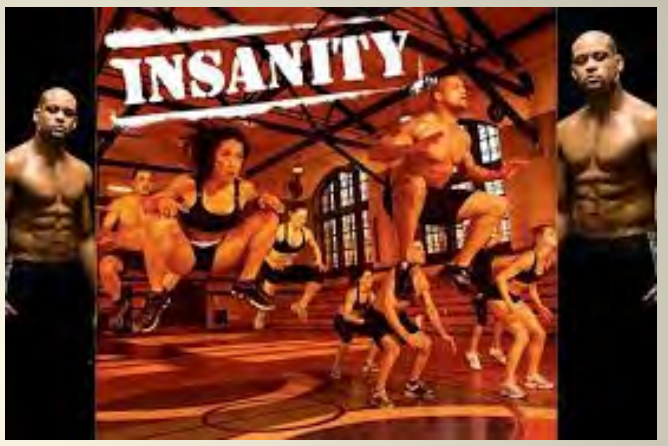
I am over 40 and want to exercise: What are my options?



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Goals

- Make it affordable
- Make it simple to do at home
- Use basic equipment (mat and hand weights)
- Make it easy to learn
- Make it adaptable to all levels of fitness
- Don't make it too long

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Types of Exercise

- Cardio Exercise
- Strength Training
- Flexibility Exercise

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Cardio (Aerobic) Exercise

- Physical activity which raises the heart rate to around 60 to 85 percent of the heart's maximum rate for an extended period of time, usually twenty minutes or longer

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Strength Training

- Use of resistance to induce muscular contraction which builds the strength, anaerobic endurance, and size of skeletal muscles.
  - ~~Machines~~
  - Weights
  - Using body weight

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Flexibility Exercise

- At the end not the beginning

Pilates

- Combination of Strength training, endurance, and flexibility
- Works arms, legs, and core
- Demands focus and technique
- Can be done in groups
- Instructors may be trained or untrained

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Benefits of Cardio

- Help maintain weight
- Increase stamina
- Prevent illness such as cold and flu
- Reduce risks of
  - Obesity
  - heart disease
  - high blood pressure
  - type 2 diabetes
  - stroke
  - certain types of cancer (especially Breast and Colon)
- Strengthen the Heart
- Keep arteries clear
- Improve cognitive function and mood
- Live longer

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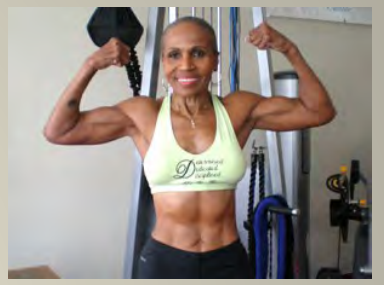
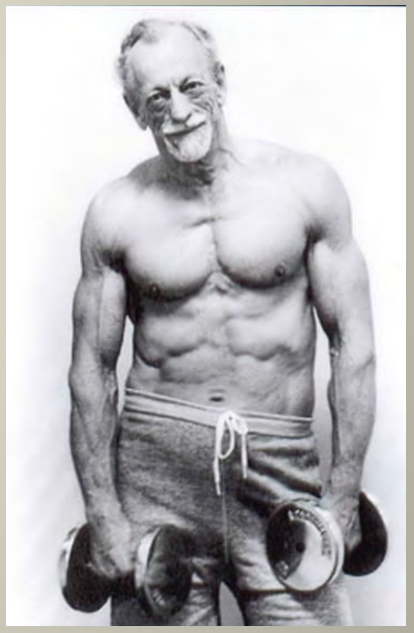
Benefits of Strength Training

- Prevent or reverse Sarcopenia
- Help lose more weight (muscle burns more calories than fat)
- Improve your balance
- Strengthen your bones and prevent Osteoporosis
- Manage chronic conditions
  - Back pain
  - Arthritis
  - Obesity
  - Heart disease
  - Diabetes
- Sharpen your focus





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Fountain of Youth?

- Research by Scientists at King's College London
- Measured the length of telomeres to determine biologic age difference
- Studied 2401 twins where one exercised and the other was sedentary
- Twins who exercised 3 hrs. or more a week were found to biologically younger by **10 years** than their twin born the same day.

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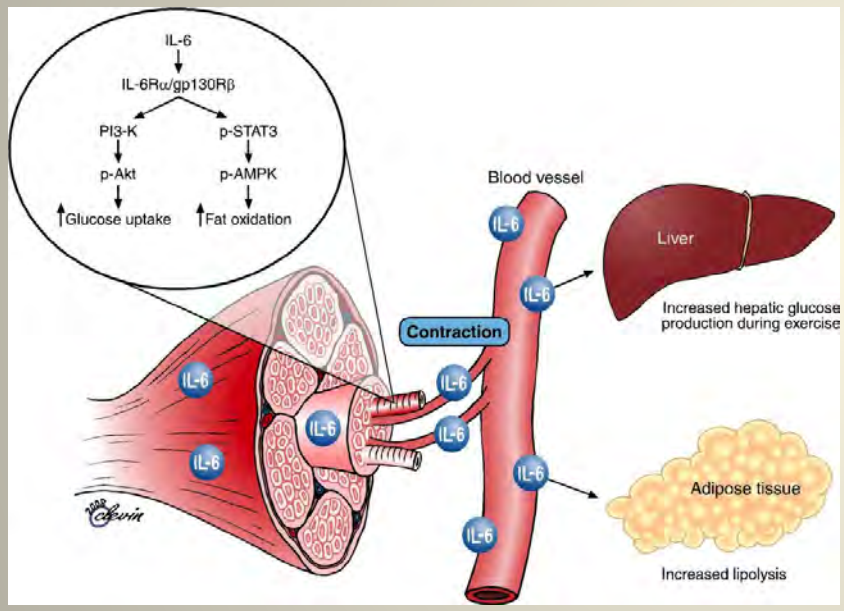
“The Holy Grail of Exercise” Interleukin – 6



- Hormone produced by muscles
- Stimulated by exercise
- Helps burn fat
- May remove plaque from arteries
- May even reverse some types of arthritis
- Probably helps extend life

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It's Never too Late
to Get Started!
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