Il circolo vizioso della disfunzione ventricolare nel diabete mellito

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iPHNET italian Pulmonary Hypertension NETtwork

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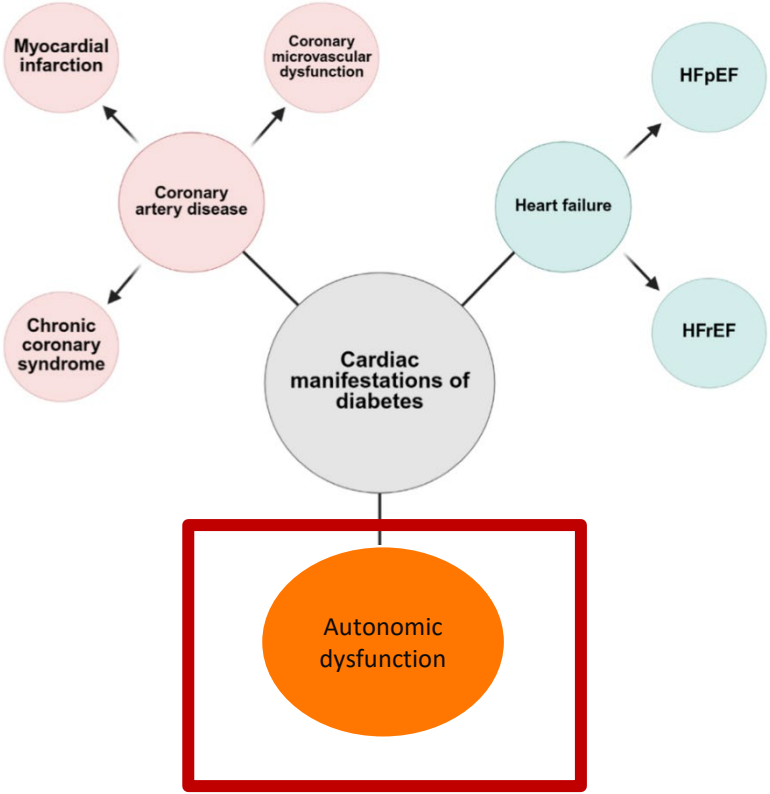
Conflict of interest

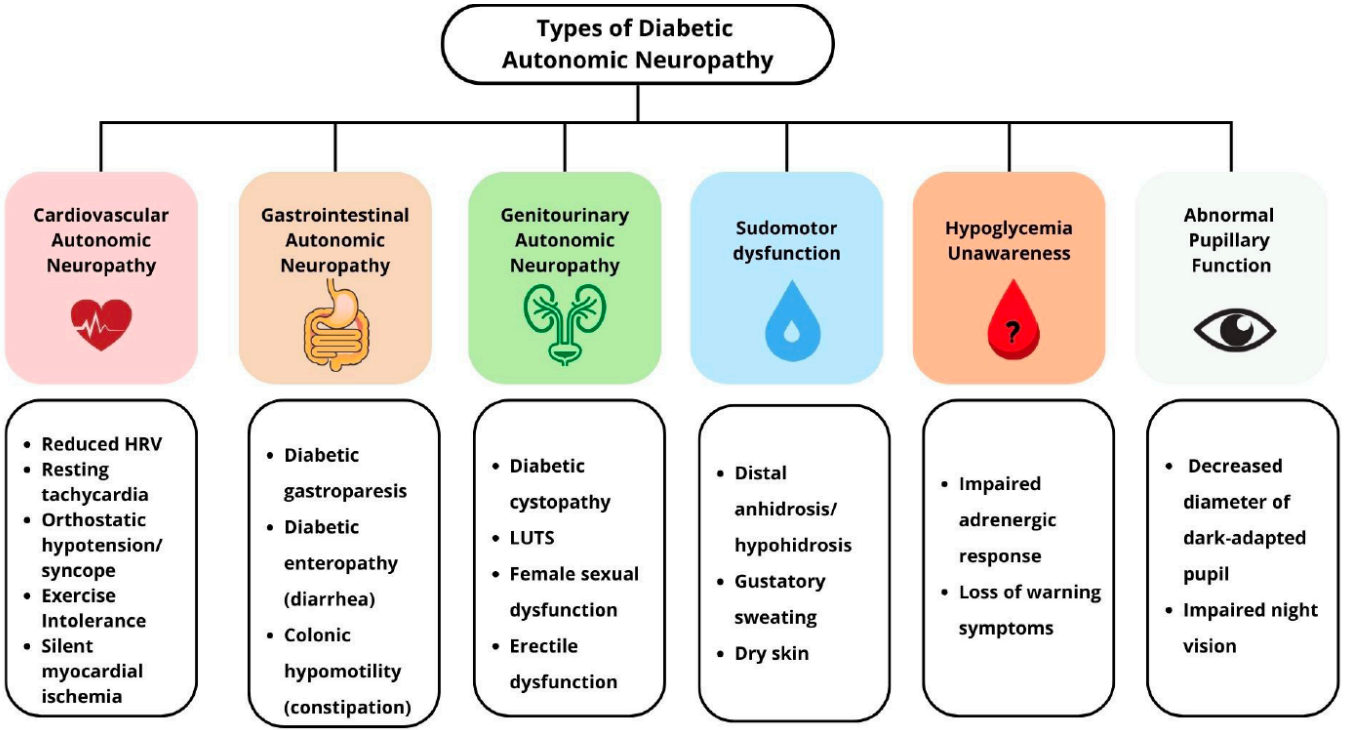
Grant for scientific collaboration (advisory board, clinical studies, speaker):

