

Oral Health and Diabetes

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Dental ECHO

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Objectives

- Understand what diabetes is
- Recognize the prevalence of diabetes
- Appreciate the morbidity + mortality associated with diabetes
- Understand the relationship between Oral Health and Diabetes

Speaker

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USA

Chronic Diseases

Cases of the *Most Common* Chronic Diseases

Frequency		Millions	% popn.
1	Pulmonary	49.2M	16.9%
2	Hypertension	36.8	12.6
3	Mental	30.3	10.4
4	Heart	19.1	6.6
5	Diabetes	13.7	4.7
6	Cancers	10.6	3.6
7	Stroke	2.4	0.8
Total Cases		162.2M	55.8%

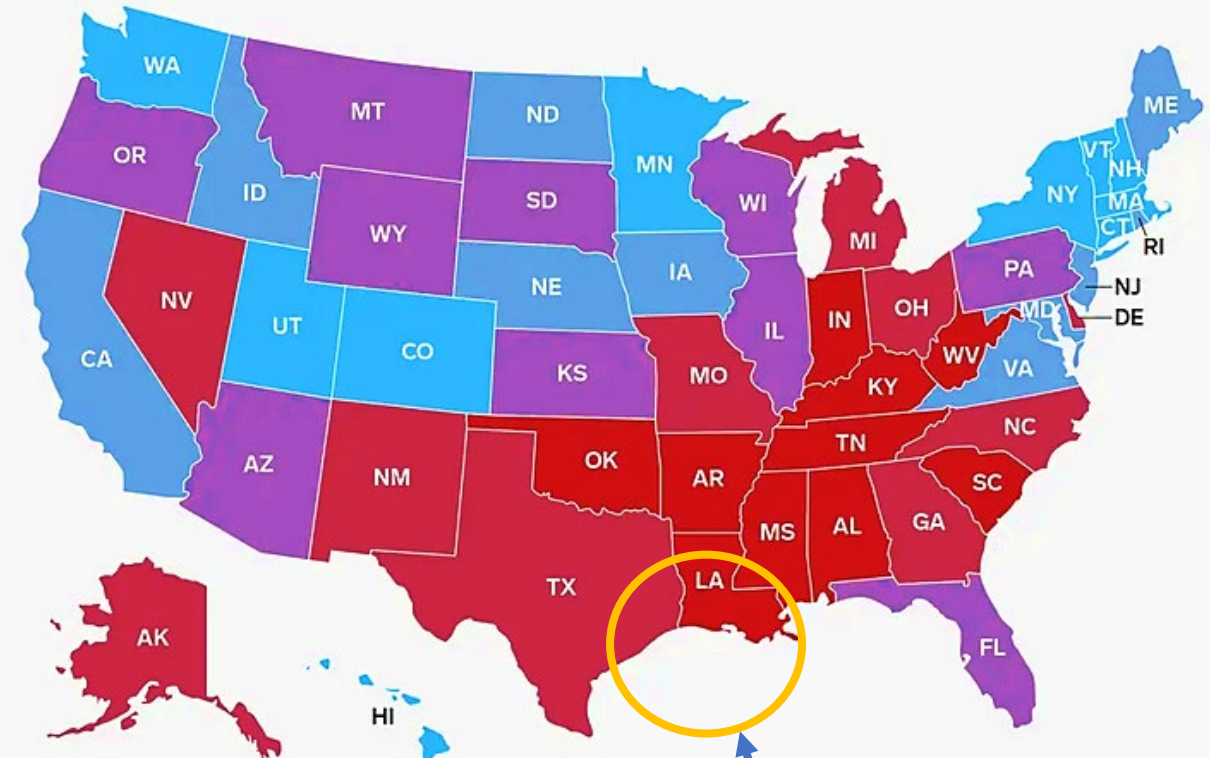
*This study evaluated the burden of seven of the most common chronic diseases/conditions (cancer, diabetes, heart disease, hypertension, mental disorders, pulmonary conditions, and stroke).

Source: DeVol, R, Bedroussian, A, et al. An Unhealthy America: The Economic Burden of Chronic Disease. The Milken Institute. October 2007. Full report and methodology available at: www.chronicdiseaseimpact.com.

Every state ranked by healthiness, 2018

Rank based on behaviors, environmental factors, policies, medical care, and outcomes

