Brigham and Women's Hospital
Founding Member, Mass General Brigham

Cardiovascular Disease and HealthSpan

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CONTINUING MEDICAL EDUCATION
DEPARTMENT OF MEDICINE

HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL

Ami Bhatt, MD

Medical school: **Yale School of Medicine**

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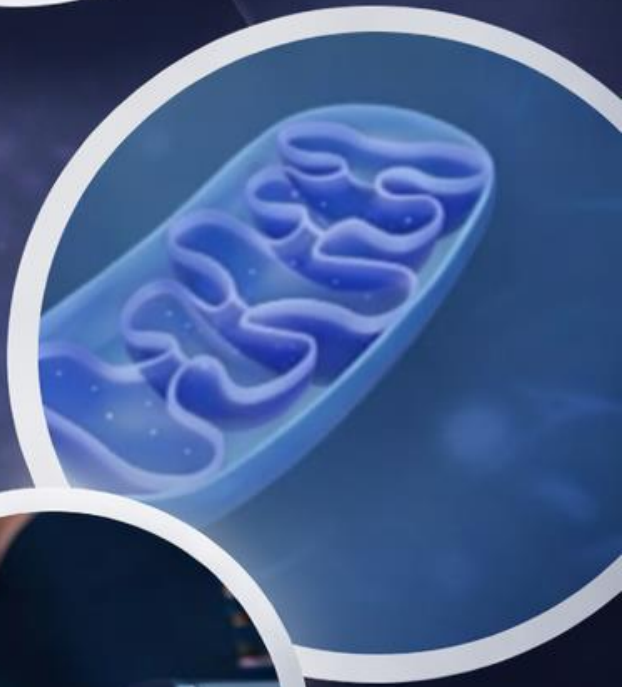
DISCLOSURES

- I, Ami B. Bhatt, I have no relevant financial relationships with ineligible companies.

OBJECTIVES

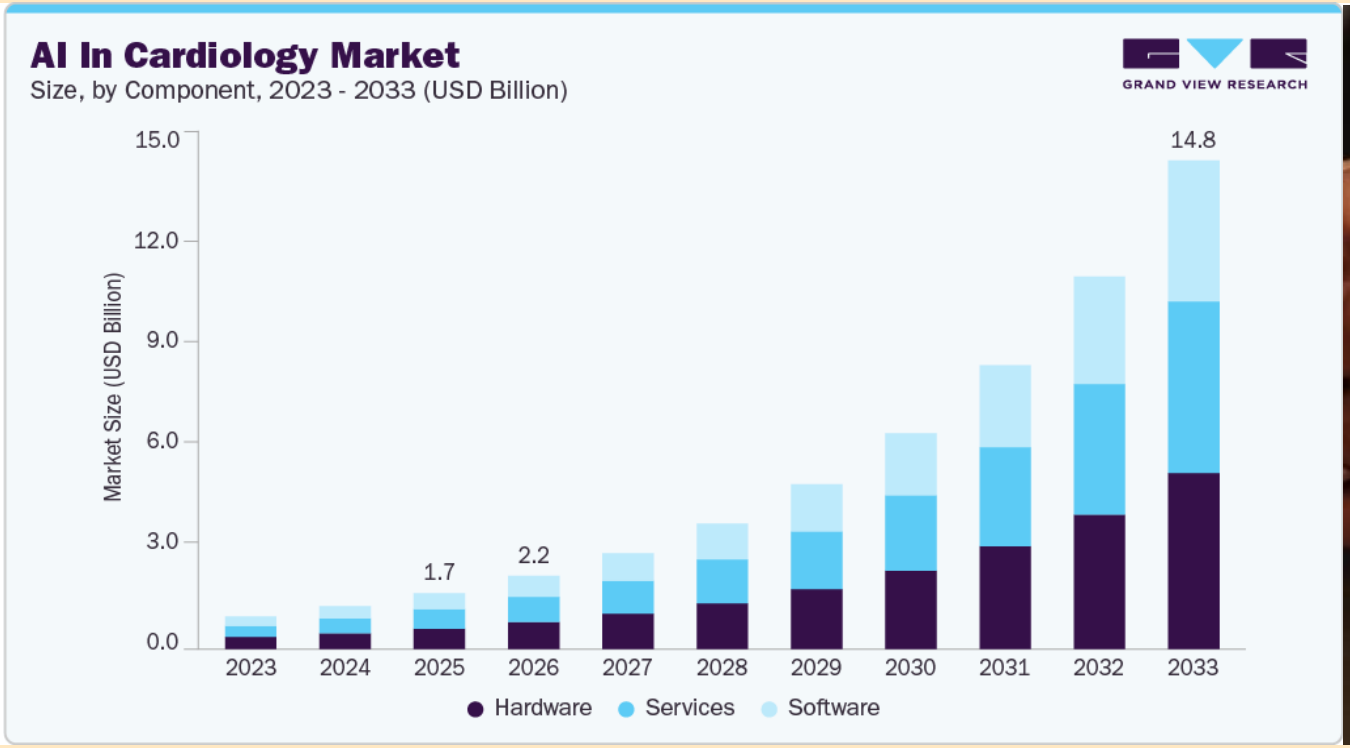
1. Define the new collaborative space of cardiovascular healthspan
2. Identify how key **cardiovascular modifiable factors** influence life expectancy
3. Recognize how digital health and AI is changing cardiovascular aging.