- Janssen
- Astra Zeneca
- Bayer
- Dompè
- Ferrer
- Janssen
- GSK
- Lilly
- Novonordisk
- MSD
- United therapeutics

L’impatto cardiovascolare del diabete mellito

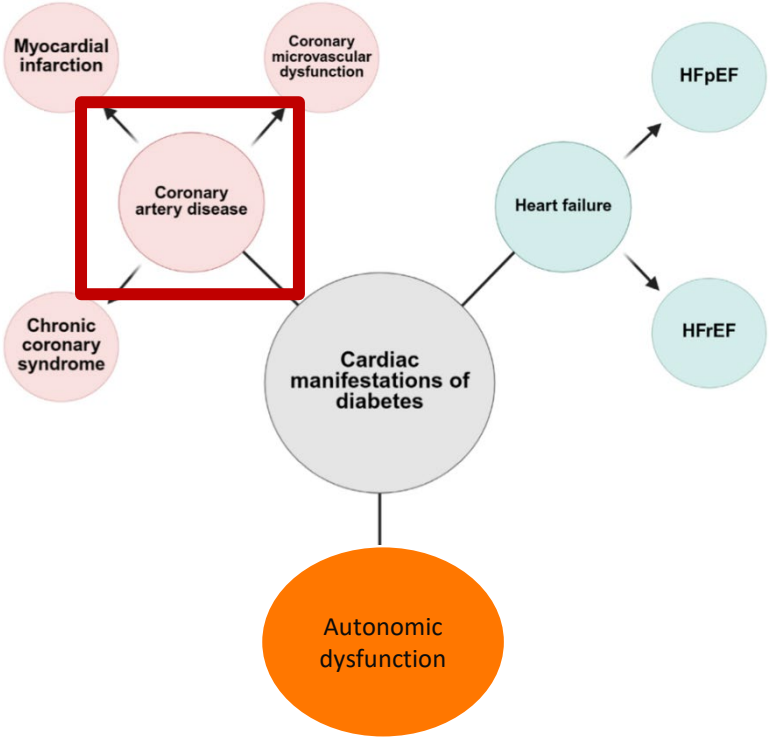


Disfunzione sistema nervoso autonomico

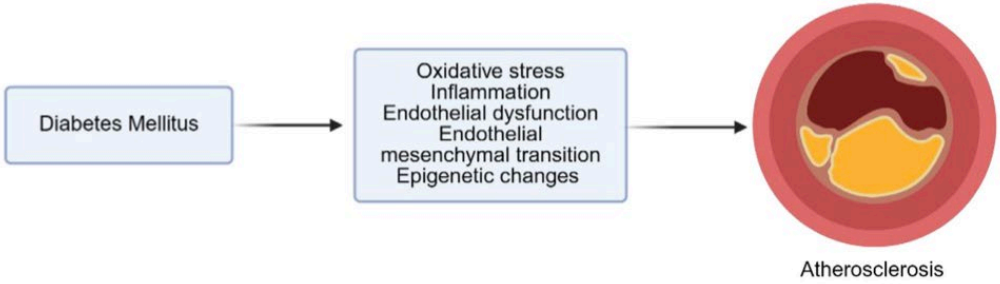


Tannus L. Arch Endocrinol Metab, 2026; 70:1-20, e250406

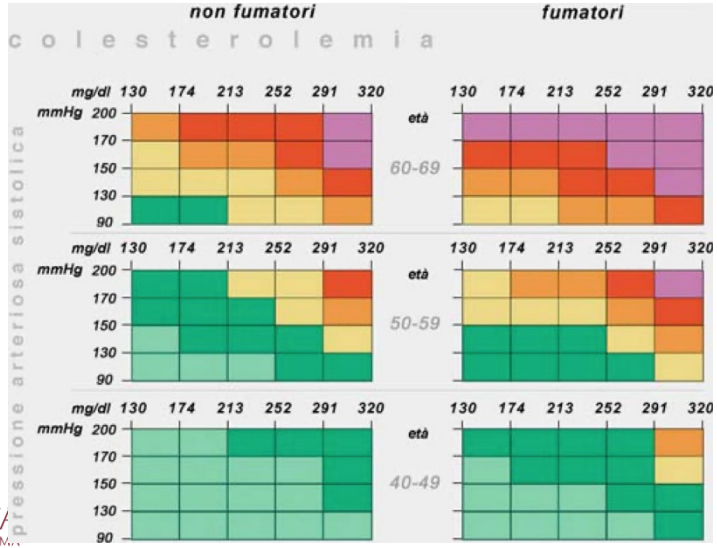
L’impatto cardiovascolare del diabete mellito



