



Kingdom Of Saudi Arabia
National Guard Health Affairs
King Abdulaziz Medical City
King Faisal Cardiac Center - Jeddah



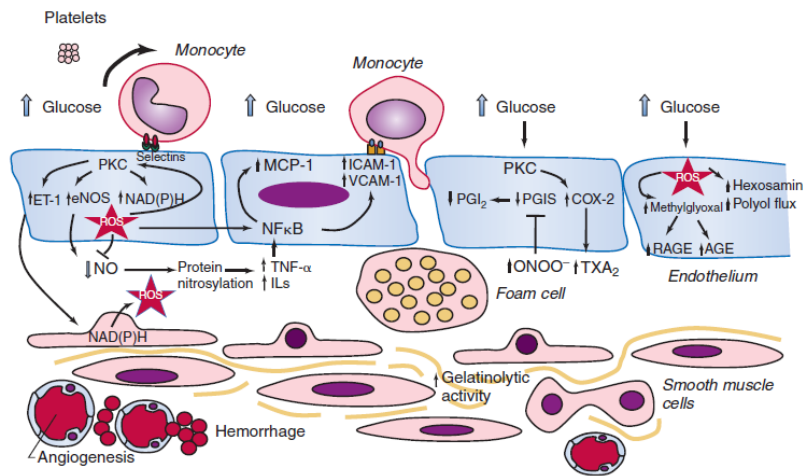
Diabetes mellitus and the Heart

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Interventional & Adult Congenital Heart Disease Cardiologist

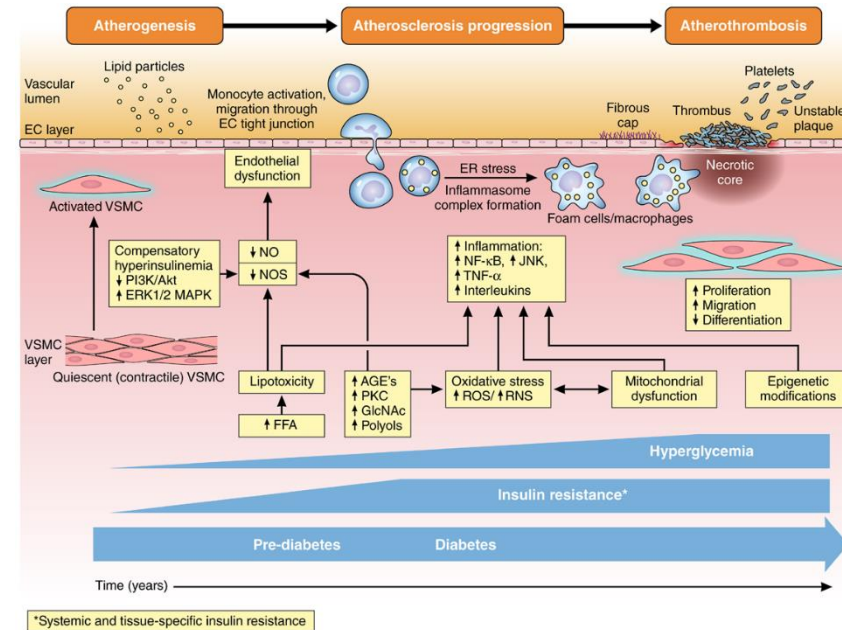


Mechanisms of hyperglycemia-induced vascular damage



Eur Heart J 34:2436-2443, 2013

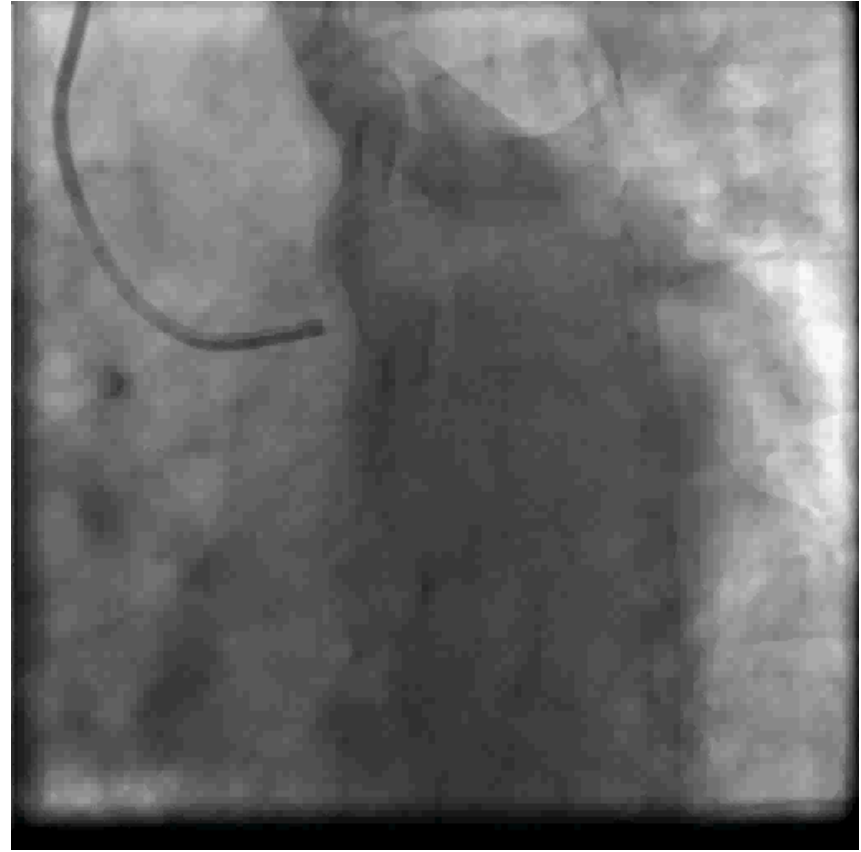
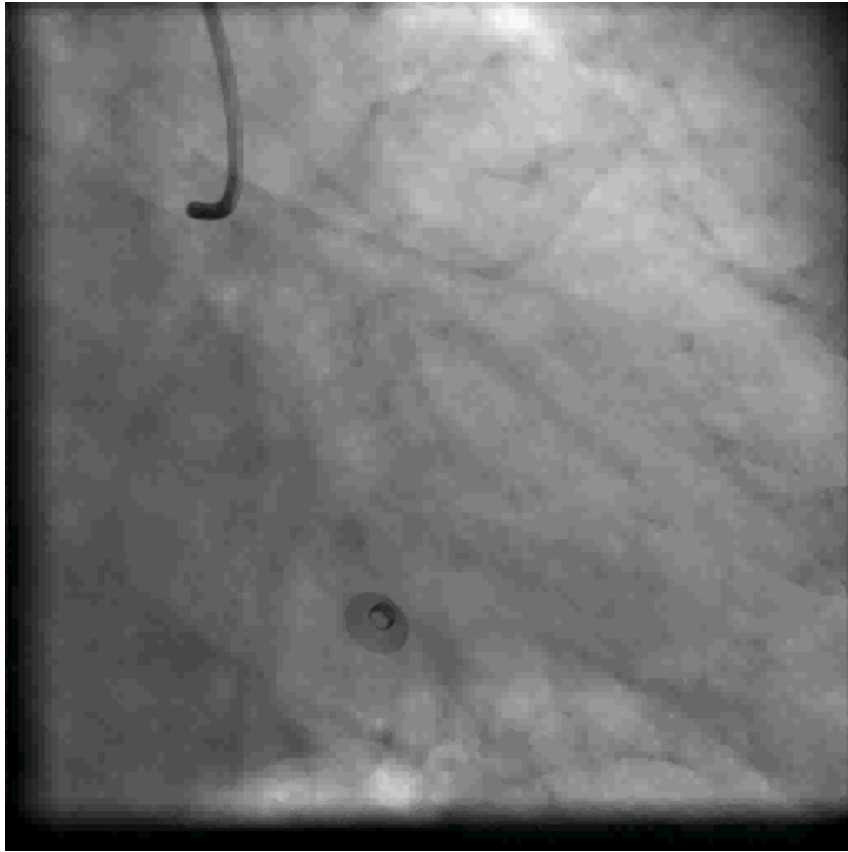
Development and progression of atherosclerosis in diabetes mellitus



Circulation. 2016;133:2459–2502

Mr. K

- 66 year old gentleman
- Active, asymptomatic
- Non-smoker
- For further risk stratification, cardiac CT was done and showed significant LAD disease and coronary angiogram was recommended