The Metrics of Longevity



We have crossed a threshold in prevention.

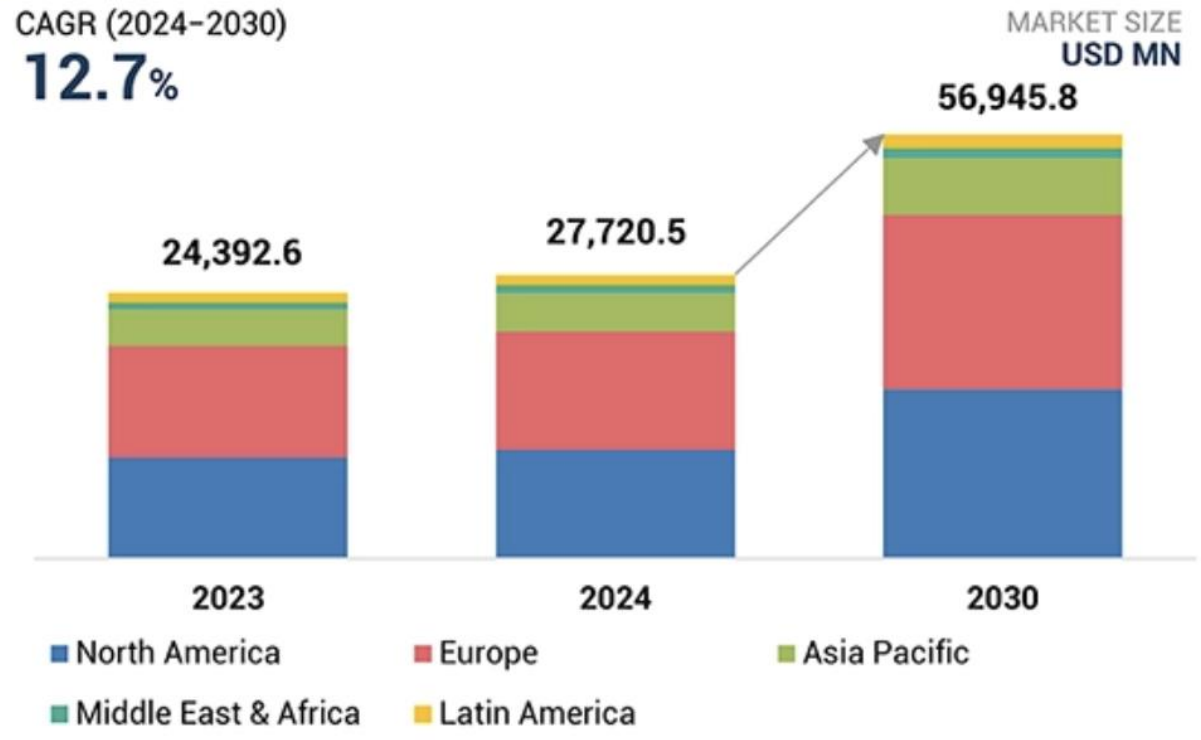
AI-powered cardiology, encompassing diagnostics, risk prediction, decision support, and workflow automation, represents a $1.7 billion market growing at 31% annually.



