Wake the Health Up!

Impacts of Diet & Nutrition on Ocular & Systemic Diseases

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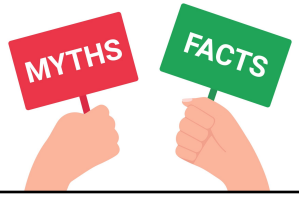
Disclosures

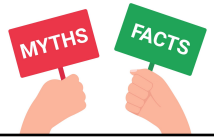
None

Learning Objectives

- **Discuss** the epidemiology, prevalence, incidence, pathophysiologies, risk factors of adult and childhood obesities in the U.S.
- **Discuss** common chronic systemic and ocular diseases often linked to poor diet and nutrition
- **Learn** various approaches to obesity treatment including life-style modification (diet, exercise and behavior modification), medical management and surgical intervention



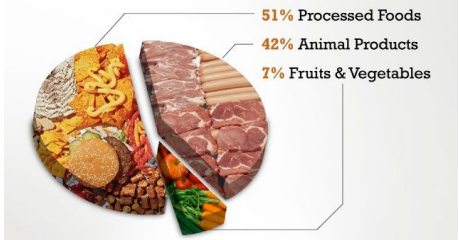
"I eat pretty healthy"



The Standard American Diet (SAD)

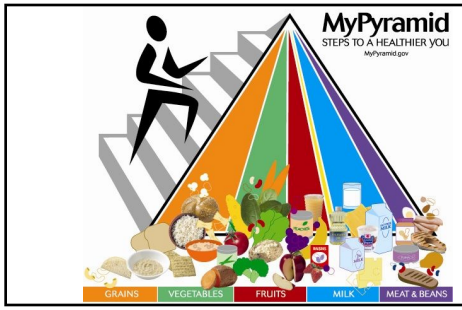
- **75%** of Americans say they eat healthy **despite evidence to the contrary**
- The Standard American Diet (SAD) has long been implicated in **contributing to the health challenges** experienced in the United States.
- The SAD was **not the diet humans evolved eating**
  - For hundreds of thousands of years, all humans were hunter-gatherers who ate mostly fatty meats, supplemented with low nutrient plant foods.
- The SAD is **not compatible with our genetic heritage**.
- Eating a Standard American Diet is a root cause of the "diseases of civilization"
  - Include heart disease, diabetes, cancer, infertility, mental health issues, and other metabolic diseases

The S.A.D. diet



Dietary Guidelines for Americans (DGA)

- The overall goal is to advise people on what to eat **to promote good health and prevent disease**
- Should eat fresh fruits and vegetables, whole grains, lean protein and healthy oils for good health.
- The current **SAD** diet→ too much-saturated fat in the form of red meat and high-fat dairy products, fast food, and refined carbohydrates, added sugars, salt, and overall calories.



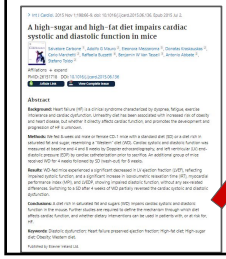
Western Dietary Consumption

- The traditional Western (American) diet is **low in fruits and vegetables**, and **high in fat and sodium**.
  - Consists of **large portions, high calories, and excess sugar**
  - This excess sugar accounts for more than 13% of the daily caloric intake with beverages constituting 47% of these added sugars.
  - Other sources include **cookies, cakes, and candy**
- Although fruits and vegetables contain natural sugars, they provide nutrients such as vitamins, minerals, and antioxidants while added sugars only contribute calories.
- The western diet is also noted to be **high in saturated and trans fats**
  - These fats not only contribute more calories; they increase low-density lipoproteins **leading to atherosclerosis**

Western Dietary Consumption

- Poor diet is predominantly **associated with weight gain and obesity**
- In animal models, animals were often fed some type of high-fat, high-sugar diet, (Western Diet) to simulate the diet that a typical American consumes
  - Animal and human studies **indicate that an unhealthy diet can contribute to the development of many diseases, like cardiovascular disease and cancer**.

Evidence-Based Studies on Dieting & Nutrition in the U.S.

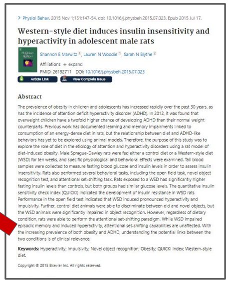


A high–sugar and high–fat diet impairs cardiac systolic and diastolic function in mice

A diet rich in saturated fat and sugars (WD) **impairs cardiac systolic and diastolic function** in the mouse.

Impacts of the Western Diet

The quantitative insulin sensitivity check index (QUICKI) **indicated the development of insulin resistance in WSD rats**



Physiol Behav. 2015 Nov 1;151:147-54. doi: 10.1016/j.physbeh.2015.07.023. Epub 2015 Jul 17.

Western-style diet induces insulin insensitivity and hyperactivity in adolescent male rats

Shannon E Marwitz [1], Lauren N Woodie [1], Sarah N Blythe [2]

Affiliations + expand

PMID: 26192711 DOI: 10.1016/j.physbeh.2015.07.023

Article Link View Complete Issue

Abstract

The prevalence of obesity in children and adolescents has increased rapidly over the past 30 years, as has the incidence of attention deficit hyperactivity disorder (ADHD). In 2012, it was found that overweight children have a twofold higher chance of developing ADHD than their normal weight counterparts. Previous work has documented learning and memory impairments linked to consumption of an energy-dense diet in rats, but the relationship between diet and ADHD-like behaviors has yet to be explored using animal models. Therefore, the purpose of this study was to explore the role of diet in the etiology of attention and hyperactivity disorders using a rat model of diet-induced obesity. Male Sprague-Dawley rats were fed either a control diet or a Western-style diet (WSD) for ten weeks, and specific physiological and behavioral effects were examined. Tail blood samples were collected to measure fasting blood glucose and insulin levels in order to assess insulin insensitivity. Rats also performed several behavioral tasks, including the open field task, novel object recognition test, and attentional set-shifting task. Rats exposed to a WSD had significantly higher fasting insulin levels than controls, but both groups had similar glucose levels. The quantitative insulin sensitivity check index (QUICKI) indicated the development of insulin resistance in WSD rats. Performance in the open field test indicated that WSD induced pronounced hyperactivity and impulsivity. Further, control diet animals were able to discriminate between old and novel objects, but the WSD animals were significantly impaired in object recognition. However, regardless of dietary condition, rats were able to perform the attentional set-shifting paradigm. While WSD impaired episodic memory and induced hyperactivity, attentional set-shifting capabilities are unaffected. With the increasing prevalence of both obesity and ADHD, understanding the potential links between the two conditions is of clinical relevance.