FFR 0.86

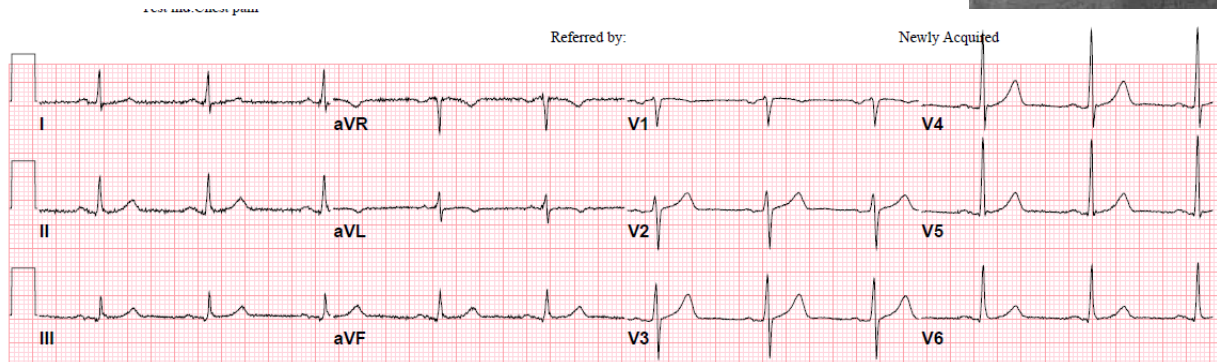
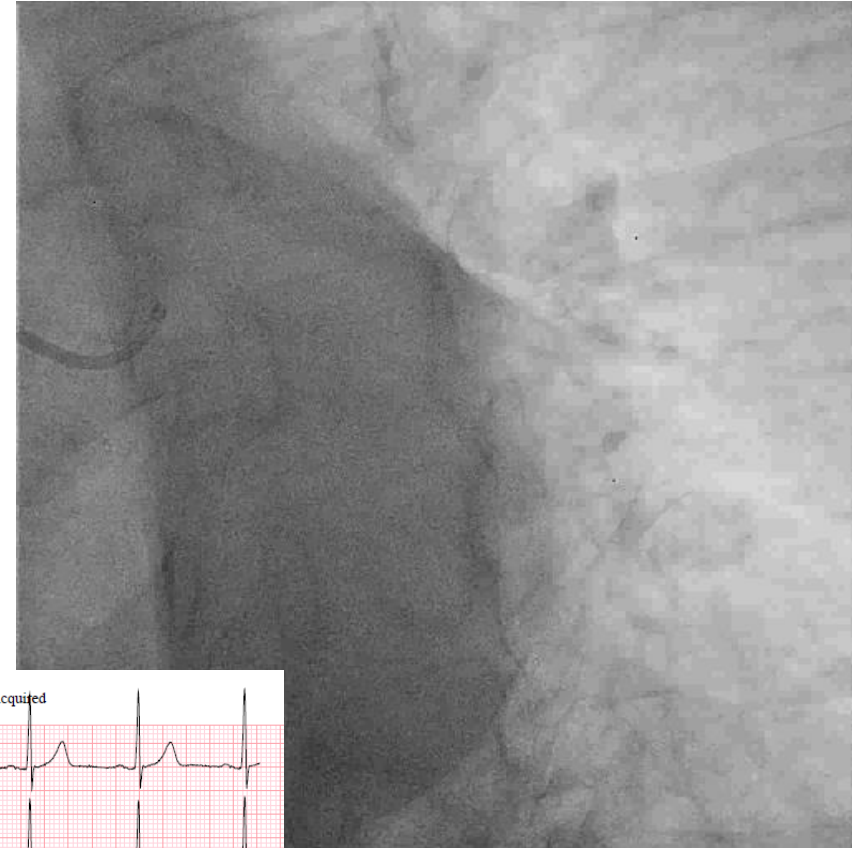
- Medical therapy was advised
- ASA and statin
- He is diabetic with HbA1C of 6.9
- On metformin

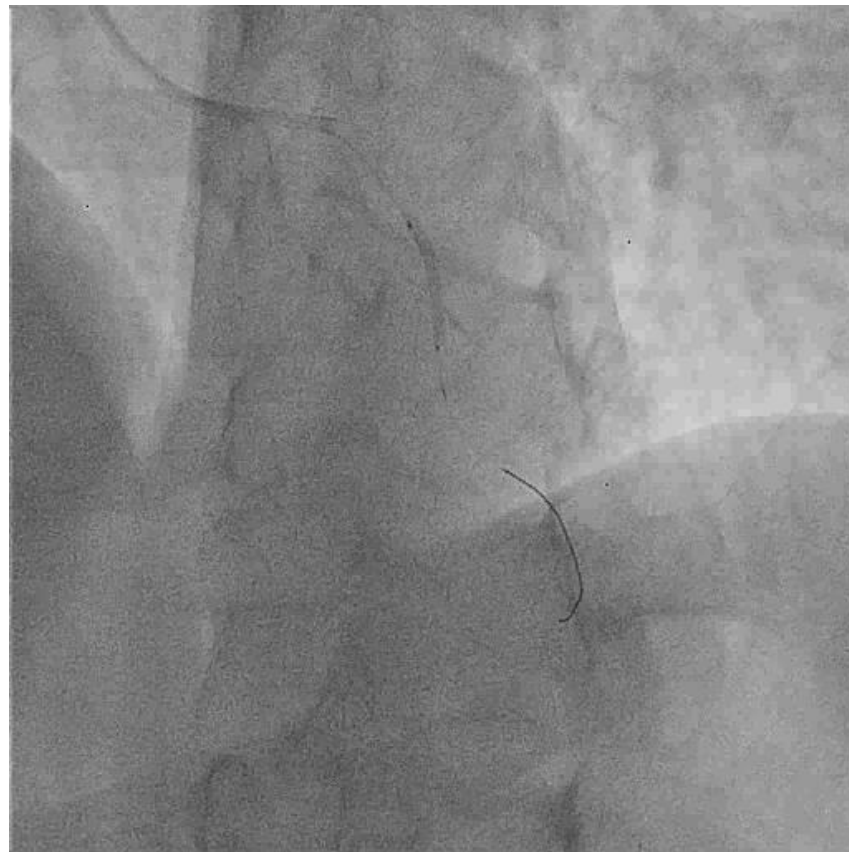
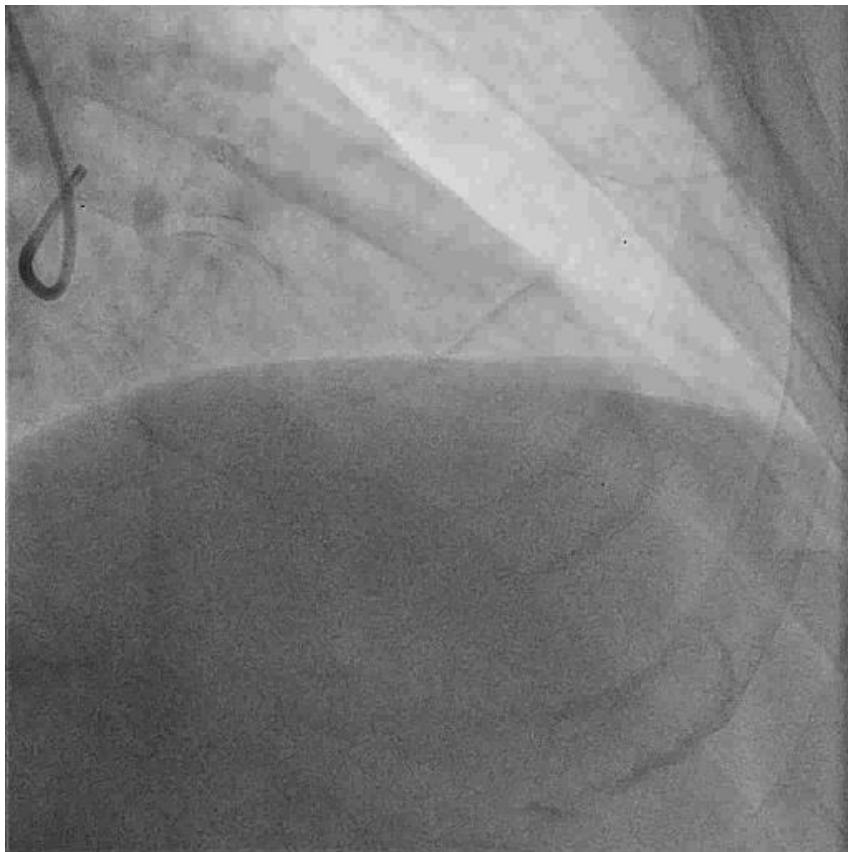
questions

- What is my risk for ACS?
- What is the probability of CAD progression?
- Do I need a stent in near future?
- What about my DM? IS it going to change my treatment?

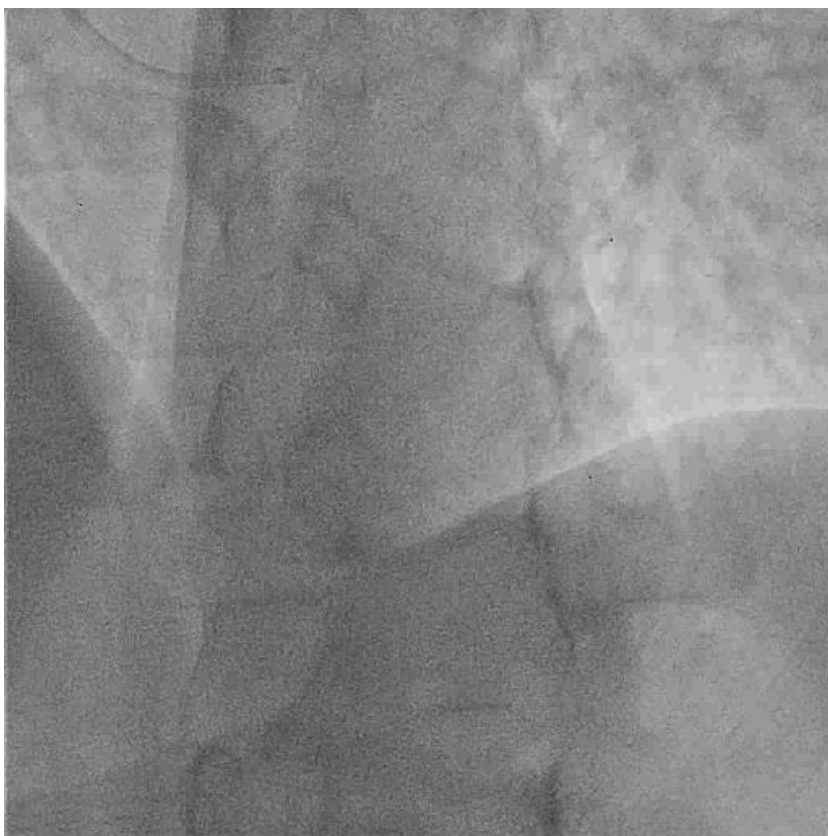
Case 2

- 47 year old gentleman
- HTN and smoker
- Previous PCI, 2 years ago
- Presented with 2 days of typical chest pain
- Trop 135 → 125