Most healthy  Least healthy



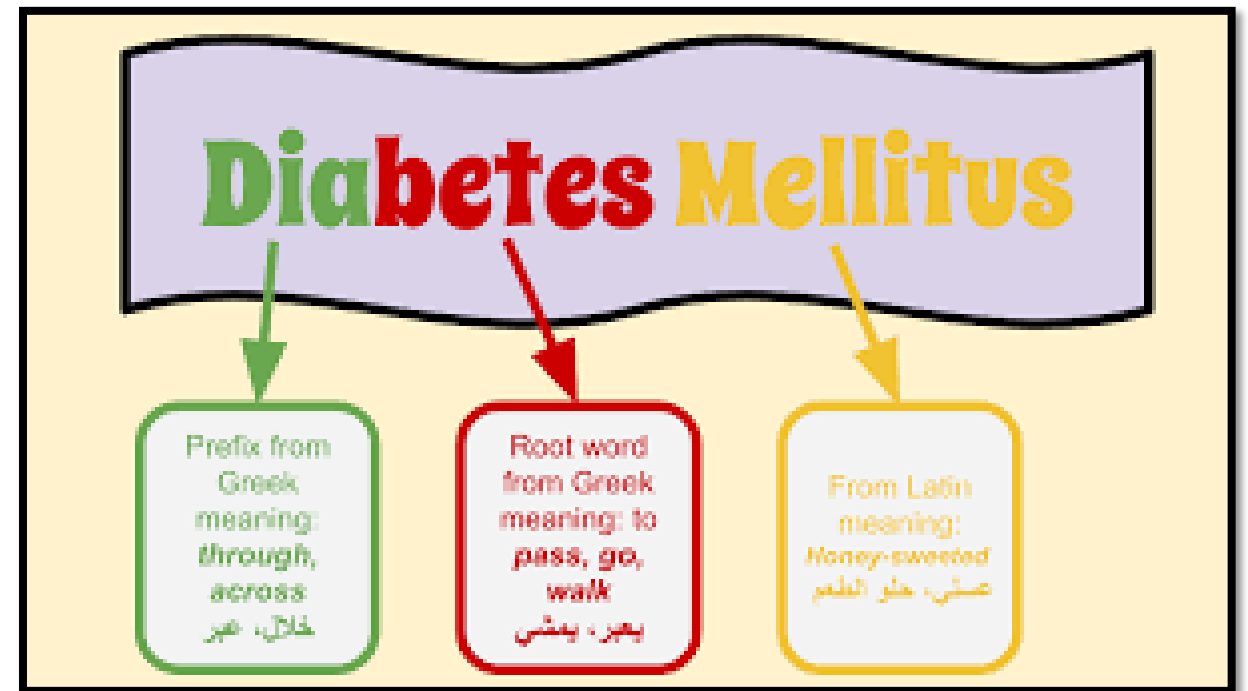
Source: United Health Foundation

Insider Inc.

“Hawaii was the healthiest state, **Louisiana** the worst!”

Diabetes Mellitus - Etymology

- The term "diabetes" comes from the Greek words "dia" (through) + "bainein" (to walk). It literally means "to pass through" or "siphon." This refers to the excessive urination that is a characteristic symptom of diabetes
- The word "mellitus" is Latin for "sweet". It was added to "diabetes" to describe the sweet taste of the urine in people with diabetes, which is caused by high levels of glucose (sugar)
- Therefore, the full term "diabetes mellitus" translates to "sweet passing through," reflecting the key symptoms of the condition



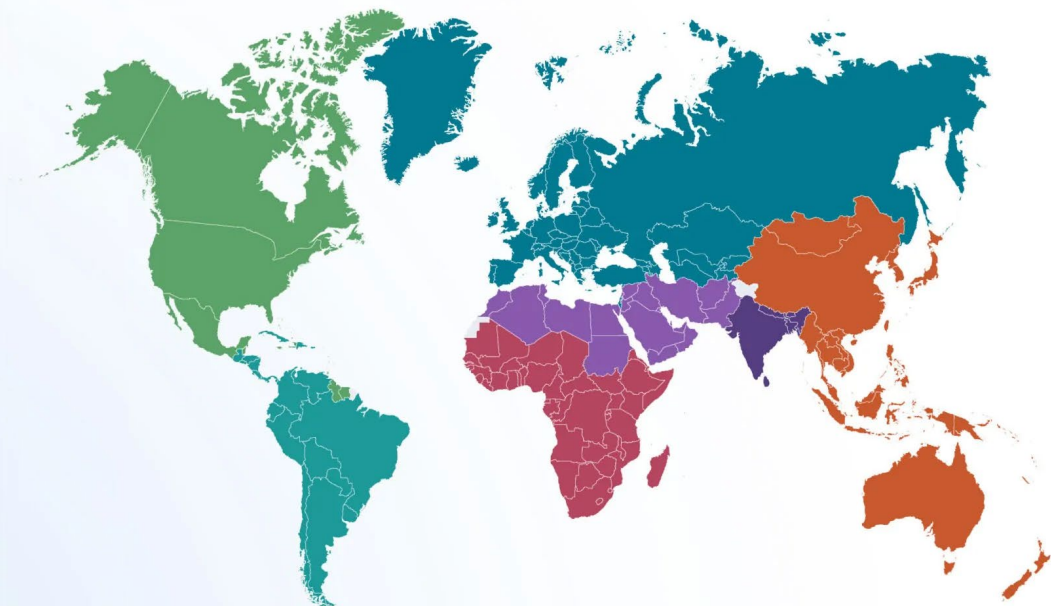


Diabetes around the world - 2024

Number of adults (20-79 years) with diabetes worldwide



Region	2024	2050	Change
World	588.7 Million	852.5 Million	45% increase
Africa (AFR)	24.6 Million	59.5 Million	142% increase
Europe (EUR)	65.6 Million	72.4 Million	10% increase
Middle-East and North Africa (MENA)	84.7 Million	162.6 Million	92% increase



