



# “Diabetes and hypertension” different faces but with the same fate

Dr. Ali Saaduldeen Alhelli  
consultant internist  
diwaniya teaching hospital

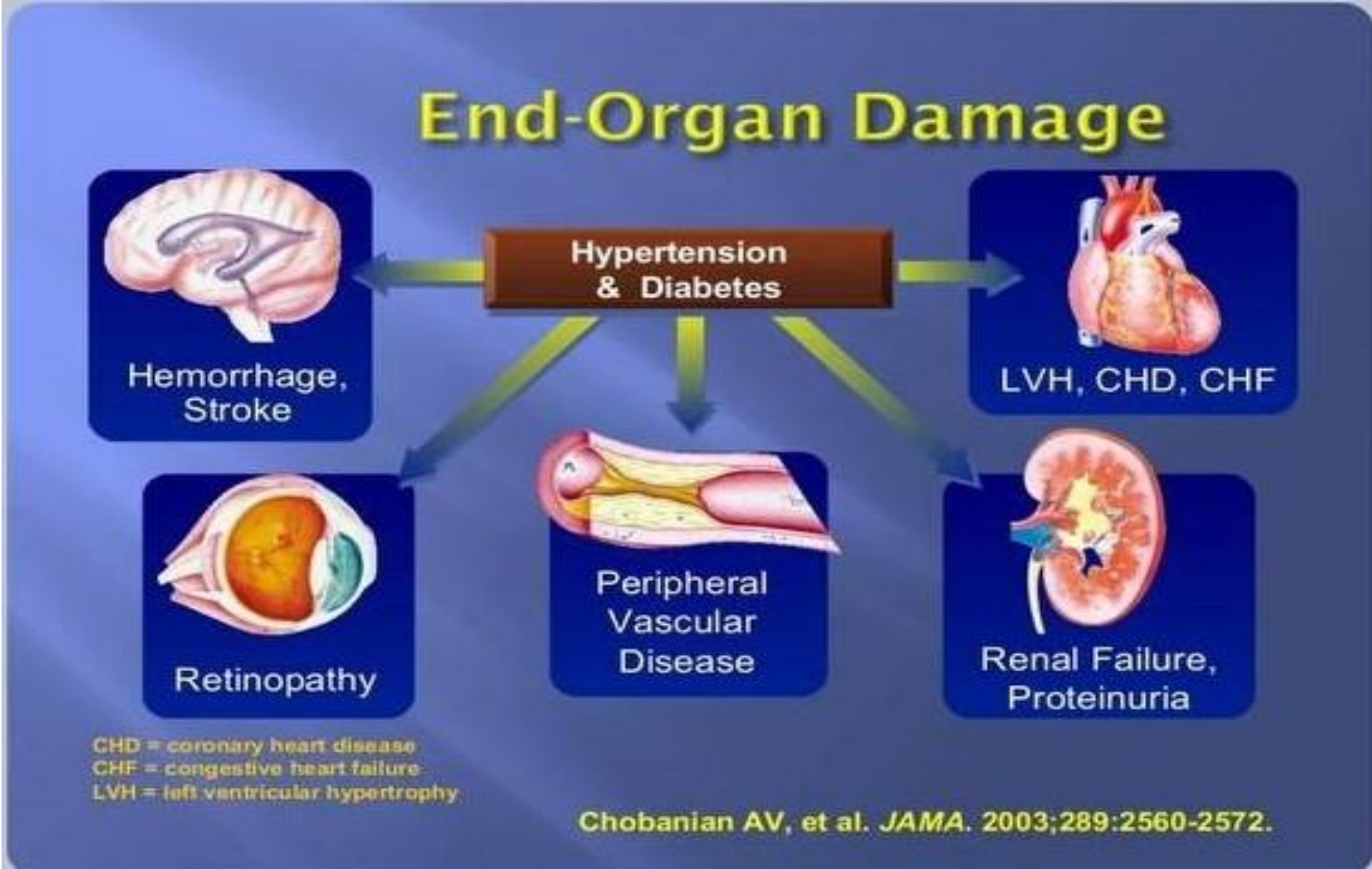
# Similar risk factors:

- 👉 **Overweight and obesity**
- 👉 **Unhealthy dietary habits**
- 👉 **Sedentary life style**
- 👉 **Smoking**
- 👉 **Dyslipidemia**
- 👉 **Stress**
- 👉 **Poor sleep**
- 👉 **old age**
- 👉 **Ethnicity**
- 👉 **Vitamin-D dyficiency**
- 👉 **Family history of hypertension and \ or diabetes**