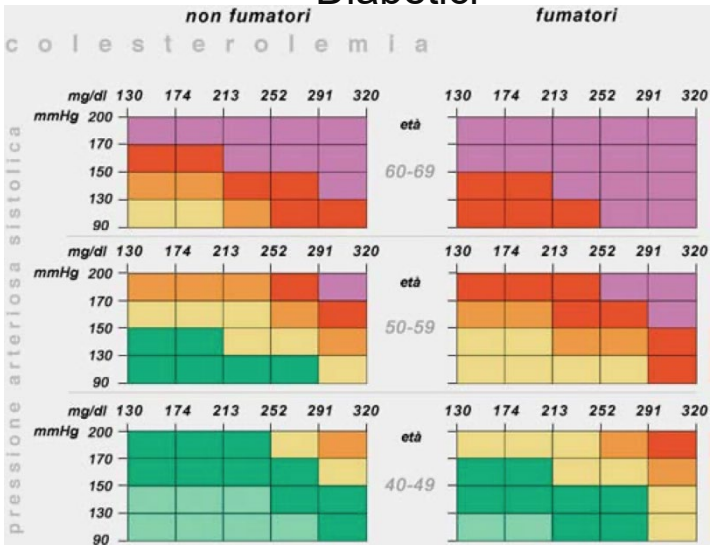
Diabete e aterosclerosi



Non Diabetici



Diabetici

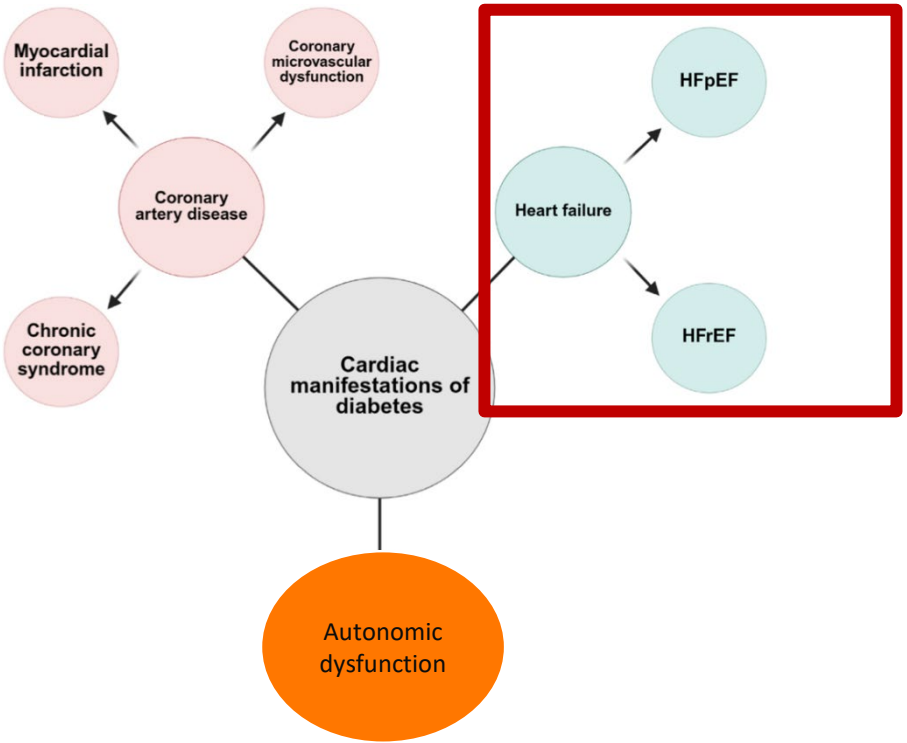


Tipo di coronaropatia nel diabetico

- More extensive and diffuse CAD
- Higher likelihood of developing multivessel and
- Diffuse disease and a larger plaque burden
- Higher prevalence of vulnerable plaques,
  - lipid-rich plaques, macrophage accumulation and thin fibrous cap thickness

Dortimer AC. Circulation. 1978;57:133-6.
Montone R. *Cardiovascular Diabetology 2022; 21:211*

L’impatto cardiovascolare del diabete mellito



Incidence of Heart Failure in 2,737 Older Persons With and Without Diabetes Mellitus*

Wilbert S. Aronow, MD, FCCP; and Chul Ahn, PhD

Studio prospettico
Associazione tra diabete e nuovi episodi di insufficienza cardiaca
4 anni di FU

