

Robert Shorey, DDS — Nutrition — Summary of points to remember from presentation.

Your Name _____ CE Units _____ Code Word _____

These notes are not intended to be a PowerPoint “frame by frame” set of notes for my presentation. They will provide notes for your reference after the presentation to refresh your memory on the main points of the discussion.

1. Omnivores vs Specialist Diets (Koalas & Ant-Eaters)

Humans, as omnivores, have evolved to eat a wide range of foods, which includes plants, animals, and other sources of nutrients. This flexibility has allowed us to survive in many different environments. However, just because humans can eat a wide range of foods doesn't mean all of them are beneficial, and this speaks to the **quality** and **balance** of our diet.

In contrast, animals like koalas and anteaters have specialized diets. Koalas are adapted to eat only eucalyptus leaves, which are low in nutrition and toxic to many other animals, while anteaters primarily consume ants or termites. Their bodies have evolved in a way that allows them to thrive on such a limited diet. The question of **nutrition** and **specialization** highlights how evolutionary pressures shape the diets of different species, leading to specific adaptations and health outcomes.

2. Correlation vs Causality

This is an important distinction in data analysis, especially in fields like medicine, social sciences, and environmental studies.

- **Correlation** refers to the statistical relationship between two variables, meaning they change together in some way. But **correlation does not imply causation**—it simply means there is some observable relationship. For instance, as you mentioned, **ice cream sales** and **shark attacks** may both rise during summer, but one does not cause the other. They **coincide** because of a **third variable**: the summer season, which leads to more people swimming in the ocean (increasing the likelihood of shark attacks) and more ice cream being sold (due to warmer weather).
- **Causality**, on the other hand, means that one event is directly responsible for causing another. Just because two things **happen together** doesn't mean one caused the other. To establish causality, scientists need to demonstrate that there is a direct link between the

two variables, often by controlling for confounding variables and establishing a cause-effect relationship through rigorous testing.

3. The Confounding Variables in Health Studies (Fats, Cholesterol, and Vascular Disease)

Your example of **fat intake**, **cholesterol levels**, and **vascular disease** is a great one. There have been correlations observed between **high fat intake** and **heart disease**, or **high cholesterol** and **arterial blockages**, but it's a much more complicated picture than just a straightforward cause-effect relationship.

- **Confounding Variables:** Many factors could be at play here, such as high **carbohydrate intake**, **inflammation**, or **genetic predisposition**. For example, people with high cholesterol may also have other risk factors like high blood pressure, lack of physical activity, or poor metabolic health that increase their risk of cardiovascular disease.
- **Inflammatory Response:** Inflammation can be a key player in many chronic diseases, including cardiovascular disease. Chronic inflammation can lead to plaque buildup in the arteries, a process that may be triggered by various factors beyond diet alone.
- **Mitochondrial Stress:** Mitochondria are the powerhouses of cells and are involved in energy production and metabolic processes. When mitochondria become dysfunctional (a condition known as **mitochondrial dysfunction**), it can have far-reaching effects on health, potentially contributing to disease development. Poor diet, lack of exercise, and environmental factors can all lead to mitochondrial stress, which may play a role in diseases like diabetes or heart disease.

In this case, **diet** could be a **contributor**, but it may not be the sole cause. **Environmental**, **genetic**, and **lifestyle factors** all intersect to contribute to health outcomes.

4. Coincidence: A Useful Reminder

The word "coincidence" is a useful reminder in science that two events happening at the same time don't necessarily have a causal relationship. This is often referred to as **spurious correlation**, where two things might appear linked due to an underlying factor.

For instance, during certain months, we might see a **spike in ice cream sales** and **shark attacks**, but if we pause and think about it, the **seasonal weather** (summer) is the underlying driver of both, not the ice cream itself causing the sharks to attack more.

Summary Takeaways:

- **Correlation does not equal causality.** Just because two variables are related **doesn't mean one is causing the other.**
- There are often **confounding variables** that influence both correlated variables, making it essential to dig deeper into the data to identify true causes.

- Many health issues, like cardiovascular disease, are the result of **complex interactions** between genetics, lifestyle, diet, and environmental factors.
- Remember the concept of **coincidence**—two events happening at the same time may simply be related by timing, not cause.

This nuanced thinking is vital in both science and everyday reasoning. Just because things appear connected doesn't mean they are directly influencing one another.

1. Introduction: The Role of Nutrition in Metabolism

- **Definition:** Nutrition involves delivering essential nutrients to our body's cells.
- **Purpose:** These nutrients maintain metabolic functions, support cellular repairs, and aid in the growth of new cells.
- **Key Point:** Every cell in the body relies on proper nutrition to perform its specific function effectively.

2. Cell Metabolism: The Core Process

- **What is Cell Metabolism?**
 - The set of life-sustaining chemical reactions that occur within cells.
 - Involves breaking down nutrients to produce energy and building new molecules for cell growth and repair.
- **Key Components for Metabolism:**
 - **Raw Materials:** Nutrients like carbohydrates, proteins, fats, vitamins, and minerals.
 - **Oxygen:** Essential for aerobic cellular respiration to produce energy (ATP).
 - **Favorable Environment:** Optimal temperature, pH, and fluid balance.

3. The Pathways: How We Deliver These Components

- **Mouth and Nose as Entry Points:**
 - **Mouth:** Breaks down food into smaller particles (mechanical digestion) and begins the chemical breakdown with enzymes (e.g., amylase).
 - **Nose:** Primary entryway for oxygen to be transported to the lungs and, subsequently, to cells for energy production.

4. Understanding the Delivery System

- **Digestion:** The process begins in the mouth, continues in the stomach, and is completed in the intestines, where nutrients are absorbed into the bloodstream.
- **Circulation:** Once nutrients enter the bloodstream, they are delivered to cells via the circulatory system.
- **Respiration:** Oxygen is absorbed through the lungs and transported via blood to the cells for energy production.

5. Interconnection Between Oxygen and Nutrients

- **Oxygen and Nutrient Interaction:**

- Oxygen helps convert nutrients (especially glucose and fats) into usable energy through cellular respiration.
- Without either oxygen or nutrients, metabolism cannot occur effectively, highlighting their complementary roles.

6. The Importance of Maintaining a Favorable Environment

- **Internal Environment:**
 - Temperature, pH, hydration, and electrolyte balance must be maintained for enzymes and cellular processes to function properly.
- **External Environment:**
 - Proper nutrition and air quality are necessary to ensure the body has adequate supplies for metabolic processes.

7. Conclusion: The Symbiotic Relationship Between Nutrition, Oxygen, and Metabolism

- **Key Takeaway:** Optimal health relies on the proper intake of nutrients and oxygen, delivered through the mouth, nose, and circulatory system to sustain cellular metabolism and support the body's functions.