Wearable technology and monitoring, with over 180 million smartwatches shipped globally in 2024, is generating continuous physiologic signals for blood pressure, cardiac rhythm, and activity.

Connected systems, linking devices, EHRs, and care teams into longitudinal pathways, are powering a remote patient monitoring market projected to reach $56.9 billion by 2030.

REMOTE PATIENT MONITORING (RPM) MARKET: SIZE & SHARE



MARKET SNAPSHOT

Market Size in 2024 (Value)	USD 27,720.5 MN
Market Forecast in 2030 (Value)	USD 56,945.8 MN
CAGR	12.7%
Years Considered	2022–2030
Base Year	2023
Forecast Period	2024–2030
Units Considered	Value (USD MN)
Fastest-growing Region	Asia Pacific

This is no longer a diabetes or lipid drug story.

Among U.S. adults with type 2 diabetes, achieving better control of LDL cholesterol, systolic blood pressure, HbA1c, and BMI was associated with modeled gains in life expectancy of ~ **1, 2, 3-4, and 4 years**, respectively.

Kianmehr H, et al. JAMA Netw Open. 2022;5(4):e227705.

Adding extra life years

1 year for cholesterol
2 blood pressure
3 blood sugar
4 weight

Kianmehr H, et al. JAMA Netw Open. 2022;5(4):e227705.

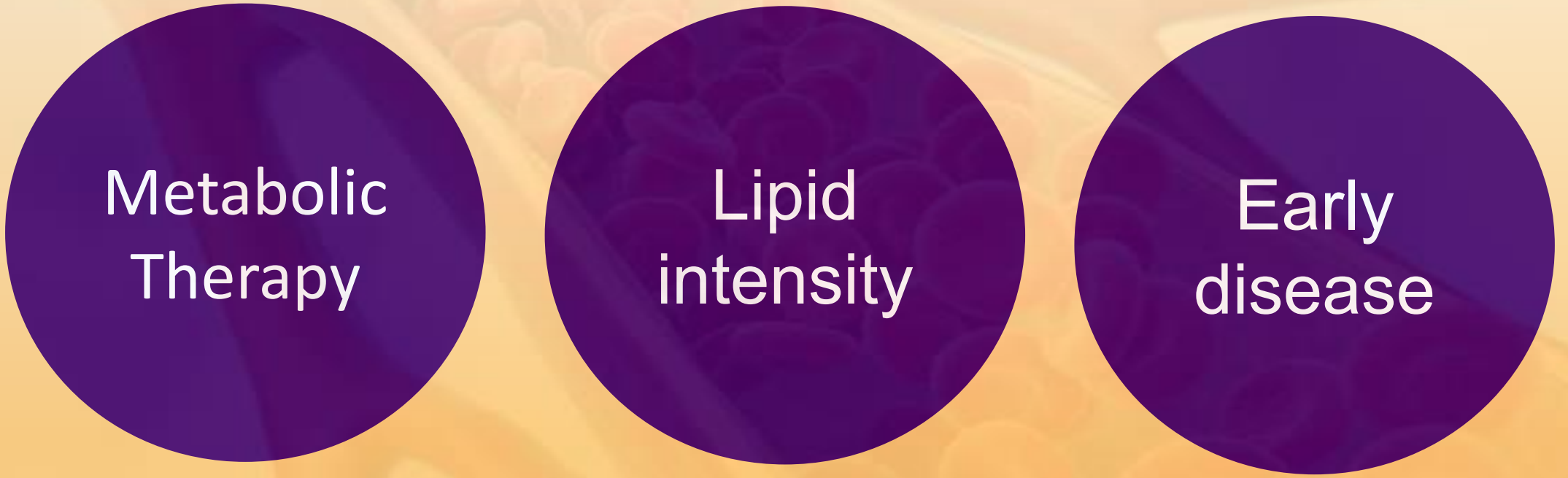
Cardiovascular Prevention Is Now Outcomes-Driven