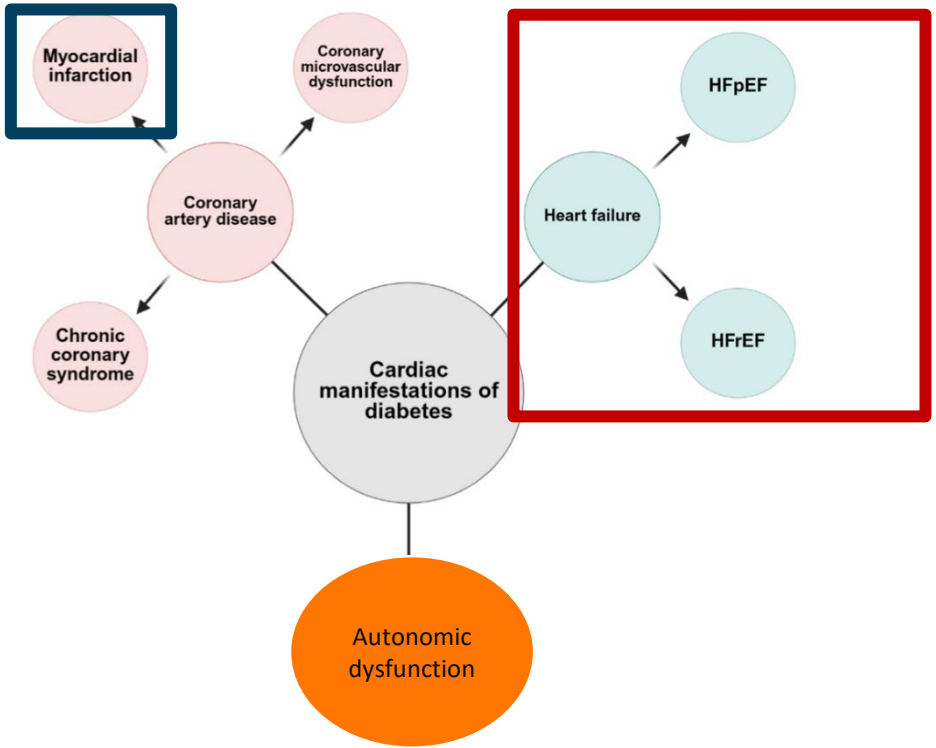
Variable	Diabetes Mellitus (n = 690) No.	(%)	No Diabetes Mellitus (n = 2,047) No.	(%)	p Value
Women	487	(71)	1,385	(68)	NS*
Men	203	(29)	662	(32)	
Systemic hypertension	468	(68)	778	(38)	< 0.000
CAD	417	(60)	758	(37)	< 0.000
Incidence of CHF	272	(39)	467	(23)	< 0.000
Age, yr	79 ± 9		82 ± 9		0.0001
Follow-up, mo	39 ± 22		44 ± 25		0.0001

Predittori di Ins cardiaca

Variable	Parameter Estimate	Standard Error	p Value	Risk Ratio	95% Confidence Limits
Age	0.047	0.005	0.0001	1.048	(1.038, 1.058)
Hypertension	0.926	0.084	0.0001	2.524	(2.139, 2.978)
CAD	1.388	0.089	0.0001	4.008	(3.368, 4.769)
Men	0.336	0.080	0.0001	1.399	(1.196, 1.636)
Diabetes mellitus	0.290	0.080	0.0003	1.337	(1.143, 1.563)

CHEST 1999; 115:867–868

L’impatto cardiovascolare del diabete mellito



Diabetic Cardiomyopathy

Abnormal myocardial structure and performance in the absence of other cardiac risk factors such as coronary artery disease, hypertension, and significant valvular disease in individuals with diabetes.

- 1972 First authopic description (4 cases)
- 1974 (Framingham Heart Study) that demonstrated a higher incidence of heart failure in diabetic women (5 fold) and men (2.4-fold) after adjustment for other risk factors such as age, coronary heart disease, and hypertension

Jia G. et al Circ Res. 2018; 122: 624–638

The Prevalence of Diabetic Cardiomyopathy: A Population-Based Study in Olmsted County, Minnesota

SANJAY DANDAMUDI, MD,[1] JOSHUA SLUSSER, BS,[2] DOUGLAS W. MAHONEY, MS,[2] MARGARET M. REDFIELD, MD,[3] RICHARD J. RODEHEFFER, MD,[3] AND HORNG H. CHEN, MB, BCh[3]

- *Cross-sectional survey*
- *2042 randomly selected residents*
- *aged 45 years or older*
- *between June 1997 and September 2000*

- *136 Diabetes*
- *52 (38%) no LV dysfunction*
- *23 (17%) Diabetic Cardiomyopathy*
- *61 (45%) LV dysfunction and Coronary disease, Hypertension*

Variable	Diabetic with No LV Dysfunction [D0CM] (n = 52)	Diabetic Cardiomyopathy [DCM] (n = 23)	Diabetic with CAD or HTN and Any LV Dysfunction [D1CM] (n = 61)
Age (y)	62.6 ± 9.1	68.5 ± 10.6‡	67.6 ± 9.2‡
Gender (male), no. (%)	31 (60)	17 (74)	33 (54)
BMI (kg/m^2)	29.9 ± 6.1	29.2 ± 4.3	32.3 ± 5.6*‡
Hyperlipidemia, no. (%)	18 (36%)	4 (18%)	24 (39%)
Smoking, no. (%)	28 (54%)	16 (70%)	35 (57%)
LV ejection fraction (%)	64.2 ± 5.2	61.7 ± 8.8	62.1 ± 8.9
Reduced LVEF (≤50%), no. (%)	0 (0%)	4 (17%)†	6 (10%)‡
E/A ratio	1.0 ± 0.2	0.9 ± 0.4†	0.9 ± 0.3‡
E/e′ ratio	7.4 ± 1.3	10.5 ± 2.8†	10.2 ± 2.4‡
LV mass index (g/m^2)	94.6 ± 24.0	105.9 ± 19.9	108.0 ± 29.1‡
Creatinine (mg/dL)	1.1 ± 0.3	1.1 ± 0.2	1.1 ± 0.2