Historical Perspective for Nutritional elements for Mankind

It's fascinating how the progression from hunting and gathering to farming—and then to the diverse economies we have today—has shaped the human experience. Foraging and hunting may have been highly efficient in their own right, but farming brought stability and allowed populations to grow much faster, which in turn, fueled the development of civilizations.

Hunter-gatherer societies were incredibly adept at utilizing the land with limited resources. With their cooperative foraging strategies, social cooperation, and skillful use of tools, humans could harvest between 500 to 1,000 kilocalories per hour. This lifestyle was sustainable, but it could only support smaller, more mobile communities due to the land's natural limits. Hunting and gathering also required a high degree of knowledge about ecosystems and seasonal changes, meaning the societies were often deeply connected to their environments.

When **farming** emerged 12,000 to 6,500 years ago, it was a game changer. It allowed for the cultivation of food in a controlled, predictable manner, leading to food surpluses and the establishment of permanent settlements. Farming was more labor-intensive, but it allowed societies to support much larger populations. One of the key drivers of the shift was **fertility**—farmers, due to their more stable food sources, had higher fertility rates. This meant that farming communities could grow quickly, leading to more children, which could eventually result in more workers and food producers. This helped build the population base needed for the development of cities, trade networks, and eventually the rise of complex societies.

Looking at modern times, it's fascinating to see how quickly the world has shifted from farming to industrial and digital economies. In 1800, 75% of people worked as farmers, but by 2025, farming has become a much smaller part of the global workforce. Along with the changes in our

daily work our society worked to meeting the needs of a busy industrial lifestyle. The preparation of food has put a high emphasis on efficiency. Families sitting around the table to enjoy a wholesome meal has devolved into quick on the go eating options. Emphasis on self life has affected our foods in negative ways. Active hard physical work of farming has been supplanted by desk jobs.

Many of us now live in cities and work in technology, services, or industries. The transformation from agricultural economies to the digital age has changed our daily eating habits and the foodstuffs that tempt us are energy rich. The world of abundance has likely overwhelmed our natural human metabolism that evolved over millions of years.

Dentistry's nutritional emphasis for oral health also devolved over time.

Early in the 20th century, many dental professionals recognized the critical role that nutrition played in oral health. Pioneers like Weston A. Price conducted research showing that traditional diets rich in nutrients helped prevent tooth decay and other dental issues. This was a time when the profession was more aligned with preventive health.

The post-World War II period brought significant changes to the dental landscape. With the introduction of dental insurance in the 1950s, there was a greater focus on procedures and treatments rather than prevention. Insurance models often incentivized treatment over prevention, and this shifted the priorities of many dental practices toward a more curative approach.

This focus on procedures, particularly restorative treatments like fillings, crowns, and extractions, continues to be central in modern dentistry. The shift to a fee-for-service model—where dentists are paid based on the amount of treatment they perform—further solidified this trend. As a result, dental education and practice have become more oriented around mechanical interventions rather than holistic approaches that might include a focus on diet, lifestyle, and prevention.

That said, there has been a gradual return to preventive care and wellness-oriented dentistry in recent years, with increasing attention on periodontal health, minimally invasive procedures, and a broader focus on overall health, including nutrition. But the foundational shift that occurred in the mid-20th century still influences much of the dental practice today.

Are you interested in exploring more about how this change has affected patient care or the future direction of dental education and practice?

Metabolism — engineering comparison to car engine running rich on fuel —

Here's an analogous breakdown between a car engine running rich on fuel and cellular metabolism, specifically with regard to a **human body consuming excessive refined carbohydrates:**

1. Poor Fuel Economy

Car Engine: Running rich on fuel means the engine is burning more fuel than necessary for the amount of work being done, resulting in poor fuel economy.

Cell Metabolism: When the body consumes an excess of refined carbohydrates (simple sugars), insulin levels spike, causing the body to store more energy as fat. This leads to always feeling hungry or not easily satiated, as the body struggles to process the excess energy and maintain a balanced supply of nutrients.

2. Excessive Emissions

Car Engine: A car engine running rich on fuel produces excessive exhaust emissions due to incomplete combustion, leading to pollutants being released into the atmosphere.

Cell Metabolism: In cellular metabolism, an excess of glucose can lead to the overproduction of reactive oxygen species (ROS), which are unstable molecules that damage critical cellular structures such as DNA, RNA, and proteins. This oxidative stress accelerates aging, leads to cell death, and may contribute to chronic diseases like diabetes, often measured by markers like A1C (glycated hemoglobin).

3. Spark Plug Fouling

Car Engine: When a car engine runs rich in fuel, it can cause spark plug fouling, where the spark plugs become coated with excess fuel, making them less effective in igniting the engine properly.

Cell Metabolism: Excess glucose or poor diet (high refined carbs) can cause mitochondrial damage. Mitochondria are literally the spark plugs of our cell energy production. Mitochondria are responsible for ATP production (cellular energy), and when they're damaged, ATP production slows, resulting in reduced cellular energy efficiency. This leads to fatigue and slower metabolic functions. When mitochondria are overloaded they signal to the body and the body begins to excess energy as fat.

4. Poor Engine Performance

Car Engine: A car engine that is running rich on fuel may have sluggish performance, as the engine is not operating at peak efficiency. It might stall or struggle to maintain speed.

Cell Metabolism: In human metabolism, running "rich" on refined carbohydrates can lead to sluggishness in energy production. Insulin resistance can develop over time, causing the body to struggle with energy production and leading to fatigue, low energy, and reduced physical performance.

Summary of Analogy:

Just as a car engine running rich on fuel suffers from poor fuel economy, excessive emissions, and poor performance, a body consuming too many refined carbohydrates experiences issues with hunger, oxidative stress, mitochondrial dysfunction, and overall sluggish metabolism. Both

systems are less efficient, waste energy, and lead to long-term damage if these conditions are not addressed.

A disease cluster results in humans as a result of the abundance of energy from refined sugars like sucrose and fructose corn syrup. A disease has been identified known as Metabolic Syndrome. Metabolic Syndrome (MetS) is a cluster of interrelated risk factors that significantly increase the likelihood of developing cardiovascular diseases, type 2 diabetes, stroke, and other chronic conditions. It is defined by the presence of at least three of the following five conditions:

1. **Abdominal (visceral) obesity:**

- Waist circumference greater than 40 inches in men and 35 inches in women.
- This type of fat distribution is particularly concerning because abdominal fat is more metabolically active and associated with greater health risks than fat in other areas of the body.

2. **High triglyceride levels:**

- Triglycerides greater than 150 mg/dL (or in some cases >500 mg/dL).
- Elevated triglycerides are linked to increased risk of atherosclerosis, heart disease, and insulin resistance.

