

Long Term Complications of Diabetes

How Worried Should We Be?

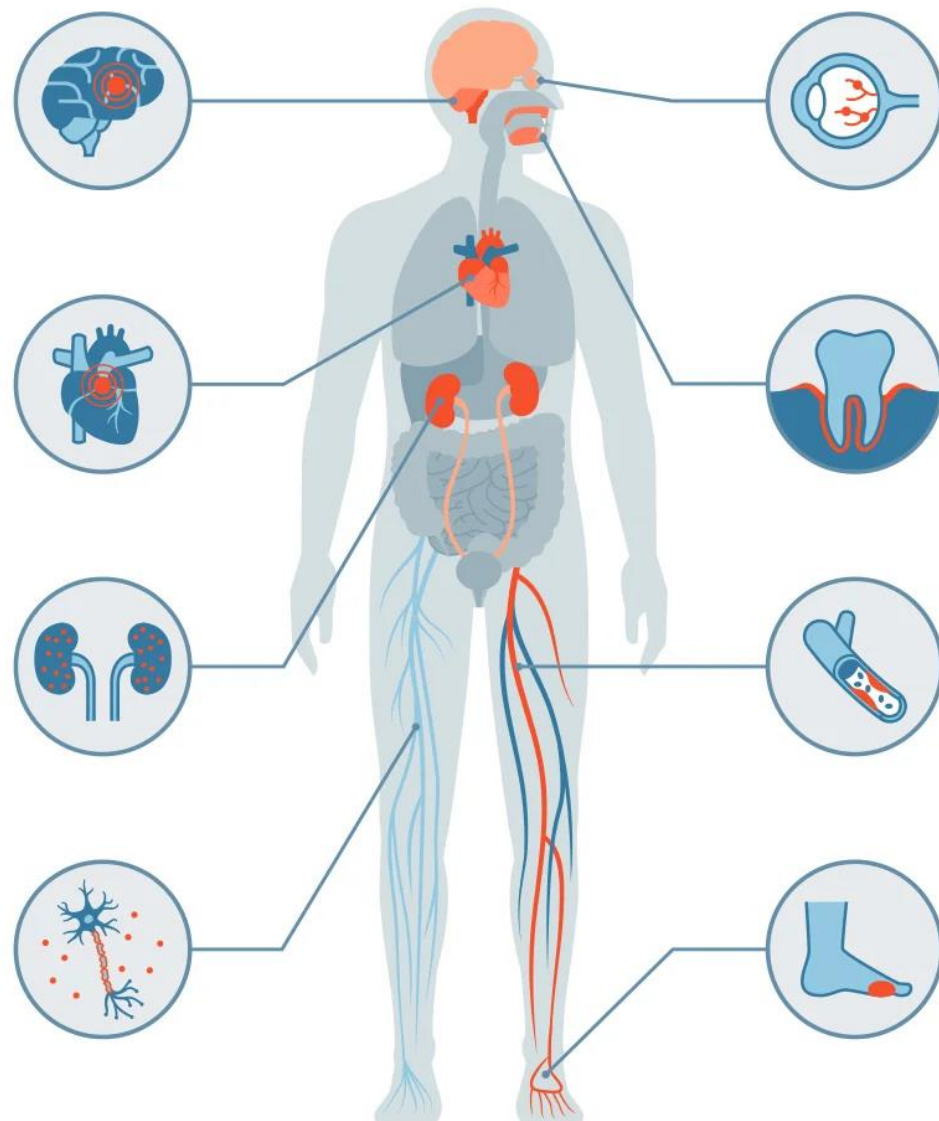
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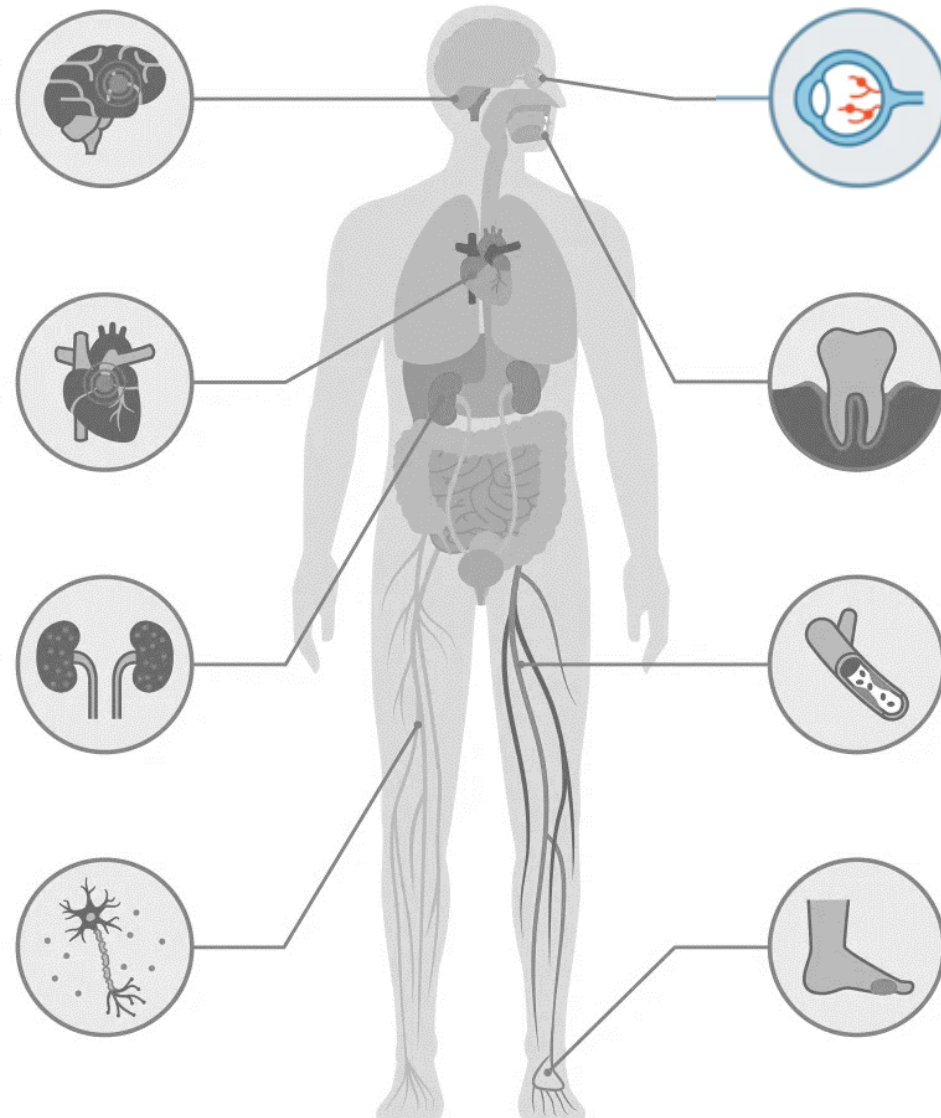
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- The planner and speaker of this CE activity has no relevant financial relationships with commercial interests to disclose.
- The speaker does not intend to discuss any unlabeled or unapproved use of drugs or devices.