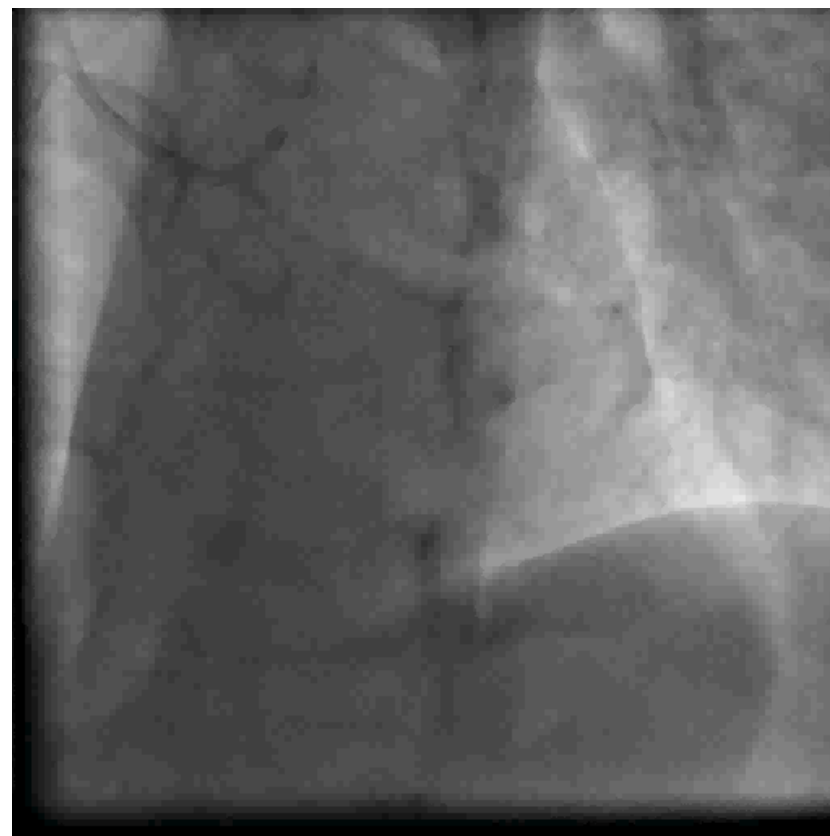




29/08/2017



21/12/2017



Looking for more RF?

- FBG 5.8
- RPG 5.6-8.6
- Is he diabetic?

DM diagnosis

	HbA1C	Random glucose	Fasting glucose	2-H OGTT
DM	$\geq 6.5\%$	11.1 mmol/L (Sp)	≥ 7 mmol/L	11.1 mmol/L
Pre-diabetic	5.6-6.9	-----	5.7-6.4	

HbA1C 6.8

What now?

How can we help these patients?

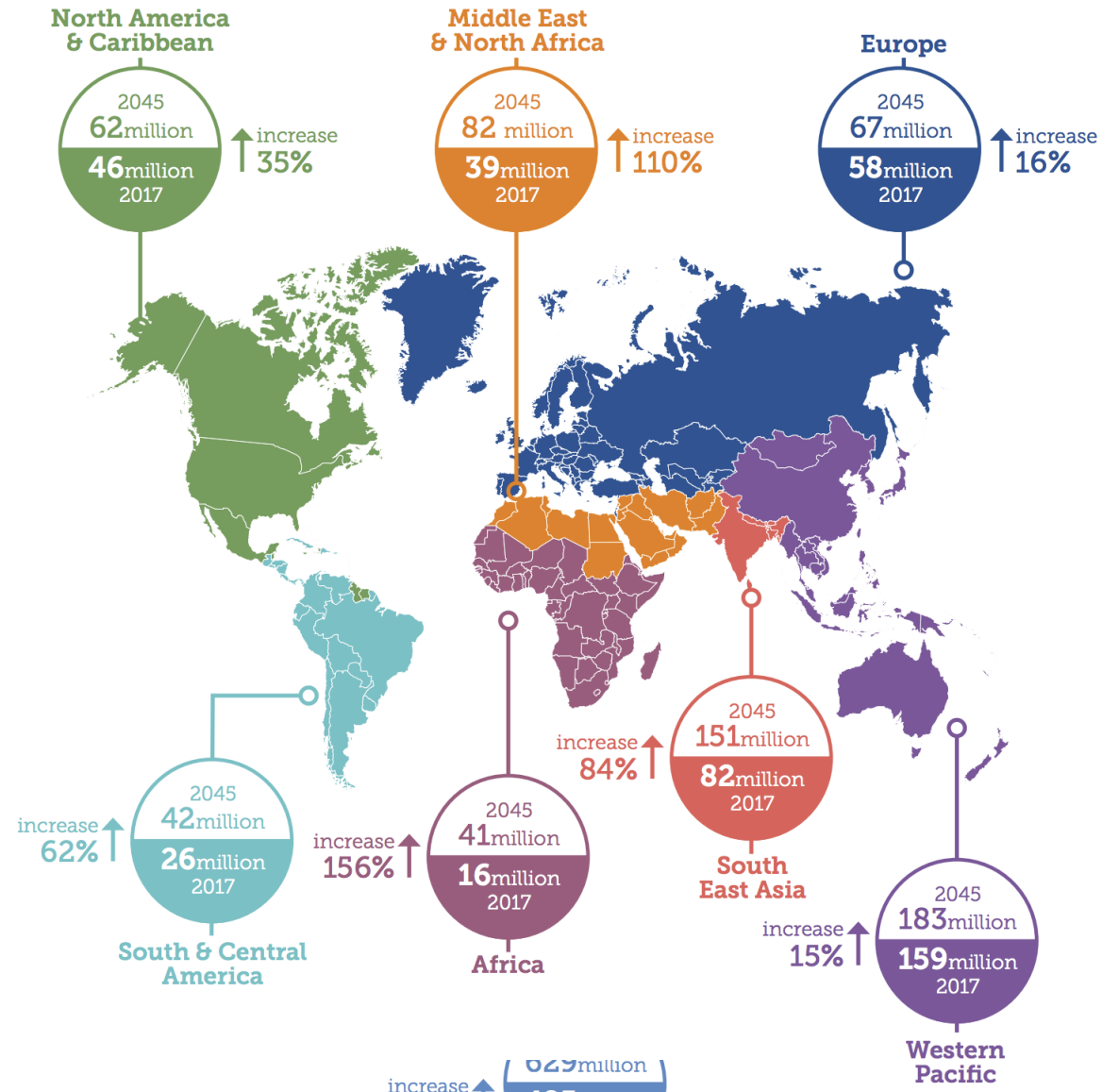
Objectives

- Magnitude of the problem
- DM as a risk factor for CVD
- Asymptomatic DM patients and future risk of CVD
- Diabetic patients with stable CAD
- Diabetic patient with ACS

Magnitude of the problem

IDF DIABETES ATLAS 8th edition 2017

Number of people with diabetes worldwide and per region in 2017 and 2045 (20-79 years)



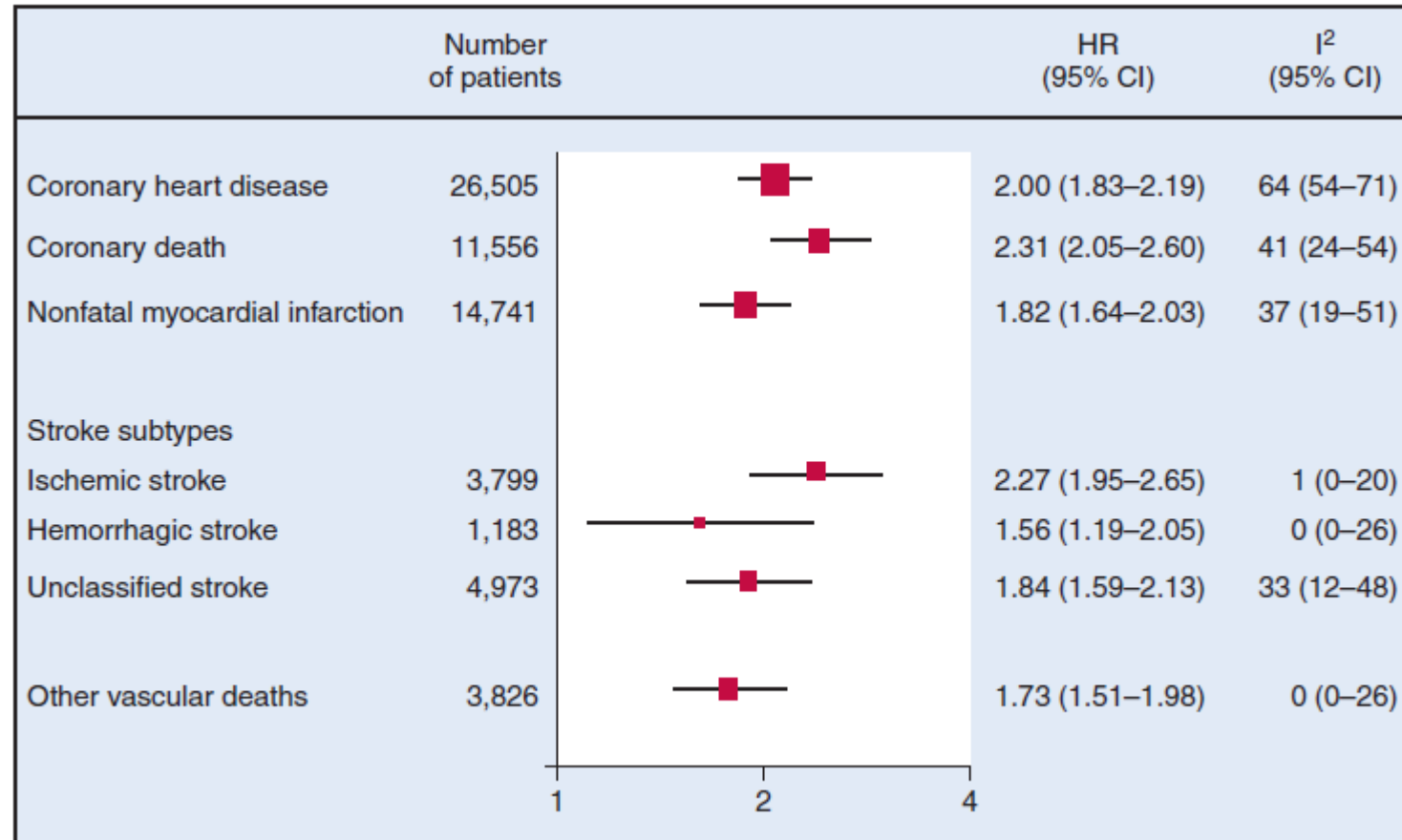
Diabetes and Cardiovascular Disease, The Framingham Study