Keywords: Hyperactivity; Impulsivity; Novel object recognition; Obesity; QUICKI index; Western-style diet.

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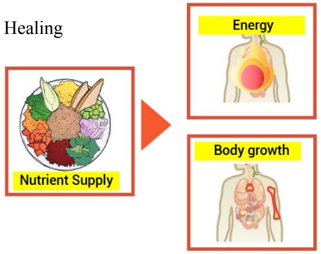
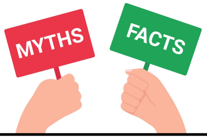
Difference Between Diet & Nutrition

Diet is what you eat while **nutrition** refers to the fuel you need to function

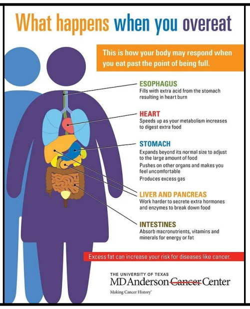
Food Can Be Healing



“Don’t get up from the table unless you’ve eaten all of your food”



Did You Know



Americans are Chronically Overeating

- Overeating is defined as **eating more food that your body needs** to the point where you feel uncomfortably full
- Children with poor eating habits don't get the amounts of nutrients they need for healthy growth and development
  - → can lead to being underweight or overweight.
  - → poorer nourishment tend to have weaker immune systems, which **increases their chances of illness**

Lay's
“Betcha can't eat just one.”

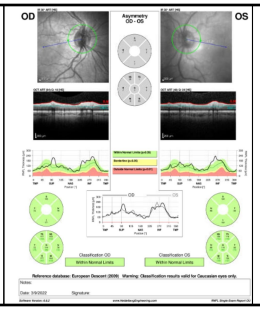
Case 1: 9 YO WF

- **CC:** blurred vision OS x > 3 months
- **BCVA**: 20/20 OD, **20/200 OS**
- **IOP**: normotensive IOP OU
- **EOMs:** Full, no restrictions OU
- **CVF:** FTFC OU
- **PMHx:** unremarkable
- **POHx**: unremarkable
- **Medicine**: Claritin OTC QD for seasonal allergies

Case Cont'd

- **Ocular Testing**
  - **Anterior Segment:** Unremarkable Findings OU
  - **Posterior Segment:**
    - OD:Unremarkable Findings OD
    - **OS: 3+ Diffuse subcapsular lenticular opacities**
  - The retina and vitreous OD, OS demonstrated normal findings on fundoscopy and B-scan ultrasonography

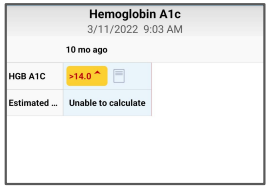
OCT MACULA



Case Cont'd

- Referred to pediatric ophthalmologist
- Ordered blood tests
  - *CBC w/ diff, ESR, CRP, BMP, PPD, FTA-ABS, RPR, ANA, ELISA, Antibody/Antigen, PCR, Glucose Panel*

Case 3 Cont'd



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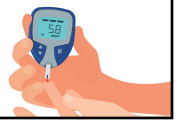
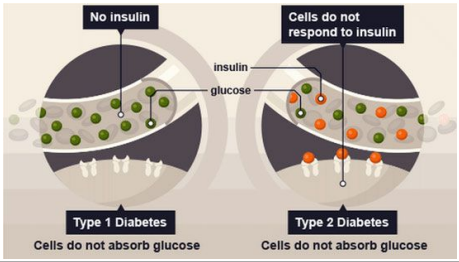
Type 1 DM (Juvenile Diabetes)

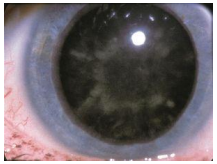
- A chronic condition in which the pancreas **produces little or no insulin**
- It typically appears in **adolescence**
- The **signs and symptoms of type 1 diabetes** in children usually develop quickly, and **may include**:
  - Increased thirst
  - Frequent urination, possibly bed-wetting in a toilet-trained child
  - Extreme hunger
  - Unintentional weight loss
  - Fatigue
  - Irritability or behavior changes
  - Fruity-smelling breath



Pathophysiology of Diabetes Mellitus (DM)

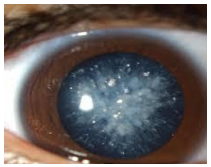


Snowstorm (Metabolic) Cataracts



- Snowstorm cataracts are **rare**
- **Early ocular manifestation in Type 1 Diabetes Mellitus (T1DM)** noted in the pediatric population with an estimated prevalence of 0.7-3.4%
- These cataracts consist of **multiple, scattered gray-white subcapsular opacities**

Snowstorm Cataracts

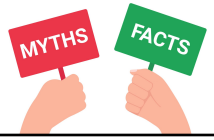


- While **rare, it is usually <u>seen in uncontrolled diabetic patients</u>**
- The exact pathophysiological mechanism of cataract development in Type 1 pediatrics is **unknown**
  - However, research suggests that lenticular opacification is associated with extended prodromal periods, elevated hemoglobin levels (>12%), and the activation of the polyol pathway and acute osmotic stress **due to hyperglycemia**

Follow Up

- The patient was immediately hospitalized, with a multi-insulin (injectable lispro and glargine) regimen being initiated.
- Once HbA1c improved (6.3%), complex cataract extraction with primary posterior capsulorhexis was performed.
- **Status post surgery, unaided visual acuity OS improved to 20/30 and glucose levels remained stable (6.3%)**

“I can’t help it”



We Eat With Our Eyes

Science Behind Fast Food Ads

- **Stratium** (Reward Center of the Brain)
  - Function→ coordinates multiple aspects of cognition, including both motor and action planning, decision-making, motivation, reinforcement, and reward perception.