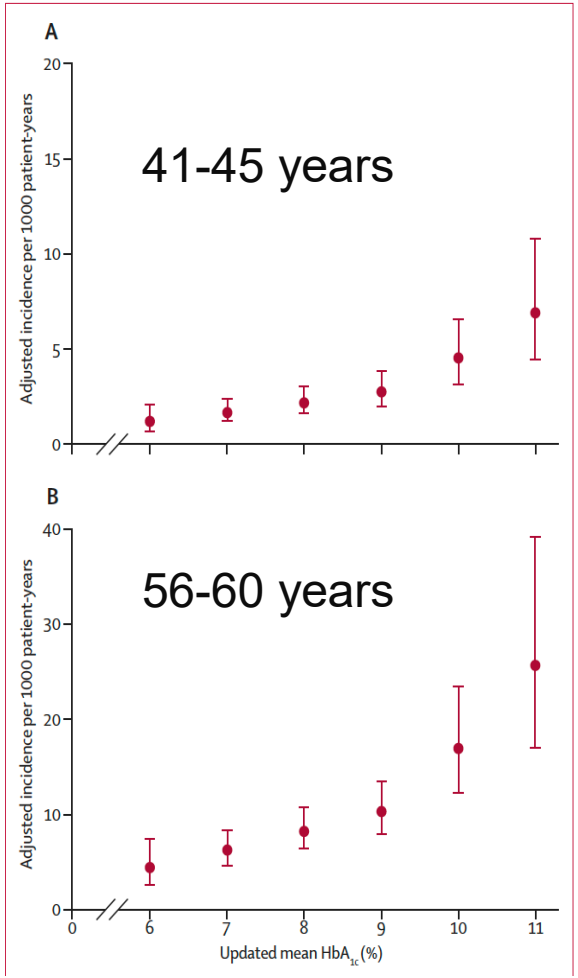
Journal of Cardiac Failure 2014;20:304-310

Glycaemic control and incidence of heart failure in 20 985 patients with type 1 diabetes: an observational study

Marcus Lind, Ioannis Bounias, Marita Olsson, Soffia Gudbjörnsdottir, Ann-Marie Svensson, Annika Rosengren

Diabetes diagnosed at 11-20 years

- *Median follow-up was 9.0 years (IQR 7.3–11.0),*
- *635 patients (3%) were admitted to hospital for heart failure,*
- *incidence of 3.38 events per 1000 patient-years*



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Lancet 2011; 378: 140–46

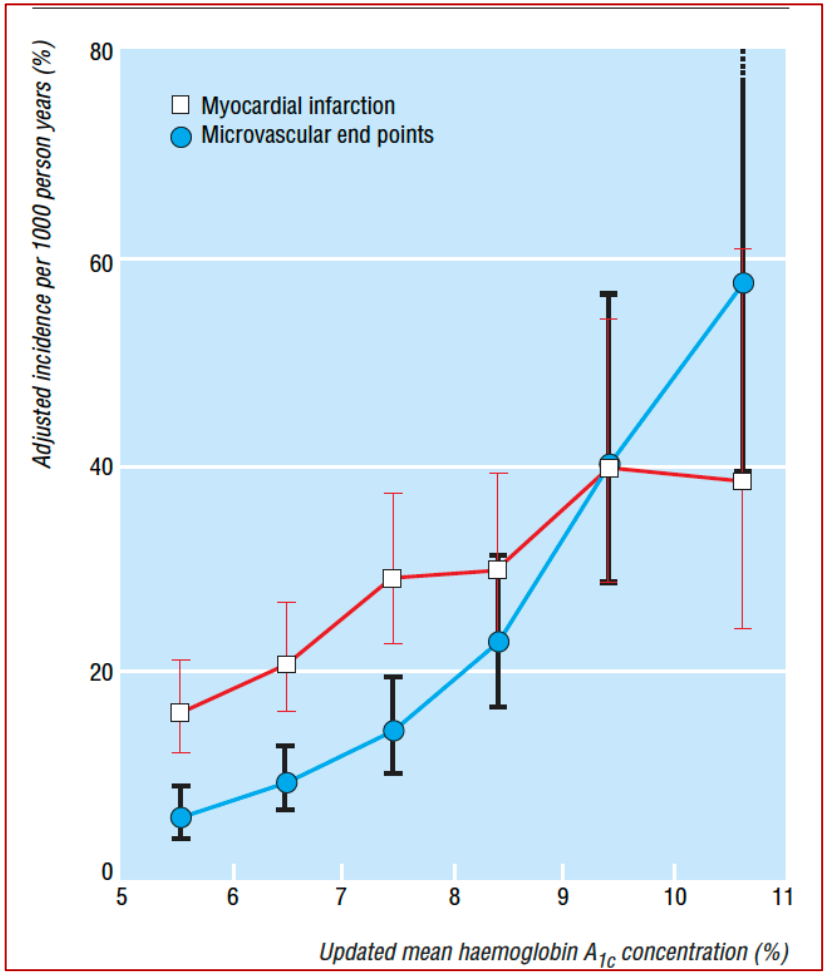
Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study

Irene M Stratton, Amanda I Adler, H Andrew W Neil, David R Matthews, Susan E Manley, Carole A Cull, David Hadden, Robert C Turner, Rury R Holman on behalf of the UK Prospective Diabetes Study Group