[William B. Kannel, MD](#); [Daniel L. McGee, PhD](#)

- Based on 20 years of surveillance of the Framingham cohort relating subsequent cardiovascular events to prior evidence of diabetes, a twofold to threefold increased risk of clinical atherosclerotic disease was reported

- The relative impact was greatest for intermittent claudication and congestive heart failure and least for coronary heart disease (CHD), which was, nevertheless, on an absolute scale the chief sequela

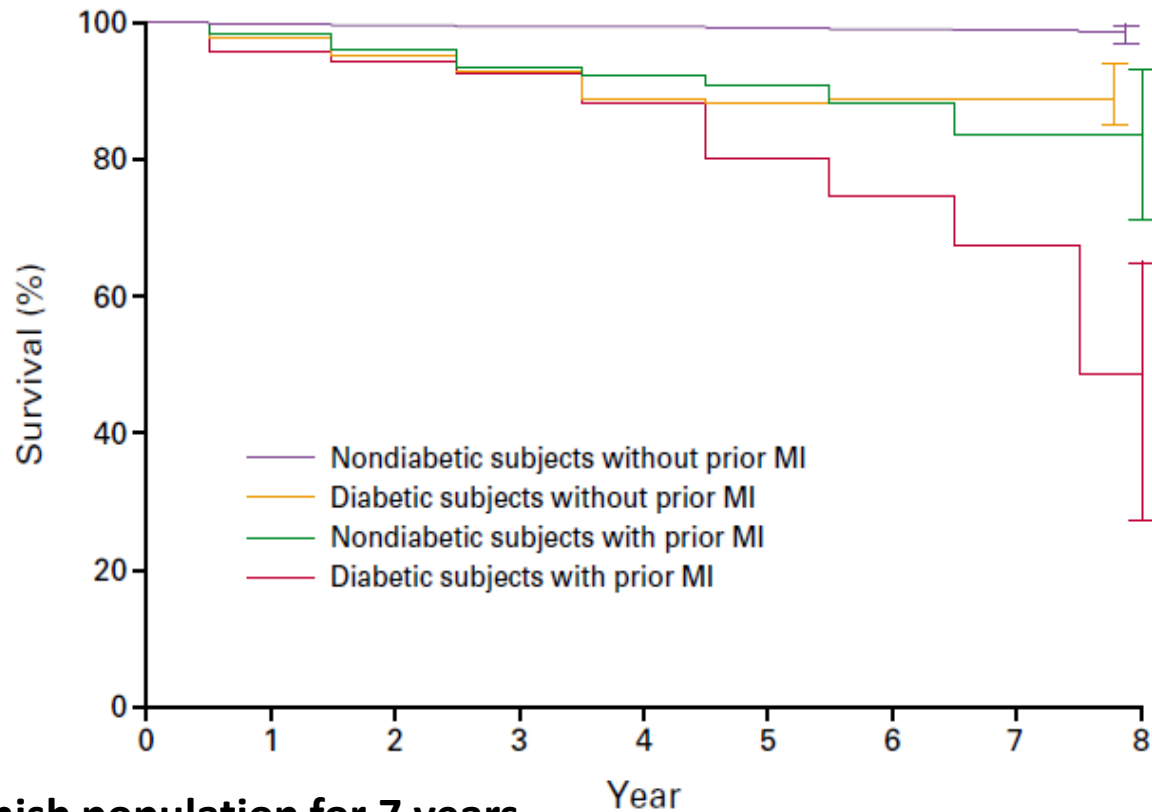
Hazard ratios for vascular outcomes in patients with Vs. without DM at baseline



Lancet 375: 2215-2222, 2010

- Magnitude of the problem
- DM is established as a RF for heart disease since the 70s
- DM = CAD

DM is equivalent to CAD?