How Fast Food Advertisements Get Under Your Skin, Whether You Realize It Or Not

Studies show how ads can trigger the reward center of the brain, and it starts during childhood.

by Carlo Pinna, HuffPost

For years, academics across the world have studied the effects fast food advertising has had on children and adolescents. With nearly 1-in-5 school-aged children in the United States qualifying as obese, these studies aim to figure out how TV commercials, product placement and the new frontier of digital marketing are leading to unhealthy lifestyles.

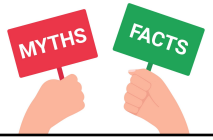
But let's say you watch a commercial for a Big Mac. Do you immediately drive to McDonald's and order the 563-calorie bomb? Not necessarily. However, fast food marketing seeps into your brain in a way you may not realize.

At the University of Michigan, associate professor Ashley Gearhardt runs The Food and Addiction Science and Treatment (FAST) lab, a simulated fast food restaurant that uses neuroimaging to study this sort of stimuli. She's currently conducting a study on 160 teenagers and what happens in the striatum—the reward section of the brain—while viewing the ads, and how the ads can get "under the skin." She showed teens three kinds of commercials: unhealthy fast food, healthier fast food and a control commercial for cat phones.

"When teenagers are seeing fast food commercials, it really seems to be activating reward centers of the brain more effectively than other types of advertisements," Gearhardt told HuffPost about her preliminary findings (a published paper is forthcoming). "The teenagers that are showing this greatest reward activation of the brain seem to be at greater risk in gaining weight over time. It's hard for people to defend against [because it's not a conscious process]."

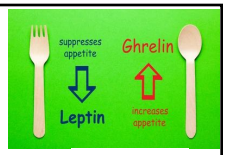
The Choice is Yours

"My stomach is talking"



Stomach Growling

- Brain → stomach = **releases ghrelin** (appetite-stimulating hormone)
  - Contraction of your intestines and stomach
  - The **<u>rumbling</u>** you hear is the movement of those organs
    - This can occur at any time, on **an empty or full stomach**



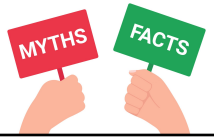
Hunger Hormones

- Stress releases hormones → push people toward overeating high-fat, sugary "comfort foods"
- Research have shown that **physical or emotional distress increases** the intake of food high in fat, sugar, or both.
- **High cortisol and insulin levels**, may be responsible.
- Other research suggests that **ghrelin**, a "hunger hormone," may have a role
  - Stimulates appetite, increases food intake and promotes fat storage

"Hangry"

- Hunger as a state actually causes a lot of shifts in hormones, brain processes and the peripheral nervous system→ **may mimic what we see in anger, fear and sadness**
- Shift out of homeostasis→ triggering cascades of hormones like cortisol, **fight or flight responses**
- Glucose states are low when people are hungry
  - The brain requires glucose and doesn't function properly in low glucose states
- Consider **high fiber and protein foods**
  - → goal to stabilize glucose levels, not to spike it

"Food is comforting"

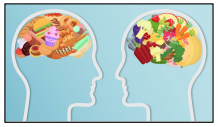


Why Comfort Foods Are Not Actually Comforting

- Researchers at the University of Illinois suggest that most of us crave comfort food **when we want to reward ourselves**
- Our cravings are more **psychologically or mentally rooted**.
  - **Cravings** might result from an emotional need, a certain smell, or how we've conditioned ourselves to deal with certain situations.
  - Essentially, a craving for comfort foods can be **emotionally driven** and also become a **habit over time**

Impacts of Dieting on Mental Health

- *International Journal of Food Sciences and Nutrition (2019)*
  - Revealed that **adults who consumed more unhealthy foods** were more likely to report symptoms of either moderate or severe psychological distress, anxiety and depression than their peers who consume a healthier diet.



Studies in humans

Mental health status and dietary intake among California adults: a population-based survey

Jim E. Banta, Gina Segovia-Siapco, Christine Betty Crocker, Danielle Montoya & Noara Alhusseini

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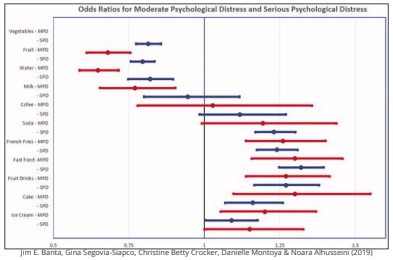
Abstract

California Health Interview Survey (2005–2015) data were used to examine the association between dietary intake frequencies and mental health – Kessler-6 scores categorised as no/low (NLPD), moderate (MPD) or serious psychological distress (SPD). The 245,891 surveys represented 27.7 million adults annually, with 13.2% having MPD and 3.7% SPD. Survey-adjusted regression adjusting for gender, age, race, education, poverty, marital status, BMI, geography and year found MPD and SPD associated with lower consumption of fruits (adjusted odds ratio 0.79 and 0.65, respectively), vegetables (AOR 0.81 and 0.68), and increased consumption of French fries (AOR 1.24, 1.30), fast food (AOR 1.32, 1.27), soda (AOR 1.23, 1.26) and variance-adjusted daily teaspoons of sugar (coefficients 3.05, 4.21), all *p*-values less than 0.001. In this large population-based sample, moderate and SPD were independently associated with unhealthy diet. Targeted public health interventions could focus on young adults and those with less than 12 years of education.