# Similar pathophysiology :

- ▶ Endothelial dysfunction
- ▶ Vascular inflammation
- ▶ Arterial remodelling
- ▶ atherosclerosis
- ▶ Dyslipidemia
- ▶ Upregulation of the renin -aldosterone-angiotensin system
- ▶ Oxidative stress

Similar microvascular and macrovascular complications



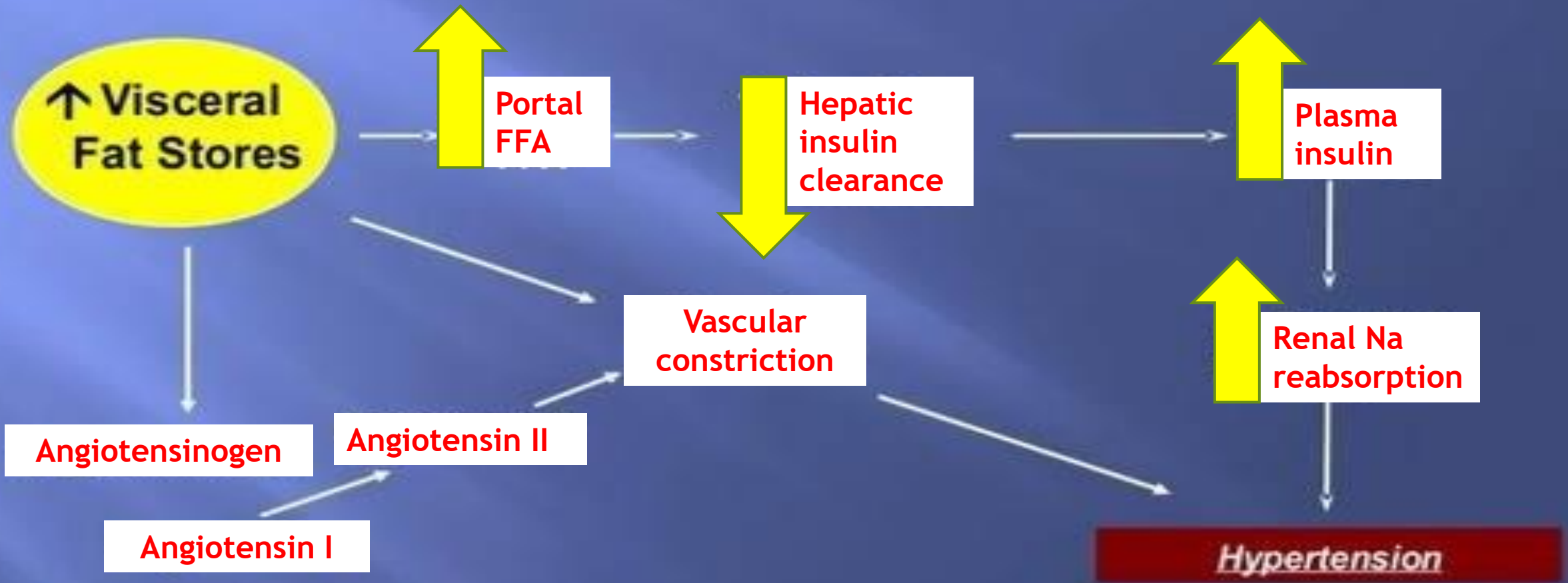
# Hypertension ↔ type 2 diabetes

- ▶ **Hypertension** and **type 2 diabetes** are common comorbidities. Hypertension is twice as frequent in patients with diabetes compared with non-diabetics.
- ▶ the ADA states that **2 in 3 people** with diabetes either report hypertension or taking hypertension medication
- ▶ patients with hypertension often exhibit **insulin resistance** and are at greater risk of developing diabetes than are normotensive individuals.
- ▶ hypertension, often occurs alongside diabetes and obesity. Together, these conditions fall under the umbrella of **metabolic syndrome**. People with metabolic syndrome are at an increased risk of death from **cardiovascular disease**.

# Can diabetes cause hypertension?

- ▶ Excessive caloric intake and a sedentary lifestyle promote **insulin resistance** a condition in which the insulin signalling response in skeletal muscle, liver, and adipose tissue is impaired. This alteration in insulin metabolic signaling leads to **increased vascular adhesion molecule expression, oxidative stress, inflammation, and decreased vascular bioavailable nitric oxide**. The decreased bioavailability of nitric oxide reduces endothelial-mediated vascular relaxation and promotes vascular stiffness.
- ▶ Obesity and insulin resistance are also associated with inappropriate activation of the **RAAS** and the **sympathetic nervous system**. A recent study highlights the role of adipose tissue in promoting activity of the RAAS.