Highlights

- 589 million adults (20-79 years) are living with diabetes worldwide - 1 in 9.
- The total number of adults with diabetes is predicted to rise to 853 million by 2050 - 1 in 8.
- 4 in 5 adults with diabetes (81%) live in low and middle-income countries.
- Diabetes caused 3.4 million deaths in 2024 - 1 every 6 seconds.
- An estimated 43% of adults living with diabetes (252 million people) are undiagnosed. Almost 90% live in low and middle-income countries.
- Diabetes was responsible for an estimated USD 1.015 trillion in global health expenditure in 2024. This represents a 338% increase over the past 17 years.
- 635 million adults worldwide (1 in 8) have impaired glucose tolerance and 488 million have impaired fasting glucose (1 in 11) placing them at high risk of type 2 diabetes.
- 1 in 5 live births are affected by hyperglycaemia in pregnancy.

Region	2024	2050	Change
North America and Caribbean (NAC)	56.2 Million	68.1 Million	21% increase
South and Central America (SACA)	35.4 Million	51.5 Million	45% increase
South-East Asia (SEA)	106.9 Million	184.5 Million	73% increase
Western Pacific (WP)	215.4 Million	253.8 Million	18% increase

The IDF Diabetes Atlas 11th edition has been produced thanks to unrestricted educational grants from

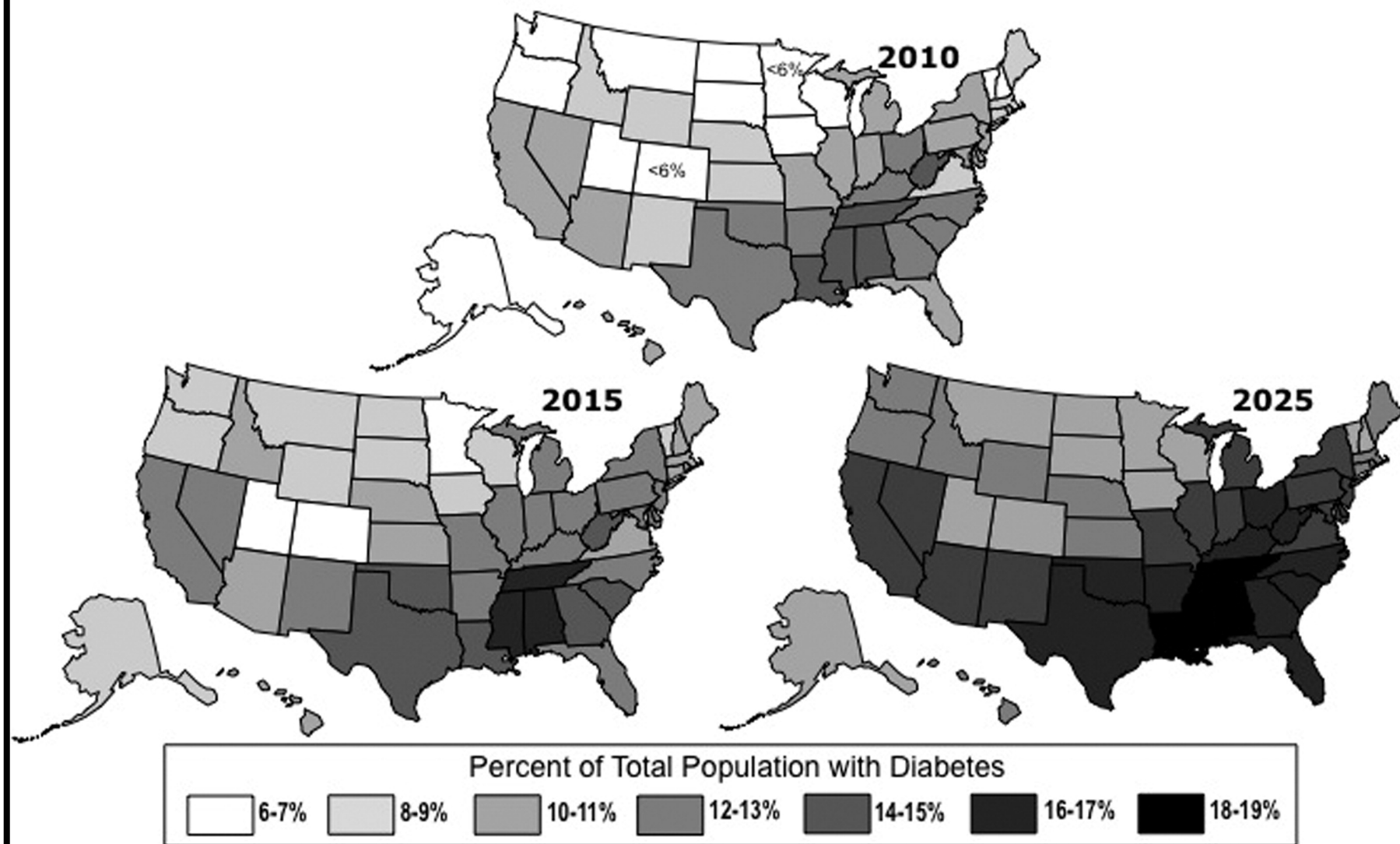


Need more information?