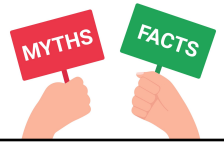
Jim E. Banta, Gina Segovia-Siapco, Christine Betty Crocker, Danielle Montoya & Noara Alhusseini (2019)

Unhealthy Dieting Linked to Mental Illness

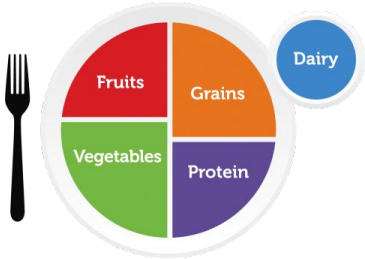


Jim E. Banta, Gina Segovia-Siapco, Christine Betty Crocker, Danielle Montoya & Noara Alhusseini (2019)

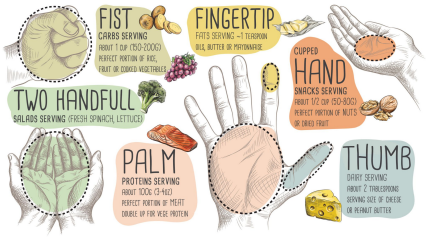
"Moderation is Key"



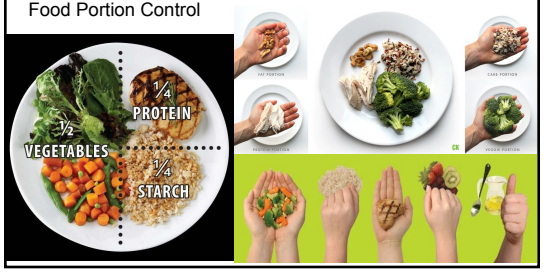
So, What's On Your Plate?



Are You Portioning Your Food?



Food Portion Control



IMPORTANT ANNOUNCEMENT!

Food can be **healing** or it can be **toxic**

Chronic Diseases

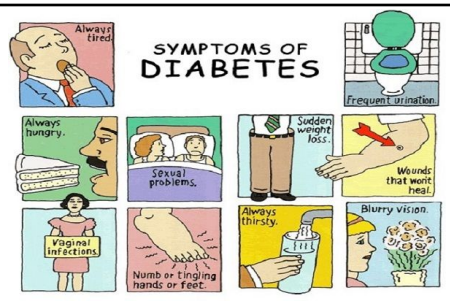
- Chronic diseases are **established, long-lasting conditions**
  - Includes: **Diabetes, Cardiovascular Disease, Kidney Disease, Hypertension, Cancer**
- In the US,
  - About **1 in 2 people** (133 million) has at least **one (1) chronic medical condition**
    - I.e. HTN, arthritis, asthma, sleep apnea, high cholesterol
- Annually, **over 75% of the US health care budget** (>$2 trillion) is spent on medical costs associated with chronic diseases

Epidemiology of Diabetes

- **34.2 million Americans**—just over 1 in 10—have diabetes.
- **88 million American adults—approximately 1 in 3—have prediabetes.**
- **New diabetes cases** were higher among Blacks and Hispanics than Asians and Whites.
- For adults diagnosed with diabetes:
  - The percentage of existing cases was highest among American Indians/Alaska Natives.
  - **15% were smokers, 89% were overweight, and 38% were physically inactive.**

Prevalence & Incidence of Diabetes

- New diagnosed cases of type 1 and type 2 diabetes have significantly increased among **youth** in the U.S.
- For ages 10 to 19 years, incidence of type 2 diabetes remained stable among non-Hispanic whites and increased for all others, especially non-Hispanic blacks.
- The percentage of adults with **prediabetes who were aware they had the condition doubled between 2005 and 2022, but most continue to be unaware**.



Risk Factors of DM

- Obesity
- Body Mass Index (BMI)
- Cardiovascular Disease

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Obesity

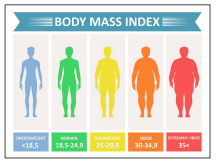
- Obesity is the **leading risk factor** for type 2 diabetes.
- From 1999 –2000 through 2017 –2022, US obesity prevalence increased from **30.5% to 42.4%**.
  - The prevalence of severe obesity increased from 4.7% to 9.2%.
- Obesity-related conditions include **heart disease, stroke, type 2 diabetes and certain types of cancer**.
  - These are among the leading causes of **preventable, premature death.**

Obesity

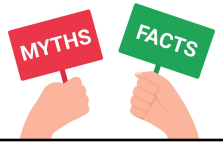
- **Black adults (49.6%)** had the highest age-adjusted prevalence of obesity, followed by **Hispanic (44.8%), White (42.2%) and Asian adults (17.4%).**
- The obesity prevalence was **40.0%** among adults aged **20 to 39 years**, **44.8%** among adults aged **40 to 60**

Body Mass Index (BMI)

- Researchers say body mass index (BMI) may be a **higher risk factor** for type 2 diabetes than genetics.
  - Other experts say genetics is actually the number one factor for developing diabetes,
    - but they note that **lowering BMI can help delay or even prevent the onset of the disease.**



“I’m too skinny to get Diabetes”

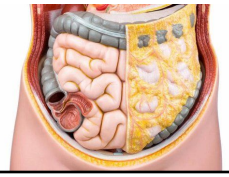


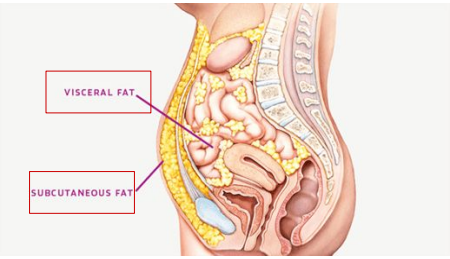
Thin Outside, Fat Inside (TOFI)

- TOFI
  - Also known as *metabolic obese normal weight or skinny fat*)
  - A metabolic syndrome used to describe **lean individuals with a disproportionate or hidden layers of adipose tissue** in their abdomen.
  - Excess amounts of fat stored around vital organs →**increases risk for chronic diseases**

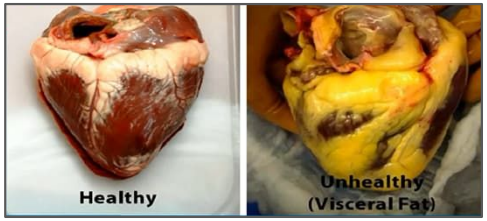
Visceral Body Fat

- **Stored fat behind the muscle** that wraps around abdominal organs, i.e. liver, stomach and intestines
- This is the fat you **should be worried about**
- **Associated with**
  - Heart Diseases
  - Repeated Heart Attacks
  - Dementia
  - Colorectal Cancer
  - Breast Cancer
  - Type 2 Diabetes