- We are no longer treating risk factors alone
- We are reducing hard cardiovascular events

20% ↓ MACE with semaglutide (SELECT)

Lincoff AM et al. NEJM. 2023 (SELECT)
Sattar N et al. Lancet. 2021 (GLP-1 meta-analysis)

Three Levers of Healthspan



Lincoff AM et al. NEJM. 2023 (SELECT)
Sattar N et al. Lancet. 2021 (GLP-1 meta-analysis)

GLP-1 Receptor Agonists: From Glycemia to Outcomes

- SELECT: obesity + ASCVD, no diabetes
- MACE: 6.5% vs 8.0% (HR 0.80)
- ARR 1.5% → NNT ~67 (~3.3 yrs)
- Consistent class effect across trials
- Mortality signal: ~12% reduction

Benefit independent of glucose → true CV therapy

Lincoff AM et al. NEJM. 2023 (SELECT), Gerstein HC et al. NEJM. 2021 (AMPLITUDE-O), Gerstein HC et al. Lancet. 2019 (REWIND), Hernandez AF et al. Lancet. 2018 (HARMONY), Sattar N et al. Lancet. 2021 (meta-analysis)

Dyslipidemia: A Shift Toward Lifetime Risk Reduction

2026 guidelines: earlier treatment threshold (≥3–5% risk)

LDL goals:

- 70 mg/dL (high risk) < ---------- > 55 mg/dL (very high risk)

Residual risk:

- Lp(a) ≥125 nmol/L
- ApoB for discordance

30% of ASCVD patients reach LDL <55 mg/dL

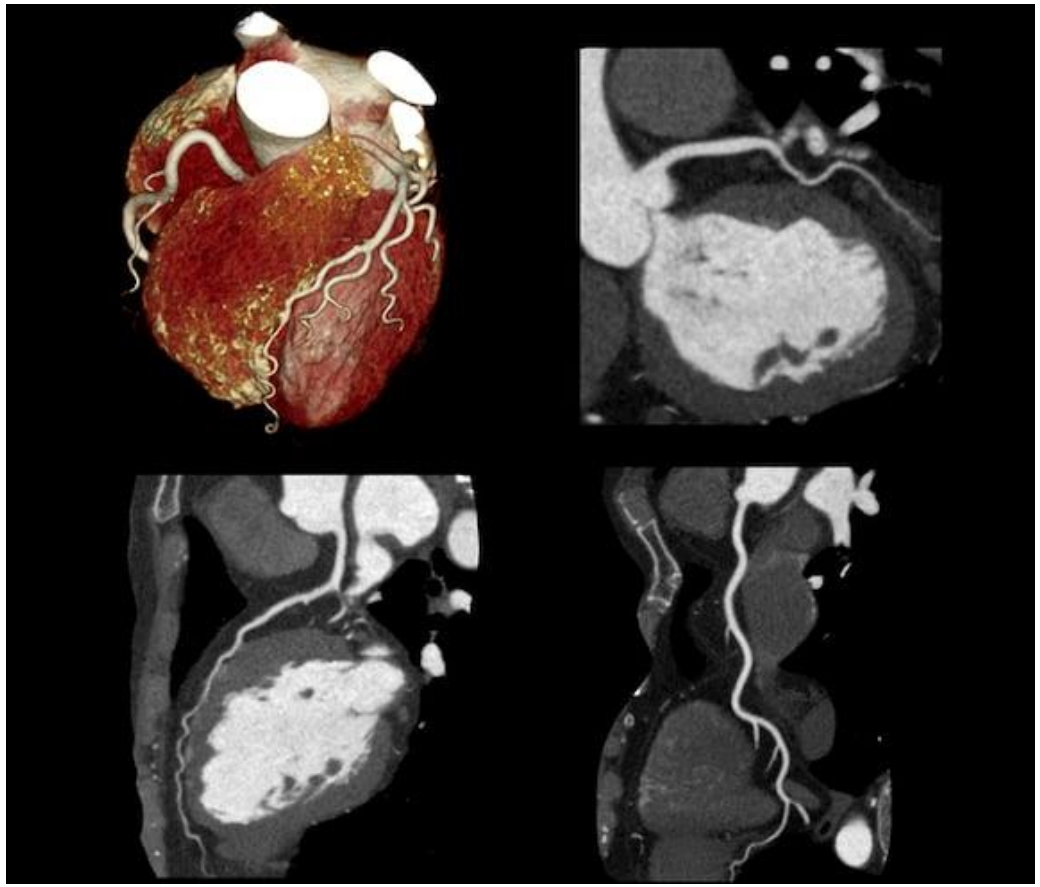
Coronary Artery Calcium: Personalizing Prevention