Visit diabetesatlas.org
Contact atlas@idf.org

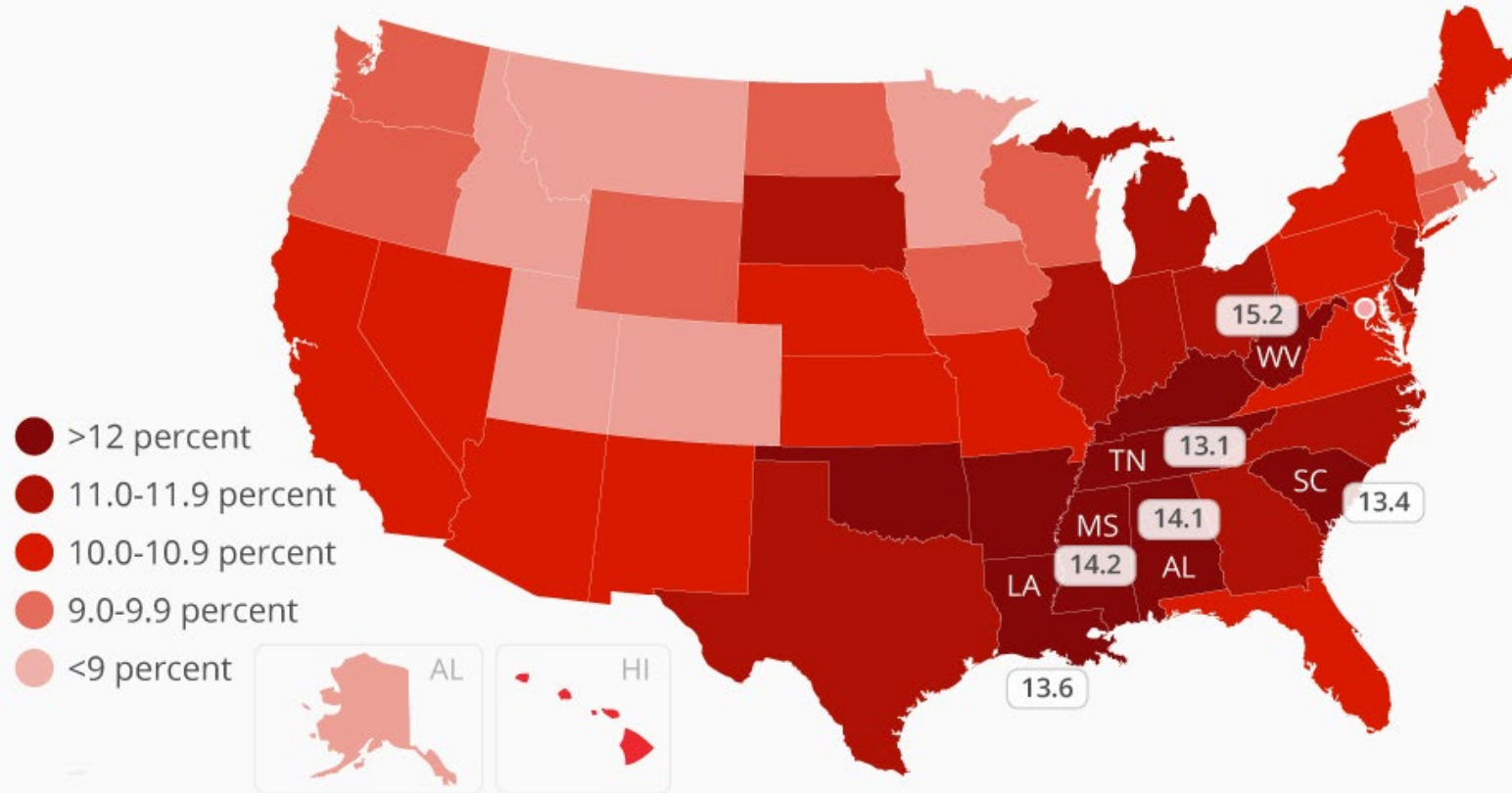


Increasing Prevalence of Diabetes



Where Diabetes is Most Prevalent in the U.S.