F/U of Finnish population for 7 years

1373 nondiabetic patients

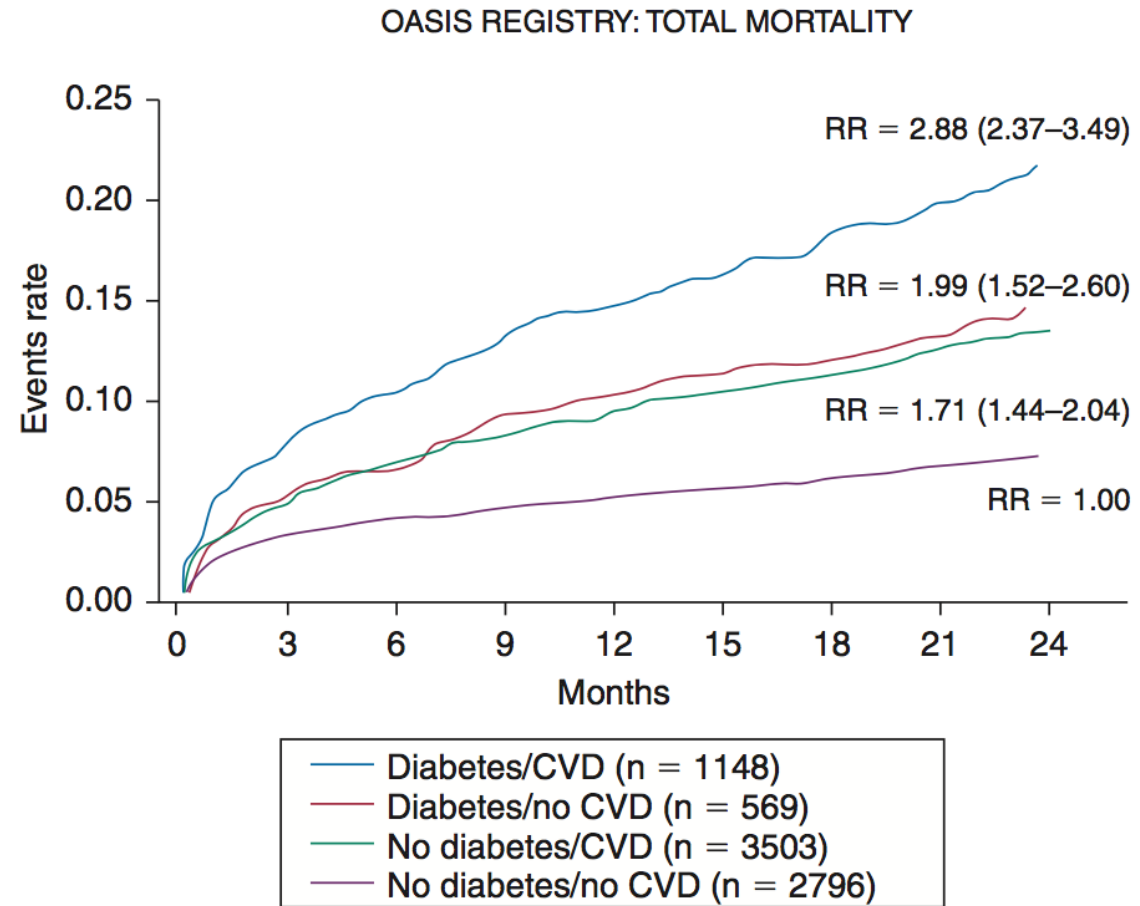
1059 diabetic patients

NEJM 1998;339:229

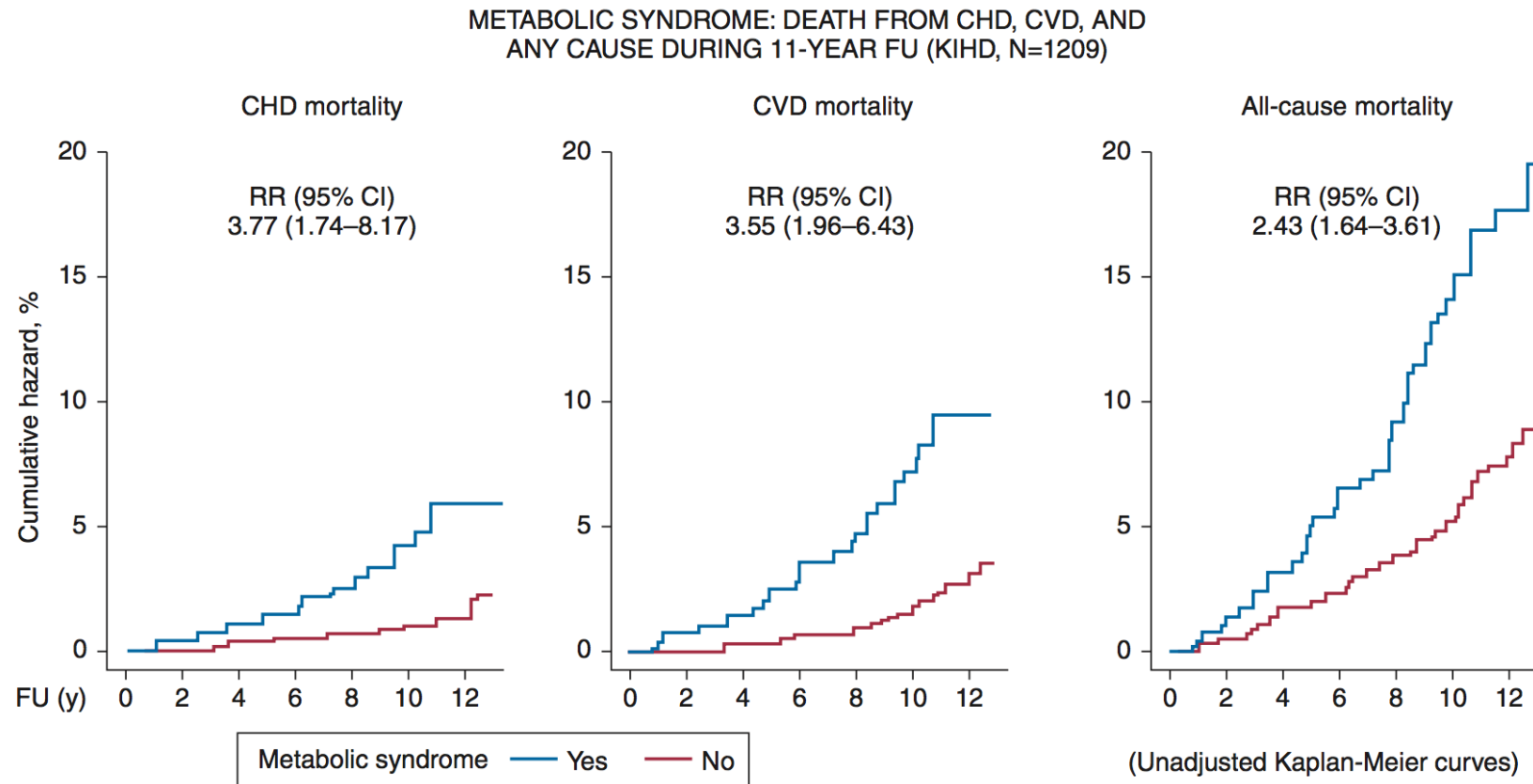
6 countries

2 years follow up for
patients admitted as UA
or NSTEMI

1718 of 8013 registry
patients (21%) had
diabetes



Causes of deaths



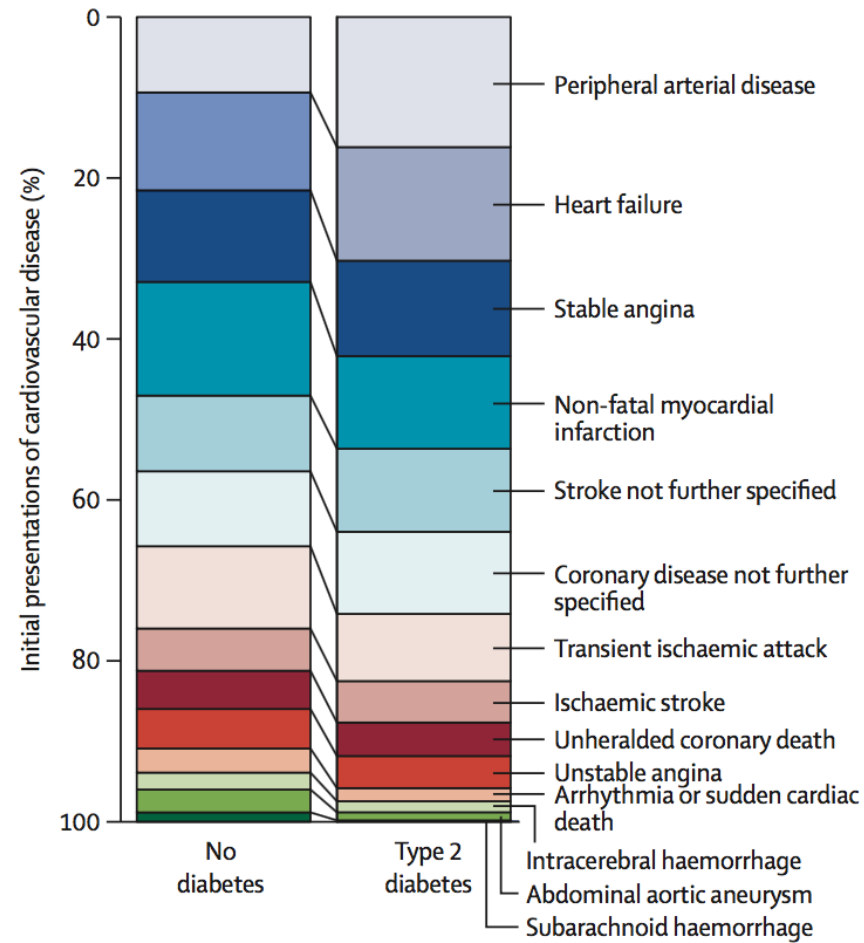
JAMA 288:2709-2716, 2002.)

Asymptomatic diabetic patients

How does patients with DM initially present?

- UK CALIBER program
- ≥ 30 years old
- 1998-2010
- Free from CV disease at baseline
- Primary endpoint: the first record of one of 12 cardiovascular presentations
- 1 921 260 individuals, of whom 1 887 062 (98.2%) did not have diabetes and 34 198 (1.8%) had type 2 diabetes

How does patients with DM initially present?



Lancet Diabetes Endocrinol
2015; 3: 105–13

Distribution of initial presentations of cardiovascular diseases
in participants with and without type 2 diabetes and no history of cardiovascular disease.

For individuals aged 40 years without cardiovascular disease

- Risk of developing any CV disease by age 80:-
- 1- Women with no DM: 30.7% (CI 30.3-31)
- 2- Men with no DM: 44.3% (CI 43.8-44.7)
- 3- Women with T2DM: 58.2% (CI 54.9-61.4)
- 4- Men with T2DM: 67.4% (CI 64.4-70.4)

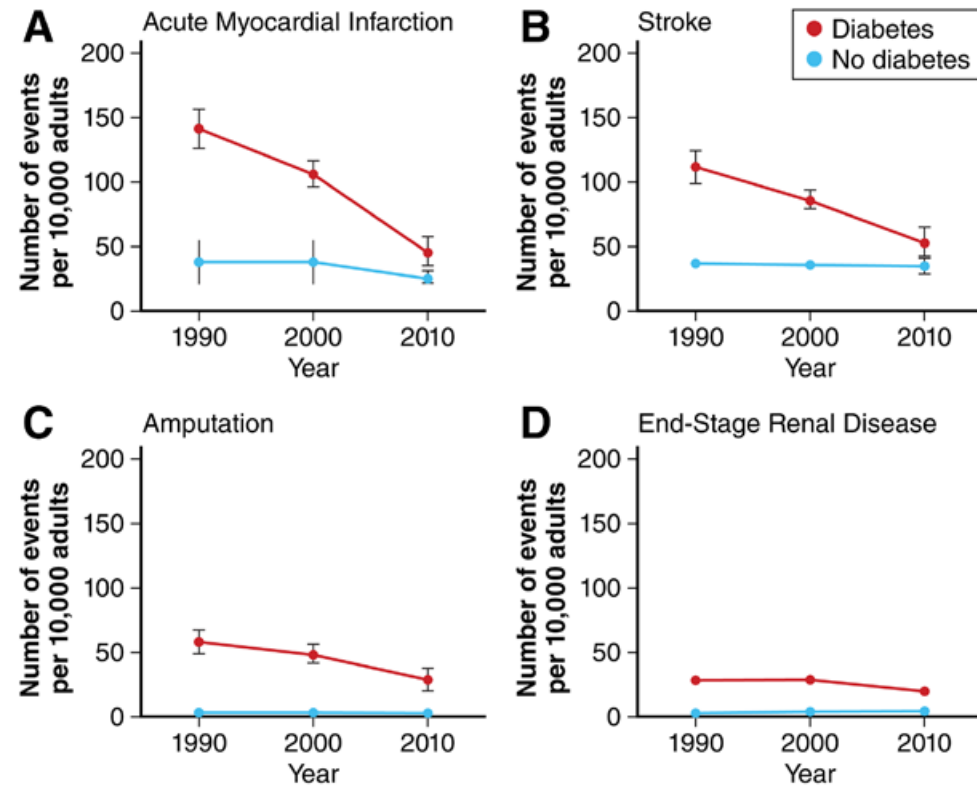
Does diabetic treatment affect the outcome?

- Many trials failed to show that tight control of glucose and HbA1c will result in better CV outcome!!!

Why?

- With the current other CV RFs treatment such as statin and RAAS inhibitor, the blood glucose lowering agents have modest effect at best
- For patient with long standing DM or established CVD, it could be too late

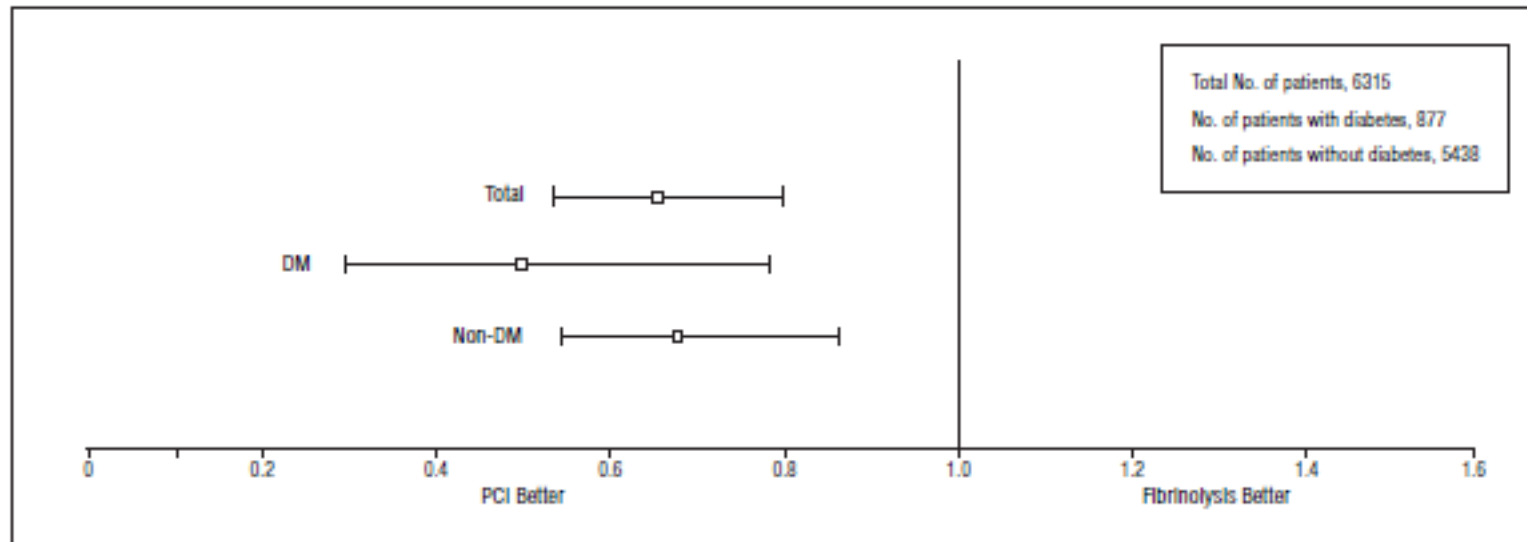
Rates of vascular diseases are decreasing in persons with diabetes mellitus but are still higher than in persons without DM



Why is that?