Learning Objectives

1. Outline the organ systems within the body which can be affected by long term diabetes
2. Identify potential symptoms of diabetes complications
3. Examine the relationship between hemoglobin A1c and the risk of complications
4. Discuss how to converse with children and adolescents about long term diabetes complications



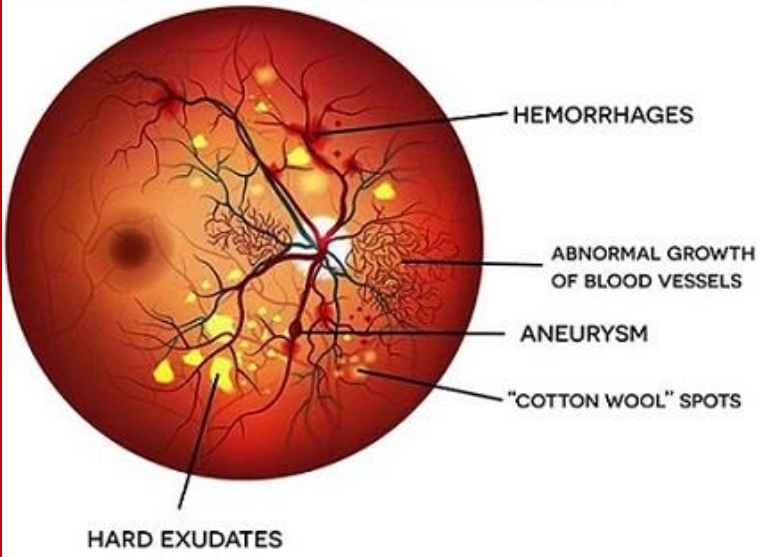


Retinopathy

- 3rd leading cause of blindness in the US
- Leading cause of new blindness in adults
- CDC: Present in ~1/3 of adults >40 with diabetes
- Highest risk factors: higher mean A1c, longer duration of diabetes

Retinopathy

DIABETIC RETINOPATHY



- Etiology: High glucose -> small blockages in BV -> new blood vessels develop, leaking blood vessels, scar tissue
- Symptoms:
 - Early often asymptomatic
 - Floaters or dark spots
 - Blurred vision
 - Fluctuating vision
 - Poor night vision
 - Fading of colors
 - Vision loss
- Screening: Dilated eye exam (After 3-5 years and pubertal in T1D, at diagnosis in T2D)
- Treatment: Steroids, laser treatment, eye surgery