3. **High LDL cholesterol (Low-Density Lipoprotein Cholesterol):**

- LDL levels greater than 100 mg/dL are considered a risk factor.
- LDL is often referred to as "bad" cholesterol because it can lead to the build-up of fatty deposits in the arteries, increasing the risk of heart disease and stroke.

4. **High blood pressure:**

- Systolic blood pressure greater than 130 mmHg or diastolic blood pressure greater than 85 mmHg.
- Hypertension is a major risk factor for cardiovascular disease and kidney failure.

5. **Fasting blood glucose:**

- A fasting glucose level greater than 100 mg/dL (pre-diabetes range or higher).
- This is an early indicator of insulin resistance, which is often a precursor to type 2 diabetes.

Metabolic syndrome is primarily linked to **insulin resistance**, where the body's cells become less responsive to insulin, leading to elevated blood sugar levels. This can also contribute to other problems like high blood pressure, high triglycerides, and central obesity.

It's important to note that individuals with MetS face a higher risk of cardiovascular disease, stroke, diabetes and dental caries/inflammatory diseases. Management typically involves lifestyle interventions, such as:

- **Dietary changes:** Reducing sugar, refined carbs, and unhealthy fats, while increasing fiber, lean protein, and healthy fats.

- **Exercise:** Regular physical activity helps improve insulin sensitivity, lower blood pressure, and manage weight.
- **Weight loss:** Reducing abdominal fat can greatly improve the components of MetS.
- **Medication:** In some cases, medications may be prescribed to manage high cholesterol, high blood pressure, or high blood sugar.

Early detection and management of MetS are crucial to preventing long-term health complications.

74% of adults are considered obese in the US

Today 77% of ages 17-24 are not fit to serve in the military

50% of kids are obese, triple the amount from 1970

91% of adults over 21 have experienced tooth decay

18% of Kids have early signs of fatty liver disease (it used to be only alcoholics would get fatty liver disease)

The rise in sugar consumption has had profound impacts on health, as it has moved from a rare luxury to an everyday staple in modern diets. From the days when cane sugar was introduced to Europe during the Crusades, to the mass production of refined sugar starting in the 1600s, and now to the present, where sugar is practically everywhere—it's become something of a double-edged sword.

The consumption numbers are staggering, especially when you consider the rapid growth from 5 pounds per person per year in the 1800s to 150-170 pounds today. Children and adolescents in the U.S. derive a significant portion of their daily calories from added sugars—around 16%—and this trend doesn't seem to be slowing down.

It's ironic how sugar, which was once a rare luxury, is now found in so many foods, often leading to more health problems than benefits. As you mentioned, the idea of "just a spoonful of sugar" making things easier to swallow is catchy, but it's also part of the reason why so many people today struggle with weight gain, diabetes, and other health issues that are exacerbated by excessive sugar intake.

It's a tricky balance, isn't it? On the one hand, sugar makes food taste better, but on the other, it's linked to a rise in chronic health conditions. It's no wonder so many people find themselves in need of "medicine" to combat the consequences of overconsumption.

It's also fascinating how sugar has gone from an elite treat to an everyday part of our diets, without many of us realizing just how much we're consuming. Some researchers even consider it

as addictive as substances like alcohol and tobacco. Would you say we're entering a new era of sugar awareness and trying to undo some of these decades of overindulgence?

The United States is the biggest consumer of sugar on the globe. According to sources, the country's per capita sugar consumption is 126.4 grams daily. Suggested no more than 25 grams a day.

The cause for such high sugar intake largely relates to the quality of food, with around 60% of the US diet consisting of processed foods on average.

Comparing sugar consumption with Europe, besides the US high consumption of soft drinks, many other packaged foods sold in the US contain up to twice as much sugar as their European counterparts.

Do we need higher sugar? Uganda has the lowest average per capita sugar consumption, with only around 2 grams per day. Myanmar (Burma) follows closely behind Uganda with an average per capita sugar consumption of around 3 grams per day.

Sweden 83 grams, France 100 grams Germany 103 grams England 100 grams Ireland 97 grams

Fats, Cholesterol and the anti-fat cholesterol movement that has affected our food supplies

Cholesterol is an essential component of the body, with many critical roles. Here's a breakdown of the key points you mentioned:

- 1. Cholesterol in Every Cell:** Cholesterol is a vital part of all cell membranes. It helps maintain the structure and fluidity of the membrane, allowing cells to function properly.
- 2. Liver Production:** If the body doesn't get enough cholesterol from food (since it's primarily found in animal products), the liver compensates by producing it. This helps ensure that the body always has enough cholesterol for its various functions.
- 3. Cholesterol and Cell Connections:** Cholesterol plays a key role in synaptic function, which is essential for communication between nerve cells in the brain. This is crucial for cognitive function and overall brain health. Additionally, cholesterol contributes to

muscle contraction by being involved in the production of signaling molecules like steroid hormones.

4. **Cholesterol as a Building Block:** Cholesterol is the precursor for several important substances:
 - **Testosterone:** A steroid hormone critical for reproduction, muscle mass, and other body functions.
 - **CoQ10 (Coenzyme Q10):** An antioxidant that plays a key role in energy production within cells.
 - **Vitamin D:** A fat-soluble vitamin essential for bone health and immune function, made from cholesterol when the skin is exposed to sunlight.
5. **Cholesterol in the Brain:** Around 20% of the body's cholesterol is found in the brain. Cholesterol is critical for the formation of synapses (the connections between nerve cells), which is necessary for memory, learning, and overall brain function.
6. **HDL and LDL Cholesterol:** These are two types of cholesterol, but the difference lies in their "wrappers":
 - **HDL (High-Density Lipoprotein):** Often referred to as "good" cholesterol, HDL helps transport excess cholesterol from the bloodstream to the liver for disposal or recycling.
 - **LDL (Low-Density Lipoprotein):** Often called "bad" cholesterol, LDL carries cholesterol to cells. If too much LDL circulates in the blood, it can contribute to plaque buildup in the arteries, increasing the risk of heart disease.
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In summary, cholesterol is indispensable for a wide range of vital processes, from cellular function and brain activity to hormone production and vitamin synthesis. However, managing the balance between different types of cholesterol, especially LDL and HDL, is important for overall cardiovascular health.