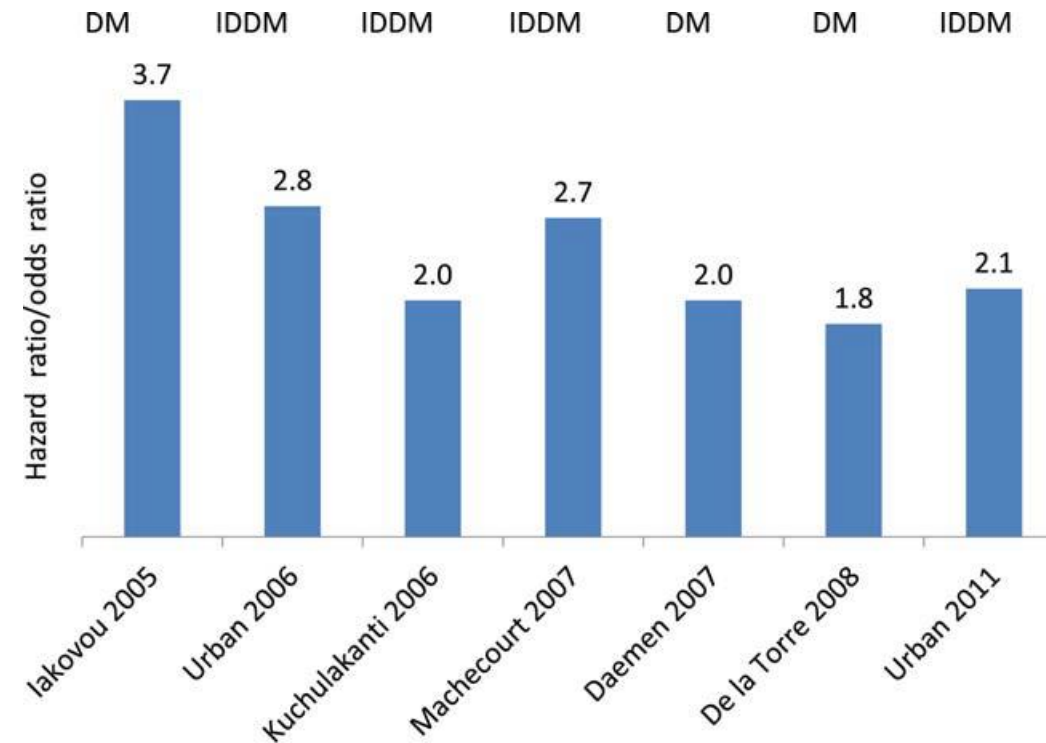
Invasive approach is better in diabetic patients

- Pooled analysis of 19 trials



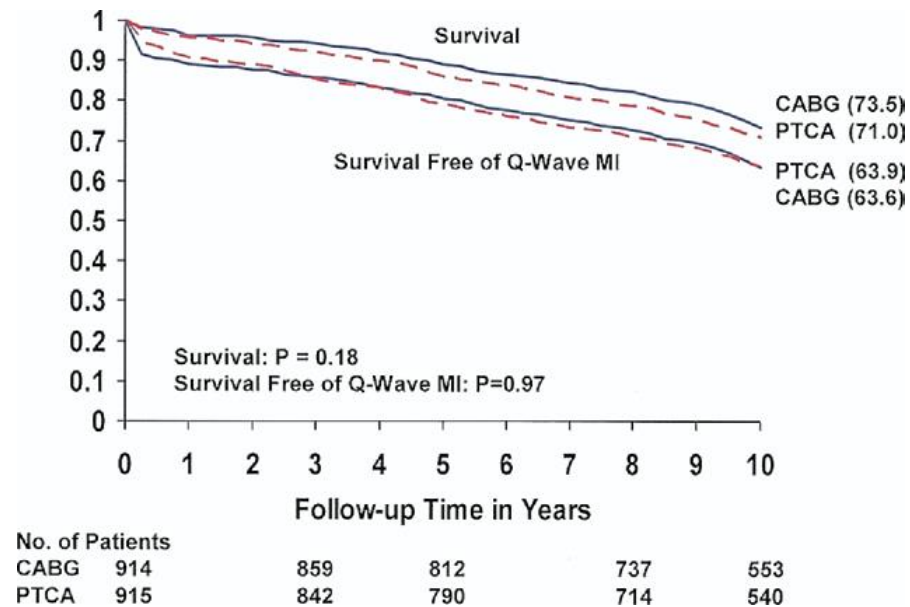
It is a bad disease

Stent thrombosis



CABG is better than PCI

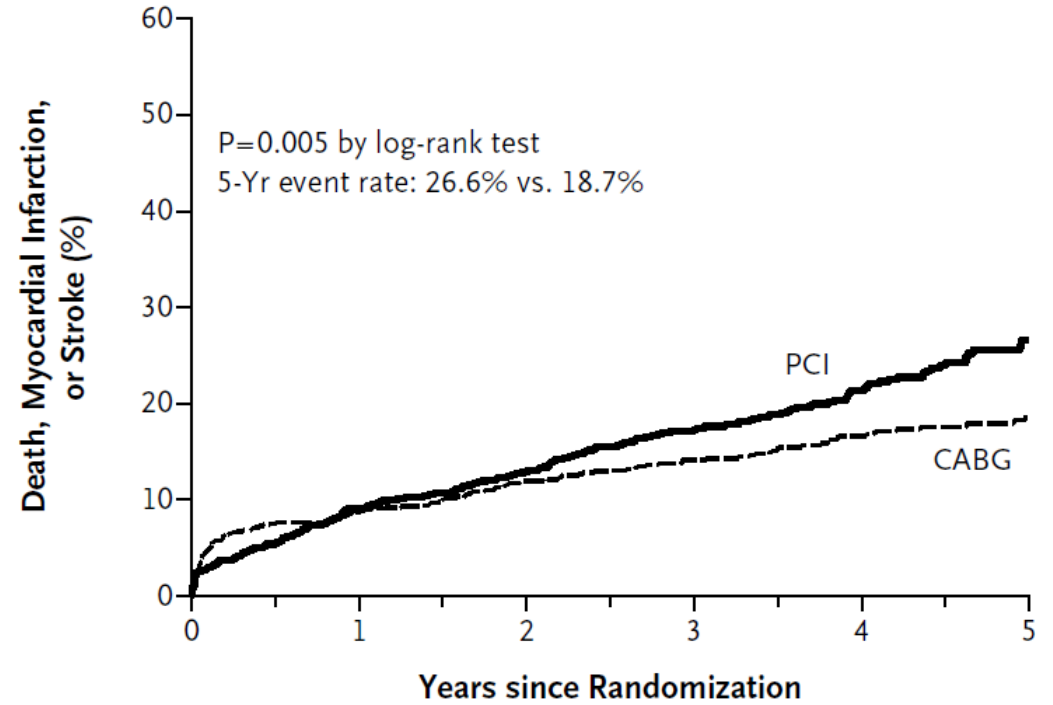
Ballooning



(J Am Coll Cardiol 2007;49:1600–6)

- Stenting

A Primary Outcome



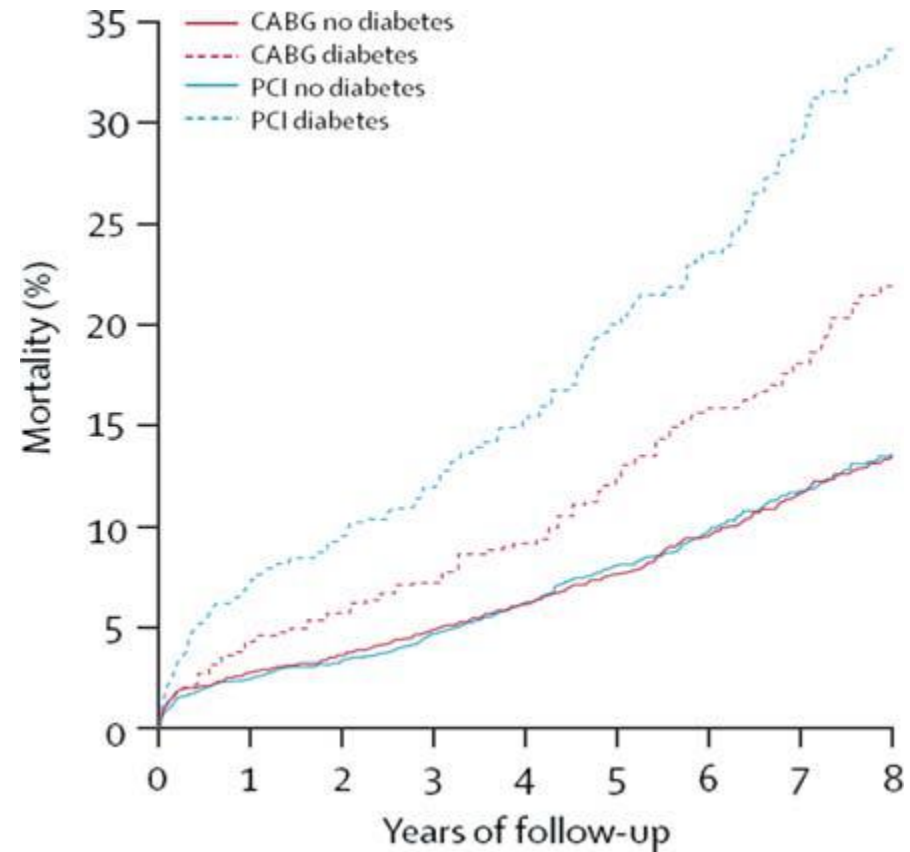
No. at Risk

PCI	953	848	788	625	416	219
CABG	947	814	758	613	422	221

N Engl J Med 2012;367:2375-84.