Percent of adults who have ever been told by a doctor that they have diabetes (2017*)



Includes pregnancy-related diabetes, percentages are weighted to reflect population characteristics (e.g. average age)
* latest on record



@StatistaCharts

Sources: Kaiser Family Foundation, CDC

TYPE-1

Juvenile Onset

Autoimmune or
Genetic Causes

**Non-functional
Pancreas**

NO
Insulin produced

**CANNOT be
Prevented**

**CANNOT be
Reversed**

Symptoms of
thirst, frequent
urination, blurry
vision

Requires a
Healthy Lifestyle &
Medical Supervision

If left untreated
can progress into
complications

TYPE-2

Adult Onset

Insulin Resistance
Obesity or Aging

**Partially Functional
Pancreas**

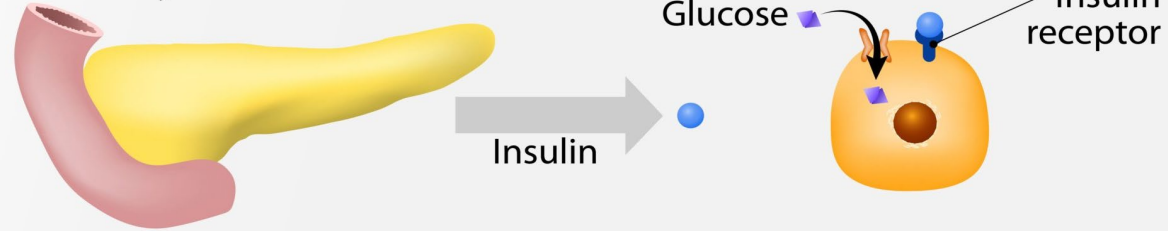
SOME
Insulin produced

**CAN be Prevented
through Lifestyle
changes**

**CAN be
Reversed with
early diagnosis**