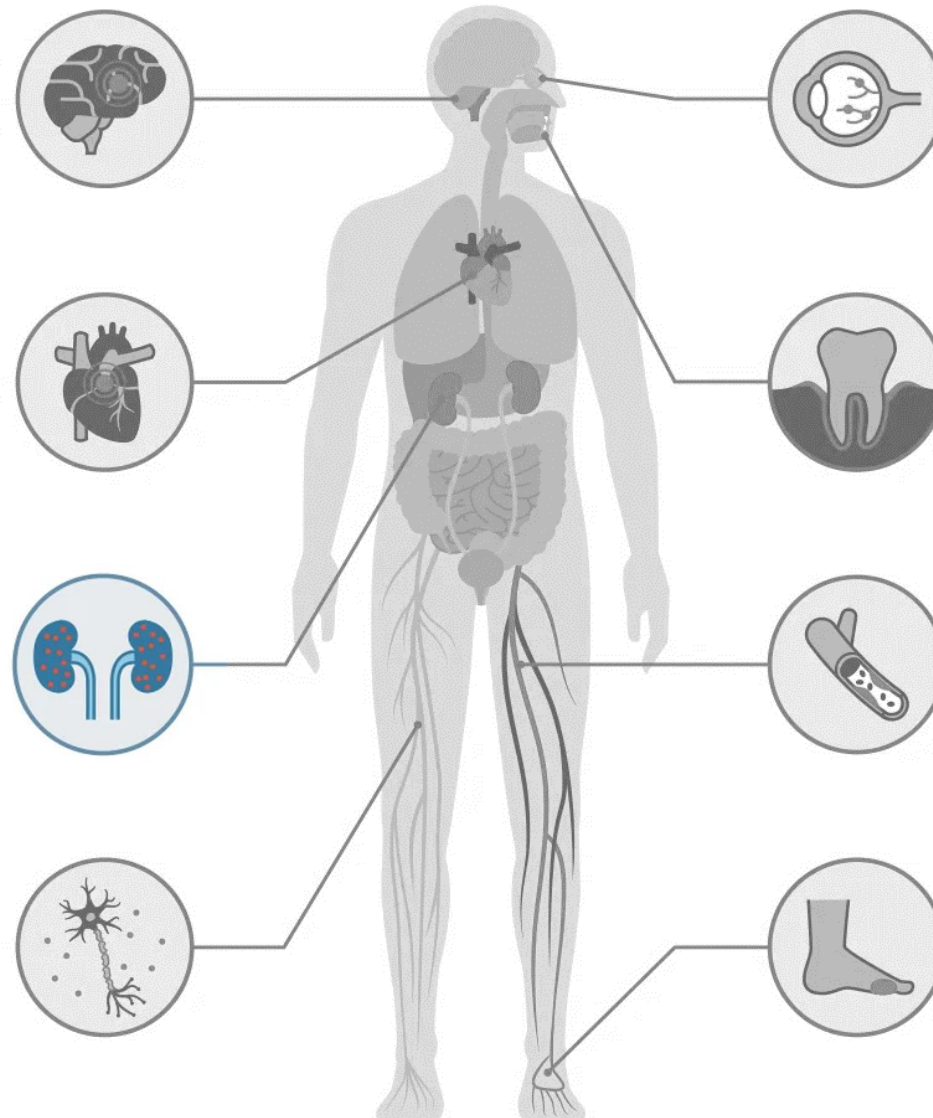


Unaffected



Diabetic retinopathy

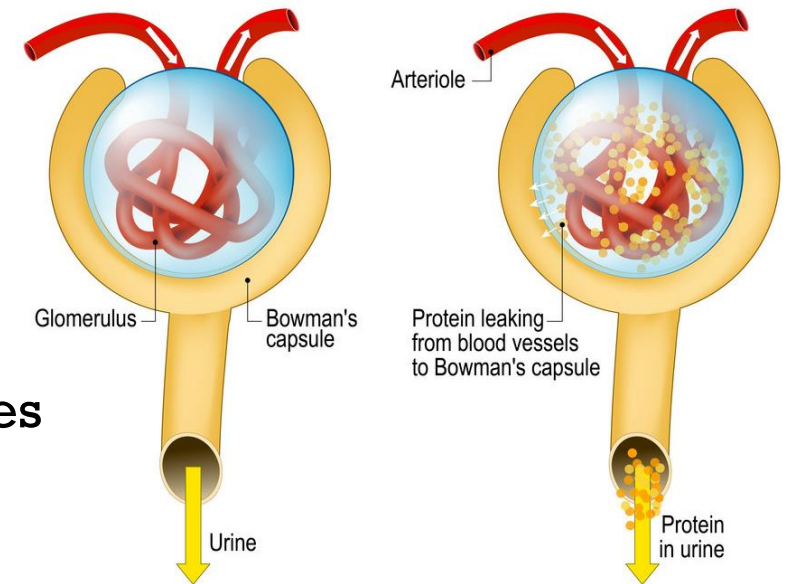
Nephropathy



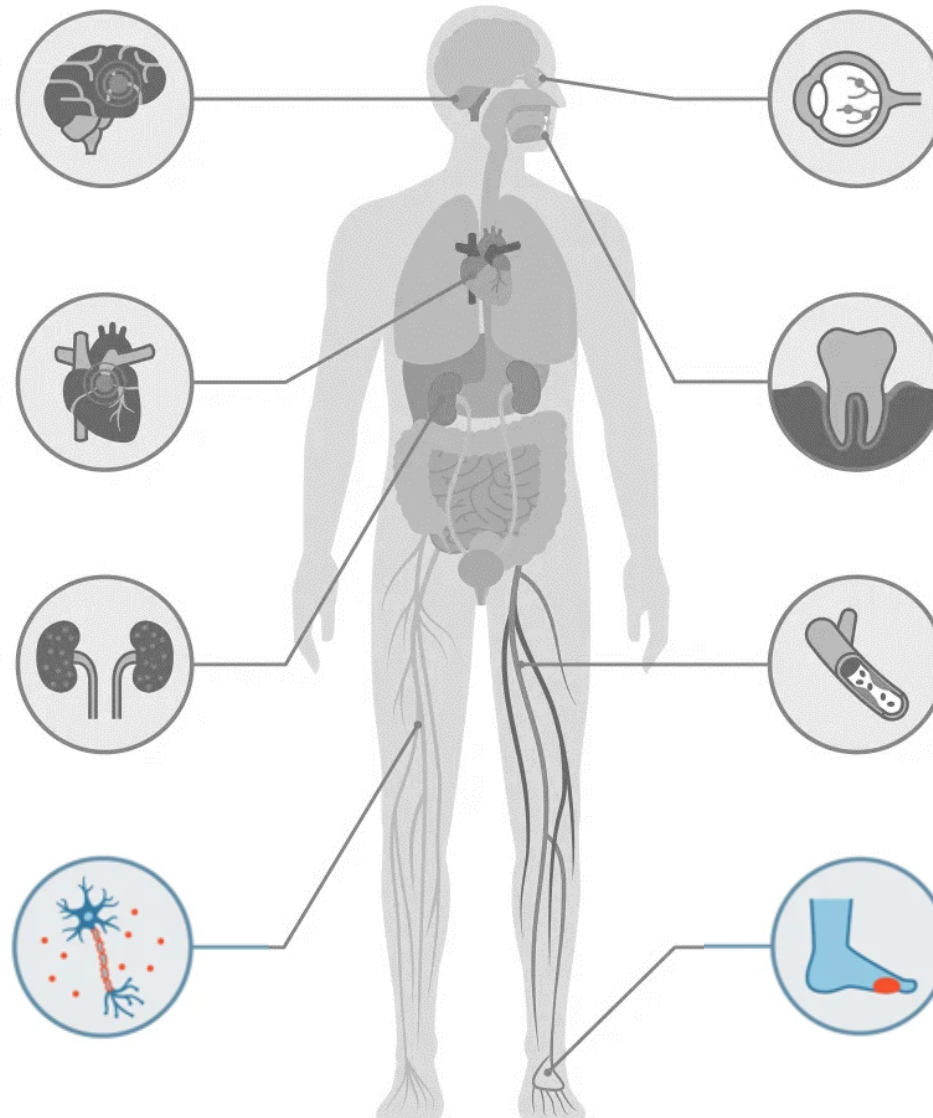
- Leading cause of chronic kidney disease in the US (30-40% of ESRD)
- Estimated to be present in 20-40% of patients with diabetes
- Generally takes 10 years to develop in T1D
- Risk factors: hypertension, higher mean A1c, longer duration of diabetes

