



Diabetes Mellitus Masterclass  
Chapter 8

# WHEN THINGS GO WRONG



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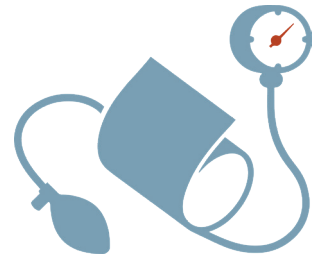
# CARDIOVASCULAR DISEASE

The primary cause of death for patients with diabetes is cardiovascular disease, so in addition to glucose control it is important to manage other cardiovascular risk factors.

## *Hypertension*

Blood pressure goal for patients with diabetes should be < 140/90 mmHg.

- If > 130/80 mmHg, recommend lifestyle changes
- If > 140/90 mmHg, need to start medications



Medications that decrease cardiovascular events in diabetes

- Angiotensin converting enzyme (ACE) inhibitors
- Angiotensin receptor blockers (ARB)
- Hydrochlorothiazide (HCTZ)
- Calcium channel blockers

## *Screening for coronary artery disease (CAD)*

- Not recommended for asymptomatic patients
- Exercise or pharmacologic stress test is indicated for any patients with symptoms of CAD

# HYPERLIPIDEMIA

## *Dyslipidemia treatment—statins*

Statins are the treatment of choice. Who should be treated and which statin to use is based on cardiovascular risk.



### **Risk factors for cardiovascular disease**

- LDL cholesterol > 100 mg / dL (2.6 mmol / L)
- Hypertension
- Current tobacco use
- Family history of premature cardiovascular disease

### **Primary prevention**

- Preventing first cardiac event in patient with no prior history of cardiovascular disease
- Type 2 diabetes, age 40–70 with risk factors for cardiovascular disease—recommend high intensity statin (see below)
- Type 2 diabetes, age 40–70 without risk factors for cardiovascular disease—recommend moderate intensity statin (see below)
- Type 2 diabetes, under age 40—no indication for statin
- Type 2 diabetes, over age 70—limited data but consider treatment based on risk
- Type 1 diabetes—limited data but consider treatment based on same guidelines provided for type 2 patients

### **Secondary prevention**

- Preventing second cardiac event in patient with established cardiovascular disease
- All patients with diabetes should be treated for secondary prevention

Name	Dose
<b>High-intensity statins</b>	
Atorvastatin	40–80 mg daily
Rosuvastatin	20 mg daily
<b>Moderate-intensity statins</b>	
Atorvastatin	10–20 mg daily
Rosuvastatin	10 mg daily
Simvastatin	20–40 mg daily
Pravastatin	40 mg daily

<b>Name</b>	<b>Dose</b>
Lovastatin	40 mg daily
Fluvastatin	40 mg daily

## *Antiplatelet therapy—low-dose aspirin*

### **Primary prevention**

- Indicated for high-risk patients over age 50
- Not indicated for low-risk patients
- Not indicated for any patient under 50 years of age

### **Secondary prevention**

- Indicated for all patients with established cardiovascular disease

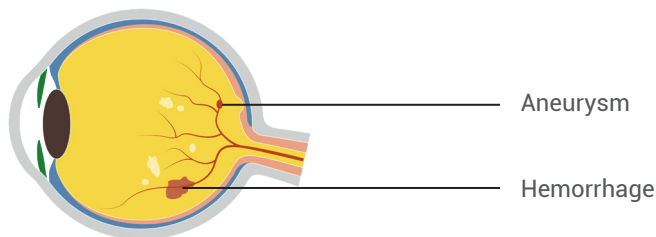
# MICROVASCULAR DISEASE

## Retinopathy

Diabetic retinopathy is the leading cause of preventable blindness.