DIABETES MELLITUS

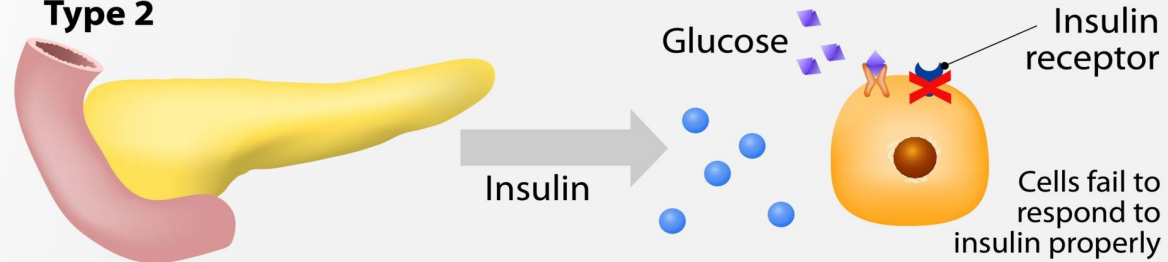
Healthy



Type 1

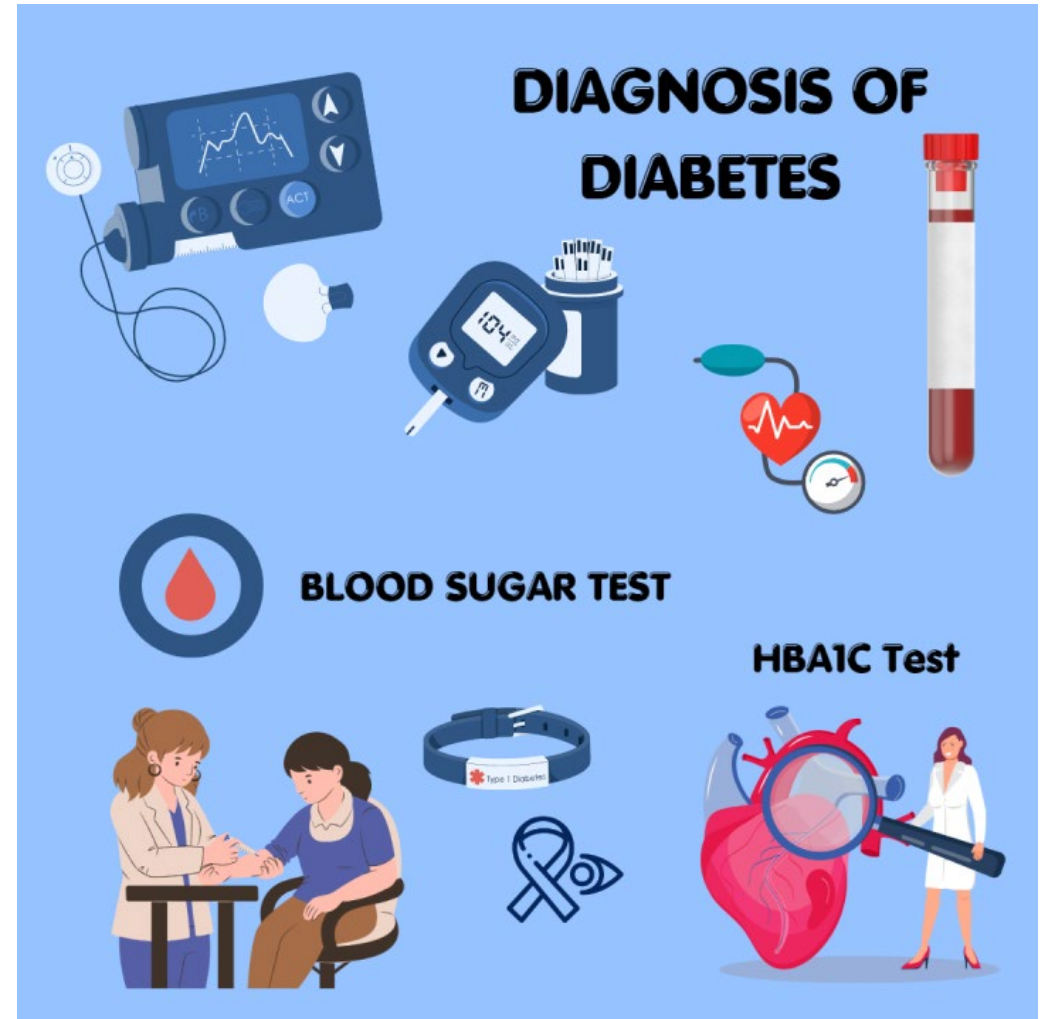


Type 2



Diagnostics

	HbA1c (percent)	Fasting Plasma Glucose (mg/dL)	Oral Glucose Tolerance Test (mg/dL)
Diabetes	≥ 6.5	≥ 126	≥ 200
Prediabetes	5.7 – 6.4	100 - 125	140 – 199
Normal	~ 5.7	≤ 99	≤ 139



Polyphagia

Excessive hunger or increased appetite. The feeling of hunger is not easily satisfied.



Also coined as
*"Starvation in
the midst of
plenty".*

The 3P's of Diabetes

Polydipsia

Excessive thirst and increased water intake, most likely as a result of frequent urination.

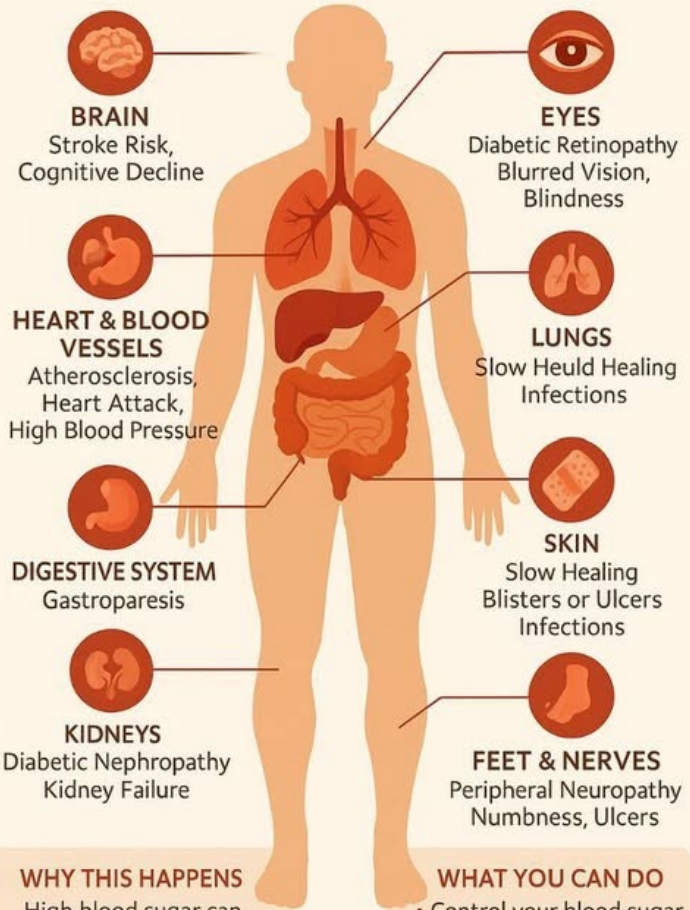


Polyuria

Increased frequency of urination and passing abnormally large amounts of urine, mostly as a result of increased renal activity due to the increased need to filter excess sugar in the bloodstream.