Best for borderline/intermediate risk patients

CAC = 0:
~50% reclassified downward
Event rate ~0.4%/year

CAC ≥100:
Strong indication for statin therapy

0 | 1–99 | ≥100



CT Coronary Angiography: Changing Outcomes

SCOT-HEART

- 2.3% vs 3.9% CHD death/MI
- ARR 1.6% → NNT ~63

Mechanism

- Earlier statins
- Better targeting of therapy

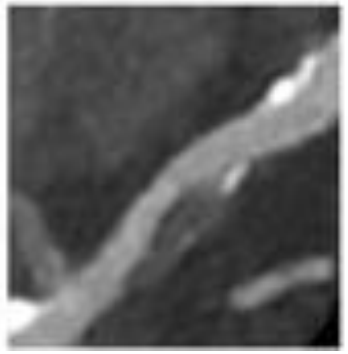
Imaging is no longer diagnostic only, it alters trajectory

What is coronary plaque?

Accumulation of lipid, inflammatory cells, fibrous tissue, and at times calcium within the wall of a coronary artery.

Visual plaque

Plaque that is identified visually by a physician with expertise in plaque imaging and is distinct from from the lumen or normal vessel wall. On CCTA, it can be visualized on multiple planes / phases of the cardiac cycle.

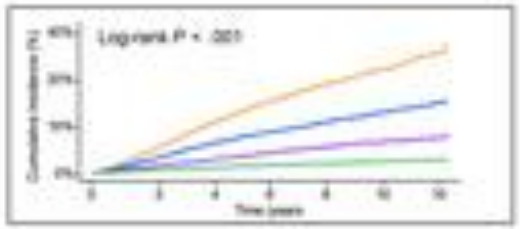


Quantitative plaque

Plaque that is identified and measured by AI or another algorithm which aims to distinguish between the normal vessel wall and the vessel lumen

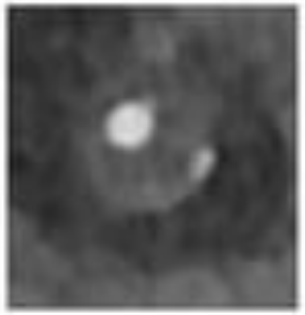
Significant plaque

Plaque which has prognostic significance (i.e. higher risk than having no plaque); defining this requires cohorts with long term follow up data