Nephropathy

- Etiology: High glucose -> blockages in small BV -> inflammation, damage, and scarring of the filtration system
- Symptoms:
 - Early often asymptomatic
 - Fatigue, weakness, loss of appetite, nausea
 - Difficulty concentrating
 - Edema and swelling of feet, ankles, hands, eyes
 - Worsening hypertension
- Screening:
 - Blood pressure at every visit
 - Urine protein assessment (After 5 years + pubertal in T1D, at diagnosis in T2D)
- Treatment: Anti-HTN agents, newer diabetes medications which decrease risk and progression of renal disease. If renal failure develops -> dialysis.



Neuropathy



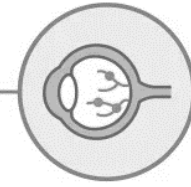
- Likely the most common complication of diabetes
- Most common cause of neuropathy in developed countries
- Several large studies indicate that 50% of people with diabetes eventually develop neuropathy
- Takes years to develop in T1D, may be present at diagnosis in T2D
- Risk factors: higher mean A1c, longer duration of diabetes, smoking

Neuropathy

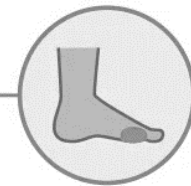
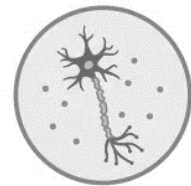
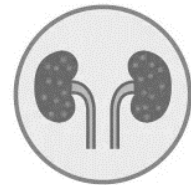
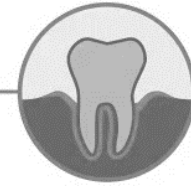
- Etiology: High glucose -> blockages in small BV causing ischemia to nerves, interference with nerve signaling
- Symptoms:
 - Early often asymptomatic
 - Peripheral neuropathy (usually feet) – Pain, tingling, burning, numbness
 - Ulcers can develop (numbness + decreased blood flow)
 - Autonomic neuropathy – affects internal organs (GI, urinary, genital, sweat, CV)
- Screening:
 - Assess peripheral nerves (monofilament, vibration, reflexes)
 - Examine for sores on the feet
 - Home exams
- Treatment: Medications to treat symptoms (pregabalin, metoclopramide), foot care