HOW TYPE 2 DIABETES AFFECTS THE BODY



WHY THIS HAPPENS
High blood sugar can damage blood vessels and nerves

WHAT YOU CAN DO

- Control your blood sugar
- Get regular screening tests
- Check your feet daily

Oral Consequences of Diabetes

Table 7 Oral Manifestations of DM and Their Etiology and Associated Risks

Manifestation	Etiology	Risks
Salivary dysfunction (xerostomia)	<ul style="list-style-type: none"> ● Polyuria ● High salivary glucose 	<ul style="list-style-type: none"> ● Caries ● Periodontal diseases ● Candida infections
Dental caries	<ul style="list-style-type: none"> ● High salivary glucose ● Xerostomia 	<ul style="list-style-type: none"> ● Cervical and root caries
Oral infections	<ul style="list-style-type: none"> ● Xerostomia ● Immune-compromised 	<ul style="list-style-type: none"> ● Angular cheilitis ● Pseudomembranous candidiasis
Periodontal disease	<ul style="list-style-type: none"> ● High levels of pro-inflammatory mediators ● High crevicular glucose 	<ul style="list-style-type: none"> ● Poor glycemic control ● High risk of periodontal diseases
Wound healing	<ul style="list-style-type: none"> ● High levels of matrix metallo-proteinases 	<ul style="list-style-type: none"> ● Delayed wound healing
Neurosensory disorders	<ul style="list-style-type: none"> ● Unclear 	<ul style="list-style-type: none"> ● Taste disturbances ● Compromised oral hygiene
Trigeminal neuropathy	<ul style="list-style-type: none"> ● Progressive dystrophy in trigeminal nerve 	<ul style="list-style-type: none"> ● Pain and discomfort

Salivary Dysfunction

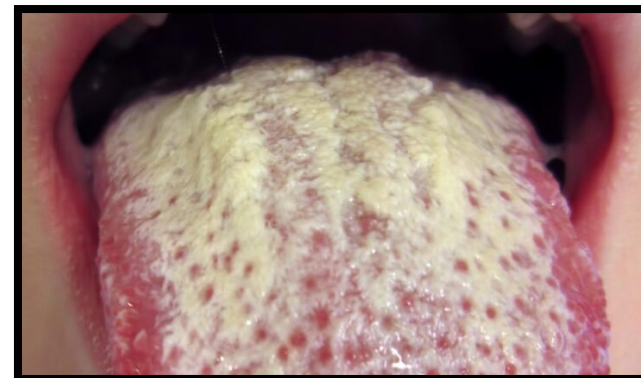
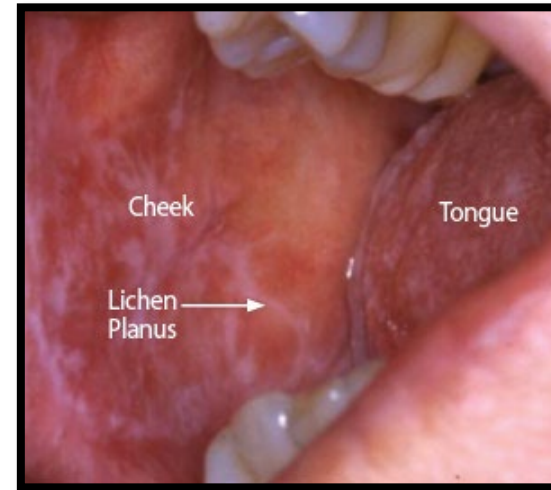
- Salivary dysfunction changes the quantity or quality of the saliva ultimately affecting its protective effects
- Hyposalivation, due to impaired gland function, occurs as a result of dehydration because of hyperglycemia + peripheral autonomic neuropathy
- However, the exact etiology is not completely understood
- As HbA1c values increase, there is a trend toward decreased salivary flow rate
- As a consequence, irritation of the oral soft tissue may occur leading to inflammation + pain
- Also, chronic complications such as endothelial dysfunction, microvascular complication + neuropathy can affect the microcirculation + deteriorate the salivary flow + composition

Dental Caries

- The association between diabetes and dental caries is complex
- There is a lack of evidence that diabetes increases the risk of dental caries
- Possible causes are:
 - Salivary dysfunction can reduce the salivary output in conjunction with a high content of glucose in saliva, which can subjectively increase the incidence of caries
 - Diabetic patients might have more dental caries due to poor oral hygiene or a higher number of meals a day
 - Neuropathy can diminish the salivary flow rate + increase the risk of developing caries because of hyposalivation, but this is not consistent in literature
 - The buffering capacity of saliva in patients with diabetes is diminished, leading to a higher risk of developing dental caries

Oral Infections + Other Oral Mucosal Diseases

- A number of different oral mucosal disorders can arise in patients with diabetes, but the frequency of such lesions is minimal
- Oral lichen planus can arise as a consequence of sulfonylurea therapy
- Fungal infection manifests as pseudomembranous candidiasis or median rhomboid glossitis
 - May be due to impaired phagocytic function due to a lack of compliance with, or inappropriate insulin therapy



Impaired Wound Healing

- The exact pathogenesis of delayed healing is poorly understood
- Contributors to delayed wound healing include:
 - Abnormal keratinocyte + fibroblast migration, proliferation, differentiation + apoptosis can contribute to impaired wound healing
 - Decreased vascularization, impaired function of endothelial progenitor cells (EPCs) + mesenchymal stem cells (MSCs) + abnormal polarization of macrophages
 - Altered homeostasis + impaired phagocyte/macrophage function due to high levels of matrix metallo-proteinases