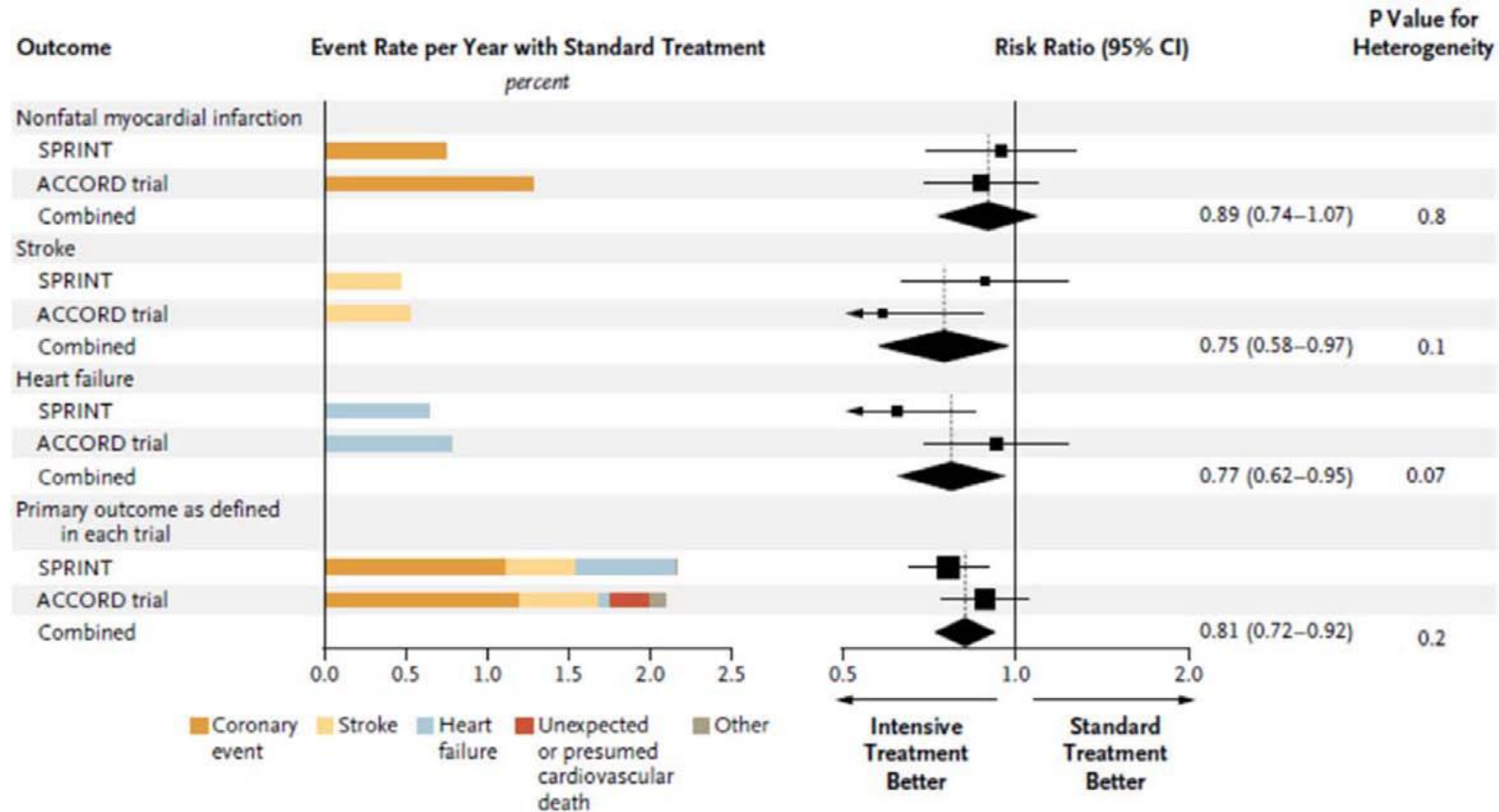
Mortality in patients assigned to CABG or PCI by diabetes status