High risk plaque

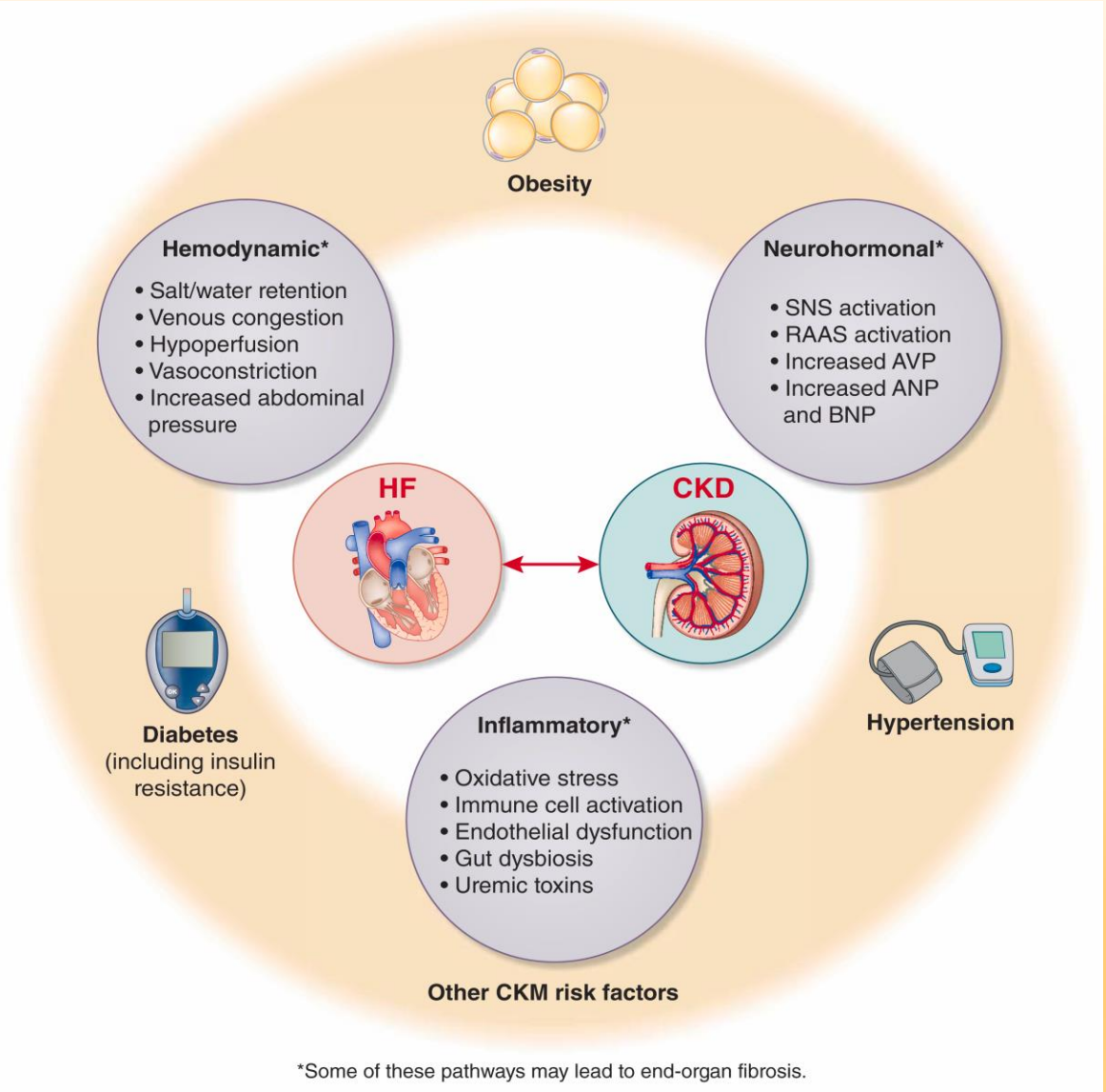
Plaque characteristics which are associated with a higher risk of adverse coronary events related to the plaque of interest



Y. Chandrashekhar et al. *J Am Coll Cardiol Img* 2025;

CardioKidneyMetabolic Disease

- 10% to 30% of patients with CKD have HF, while about 30% to 60% of patients with HF have CKD.
- Lower kidney function is not just a comorbidity marker.
- The biology is shared, not parallel.