Periodontal Disease

- Considered the main oral problem as observed by dental professionals
- Increased risk of prevalence, severity, extent, or progression of periodontal diseases
- Poor control of diabetes is associated with severe periodontitis compared to those without diabetes
- High levels of local pro-inflammatory mediators + bacterial existence result in periodontal conditions

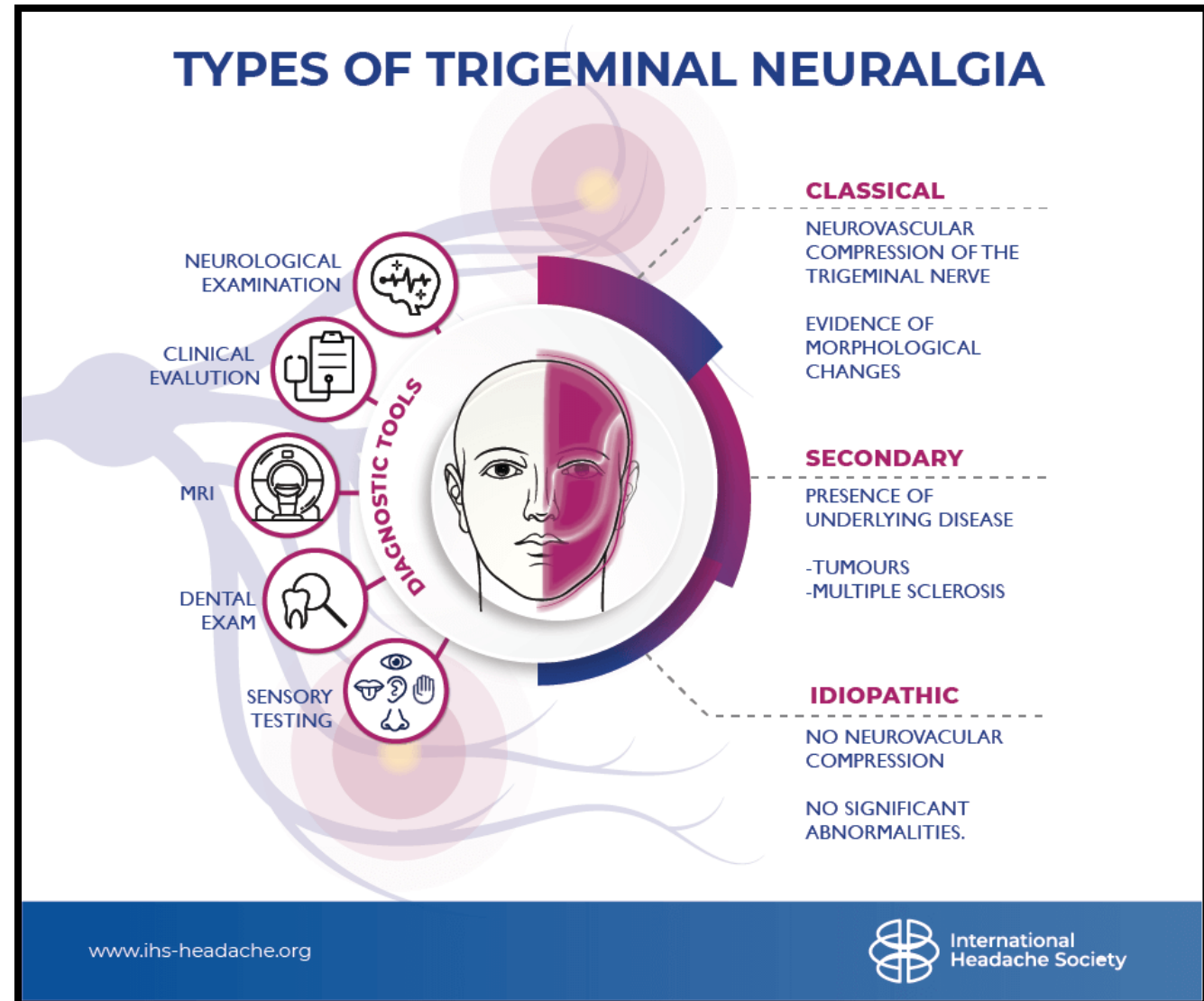


Neurosensory Disorders

- Diminished taste (hypogeusia) is common as it may be related to changes in diet + salivary flow alterations
- Interestingly, there is no relation between the severity of gustatory impairment + the HbA1c levels
- Other neurosurgery disorders are burning mouth syndrome + dysphagia

Neuropathy

- Diabetes can affect the function of the trigeminal nerve resulting in trigeminal neuralgia or trigeminal neuropathy
- Most likely due to glucose neurotoxicity after persistent episodes of hyperglycemia





Questions?



THANK YOU

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Department of Health

Contact us: WellAhead@la.gov

Please also feel free to visit the Well-Ahead
website at:

<http://wellaheadla.com>