Historical perspective:

The debate over the causes of cardiovascular disease (CVD) has been a complex and evolving saga, shaped by scientific discovery, shifting dietary patterns, and broader socio-political and economic forces. Let's break down the main theories you mentioned, highlighting the evolution of thought and the competing scientific, economic, and political forces at play:

1. The Fat and Cholesterol Hypothesis (Dietary Fat and Heart Disease)

The theory that dietary fat, particularly saturated fat, and cholesterol are directly linked to heart disease became widely accepted starting in the 1950s. This hypothesis largely stemmed from the work of **Ansel Keys**, a researcher who famously developed the **Seven Countries Study** in the 1950s. Keys observed that populations with higher saturated fat intake seemed to have higher rates of coronary heart disease (CHD). This led to the popular belief that saturated fats raised

cholesterol levels, which then clogged arteries and led to heart disease. It was later (1990's) found that his findings were "dry labbed" choosing to only include country's findings to substantiate his hypothesis.

As a result, in the 1970s and 1980s, dietary guidelines started recommending a reduction in fat consumption, especially saturated fat, and **an emphasis on low-fat, carbohydrate-rich diets.** The idea was simple: "Eat less fat, be less fat, and reduce your risk of heart disease."

Key takeaways from this theory:

- **High Saturated Fat Intake → Increased Cholesterol Levels → Increased Risk of Heart Disease**
- This concept formed the foundation of **public health messaging throughout much of the 20th century and influenced dietary guidelines worldwide.**

However, over time, this theory has been increasingly questioned, especially after emerging research suggested that the relationship between dietary fat, cholesterol, and heart disease was more complex than initially thought. **In fact, several large studies failed to show a strong, consistent link between saturated fat consumption and heart disease.**

2. The Carbohydrate (Sugar) Hypothesis (Yudkin's Perspective)

At around the same time that Keys was popularizing the "fat causes heart disease" hypothesis, **John Yudkin**, a British physiologist and nutritionist, was arguing that the real culprit in heart disease was **excessive sugar and refined carbohydrates**, not fat. In his 1972 book "*Pure, White, and Deadly*", **Yudkin presented evidence that sugar—especially refined sugar and high-glycemic carbohydrates—could lead to obesity, insulin resistance, high cholesterol, and increased triglycerides, all of which contribute to cardiovascular disease.**

Yudkin pointed out that the rise in heart disease rates in the Western world coincided with the increased consumption of processed sugars and carbohydrates, especially following the industrialization of food production. According to Yudkin, **elevated blood sugar and insulin** caused the liver to produce excess **LDL cholesterol** (the "bad" cholesterol) and triglycerides, both of which are **associated as a marker** for increased cardiovascular risk.

Key points from Yudkin's theory:

- **High Carbohydrate/Sugar Intake → Insulin Resistance → Increased LDL Cholesterol → Increased Heart Disease Risk**
- This theory emphasized the metabolic effects of sugar and carbohydrates, which were largely ignored by the prevailing "fat hypothesis."

Yudkin's ideas were largely overshadowed by the dominance of the low-fat, high-carbohydrate nutrition paradigm. However, in recent years, there has been a resurgence in interest in the role of sugar and refined carbs in cardiovascular disease, especially with the growing recognition of the links between **insulin resistance, metabolic syndrome, and heart disease.**

3. Competing Theories and the Role of Politics and Economics

The competing theories of fat versus sugar as the primary cause of heart disease are a fascinating example of how science, economics, and politics intersect.

- **Economic Forces:** The sugar and processed food industries were powerful players in shaping dietary guidelines. In the 1950s and 1960s, the sugar industry funded research that downplayed the risks of sugar and promoted the idea that fat was the major dietary culprit in heart disease. This campaign was highly effective, and it helped shape public health policy for decades.
- **Scientific Debate:** Both sides of the argument had their champions. In the case of the fat hypothesis, researchers like Ancel Keys and others pushed forward with the idea that saturated fat was a primary driver of heart disease. On the other side, Yudkin and later researchers advocating for a "low carb" or "low sugar" approach pointed to rising rates of metabolic diseases (obesity, diabetes) and cardiovascular disease in populations consuming more refined carbohydrates and sugars.
- **Political Influence:** Dietary guidelines are influenced not only by science but also by political lobbying, industry interests, and public opinion. For example, the U.S. dietary guidelines of the 1970s, which recommended low-fat diets, came in part due to lobbying from the vegetable oil and sugar industries, which stood to gain from a shift away from animal fats.
- **Dietary Guidelines and Shifting Consensus:** Over time, however, the pendulum has swung back and forth. As the evidence on the limited benefits of low-fat diets mounted, and as more research highlighted the role of sugar and refined carbs in metabolic disease, many experts began to revise their recommendations. The **American Heart Association** and **National Institutes of Health (NIH)** now acknowledge that the relationship between fat and heart disease is far more nuanced than previously thought, and there is increasing recognition of the dangers of excessive sugar and refined carbohydrate consumption.

4. Current Understanding: A More Complex View

Today, the scientific consensus has become more nuanced. Instead of focusing exclusively on one nutrient—whether fat or sugar—experts are recognizing that **overall dietary patterns**, rather than individual foods or macronutrients, are more predictive of heart disease risk. This includes:

- **Quality of fats:** Emphasis is shifting to the quality of fat (e.g., unsaturated fats from fish, nuts, and olive oil) rather than simply reducing total fat intake.
- **Refined carbohydrates and sugars:** High intake of refined carbs, particularly added sugars, is now recognized as a significant contributor to metabolic dysfunction, insulin resistance, and cardiovascular disease.
- **Whole foods and balanced diets:** A growing body of research emphasizes the importance of diets rich in whole, minimally processed foods—such as fruits, vegetables, whole grains, lean proteins, and healthy fats—while minimizing processed foods and sugary beverages.

Conclusion: The Evolving Landscape of Heart Disease Research

The evolution of cardiovascular disease theories reflects the dynamic and sometimes contentious nature of scientific inquiry. What was once seen as the prevailing truth (fat causes heart disease) has been re-evaluated in light of new evidence, much of it brought forward by scholars like Yudkin and, more recently, by proponents of low-carb and ketogenic diets. The role of **politics and economics**—especially the influence of the food industry—has also been a significant factor in shaping the direction of dietary advice.

Ultimately, the current understanding of cardiovascular health is moving away from reductionist approaches that demonize single nutrients and toward a more holistic view that considers the complexity of metabolism, food quality, and overall lifestyle.

It's an ongoing conversation, and as research continues to evolve, so too will our understanding of the causes of cardiovascular disease and the most effective ways to prevent and treat it.

Fats:

Our understanding of fats, particularly saturated fats, has been shaped more by fear and misinformation than by solid scientific evidence. Over the last several decades, there's been a prevailing narrative in mainstream nutrition that painted saturated fats as the villain in heart disease and overall poor health. This narrative, often shaped by early studies and public health campaigns in the 1960s and '70s, led many to vilify saturated fats without fully understanding the complexities involved.