# Fat cell products and hypertension





# Role of Abdominal Adipocytes in Insulin Resistance and Heart Disease



Liver





Hyperinsulinemia can enhance renal sodium reabsorption and vascular reactivity



Angiotensinogen from fat cells can increase angiotensin II and thus blood pressure



Both systolic and diastolic blood pressure increase with increasing body mass index



Both essential hypertension and diabetes mellitus affect the same major target organs




The common denominator of hypertensive and diabetic end organ damage is the  
“vascular tree”


# The vascular tree



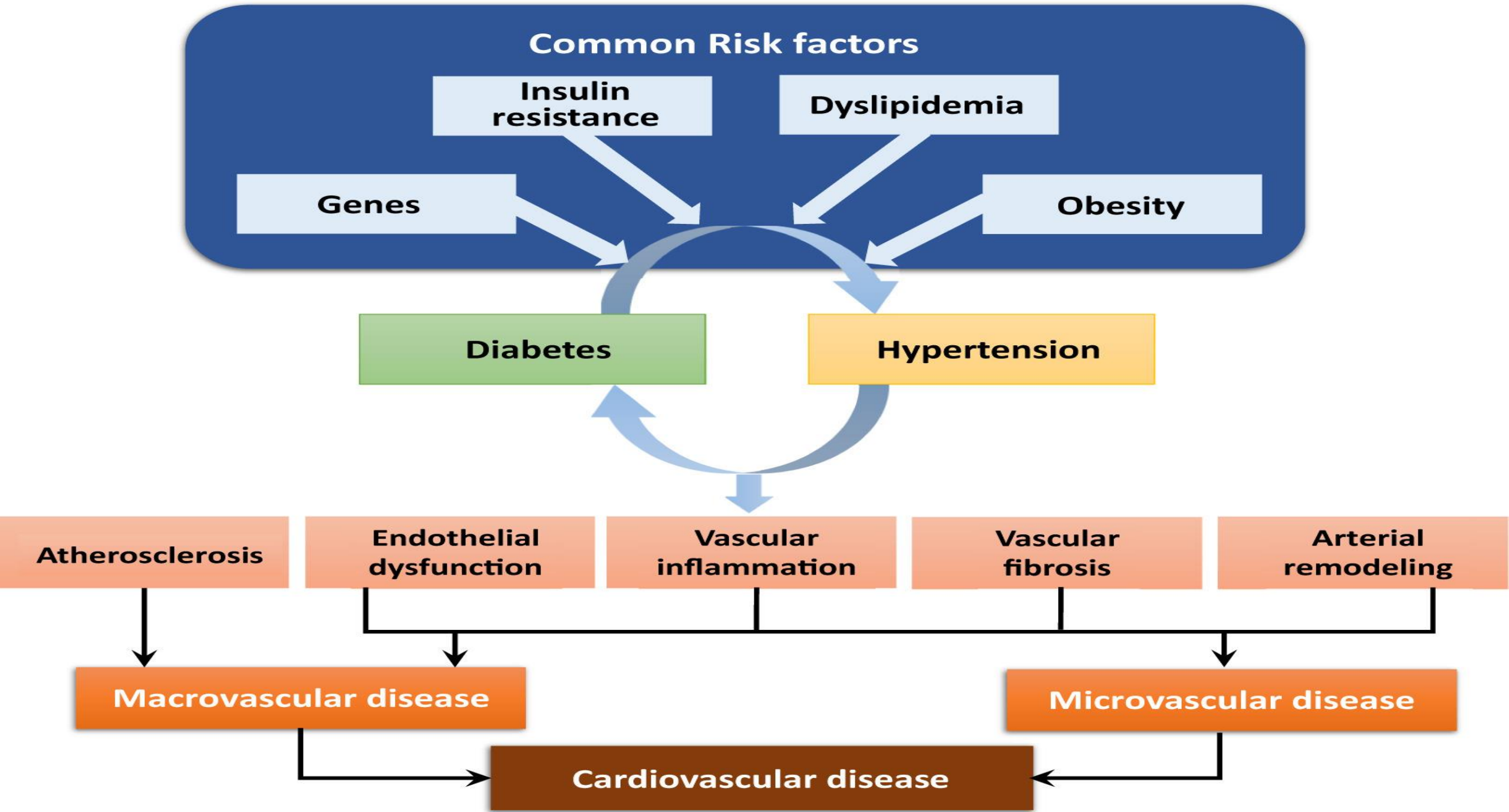
Diabetes seems to be a specific risk factor for small vessel disease