4585 UKPDS patients

Incidence rates for HbA1c levels adjusted for

- *male sex,*
- *white ethnic group,*
- *age at diagnosis (50-54 years),*
- *and duration of diabetes (7.5-12.5 years)*



BMJ 2000;321:405–12

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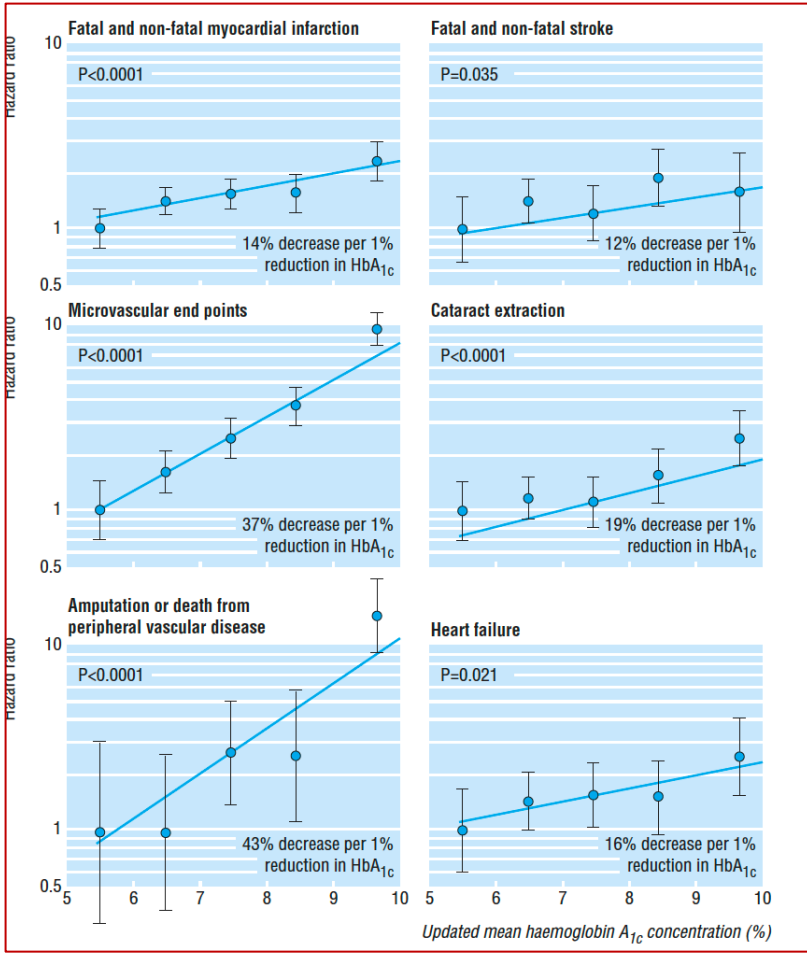
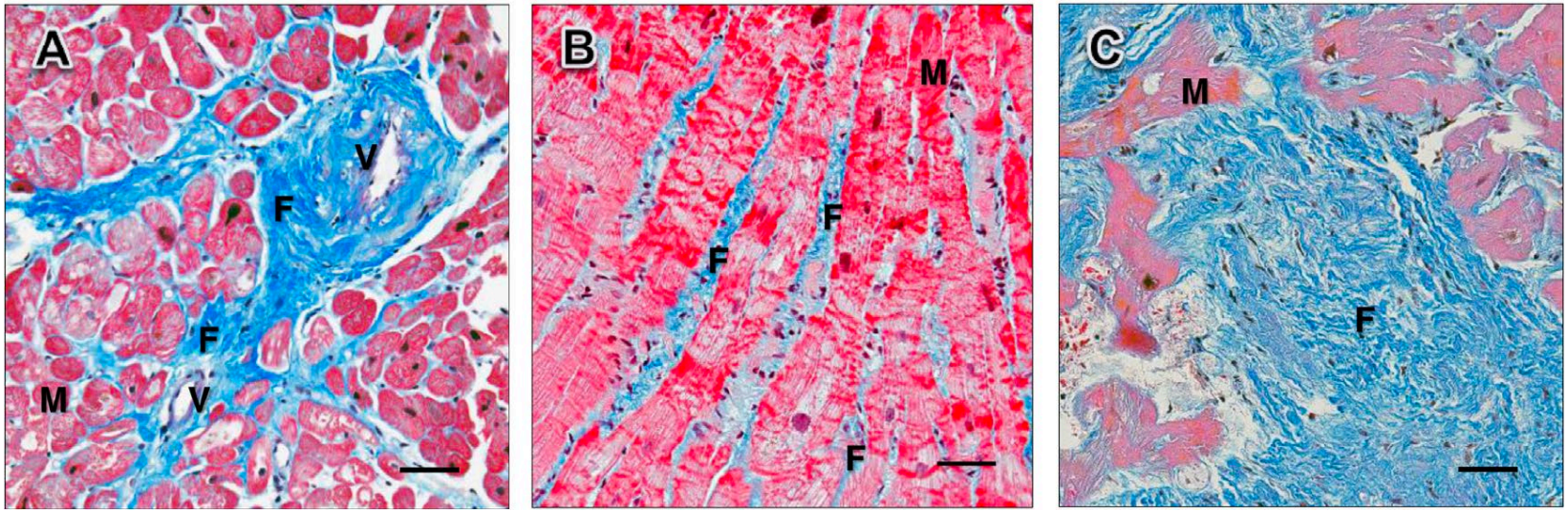