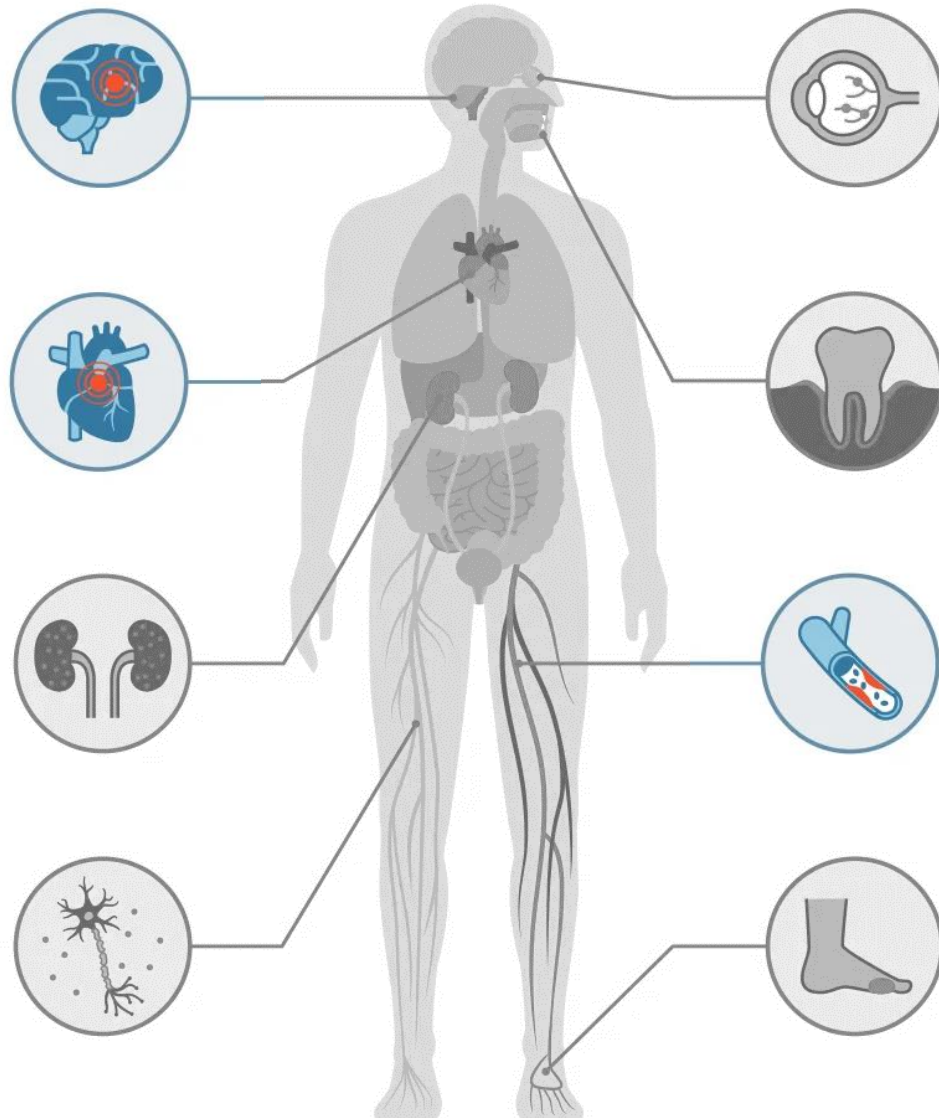
Cerebrovascular



Cardiovascular



**And
Peripheral
Vascular
Disease**

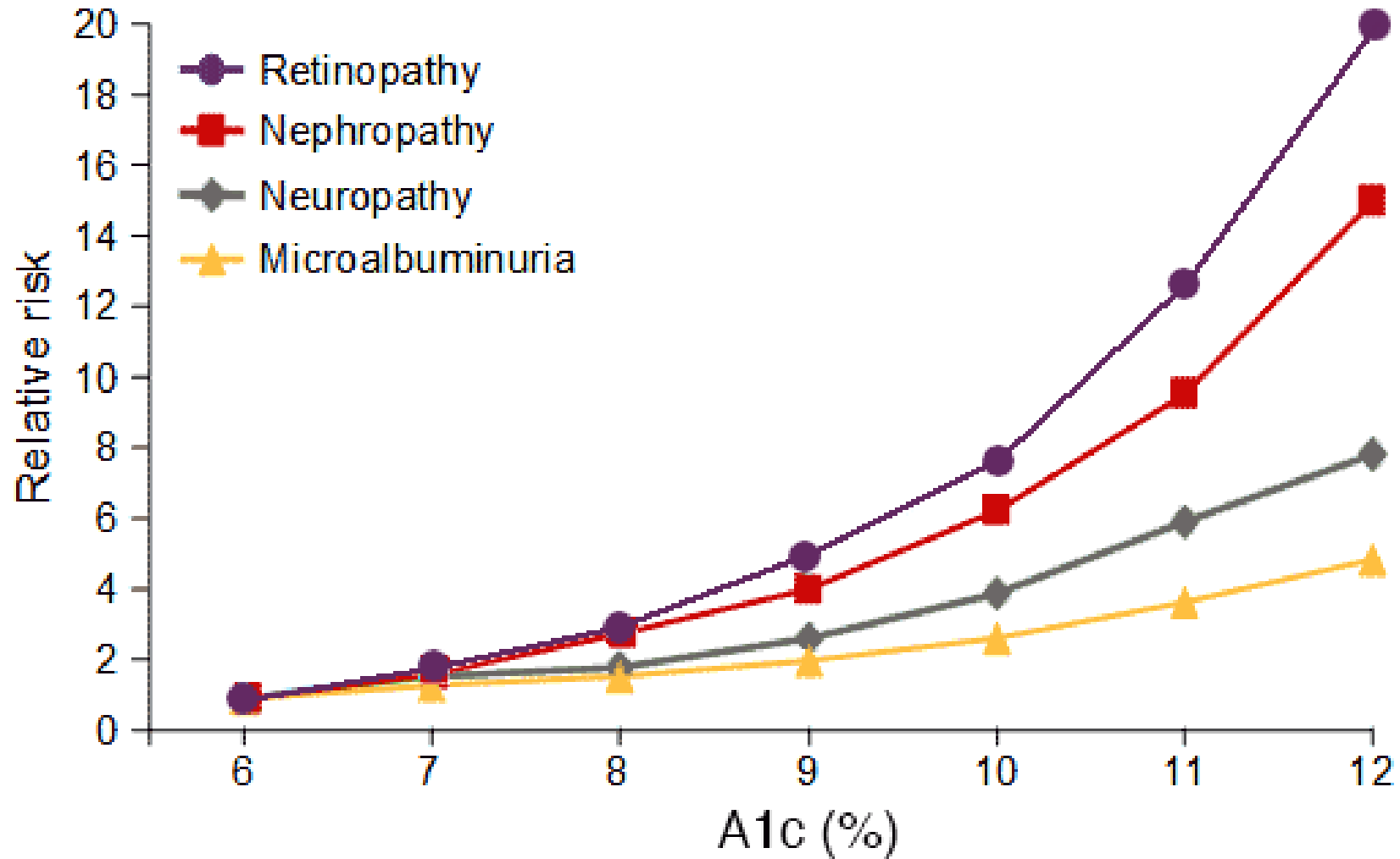


Cardiovascular Disease

- Leading cause of morbidity and mortality in those with diabetes
- Atherosclerotic process begins in childhood, accelerated with diabetes
- Worsened by co-existent hypertension, elevated cholesterol, and kidney disease
- Screening:
 - Cholesterol levels soon after diagnosis in children with T1 and T2 diabetes to catch any familial cholesterol problems early
 - Test again at age 9-11 (universal screening)
 - Check every 3 years in T1 and yearly in T2
- Treatment: Statins in those over 10 if elevated LDL
- Prevention: Glycemic control, tobacco avoidance, monitoring for other conditions