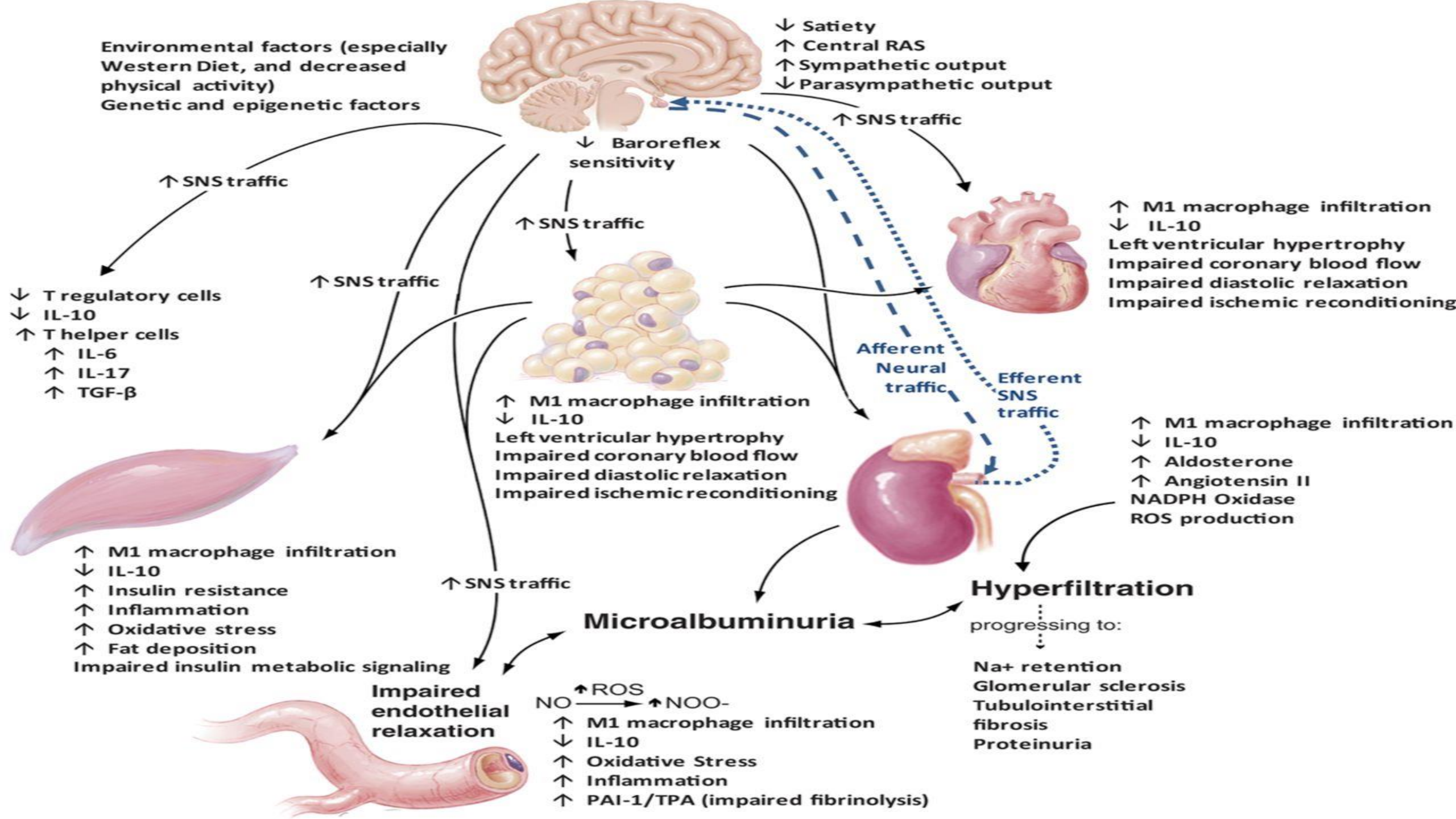


In contrast , hypertension , at least in its non-malignant form , seems to affect predominantly the large vessels.