Indeed, much of the concern around fats might stem from a **broader issue related to the industrialization of food systems and the mass production of highly processed fats.** Industrially processed oils, such as trans fats and refined vegetable oils (e.g., soybean, corn, canola), have been shown to have negative health impacts—especially in their role in **promoting inflammation and oxidative stress.** These oils, often found in packaged foods, fast foods, and processed snacks, can contribute to metabolic issues and are far **more physiologically problematic than the natural fats found in whole foods like butter, coconut oil, or fatty cuts of meat.**

Inflammatory foods like refined carbohydrates (sugars, white bread, pastries), alcohol, and poor-quality animal fats (e.g., factory-farmed meats) complicate the issue. Inflammatory diets tend to exacerbate chronic diseases like cardiovascular disease, obesity, and type 2 diabetes, and it can sometimes be difficult to tease out the role of fats when people are consuming a wide range of harmful foods.

In fact, newer research is showing that not all fats are created equal. **Saturated fats from whole, minimally processed sources (like grass-fed beef, butter, and full-fat dairy) appear to have a very different effect on the body than those from processed or factory-farmed animals.** And in some contexts, moderate consumption of saturated fat does not have the harmful effects on heart health that were once widely assumed.

So, yes, the fear of saturated fats may have been overblown, but it's important to consider the broader picture: the quality of food overall, the sources of fats, and how modern food processing has altered what we consume. Balancing the right kinds of fats—along with a diet rich in whole, nutrient-dense foods—can be a much **healthier approach than focusing solely on one type of nutrient**.

The overall context of an individual's diet and lifestyle—such as their intake of refined carbohydrates, their physical activity level, and their stress levels—also plays a huge role in determining health outcomes.

Human metabolism tends to seek *stasis*, or balance, often referred to as *homeostasis*. The body is constantly working to **maintain a set point**, especially when it comes to weight and energy balance. When you look at weight management, while exercise has health benefits, **it's not the most powerful lever for weight control** on its own, especially when compared to the hormonal and nutritional factors at play.

Hormonal Influence

Hormones play a pivotal role in regulating metabolism, fat storage, and hunger. These can often "trump" or override the effects of exercise. Here are some key hormones to consider:

1. **Insulin** – A primary hormone involved in fat storage. Insulin levels are strongly influenced by carbohydrate intake. When you consume more carbs (especially refined ones), your body releases more insulin, promoting fat storage. Conversely, low-carb or ketogenic diets can help lower insulin levels, facilitating fat loss.
2. **Cortisol** – Known as the stress hormone, cortisol is released in response to stress and can increase appetite and fat storage, particularly around the abdomen. High cortisol levels, whether due to stress or excessive exercise (overtraining), can lead to an increase in fat storage and hinder weight loss efforts.
3. **Leptin and Ghrelin** – Leptin signals satiety, while ghrelin signals hunger. If you're in a calorie deficit for a long period (as in many diets), leptin levels drop and ghrelin levels rise, making you feel hungrier and more likely to overeat.
4. **Thyroid Hormones** – Your thyroid influences the basal metabolic rate (BMR), which determines how many calories you burn at rest. Hypothyroidism (low thyroid function) can slow metabolism, making weight loss more difficult.

Exercise's Role

Exercise is incredibly important for overall health, improving cardiovascular fitness, muscle mass, mood, and even insulin sensitivity. However, on its own, it is not the most effective tool for weight management because the body compensates for increased energy expenditure by

adjusting appetite, lowering metabolism, and seeking to restore the balance of energy in other ways.

- **Exercise and metabolism:** While intense exercise (like HIIT or strength training) can temporarily boost metabolism, the long-term impact on weight loss is often minimal if not combined with appropriate dietary adjustments.
- **Appetite:** Some types of exercise, especially long-duration aerobic exercises, can increase hunger, which can lead to overeating and thus cancel out any calorie deficit created by the activity.

Nutritional Factors

When it comes to managing weight, **nutrition** and its effects on hormones play a much greater role. The type and timing of food you eat can directly influence your hormonal responses and, consequently, your weight.

1. **Carbohydrates** – The intake of carbohydrates, particularly refined sugars, can cause sharp spikes in insulin. Over time, if the body is frequently exposed to high insulin levels, it can lead to insulin resistance, which contributes to weight gain and difficulty losing weight. Low-carb diets or intermittent fasting have gained popularity in part because they help keep insulin levels more stable.
2. **Proteins and Fats** – Protein intake is crucial for preserving muscle mass, and it has a higher thermic effect (the amount of energy required to digest, absorb, and metabolize food) compared to carbs and fats. Fats, especially healthy fats, can help regulate hormones like leptin, insulin, and cortisol, and provide satiety.
3. **Caloric Intake and Frequency** – While overall caloric intake still matters, the timing and frequency of meals can influence insulin sensitivity, hunger levels, and fat-burning processes. **Some research supports intermittent fasting or eating within specific windows to help regulate hormones like insulin and cortisol.**

A Holistic Approach

Given these factors, a holistic approach to weight management that integrates proper nutrition (focused on hormone balance), stress management, and moderate exercise seems most effective. Here's a more specific breakdown of how to approach weight control:

- **Focus on nutrient-dense foods** that stabilize blood sugar and insulin levels, such as vegetables, high-quality proteins, and healthy fats.
- **Manage stress** through mindfulness, sleep, and stress reduction techniques to keep cortisol levels balanced.

- **Exercise regularly**, but not excessively. Strength training and moderate aerobic exercise help maintain muscle mass and improve metabolic function without overstressing the body.
- **Consider intermittent fasting** or other eating patterns that help regulate insulin sensitivity and manage hunger.

In short, exercise alone, without considering the hormonal and nutritional aspects, is unlikely to be the most effective strategy for weight management. Hormonal balance, primarily driven by diet, is often the most significant factor.

Insulin is a key regulator of metabolism, it is released in response to spikes in blood sugar. Chronic production of insulin leads to insulin resistance, fat accumulation and type II diabetes

1. Blood Sugar Regulation

- When refined sugar (or any carbohydrate) is consumed, it gets broken down into glucose in the bloodstream. This causes an increase in **blood sugar levels**.
- In response, the **pancreas** secretes **insulin**, a hormone that plays a key role in managing blood sugar levels. Insulin helps move glucose from the bloodstream into various cells in the body, such as muscle cells, liver cells, and fat cells, so it can be used for energy or stored for later use.

2. Storage of Glucose as Fat

- If there's an excess of glucose that is not immediately needed for energy, insulin facilitates its conversion into **fat** for storage, particularly in the **visceral fat** around the abdomen, liver, and muscles. This process can contribute to fat accumulation, especially when insulin levels remain chronically elevated (as in the case of frequent sugar consumption).

3. Kidneys and Salt Retention

- **Insulin has a secondary role in regulating kidney function. It signals the kidneys to retain sodium (salt), which can increase blood volume and thus raise blood pressure.** This is why people with insulin resistance or high insulin levels may also experience hypertension (high blood pressure).