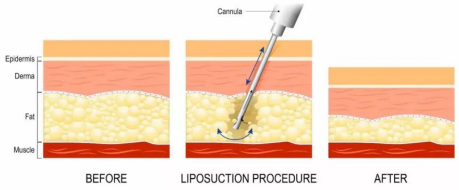
Example of Normal vs Visceral Fat Heart



Visceral Adiposity & Heart Disease

- Studies have shown that **belly fat** is an important risk factor for having a first heart attack
  - Closely associated with accelerated atherosclerosis
- **Increasing visceral fat increases the risk** for heart attacks and strokes despite being on controlled therapies that should lower the risk
  - I.e. HTN, Diabetes, Cholesterol Meds

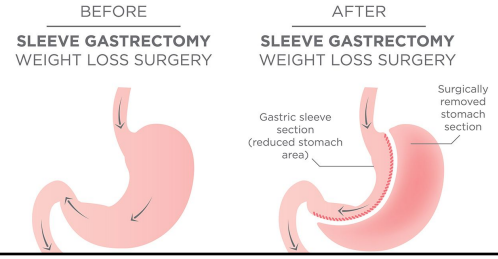
Liposuction Does NOT removal Visceral Fat



The "Skinny" on Diabetes Risk

- **The lifestyle that puts thin people are risk for diabetes includes:**
  - Little or no physical activity
  - Eating too many carbohydrates, especially from simple sources like sugary drinks
  - Not managing stress
  - Disrupted sleep patterns and grazing/snacking late into the night
- If your body receives a constant influx of carbohydrates, or daily increases in blood sugar due to stress, **your pancreas becomes taxed and exhausted**.
  - → to insulin resistance, which in turn can lead to **diabetes**
- Your metabolism might be higher genetically, but that doesn't affect how your body processes blood sugars and insulin
- The weight scale can give some people a **false sense of health**

Bariatric (Gastric) Weight Loss Surgery



Ozempic ®

- an semaglutide injectable prescription medicine used: along with diet and exercise to improve blood sugar (glucose) in Type 2 Diabetics
- Once-weekly prescription
- **GOAL→**
  - Ozempic works by **mimicking a naturally occurring hormone .**
  - As those hormone levels rise, the molecules go to your brain, **telling it you're full.**
  - It also **slows digestion** by increasing the time it takes for food to leave the body. This is similar to the effect of bariatric surgery.

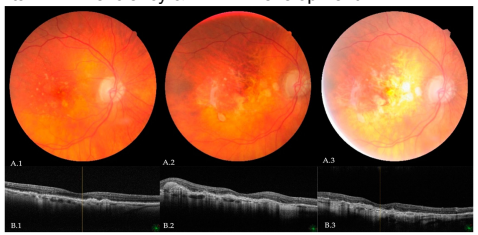
Ozempic ®

- The **most common side effects** of Ozempic® may include *nausea, vomiting, diarrhea, stomach (abdominal) pain, and constipation*
- **Other Possible Side Effects**
  - Kidney problems (kidney failure)
  - Serious allergic reactions
  - Gallbladder problems
  - Tumors
  - Thyroid problems
  - Stomach paralysis
  - Internal obstruction
  - **Visual changes**

Risk of Rapid Weight Loss

- **MAJOR RISK→ malabsorption of nutrients**, including essential vitamins like *vitamin D and vitamin A*, both of which are critical for maintaining healthy eyes.
  - **Vitamin D deficiency** has been associated with an increased risk of eye conditions like age-related macular degeneration (AMD)
  - **Vitamin A** is crucial for normal vision. May result in visual alterations

Vitamin D Deficiency & ARMD Development



Fernandes N, Araújo MC, Lança C. The Roles of Vitamin D and Polyphenols in the Management of Age-Related Macular Degeneration: A Narrative Review. *Future Pharmacology*. 2023

Nutritional Optic Neuropathy

- The role of **vitamin B12, folic acid, and copper deficiencies** in nutritional optic neuropathy is well established.
  - Copper deficiencies often cited gastric surgeries
- **Pathophysiology→**
  - Secondary to the damage of ganglion cell axons in the papillomacular bundle → central and cecocentral VF defects
- **Clinical Presentations**
  - Slow, insidious bilateral painless visual loss
  - Decreased vision, visual field defects, difficulty seeing in low-light conditions, and decreased visualization of colors.
  - **Early**→ Normal ocular health findings
  - **Late**→ ONH pallor and severely NFL rim thinning

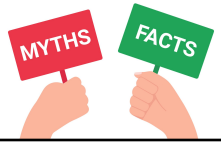
Health

Malnourished Teenage Boy Suffers Irreparable Sight Loss after Living on Junk Food Diet

Because of his diet, the fibres in his optic nerves died and the damage became irreversible

BY RACHEL DAVIES PUBLISHED: 03 SEPTEMBER 2020

“Eating Healthy is Expensive”



Burger
$0.99

Salad
$4.99

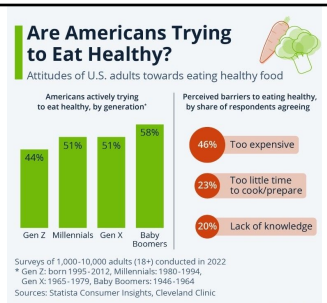
Cost of Healthier Foods vs Less Healthier Food Options

Do healthier foods and diet patterns cost more than less healthy options? A systematic review and meta-analysis

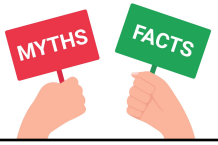
Abstract

The healthiest diets cost about **$1.50 more per day** than the least healthy diets

Our Food Choices



“We all gotta die from something”