Together , the two disorders synergistically damage the arterial tree







## MICROVASCULAR

- >70% end stage renal disease in U.S. attributed to HTN or DM
- Increased risk of retinopathy

## HEART

- 3-times likely to have CHD
- 2-times likely to have LVH
- 3-times likely to develop CHF

## DIABETES

Globally  
285 million  
individuals, 6%  
Projected  
2030:  
439 million  
individuals, 8%

40- 80% of  
diabetics  
have HTN  
  
Diabetics  
2-times  
likely to  
develop HTN

## HYPERTENSION

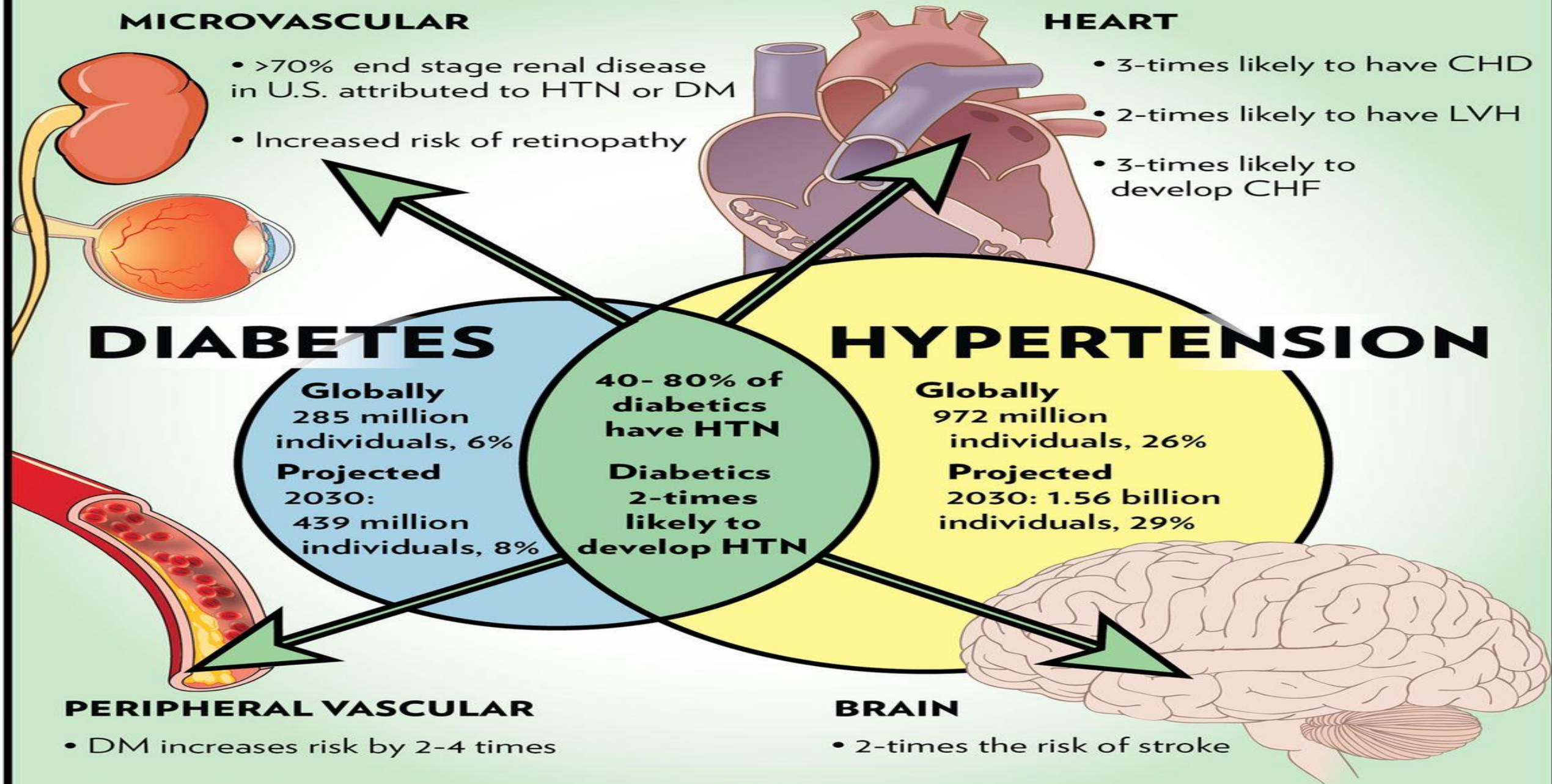
Globally  
972 million  
individuals, 26%  
Projected  
2030: 1.56 billion  
individuals, 29%