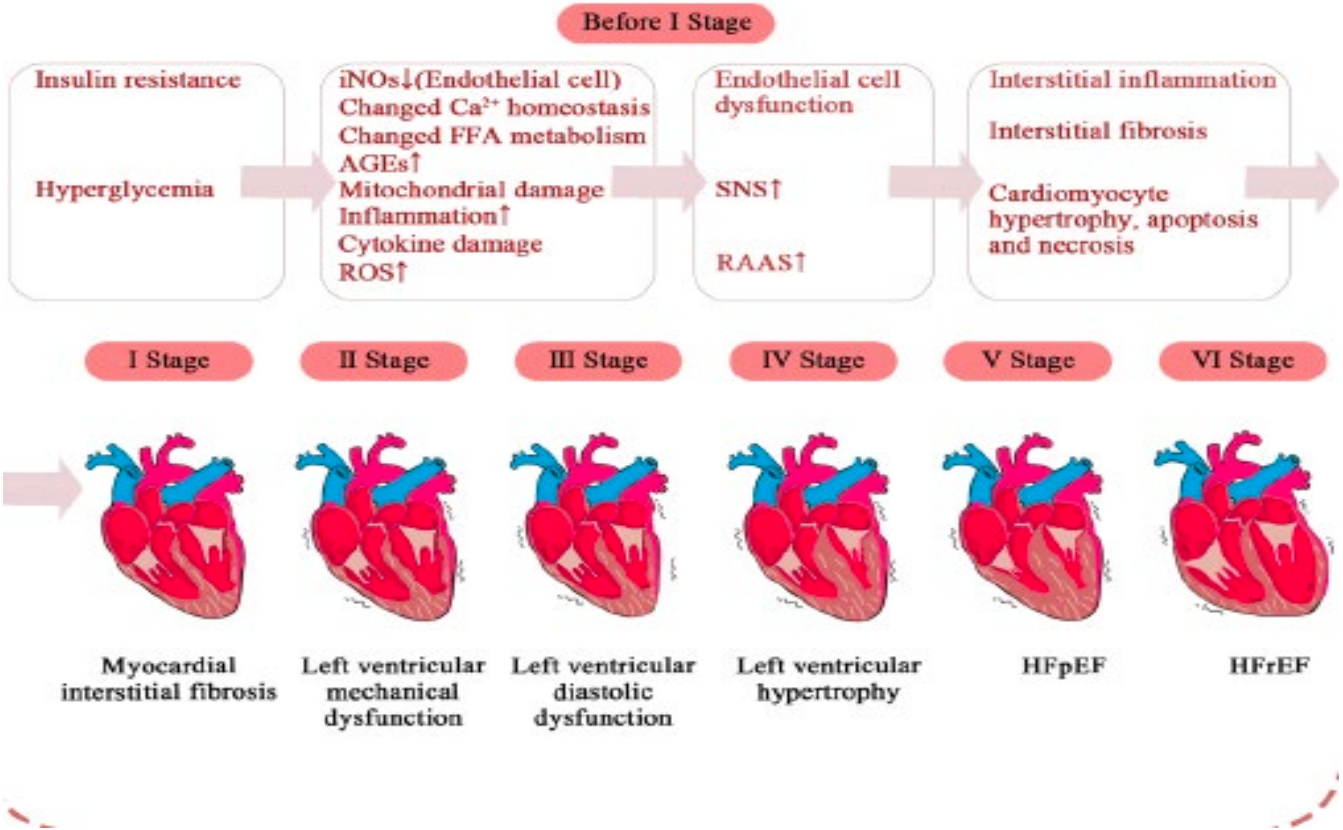
BMJ 2000;321:405–12

The aspecific findings of diabetic cardiomyopathy: fibrosis



A: perivascular, B: interstitial, and C: replacement

The natural hisrtory of diabetic cardiomyopathy

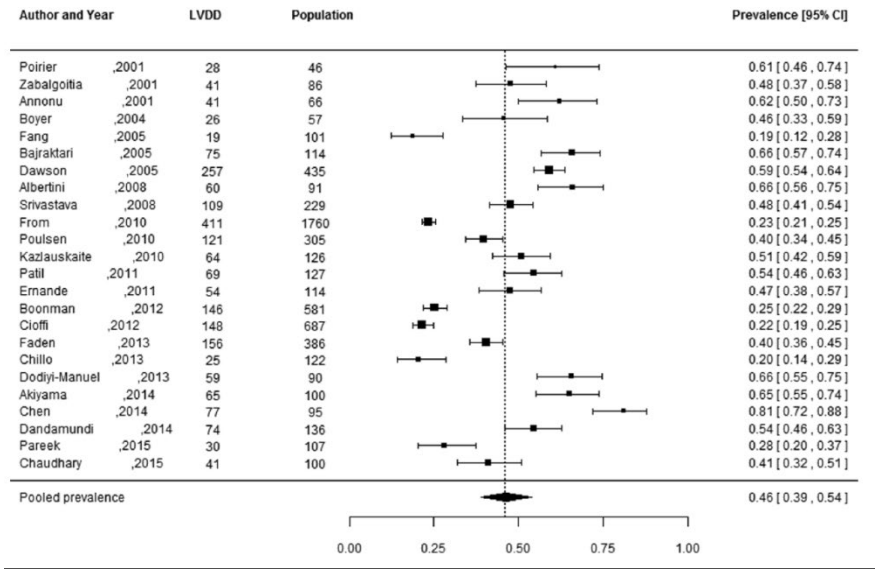


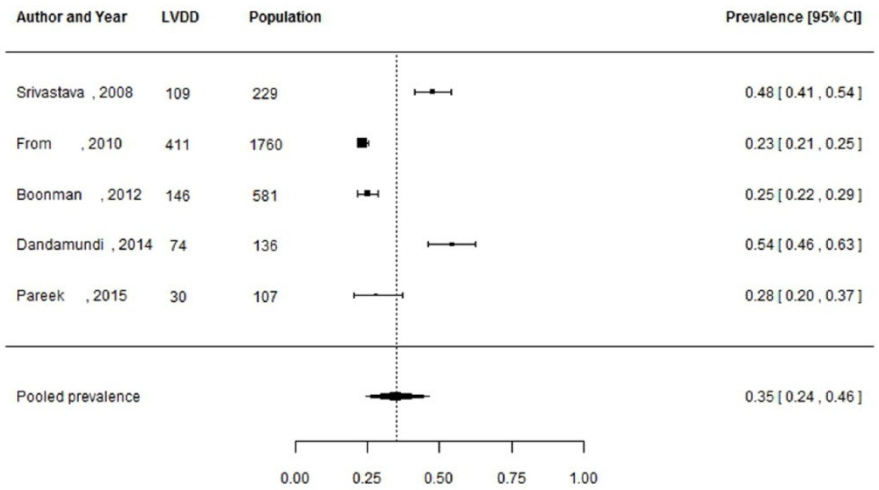
The prevalence of left ventricular diastolic dysfunction and heart failure with preserved ejection fraction in men and women with type 2 diabetes: A systematic review and meta-analysis

2018, Vol. 15(6) 477–493

DOI: 10.1177/1479164118787415
journals.sagepub.com/home/dvr
SAGE

Selma Bouthoorn[1], Gideon B Valstar[1,2], Aisha Gohar[1,2], Hester M den Ruijter[2], Hans B Reitsma[1], Arno W Hoes[1] and Frans H Rutten[1]; on behalf of the RECONNECT and Queen of Hearts Consortium





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Key points

- Il diabete rappresenta un importante fattore nel determinare disfunzione ventricolare (sinistra) attraverso diversi meccanismi (coronaropatia, microangiopatia circolo coronarico, danno miocitario)
- La cardiomiopatia diabetica rimane una diagnosi elusiva
- Lo stretto controllo glucidico permette di ridurre la probabilità di sviluppare insufficienza cardiaca
- Glifozine e GLP1 agonisti possono avere un ruolo importante nella riduzione di eventi cardiovascolari nei pazienti diabetici

ACAD Detection in Asymptomatic Patients with Type 2 Diabetes Mellitus

Evaluation of SCORE 2 Diabetes

Risk modifiers/ enhancers

Psychosocial factors, ethnicity

Frailty, family history, socioeconomic determinants, environmental exposure, eir pollution

Body composition

MASLD

Chronic Inflammatory Diseases

Arterial stiffness