A1c and complications risk

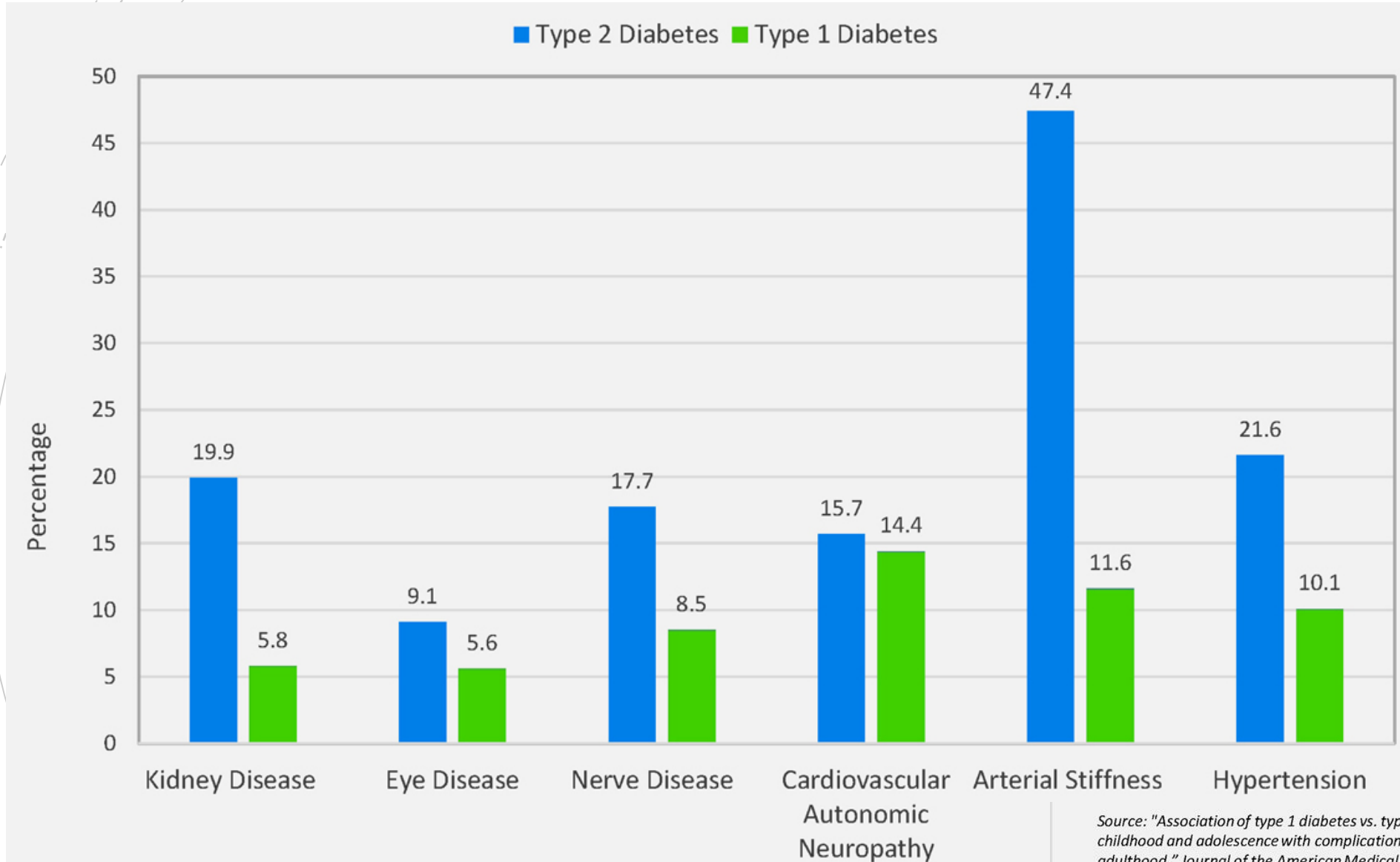




A quick word about T2D

Not the “good” type of diabetes

Higher Risk of Complications Type 2 vs Type 1 Diabetes



Source: "Association of type 1 diabetes vs. type 2 diabetes diagnosed during childhood and adolescence with complications during teenage years and young adulthood," *Journal of the American Medical Association*, Feb. 28, 2017

TODAY2 – Continuing to Follow Type 2 Diabetes

- 517 patients, average 25 years of age with 12 years of T2D
- Preliminary results:
- Event rate for all heart, vascular, and cerebrovascular events: 6.41 per 1,000 patient-years (3x seen in the Diabetes Control and Complications Trial)

Complication	Percentage of Cohort
Dyslipidemia	>50%
Hypertension	55%
Microalbuminuria	40%
Macroalbuminuria	11%
Retinopathy	50%
Early signs of neuropathy	33%
Pregnancy complications (306 pregnancies):	
- Miscarriage or fetal death	25%
- Preterm birth	24%


Future of Complications

POSITIVE

- More technology making care of diabetes easier
- More medications that improve risk profile
- More interventions and treatments when complications arise

NEGATIVE

- Cost limiting medication options
- Increasing obesity rates in entire population
- Early age of type 2 diabetes diagnoses



How to talk to
children and
adolescents about
diabetes
complications

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