## PERIPHERAL VASCULAR

- DM increases risk by 2-4 times
- Increased risk in proportion to severity of BP

## BRAIN

- 2-times the risk of stroke





# What is Metabolic Syndrome?



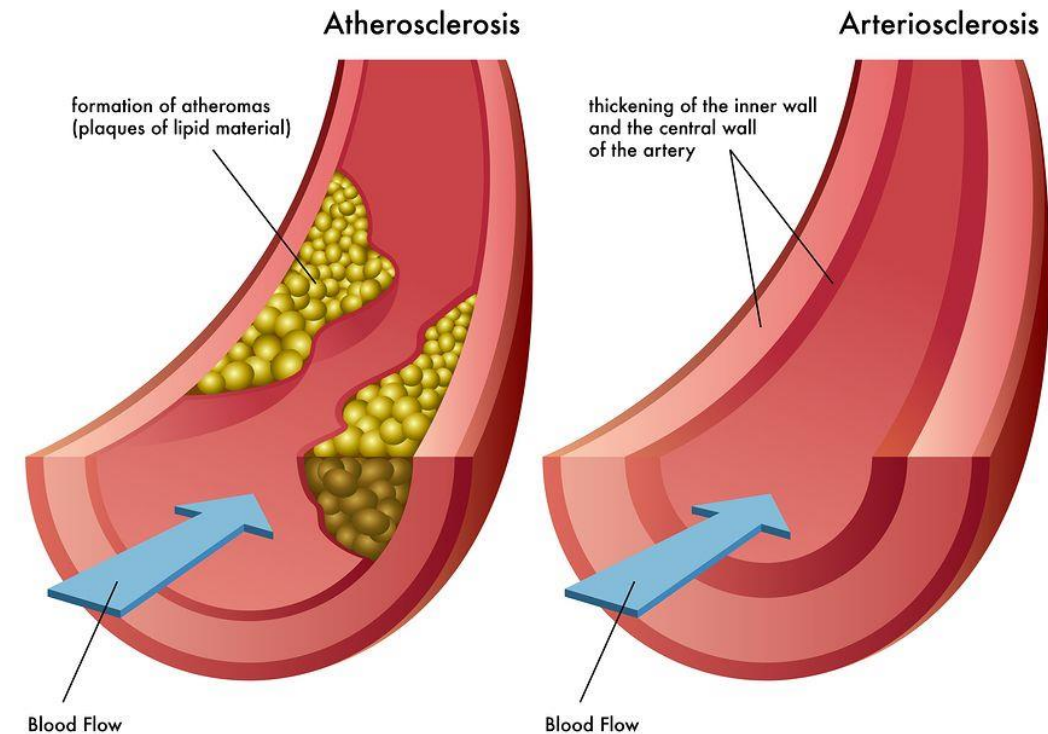
# Diabetes and hypertension

Wild twin



Both hypertension and diabetes are well-identified risk factors for atherogenesis and cardiovascular death through:

- Elevated LDL
- Poor glycemic control (fluctuation)
- hypertension
- Enhanced foam cell formation
- Functional and anatomical abnormalities of vascular endothelium
- Increased coagulability