Biomarkers

Hs-CRP

Lipoprotein (a)

11-dehydro-TXB_2

Subclinical Atherosclerosis/ Plaque burden

CAC score

CAC <0: low risk

CAC >300

comparable with previous MI or arterial revascularization, equivalent to a severe stenosis

Carotid ultrasound

Carotid plaque Score

CCTA

Direct visualization of plaque burden and plaque morphology

AI-tools

Myocardial ischemia/ microvascular dysfunction

Functional imaging:

RWMA, myocardial perfusion and microvascular dysfunction

PET and **stress CMR**: quantify myocardial blood flow

Silent MI

ECG

Echocardiography

CMR

CT-LIE

Subclinical ACAD | **Silent ischemia** | **Unrecognized MI**

Redifining cardiovascular risk
Treatment intensity
Need for more aggressive monitoring
Uncover disease at an earlier stage when preventive pharmacology can make the most singnificant impact

Disfunzione autonomica cardiaca

ADA 2024 American Diabetes Association Cardiovascular Disease and Risk Management: Standards of Care in Diabetes—2024	In asymptomatic individuals, routine screening for coronary artery disease is **not recommended**, as it does not improve outcomes as long as ACAD risk factors are treated **Consider investigations for ACAD** in the presence of any of the following: atypical cardiac symptoms; signs or symptoms of associated vascular disease, including carotid bruits, transient ischemic attack, stroke, claudication, or PAD; or electrocardiogram abnormalities (e.g., Q waves)
ESC 2024 European Heart Journal Guidelines on Chronic Coronary Syndromes	Optimal screening options **remain to be determined for specific groups ai high risk** (e.g. asymptomatic individuals with diagnosed diabetes for longer than 10 years