DM & Cardiac Disease

- **Cardiovascular disease (CVD)** is the **number one cause of death** in people living with diabetes, resulting in **2/3** of deaths in people with type 2 diabetes.
- Patients with diabetes are **twice as likely** to have heart disease or a stroke than people without diabetes.
- With proper exercise, diet, and diabetes management, the risk of CVD and associated complications **lowers**

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Coronary Artery Disease

- **Coronary artery disease (CAD)** is the most common type of heart disease in the United States.
- For some people, the first sign of CAD is a **heart attack**.
- CAD is caused by **plaque buildup** in the walls of the arteries that supply blood to the heart (called coronary arteries) and other parts of the body.
  - Narrowing of the arterial walls---> **atherosclerosis**
    - By age 10, most kids have fatty streaks in their arteries
      - Prescusors for CAD, stroke, and HD

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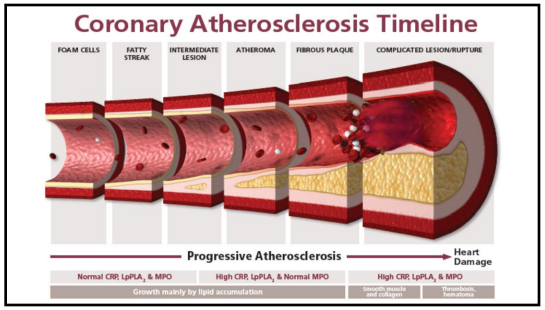
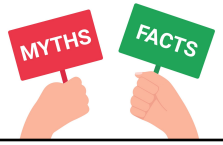
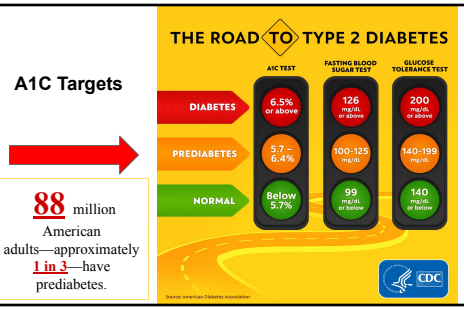


"I'm only Prediabetic"



A1C Targets



88 million American adults—approximately **1 in 3**—have prediabetes.

Borderline/Prediabetes

- Individuals whose glucose levels **do not meet the criteria for diabetes** but are too high to be considered normal
- Patients with prediabetes are defined by the presence of IFG and/or IGT and/or A1C 5.7–6.4% (39–47 mmol/mol)
- Prediabetes should not be viewed as a clinical entity in its own right but rather as **an increased risk for diabetes and cardiovascular disease (CVD)**
- Prediabetes is associated with **obesity, dyslipidemia with high triglycerides and/or low HDL cholesterol, and hypertension**

Hemoglobin A1C

- The **A1C test**—also known as the hemoglobin A1C or HbA1c test
  - Measures your average blood sugar levels **over the past 3 months.**
- When sugar enters your bloodstream, it attaches to hemoglobin, a protein in your red blood cells.
  - Normal patients have some sugar attached to their hemoglobin, but people with **higher blood sugar levels have more**.
- The A1C test measures the % of your red blood cells that have sugar-coated hemoglobin.
  - The A1C test result is reported as a percentage. The higher the percentage, the higher your blood glucose levels.
  - A normal A1C level is < 5.7%.

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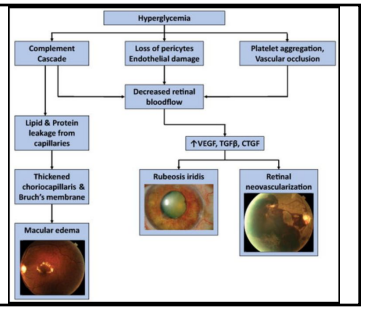
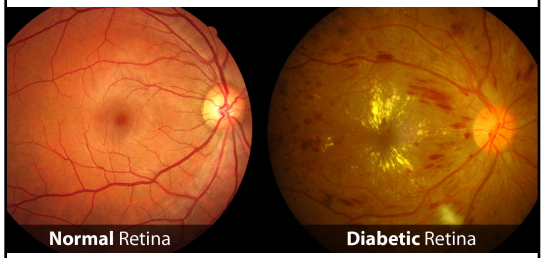
Diabetes & Ocular Complications

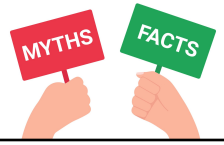




Treatment & Management of DM patients

- **Diabetes isn't just a medical condition**
- Diabetes is a complex, chronic illness requiring continuous medical care with **multifactorial risk-reduction strategies** beyond glycemic control.
- The American Diabetes Association (ADA) highlights the importance of **patient-centered care**.

"I just have a little high blood pressure"



Hypertension (HTN)

- High blood pressure, also called hypertension, is blood pressure that is higher than normal.
- Your blood pressure changes throughout the day based on your activities.
- Having blood pressure measures consistently above normal may result in a diagnosis of high blood pressure (or hypertension).
- **The higher your blood pressure levels, the more risk you have for other health problems, such as heart disease, heart attack, and stroke.**

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Epidemiology of HTN

- Approximately **76 million** adults in the United States have high blood pressure
- **49.6%** (>110 million people) of US adults aged 20 and over have hypertension
  - measured high blood pressure (defined as a systolic blood pressure ≥ 130 mm Hg or a diastolic blood pressure ≥ 80 mm Hg)
  - and/or taking antihypertensive medication
- High blood pressure is called the **"silent killer"** because it usually has no warning signs or symptoms, and many people do not know they have it.
- Having hypertension puts you at risk for **heart disease** and **stroke**, which are leading causes of death in the United States.