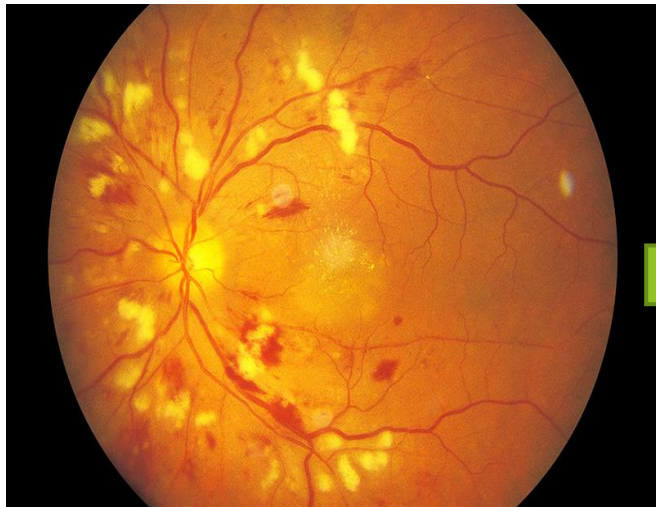
# Retinopathy



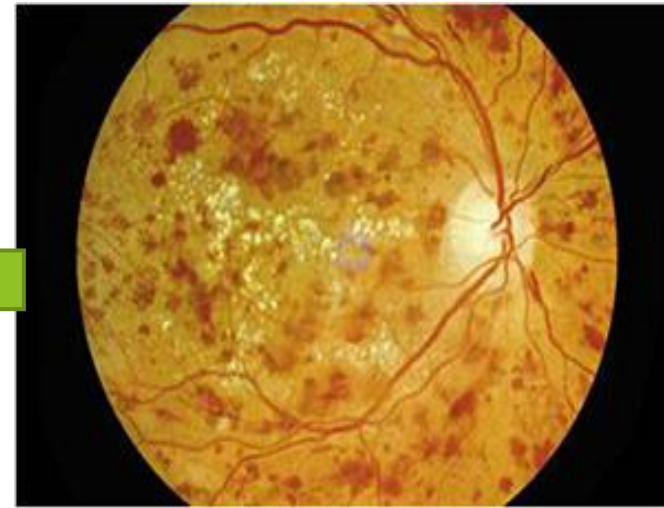
**Hypertension**



**Diabetes mellitus**



**blindness**



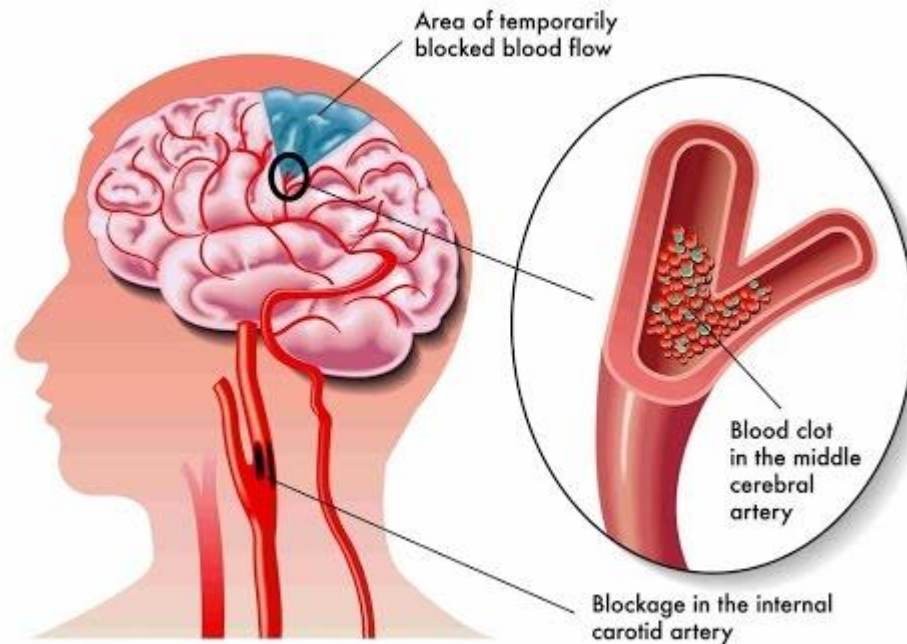
Hypertension

diabetes mellitus

Stroke

→ Thromboembolic

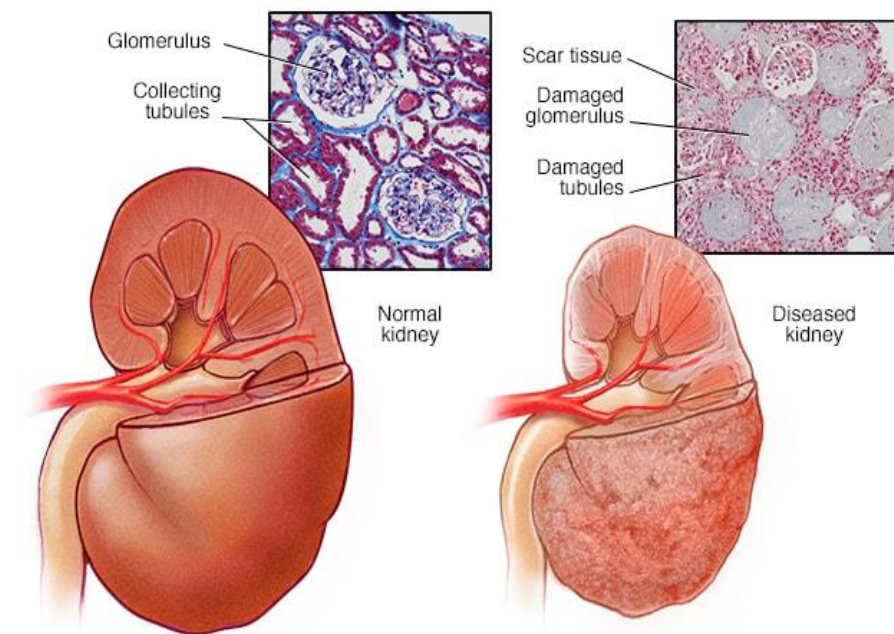
→ hemorrhagic





# Chronic kidney disease

- ➔ Proteinuria
- ➔ Nephropathy ↓ (GFR)
- ➔ Glomerulosclerosis
- ➔ End stage renal disease
- ➔ dialysis



© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.



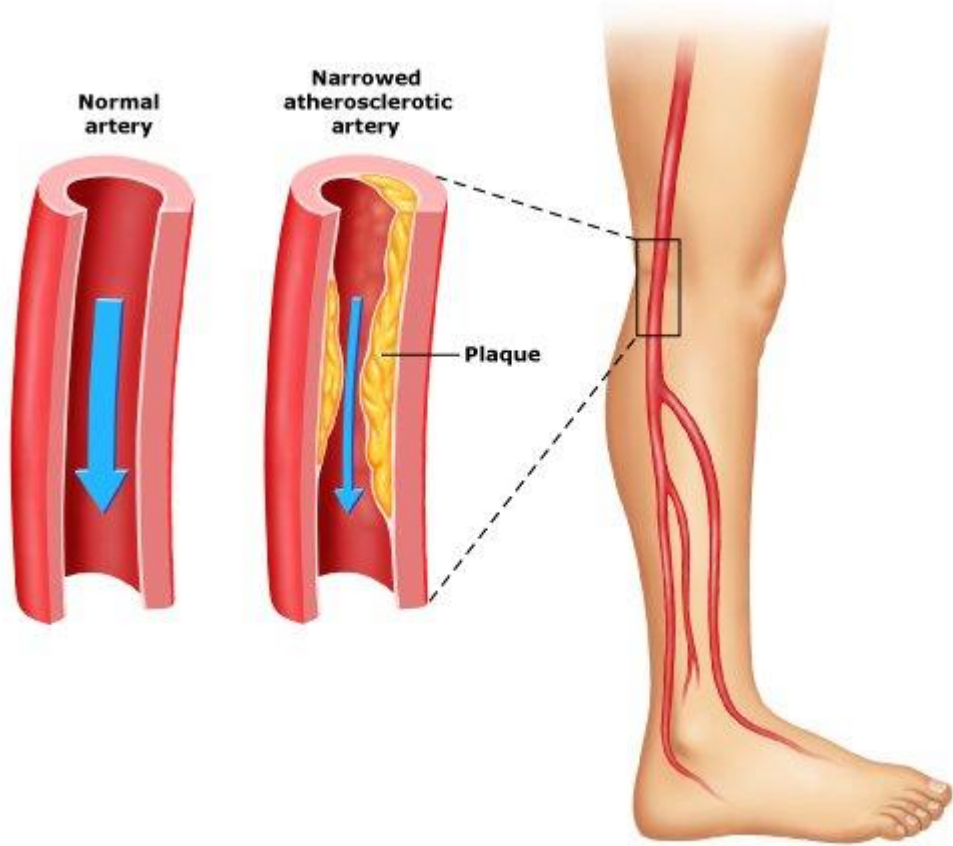
**1** in **3**

Approximately 1 in 3 adults with diabetes (and 1 in 5 adults with high blood pressure) may have chronic kidney disease.





# Peripheral arterial disease



# Amputation



## World Health Organization (WHO)

- ▶ In 2019, diabetes was the direct cause of **1.5 million deaths** and 48% of all deaths due to diabetes occurred before the age of 70 years. Another 460 000 kidney disease deaths were caused by diabetes, and raised blood glucose causes around 20% of cardiovascular deaths

## World Heart Federation (WHF)

- ▶ Hypertension is the leading preventable risk factor for cardiovascular disease. It affects an estimated 1.3 billion worldwide, killing approximately **10 million people every year**

# Primary goal in the management of diabetes and hypertension

A decrease in the hemodynamic and glycemic burden is the primary goal in the management of the hypertensive diabetic patients



Gaining Control of  
Hypertension  
Early in Patients  
with Diabetes





THANK YOU