- Analysis of 10 randomized trials

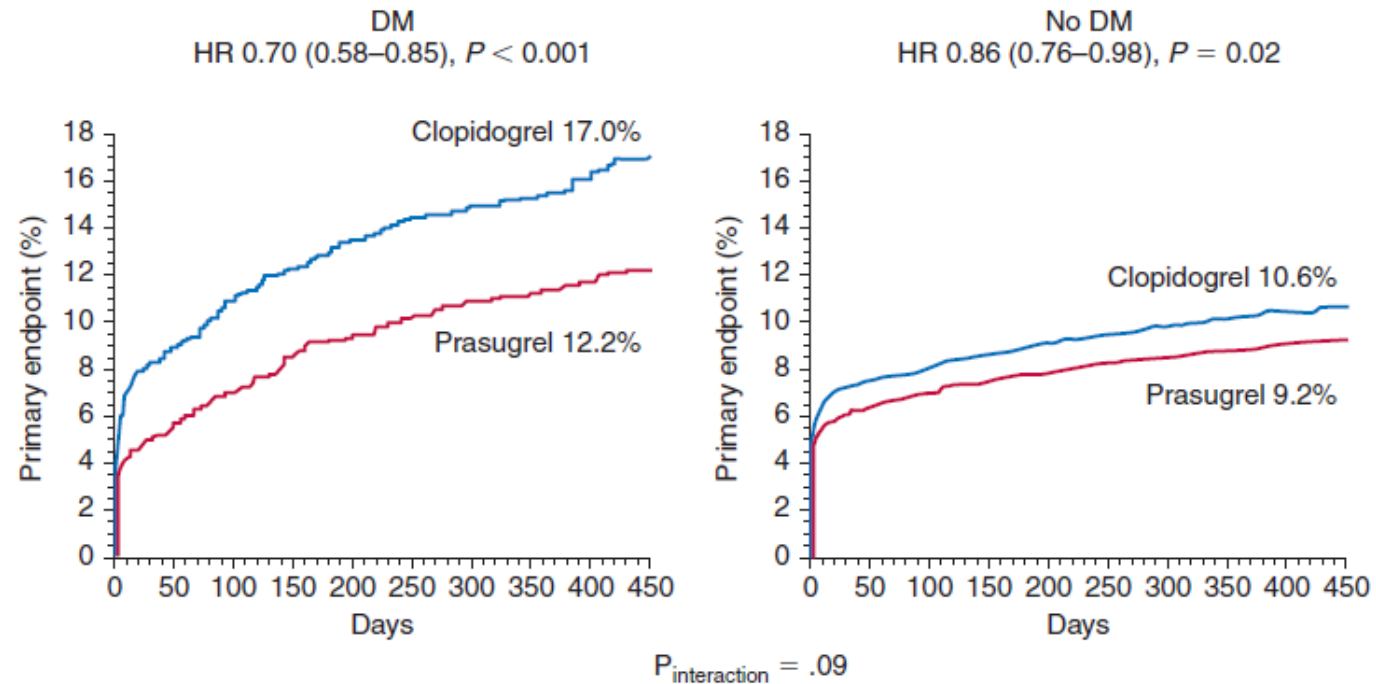


Lancet 2009;373:1190–1197

More aggressive in treating other RF



Aggressive antiplatelet

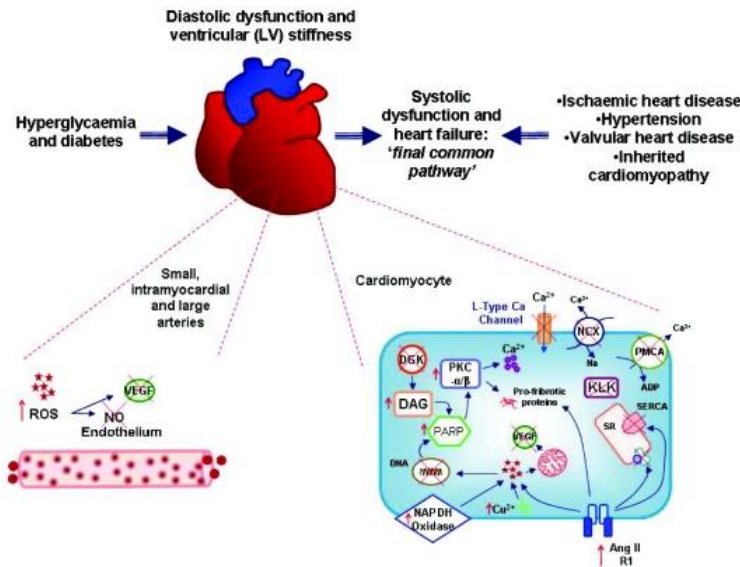


Circulation 118: 1626-1636; 2008

Heart Failure and DM

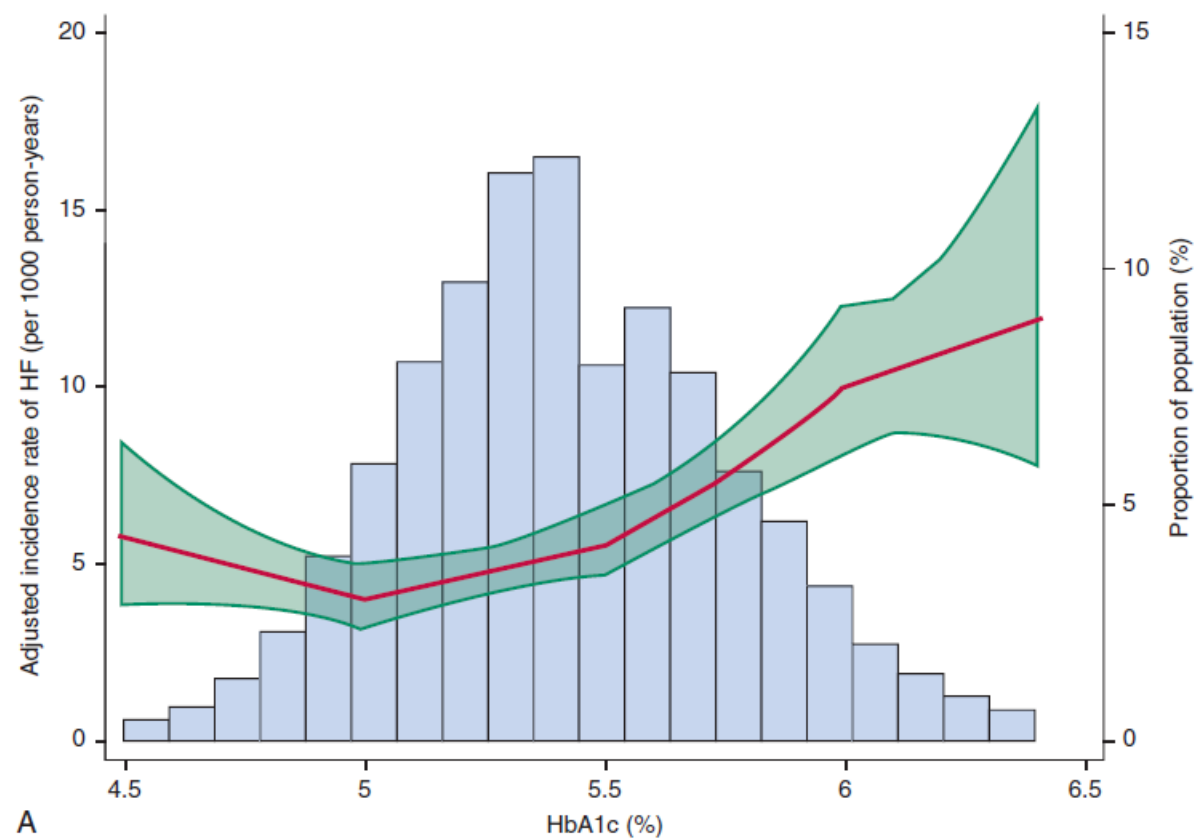
DM and Cardiomyopathy

- DM acts directly on the myocardium leading to the development of CMP, rather than solely via coronary atherosclerosis and hypertension



Clin Sci (Lond). 2009 May 1; 116(Pt 10): 741–760.

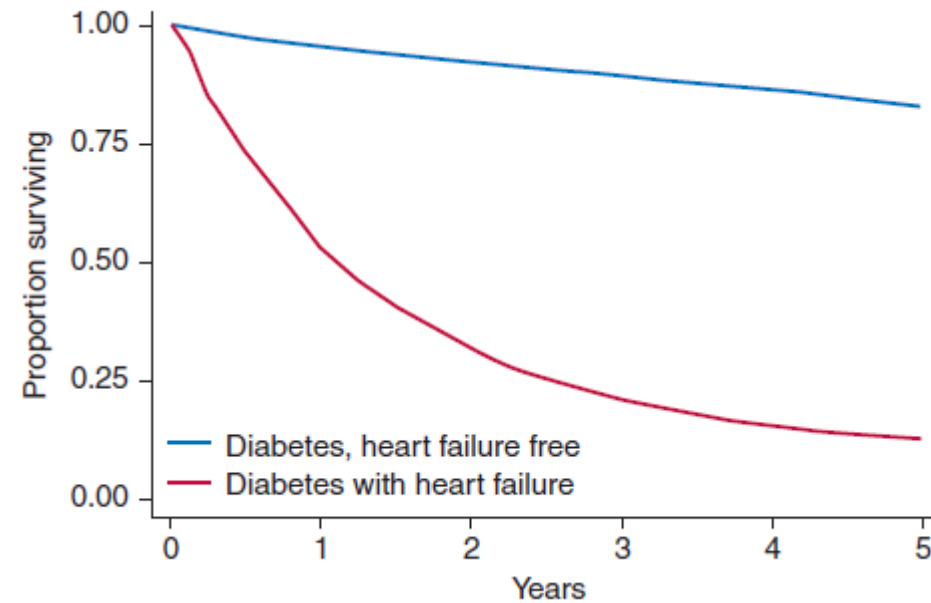
Incident rates of HF according to HbA1c



Diabetes 59:2020-2026, 2010

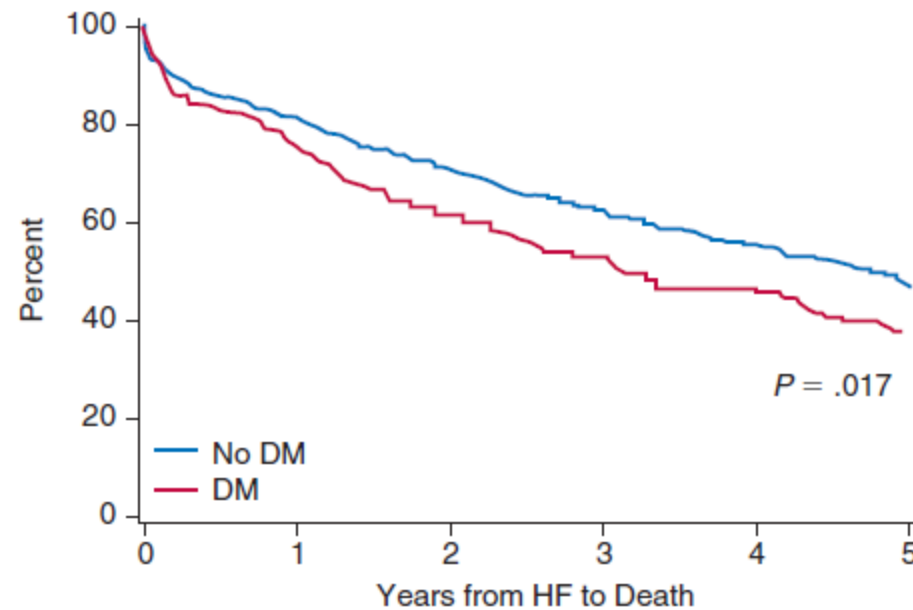
Five-year Kaplan-Meier survival estimates for 115,803 adults ≥ 65 years in fee-for-service Medicare with DM by incident HF status

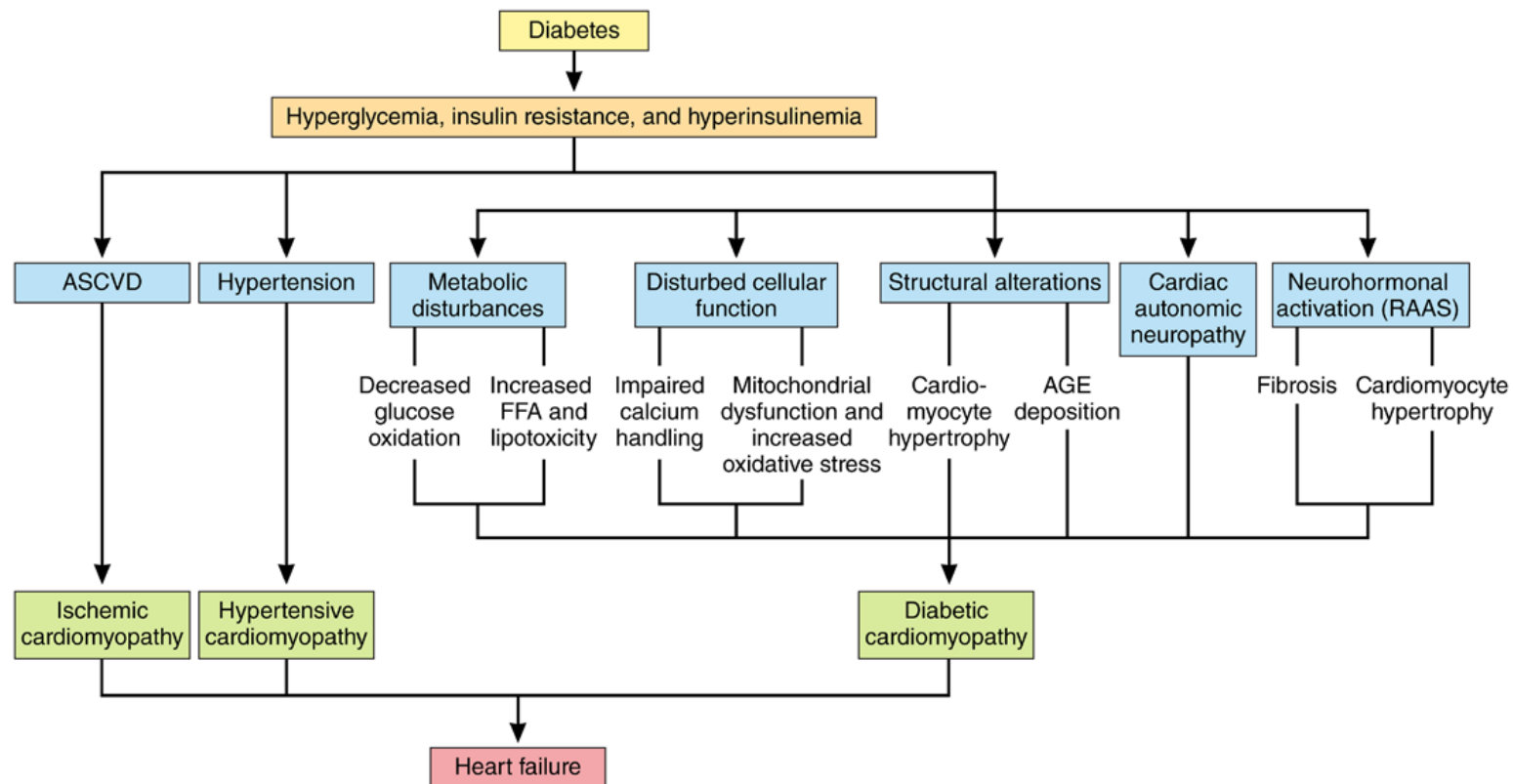
- DM
- HF vs. no HF



Kaplan-Meier survival estimates in HF patients with and without DM

- HF
- DM vs. no DM





- DM is pan-endemic and pan-epidemic
- DM affects the heart through different presentation
- At the moment, we understand diabetic patient with Cv illness behave differently than non diabetic patient
- So far, we do not have much to do
- **Or DO WE??**

Thank you