Epidemiology of HTN

- Only about **1 in 4 adults (24%)** with hypertension have their condition under control.
- About **half of adults (45%)** (approximately 37 million US adults) with uncontrolled hypertension have a blood pressure of 140/90 mm Hg or higher.
- **High blood pressure was a primary or contributing cause of death** for more than 494,873 people in the United States in 2022.
- High blood pressure costs the United States about **$131 billion each year**, averaged over 12 years from 2003 to 2014.
  - Health & Data experts are expecting this cost value to **double in the upcoming years**

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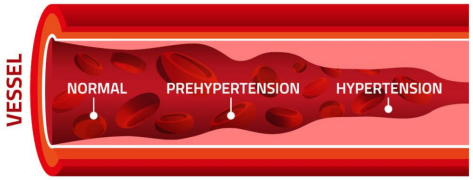
Prevalence & Incidence of HTN

- Risk for high blood pressure **increases with age.**
  - About 9 out of 10 Americans will develop high blood pressure during their lifetime
  - Nearly 1 in 4 adults aged 20 to 44 have high blood pressure.
- **Women are about as likely as men** to develop high blood pressure at some point during their lives.
- **Blacks develop high blood pressure more** often than Whites, Hispanics, Asians, Pacific Islanders, American Indians, or Alaska Natives do.
  - Compared with Whites, **Blacks also develop high blood pressure earlier in life.**

Pathogenesis of HTN



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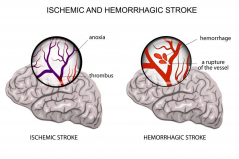
BLOOD PRESSURE CATEGORY	SYSTOLIC mm Hg (upper number)		DIASTOLIC mm Hg (lower number)
NORMAL	LESS THAN 120	and	LESS THAN 80
ELEVATED	120 – 129	and	LESS THAN 80
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 1	130 – 139	or	80 – 89
HIGH BLOOD PRESSURE (HYPERTENSION) STAGE 2	140 OR HIGHER	or	90 OR HIGHER
HYPERTENSIVE CRISIS (consult your doctor immediately)	HIGHER THAN 180	and/or	HIGHER THAN 120

Complications of HTN

- High blood pressure is a leading cause of stroke, a condition that is on the rise among younger people.
  - The **increased risk for stroke** in this age group may be a direct result of the rising rates of:
    - **obesity, high blood pressure, and type 2 diabetes**—conditions that are preventable and treatable.



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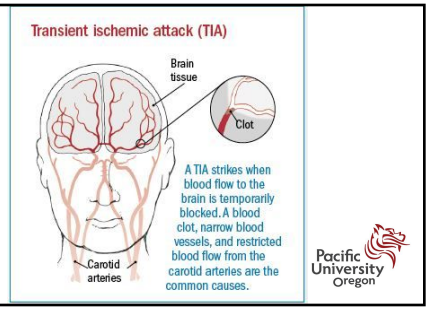
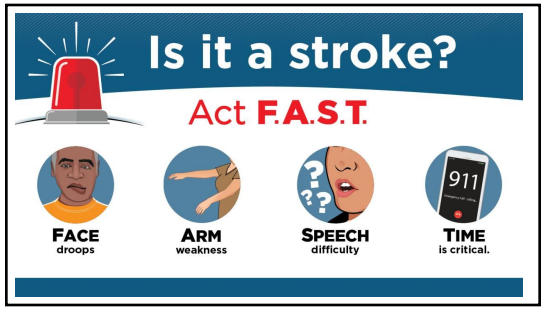
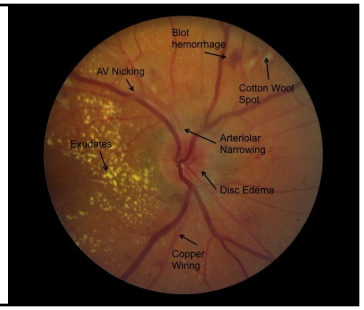
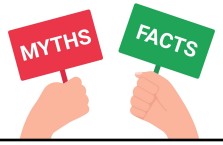




Hypertensive Retinopathy



"It runs in my family"

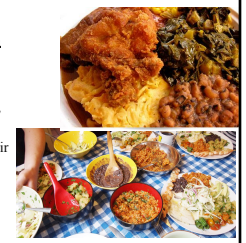


Risk Factors for HTN

- **Genes** likely play some role in high blood pressure, heart disease, and other related conditions.
  - However, it is also likely that people with a family history of high blood pressure **share common environments and other potential factors that increase their risk.**
- **CULTURAL & ETHNIC INFLUENCES** *****
  - The American College of Cardiology says **sodium-rich foods are a major cause of high blood pressure, and many soul food items traditionally contain large amounts of sodium**. Consequently, continuous consumption can contribute significantly to high blood pressure.

Traditional & Cultural Foods

- Food is an important part of culture.
- **Traditional cuisine is passed down from one generation to the next**
  - It also operates as an expression of **cultural identity**
  - I.e. *Soul Food, Thanksgiving/Holiday*
- **Immigrant Food**
  - Immigrants brought/bring food of their countries with them
  - Cooking traditional food is a way of preserving their culture when they move to new places.



Disney removes 'healthy gumbo' recipe after backlash on social media

Causes of HTN

- Family history/genetic predisposition
- Alcohol consumption
- Age
- Sodium consumption
- Obesity
- Smoking
- Low physical exercise or activity
- Excess stress
- Underlying chronic conditions

Treatment & Management Goals of HTN

- Changing your lifestyle can help control and manage high blood pressure. Your doctor may recommend that you make lifestyle changes including:
  - Eating a heart-healthy diet with less salt
  - Getting regular physical activity
  - Maintaining a healthy weight or losing weight if you're overweight or obese
  - Limiting the amount of alcohol you drink
- **Sometimes lifestyle changes aren't enough.**
- If diet and exercise don't help, your doctor may recommend medication to lower your blood pressure.

Chronic Kidney Disease (CKD)

- Chronic kidney disease, also called chronic kidney failure, describes **the gradual loss of kidney function**.
  - The kidneys filter wastes and excess fluids from your blood, which are then excreted in your urine.
  - When chronic kidney disease reaches an advanced stage, dangerous levels of fluid, electrolytes and wastes can build up in your body.
- In the early stages of chronic kidney disease, **you may have few signs or symptoms**.
- Chronic kidney disease may not become apparent until your kidney function is significantly impaired.