Lam et al., *JACC: Heart Failure*, 2026)

We're still undertreating what we already know

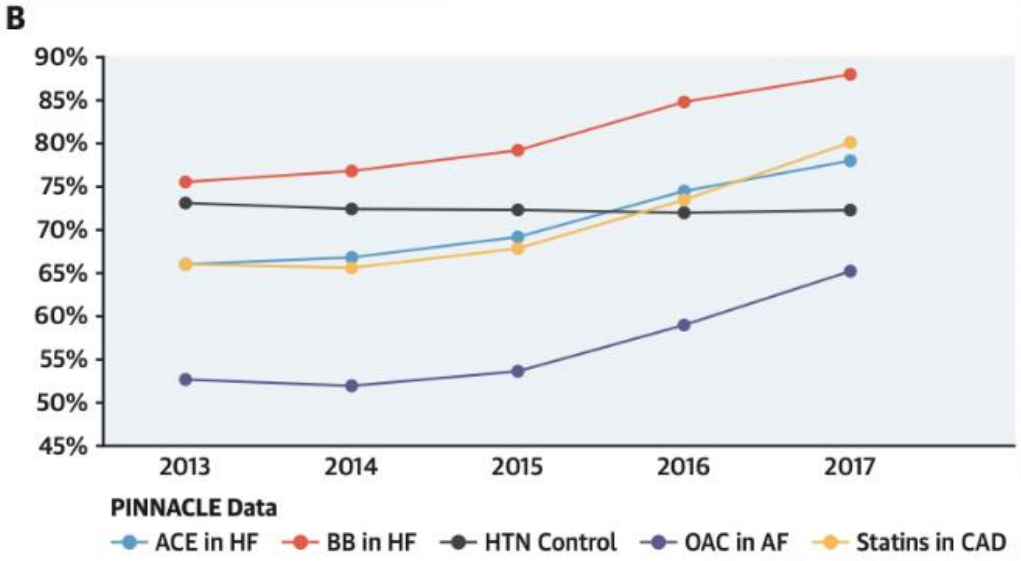
BP Control Rates Declining Nationally and Stagnating in Cardiology Offices

CARDIOVASCULAR MEDICINE AND SOCIETY

Controlling Hypertension

Our Cardiology Practices Can Do a Better Job

William J. Oetgen, MD, MBA,[a] Janet S. Wright, MD[b]



Authors Speculations:

- Cardiologists believe HTN is a primary care condition, and don't want to take over the entire care of the patient out of respect for primary care colleagues.
- Patients more complex, older, sicker (e.g., acute and chronic issues such as hypotension and renal failure).
- Chronically and severely ill patients, other specialists like nephrologists assumed to be responsible for HTN.
- Recent advances in therapeutics (ie, TAVR, AF ablation, etc.) have been concentrated in areas other than HTN.

There is a correlation between reduction in office systolic BP and risk of cardiovascular events

A 10 mmHg drop in office systolic BP reduces risk by[1]:

(Based on meta-analysis of 613,815 patients from 123 studies)

28% Heart failure

27% Stroke

20% CV events*

17% Coronary disease

13% Mortality

5% Chronic renal failure

* Defined as fatal and non-fatal myocardial infarction, sudden cardiac death, re-vascularization, fatal and non-fatal stroke, and fatal and non-fatal heart failure