4. Calcium Retention and Beta Cell Function

- Insulin also has a role in **calcium retention** within cells. Calcium is essential for various cellular functions, including the functioning of **beta cells** in the pancreas, which are responsible for producing insulin. If insulin resistance occurs, the **beta cells** can become overstressed, potentially leading to **beta cell dysfunction**, which is a hallmark of Type 2 diabetes.

5. Implications for Health

- Chronic high insulin levels, resulting from frequent consumption of refined sugars and processed carbohydrates, can lead to **insulin resistance**. Over time, this can impair the **body's ability to regulate blood sugar**, which can eventually result in **type 2 diabetes**.
- Insulin resistance also contributes to other metabolic disturbances, including weight gain, high blood pressure (due to salt retention), and altered calcium balance, further complicating health outcomes.

Conclusion:

The relationship between insulin and sugar consumption is crucial for understanding metabolic health. Insulin helps control blood sugar, but when chronically elevated (due to excess sugar intake), it can promote fat storage, raise blood pressure, and affect calcium metabolism, all of which can contribute to the development of **metabolic syndrome** and **type 2 diabetes**.

This is a very complex system, and the findings from research referenced (Diabetes 2005, Guang Sun et al.) are important in understanding the broader physiological impacts of insulin beyond just blood sugar regulation.

Cortisol affects nutrition and metabolism:

High cortisol levels can significantly affect both physical and mental health. Here's a more organized breakdown of the symptoms and causes of elevated cortisol, along with the impact on overall health:

Symptoms of High Cortisol Levels:

- **Weight Gain:** Especially around the face, neck, abdomen, and upper back (a "moon face" appearance).
- **Fatty Deposits:** Particularly between the shoulder blades, often referred to as a "buffalo hump."
- **Stretch Marks:** Wide, purple or reddish stretch marks, commonly seen on the abdomen, thighs, and breasts.
- **Muscle Weakness:** Noticeable in the upper arms and thighs, making it difficult to carry out normal physical activities.
- **High Blood Sugar:** This can lead to insulin resistance and, over time, develop into Type 2 diabetes.
- **Osteoporosis:** Cortisol can interfere with bone formation, leading to brittle bones and increased fracture risk.
- **Dry Mouth:** A common symptom, often linked to dehydration or the effects of chronic stress on the salivary glands.
- **Chronic Inflammation:** Elevated cortisol can contribute to ongoing inflammation, which may increase susceptibility to various diseases.
- **Fatigue & Sleep Disruptions:** The body's natural circadian rhythm may be disrupted, leading to poor sleep and constant tiredness.

Typical Causes of Elevated Cortisol:

- **Chronic Stress:** The most common cause, especially for individuals experiencing ongoing emotional or psychological pressure.
- **Type A Personality:** High-strung, competitive, and perfectionistic individuals may be more prone to high cortisol levels.
- **Sleep Issues:** Conditions like sleep apnea, insomnia, or lack of quality sleep can significantly increase cortisol production.
- **Poor Lifestyle Choices:**
 - **Chronic dehydration:** Hydration is crucial for maintaining normal cortisol levels. Inadequate water intake can make the body more prone to producing excess cortisol.
 - **Poor diet:** High sugar intake, processed foods, or caffeine dependence may elevate cortisol.
 - **Lack of exercise:** While exercise can reduce cortisol levels in the long term, a sedentary lifestyle can exacerbate stress and cortisol production.

Cortisol Testing:

- **Blood Tests:** Measure cortisol at specific times (often early morning and late evening, when cortisol naturally fluctuates). Abnormal levels can indicate stress or health issues like Cushing's syndrome.
- **Saliva Tests:** These are non-invasive and measure cortisol at different times of day, offering insight into circadian rhythm patterns and cortisol overproduction.
- **Urine Tests:** A 24-hour urine collection is sometimes used to measure free cortisol levels over a full day, helping to diagnose conditions like Cushing's syndrome.

Cortisol and Heart Health:

- Elevated cortisol, especially when linked to chronic stress, has been shown to increase the risk of heart disease. Both **urinary cortisol** and **salivary cortisol** tests have been associated with predicting heart attack susceptibility and chronic inflammation. Elevated cortisol can cause high blood pressure, increase blood sugar, and promote fat storage, all of which are risk factors for cardiovascular diseases.

Cortisol and Chronic Inflammation:

- Cortisol plays a crucial role in the inflammatory response, and while it is typically anti-inflammatory, **chronic high cortisol** can actually lead to sustained inflammation. This makes the body more vulnerable to autoimmune disorders, cardiovascular diseases, and other chronic conditions.

Lifestyle Factors for Managing Cortisol Levels:

- **Sleep:** Aim for 7-9 hours of quality sleep each night. Sleep apnea or poor sleep quality can exacerbate cortisol production.

- **Hydration:** The general recommendation is to drink about 9 cups (2.1 liters) for women and 13 cups (3.1 liters) for men, but hydration needs can vary depending on factors like climate, activity level, and individual health.
- **Exercise:** Regular, moderate exercise can help balance cortisol levels, although overtraining can increase cortisol. Activities like yoga, walking, or swimming may be especially helpful for stress reduction.
- **Mindfulness and Relaxation:** Meditation, breathing exercises, and relaxation techniques can help reduce chronic stress, lowering cortisol levels over time.

Conclusion:

Elevated cortisol can have serious effects on both physical and mental health, leading to issues like weight gain, muscle weakness, osteoporosis, and cardiovascular problems. Monitoring your stress levels, sleep, hydration, and exercise can help manage cortisol production, and tests like saliva or urine cortisol levels can give insight into your body's cortisol rhythm and overall health.

A systematic breakdown including pharmaceuticals affecting excess insulin and carbohydrates:

1. Hypothesis on Refined Sugar, Carbohydrates, and Chronic Diseases

- **Sugar and Insulin Resistance:** Refined sugars and simple carbohydrates can lead to insulin spikes and, over time, may contribute to insulin resistance. Insulin resistance is a hallmark of Type 2 diabetes and is thought to play a central role in the development of various chronic diseases like cardiovascular disease, obesity, and fatty liver disease.
- **Chronic Cortisol and Blood Sugar Control:** Cortisol, often referred to as the "stress hormone," is released by the adrenal glands in response to stress, but it also plays a role in regulating blood sugar levels. Chronic stress or dysregulation of the hypothalamic-pituitary-adrenal (HPA) axis (which controls cortisol production) can lead to prolonged cortisol release, which can further destabilize blood sugar levels. This disruption might worsen insulin resistance and lead to hyperglycemia, potentially accelerating the development of metabolic diseases.