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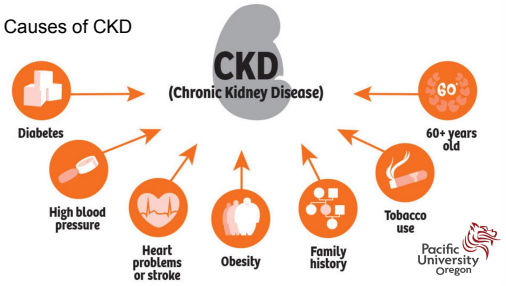
Epidemiology of CKD

- Kidney diseases are the **ninth leading cause of death** in the United States.
- About 37 million US adults are estimated to have CKD and **most are undiagnosed.**
- **40%** of people with severely reduced kidney function **are not aware of having CKD**.
- Every 24 hours, 350 people begin dialysis treatment for kidney failure.
- In the United States, diabetes and high blood pressure are the leading causes of kidney failure, representing about 3 out of 4 new cases.
- In 2018, treating Medicare beneficiaries with CKD cost over **$81.8 billion**, and treating people with ESRD cost an additional **$36.6 billion**.

Causes of CKD



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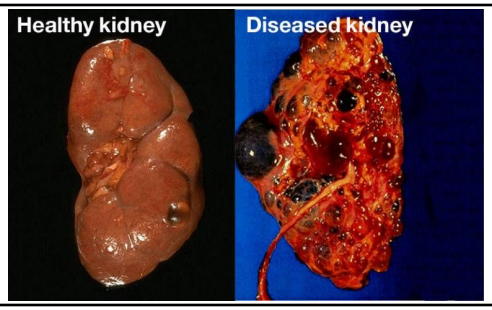
Pathogenesis of CKD

- CKD has varying levels of seriousness.
- It usually worsens over time though treatment has been shown to slow progression.
  - **If left untreated, CKD can progress to kidney failure and early cardiovascular disease.**
- When the kidneys stop working, dialysis or kidney transplant is needed for survival.
- Kidney failure treated with dialysis or kidney transplant is called **end-stage renal disease (ESRD).**



Treatment for CKD Complications

- Treatment for chronic kidney disease focuses on slowing the progression of the kidney damage, usually by **controlling the underlying cause**.
- Chronic kidney disease can progress to end-stage kidney failure, which is fatal without artificial filtering (dialysis) or a kidney transplant.

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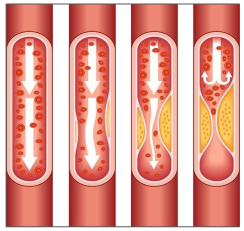
Cardiovascular Disease (CVD)

- As plaque builds up in the arteries of a person with heart disease, the inside of the arteries begins to narrow, which lessens or blocks the flow of blood.
  - Plaque can form a clot or also rupture (break open).
- **Coronary heart disease** is the most common type of heart disease

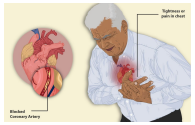


Epidemiology of CVD

- Heart disease is the leading cause of death for men, women, and people of most racial and ethnic groups in the United States.
- **One person dies every 36 seconds** in the United States from cardiovascular disease.
- About 655,000 Americans die from heart disease each year—that's **1 in every 4** deaths.
- Heart disease costs the United States about **$219 billion each year** since 2015.
  - This includes the cost of healthcare services, medicines, and lost productivity

Prevalence & Incidence of CVD

- In the United States, someone has a **heart attack every 40 seconds**.
- Every year, about 805,000 Americans have a heart attack.
  - Of these,
    - 75% are a first heart attack
    - 25% happen to people who have already had a heart attack
- About 1 in 5 heart attacks are silent



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Symptoms of CVD

It may be appropriate to begin testing for heart failure if you or a family member has any of the potential signs of heart failure, such as:

- Shortness of breath
- Persistent coughing or wheezing
- Buildup of excess fluid in body tissues (edema)
- Unusual fatigue
- Lack of appetite or nausea
- Impaired thinking
- Increased heart rate

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Causes of CVD

- **DM**
- **HTN**
- **CKD**
- Viral
- Infection
- Genetics

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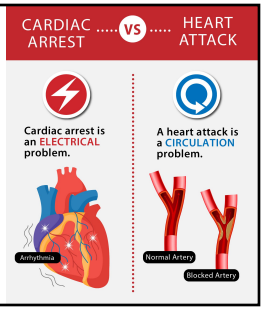
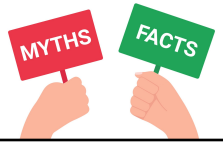
Complications of CVD

- Heart Attack
- Cardiac Arrest
- Arrhythmia
- Pulmonary Edema
- **DEATH**



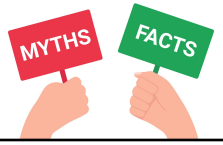
"But I'm taking my medicine "

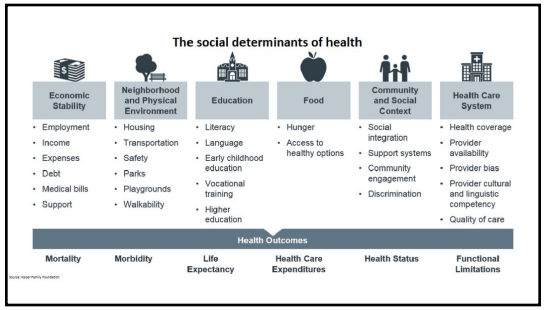


And the Disease Goes On

- Over **80%** of Americans are taking at least **one medication for a preventable disease**
  - **More than half** of those patients are still actively progressing because of health behaviors, unhealthy diet, physical inactivity, health illiteracy, and other risk factors

"I've been trying, doc"





Patient Education Considerations

- **Eat** a healthy diet rich in vegetables, fruits, and lean proteins can benefit a person with diabetes
- **Embrace** healthier behaviors and habits
- **Limit** the intake of white bread, sweets, and other highly refined foods
- **Encourage** physical activity
  - Get up and move!
- **Avoid or Reduce** Stressors
- **Build** relationships with nutritionists and dieticians in your community
- **Stay** Positive & **Discipline** Your Self
- **Cook** at home!
  - Remember portion control
- **Know** your community!
- **Co-manage** with PCP, nutritionist, and dietitian

Thank You