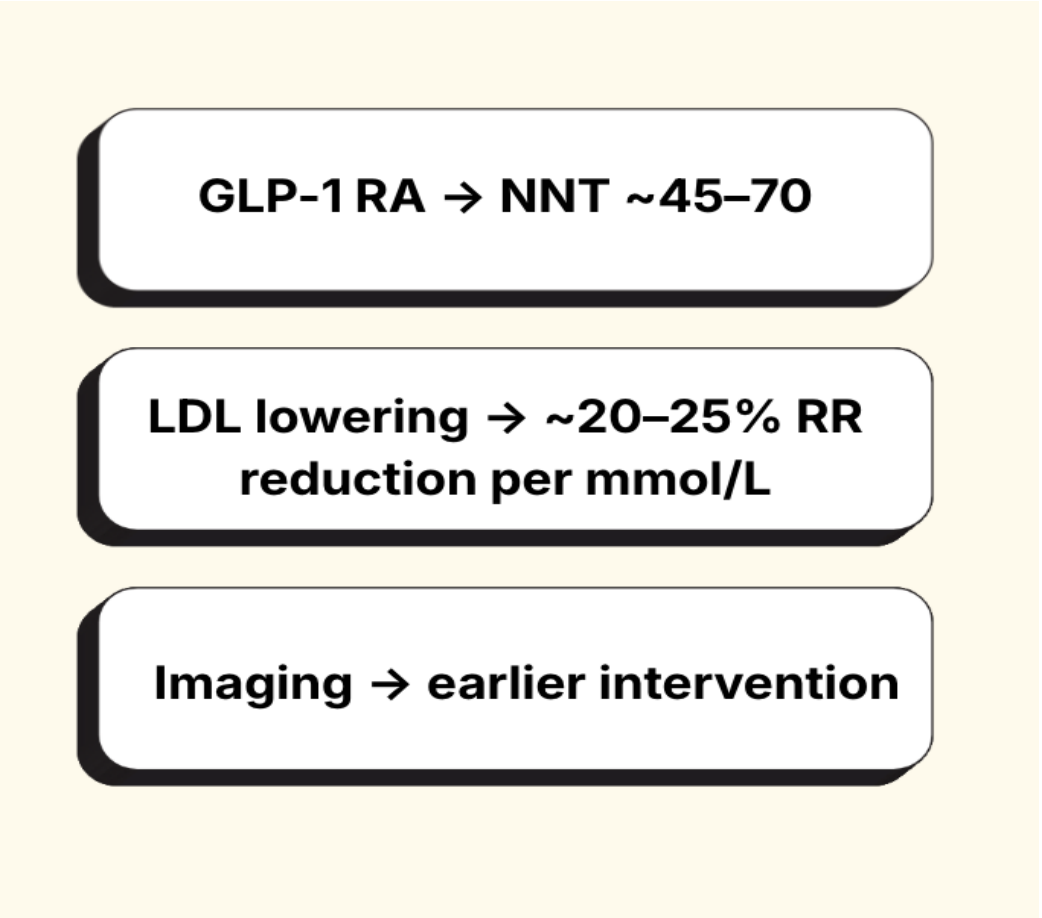
1. Ettehad et al. *Lancet* 2016; 387: 957–67

Extending Healthspan Through Cardiovascular Prevention

Cardiovascular disease drives:

- Disability
- Cognitive decline
- Loss of independence

Healthspan is extended by earlier, layered prevention



Sattar N et al. Lancet. 2021, Ference BA et al. JAMA. 2017

Key Takeaways: Cardiovascular Healthspan

Cardiovascular healthspan is a shared, cross-disciplinary space
It sits at the intersection of cardiology, metabolic health, aging science, and population health, requiring collaboration beyond traditional silos.

Modifiable CV risk factors remain the highest-leverage intervention
Blood pressure, lipids, glucose, physical activity, and nutrition are not just disease drivers, but the primary determinants of how long and how well people live.

Key Takeaways: Cardiovascular Healthspan

Risk begins early and accumulates silently
Cardiovascular aging is a decades-long process, making earlier identification and intervention essential to meaningfully impact life expectancy.

Digital health is shifting care from episodic to continuous
Wearables, remote monitoring, and real-world data create visibility into risk trajectories outside the clinic.

Key Takeaways: Cardiovascular Healthspan

AI enables scale, precision, and timing of intervention
Its value lies in translating complex data into actionable insights that clinicians and patients can use to prevent, not just treat, disease.

The future of longevity is cardiovascular
Extending life expectancy at a population level will depend on how effectively we prevent and manage cardiovascular risk across the lifespan.