2. Role of GLP-1 and New Medications — a new unproven intervention for regaining metabolic stasis and health.

- **GLP-1 (Glucagon-Like Peptide-1):** GLP-1 is a hormone that plays several important roles in glucose metabolism. It enhances insulin secretion in response to meals, inhibits glucagon release (which prevents the liver from producing excess glucose), slows gastric emptying (which reduces postprandial blood sugar spikes), and promotes satiety. Activation of GLP-1 receptors in the brain can also impact appetite and food intake, which is key for weight management.
- **Ozempic (Semaglutide):** This medication is a GLP-1 receptor agonist. By activating GLP-1 receptors, Ozempic helps lower blood sugar, supports weight loss, and may reduce the activity of the HPA axis, which could be beneficial in reducing cortisol-related

disruptions in blood sugar regulation. There's evidence suggesting Ozempic may have beneficial effects on reducing inflammation and improving overall metabolic health.

- **Trulicity (Dulaglutide):** Like Ozempic, Trulicity is a GLP-1 receptor agonist. It's approved for managing Type 2 diabetes and has been shown to support weight loss and cardiovascular health. The drug also works by improving insulin sensitivity and glucose metabolism, making it effective for reducing the risk of cardiovascular events, which is a common concern in patients with Type 2 diabetes.
- **Rebelsus:** This is another formulation of semaglutide (like Ozempic), but it's taken orally rather than by injection. It's primarily used to treat Type 2 diabetes, and like other GLP-1 receptor agonists, it helps control blood sugar and may contribute to weight loss.
- **Wegovy:** This is semaglutide, marketed for weight loss in individuals who are overweight or obese. It also targets the GLP-1 pathway and helps control blood sugar in the process, making it a useful option for people at risk of or living with Type 2 diabetes.
- **Mounjaro (Tirzepatide):** Mounjaro is a newer medication that acts as a dual GLP-1 and GIP (Gastric Inhibitory Polypeptide) receptor agonist. It's shown to be very effective in lowering blood sugar and supporting weight loss, potentially providing benefits that go beyond what GLP-1 alone can offer.

3. Mechanism of Action of GLP-1 Receptor Agonists and Impact on Cortisol

- **GLP-1 and the HPA Axis:** The HPA axis governs the body's response to stress, including the release of cortisol. While GLP-1's primary effects are on glucose metabolism and appetite regulation, there's emerging research suggesting that GLP-1 may have an indirect role in modulating the HPA axis. This modulation could potentially reduce chronic cortisol production and improve overall blood sugar control in individuals with insulin resistance or Type 2 diabetes.
- **Cortisol and Blood Sugar:** Chronic stress and elevated cortisol levels can disrupt insulin sensitivity, leading to more difficulty in controlling blood sugar. By lowering cortisol production, drugs like Ozempic and Mounjaro might help restore more stable blood sugar levels, especially in individuals whose insulin resistance is exacerbated by stress.

4. Connections Between Chronic Disease, Cortisol, and Blood Sugar

- **Chronic Stress and Metabolic Dysregulation:** Chronic exposure to stress, and therefore elevated cortisol, can lead to metabolic disruptions, including insulin resistance and dysregulated blood sugar. It can also lead to increased visceral fat accumulation, which further exacerbates metabolic dysfunction.
- **Cardiovascular Disease Risk:** Both insulin resistance and chronic cortisol elevation contribute to atherosclerosis and other cardiovascular diseases. Newer GLP-1 receptor agonists like Ozempic and Trulicity have shown to have cardiovascular protective effects, in part because they improve blood sugar control and reduce the risk of heart attacks, strokes, and other cardiovascular complications.

5. Testing the Hypothesis

The conclusions are partly speculative — To test our hypothesis, studies need to be conducted which would involve:

Groups with Different Diets: One group could have a diet high in refined sugar and processed carbohydrates, while another group could follow a lower-carb, whole-food diet.

- **Assessing Cortisol and Blood Sugar:** Measure cortisol levels and blood sugar control over time, both in response to dietary changes and pharmacological interventions like GLP-1 agonists.
- **Drug Intervention:** You could also look at the effects of GLP-1 receptor agonists (like Ozempic or Mounjaro) on cortisol levels and metabolic parameters in individuals with insulin resistance or T2D.
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By combining dietary interventions with pharmacological treatments, you could explore how modulating both sugar intake and cortisol levels through GLP-1 receptor agonists impacts the broader picture of chronic disease prevention and management.

Nasal Breathing:

Nasal breathing has numerous advantages over mouth breathing, both from a physiological and health perspective. Here's a breakdown of the key benefits:

1. Air Filtration and Warming:

- The nose acts as a natural air filter. It traps dust, allergens, and pathogens in the mucous lining, preventing them from entering the lungs and potentially causing infections or irritation.
- Nasal passages also warm and humidify the air before it reaches the lungs, which is especially important in cold or dry environments, reducing the strain on the respiratory system.

2. Nitric Oxide Production:

- Nitric oxide (NO) is indeed produced in the sinuses, and it plays a crucial role in respiratory health. When inhaled through the nose, this molecule helps:
 - **Dilate blood vessels** in the lungs, improving blood flow and increasing oxygen exchange.
 - **Enhance immune function** by neutralizing pathogens and supporting better airway health.
 - It also has beneficial effects on blood pressure regulation throughout the body.

3. CO2 Regulation and the Bohr Effect:

- Nasal breathing helps **retain more carbon dioxide (CO2)** in the blood compared to mouth breathing. This slower exchange of gases is important because CO2 is a key factor in facilitating the **Bohr effect**.
- The **Bohr effect** describes how an increase in CO2 concentration in the blood promotes the release of oxygen from hemoglobin to tissues that need it most. By keeping CO2 levels more stable, nasal breathing ensures more efficient oxygen delivery to the muscles and organs.

4. Additional Benefits of Nasal Breathing:

- **Improved diaphragm function:** Nasal breathing encourages deeper, diaphragmatic breaths, which leads to better lung ventilation and overall oxygenation.
- **Reduced stress:** Nasal breathing stimulates the parasympathetic nervous system, which promotes relaxation and reduces the production of stress hormones like cortisol.
- **Enhanced endurance and performance:** Due to the better oxygen exchange and CO₂ regulation, athletes often find nasal breathing supports prolonged physical activity and improves performance.