### Nonproliferative diabetic retinopathy (NPDR)

- Results from small hemorrhages in the retinas and other microvascular abnormalities
- Vision loss due to macular edema



### Proliferative diabetic retinopathy (PDR)

- New vessel growth (can result in vitreous hemorrhage and retinal detachment)
- Permanent vision loss occurs through retinal detachment or macular ischemia
- Severe proliferative diabetic retinopathy has a 60% risk of vision loss at five years if untreated



## Screening

- Critical—most patients with diabetic retinopathy are asymptomatic until vision loss occurs
- Type 1—initial screening within five years of diagnosis
- Type 2—initial screening at time of diagnosis
- Normal exam with well controlled blood sugars—screening every two years
- Any abnormalities or blood sugars not well controlled—annual screening

## Diabetic kidney disease

Diabetic kidney disease is the leading cause of end-stage renal disease in the United States.

### Clinical progression

1. Hyperfiltration occurs in early disease
2. Followed by microalbuminuria (30–300 mg / day)
3. Then macroalbuminuria (> 300 mg / day)
4. Ultimately a decline in glomerular filtration rate (GFR)

### Screening

- Allows for early interventions and can prevent progression
- Done with a urine test to measure albumin excretion
- If microalbuminuria is detected treatment should be initiated (see below)
- Type 1 diabetics should be screened starting five years after diagnosis (then annually)
- Type 2 diabetics should be screened at time of diagnosis (then annually)

### Treatment

- Glucose and blood pressure control
- Medications
  - ACE inhibitors and ARBs can both decrease albumin excretion and slow progression
  - ACE and ARBs should not be used in combination due to increased rate of adverse events

# DIABETIC NEUROPATHY

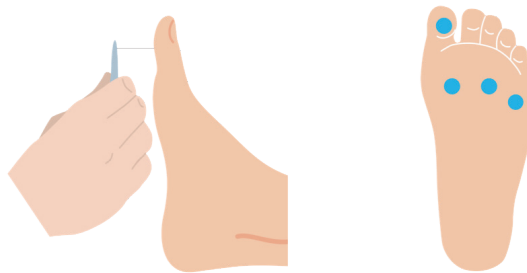
Diabetic neuropathy is the most common complication of diabetes, affecting nearly 50% of patients.

## Peripheral neuropathies

- Symmetric distal sensory neuropathy presents in a *stocking-glove* distribution.
- Small nerve fiber damage causes loss of pain and thermal sensation
- Large nerve fiber damage results in loss of touch and vibration perception
- Sensory fiber damage causes paresthesias and pain

### Screening

- Visual inspection of patient's feet at each visit
- Ensure patient has no ulcers or callouses and shoes fit appropriately
- Assess for loss of protective sensation using the 10g monofilament test



- Assessment of vibratory sense, using a 128-Hz tuning fork



- Assessment for intact peripheral pulses



If there is a concern for loss of protective function or vascular disease, referral to a podiatrist should be considered for evaluation for proper footwear, or other interventions to decrease risk of ulceration.

## *Autonomic neuropathies*

- Hypoglycemia unawareness
- Resting tachycardia or postural dizziness
- Gastroparesis, diabetic diarrhea or chronic constipation
- Erectile dysfunction
- Hyperhidrosis—particularly with increased sweating of the upper body and decreased sweating in the lower body

### **Treatment**

- For hypoglycemia unawareness
  - less aggressive glycemic targets
  - consider a continuous glucose monitor
- For orthostatic hypotension
  - increase salt intake
  - use of compression stockings
  - fludrocortisone 0.1–0.4 mg daily
- For gastroparesis
  - dietary changes—consuming several small meals throughout the day
  - metoclopramide 5–10 mg three times daily (acts to stimulate gastric motility)
  - domperidone 10–20 mg three times daily (not available in the US)
- For erectile dysfunction
  - PDE5 inhibitors



# READING LIST

## **Cardiovascular disease risk management**

American Diabetes Association. 2018. 9. Cardiovascular Disease and Risk Management: Standards of Medical Care in Diabetes-2018. *Diabetes Care*. **41**: S86–S104.

<https://www.ncbi.nlm.nih.gov/pubmed/29222380>

## **Microvascular disease risk management and foot care**

American Diabetes Association. 2018. 10. Microvascular Complications and Foot Care: Standards of Medical Care in Diabetes-2018. *Diabetes Care*. **41**: S105–S118.

<https://www.ncbi.nlm.nih.gov/pubmed/29222381>