5. Mouth Breathing:

negative effects of mouth breathing on oral and overall health. Let's break down how these issues manifest:

1. **Malocclusions (Misalignment of the Teeth):** When a person breathes through their mouth, the tongue isn't positioned against the roof of the mouth as it should be. The tongue plays an essential role in guiding the development of the jaw and teeth. If the tongue isn't applying the correct pressure during childhood and growth, it can lead to a narrower upper jaw, which may contribute to dental crowding, overbites, or underbites. In some cases, this can lead to more complex orthodontic problems later on.
2. **Higher Risk of Cavities (Dental Caries):** Breathing through the mouth can lead to a dry mouth, reducing the natural flow of saliva. Saliva is crucial for neutralizing acids in the mouth and washing away food particles and bacteria. When there is less saliva, the teeth become more vulnerable to acid attacks from foods and drinks, increasing the likelihood of tooth decay (caries). The reduction in salivary flow also means that the mouth is less capable of remineralizing enamel, further raising the risk of cavities.
3. **Tonsils and Immune System Issues:** Mouth breathing can result in the tonsils being exposed to more airborne allergens and pathogens, as the nasal passages, which filter and warm the air, are bypassed. This increased exposure can contribute to chronic inflammation, allergies, and even more frequent infections. In children, this can also lead to enlarged tonsils or adenoids, which may affect breathing and contribute to sleep disorders like snoring or sleep apnea.
4. **Gum Disease (Periodontal Disease):** Reduced saliva flow associated with mouth breathing can also create an environment where bacteria thrive in the mouth. Saliva has antimicrobial properties, and when its flow is diminished, bacteria and plaque can accumulate more easily, contributing to gum disease (gingivitis or periodontitis). Over time, this can lead to swollen, bleeding gums, and in severe cases, tooth loss.
5. **Other Health Concerns:** Chronic mouth breathing can lead to issues beyond the teeth, such as dry or irritated oral tissues, bad breath, and even problems with proper tongue posture. It can also negatively affect facial development, causing long, narrow faces or "adenoid facies" in children, where the appearance of the face is altered due to chronic open-mouth posture.

Addressing Mouth Breathing:

In summary, mouth breathing can have wide-reaching effects on oral and overall health, but with proper awareness and early intervention, many of these issues can be mitigated.

Conclusion:

Nasal breathing is generally superior for overall health, supporting optimal oxygen delivery, immune function, and stress regulation. Of course, there are situations (like intense exercise or nasal congestion) where mouth breathing might be necessary, but for daily activities, nasal breathing is the preferred option whenever possible.

considerations in the evolving role of dental care in overall health. Let's address each part one by one:

Discussion Wrap Up

1. Would it be appropriate to ask your patient to create a diary (journal) of their last week's eating habits?

If we are serious about preventive dental care? Yes, it can be appropriate to ask a new patient for a food diary, especially during an initial dental health evaluation. This practice can provide valuable insights into the patient's diet and its potential impact on oral health. A food diary allows the dentist to identify habits or foods that might contribute to issues like cavities, tooth erosion, or gum disease. For example:

- **Frequency of sugar intake:** Regular consumption of sugary snacks or beverages can increase the risk of caries.
- **Acidic foods and drinks:** High-acid foods (like citrus fruits and soda) can contribute to enamel erosion.
- **Overall nutrition:** A lack of essential vitamins and minerals (like calcium, vitamin D, and vitamin C) can affect gum health and the strength of teeth.

However, it's essential to ensure that asking for a food diary is done in a non-judgmental way. It should be framed as a tool for helping patients improve their oral health and well-being.

2. Can dentistry acquire the expertise to advise patients of varying health conditions on their daily nutrition habits?

The extent of nutritional advice should be guided by a dentist's level of expertise and training. Dental professionals, particularly those in general practice, can acquire the necessary knowledge to offer basic nutrition advice related to oral health if our profession takes the lead to help set standards and learning opportunities concerning nutritional evaluation, counseling and possible referrals. Dentists can advise patients on:

- The **impact of diet on caries** (sugars, fermentable carbohydrates, etc.).

- **Recommendations for foods that promote oral health**, such as those high in calcium, phosphates, and vitamin D, which help strengthen teeth.
- The effect of **nutrition on gum health** (for example, foods rich in vitamin C to prevent gum disease).

However, for complex dietary issues related to specific health conditions (e.g., diabetes, eating disorders, or nutritional deficiencies), it's important that dentists refer patients to a registered dietitian, nutritionist, or other healthcare providers for more specialized advice.

3. Can we clearly demonstrate a link between nutrition, caries, oral and systemic health?

Yes, there is a well-established link between nutrition and oral health, as well as systemic health. Multiple studies support the idea that poor nutrition can contribute to both oral and systemic health issues:

- **Caries:** Diets high in sugars, especially when consumed frequently, are one of the primary risk factors for dental caries. Sugars provide food for harmful bacteria in the mouth, which produce acids that demineralize tooth enamel.
- **Enamel erosion:** Acidic foods and drinks (e.g., citrus, carbonated drinks, vinegar-based foods) can erode enamel over time.
- **Periodontal disease:** Nutritional deficiencies (e.g., low vitamin C) can impair the body's ability to fight infection, making the gums more susceptible to disease.

Furthermore, poor oral health has been linked to several systemic conditions:

- **Heart disease:** Chronic gum disease (periodontitis) has been linked to an increased risk of cardiovascular disease.
- **Diabetes:** Poor oral health can exacerbate diabetes, and diabetes can, in turn, make patients more susceptible to gum disease.
- **Pregnancy complications:** There's some evidence linking gum disease with preterm birth or low birth weight.

Advising on nutrition can have a direct impact on improving both oral and systemic health, supporting the idea that a holistic approach is important.

4. Would advising patients concerning nutrition be within the scope of dental care?

Yes, advising patients about nutrition can be within the scope of dental care, especially as it pertains to the prevention of oral diseases such as cavities and periodontal disease. The American Dental Association (ADA) and other professional organizations recognize the connection between diet and oral health, and many encourage dentists to provide basic nutrition advice or guidance related to oral care.

However, as mentioned earlier, there are limits. Dentists should be mindful of their expertise and should refer patients to specialists, such as dietitians or medical doctors, for more detailed nutrition counseling related to systemic health or specific medical conditions.

Scope considerations:

- **Basic dietary guidance** related to caries prevention, enamel health, and gum health is well within the scope of dental care.
- **Referrals to specialists:** For more detailed dietary planning, particularly for managing medical conditions (like diabetes, malnutrition, or eating disorders), a referral to a registered dietitian or healthcare provider is advisable.

In summary:

- Asking for a food diary can be appropriate in a dental evaluation as it can provide important insights into a patient's oral health habits.
- Dentists can acquire expertise to offer basic nutritional advice, especially related to oral health, but should refer patients to nutrition specialists for complex issues.
- There is clear evidence linking nutrition with oral and systemic health, making nutrition guidance an important aspect of dental care.
- Advising on nutrition, particularly as it pertains to oral health, is within the scope of dental practice, but it's important to refer patients to specialists when necessary.

Thank you —

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