Record your Attendance by SMS Text

To enable the SMS texting feature, login to your account @ http://cce.upmc.com .
Click the "Mobile" tab to add your ten-digit mobile phone.

Receive credit instantly by texting the following code:

HUWKAV

to

412-312-4424

Code MUST be texted by today at 11:59pm.

A Fib or Fact? Arrhythmia Prevention With SGLT2 Inhibitors

Jason Walker, PharmD
PGY2 Ambulatory Care Resident
UPMC Presbyterian/Shadyside

Continuing Education Information

- In support of improving patient care, the University of Pittsburgh is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.
- Pharmacy (CPE)
- This knowledge-based activity provides 1.0 contact hours of continuing pharmacy education credit

Disclosures

- The author/presenter, content reviewers, and/or anyone else in a position to control the content of this education activity do not have relevant financial relationships with any entity producing, marketing, re-selling, or distributing health care goods or services, used on, or consumed by, patients to disclose.

Before we begin…

The author did not identify any guidelines that comment on treatment with antihyperglycemic medications for preventing atrial fibrillation in diabetic patients

All sources are primary or secondary literature

Assessing Quality of Evidence

- Strength of Recommendation Taxonomy (SORT)
  - Level of Evidence (1-3)

TABLE 2

Assessing Quality of Evidence

Study quality	Diagnosis	Treatment/prevention/screening	Prognosis
Level 1: good-quality, patient-oriented evidence	Validated clinical decision rule Systematic review/meta-analysis of high-quality studies High-quality diagnostic cohort study*	Systematic review/meta-analysis or RCTs with consistent findings High-quality individual RCT† All-or-none study‡	Systematic review/meta-analysis of good-quality cohort studies Prospective cohort study with good follow-up
Level 2: limited-quality patient-oriented evidence	Unvalidated clinical decision rule Systematic review/meta-analysis of lower quality studies or studies with inconsistent findings Lower quality diagnostic cohort study or diagnostic case-control study	Systematic review/meta-analysis of lower quality clinical trials or of studies with inconsistent findings Lower quality clinical trial Cohort study Case-control study	Systematic review/meta-analysis of lower quality cohort studies or with inconsistent results Retrospective cohort study or prospective cohort study with poor follow-up Case-control study Case series
Level 3: other evidence	Consensus guidelines, extrapolations from bench research, usual practice, opinion, disease-oriented evidence (intermediate or physiologic outcomes only), or case series for studies of diagnosis, treatment, prevention, or screening		

RCT = randomized controlled trial.

*—High-quality diagnostic cohort study: cohort design, adequate size, adequate spectrum of patients, blinding, and a consistent, well-defined reference standard.

†—High-quality RCT: allocation concealed, blinding if possible, intention-to-treat analysis, adequate statistical power, adequate follow-up (greater than 80 percent).

‡—In an all-or-none study, the treatment causes a dramatic change in outcomes, such as antibiotics for meningitis or surgery for appendicitis, which precludes study in a controlled trial.

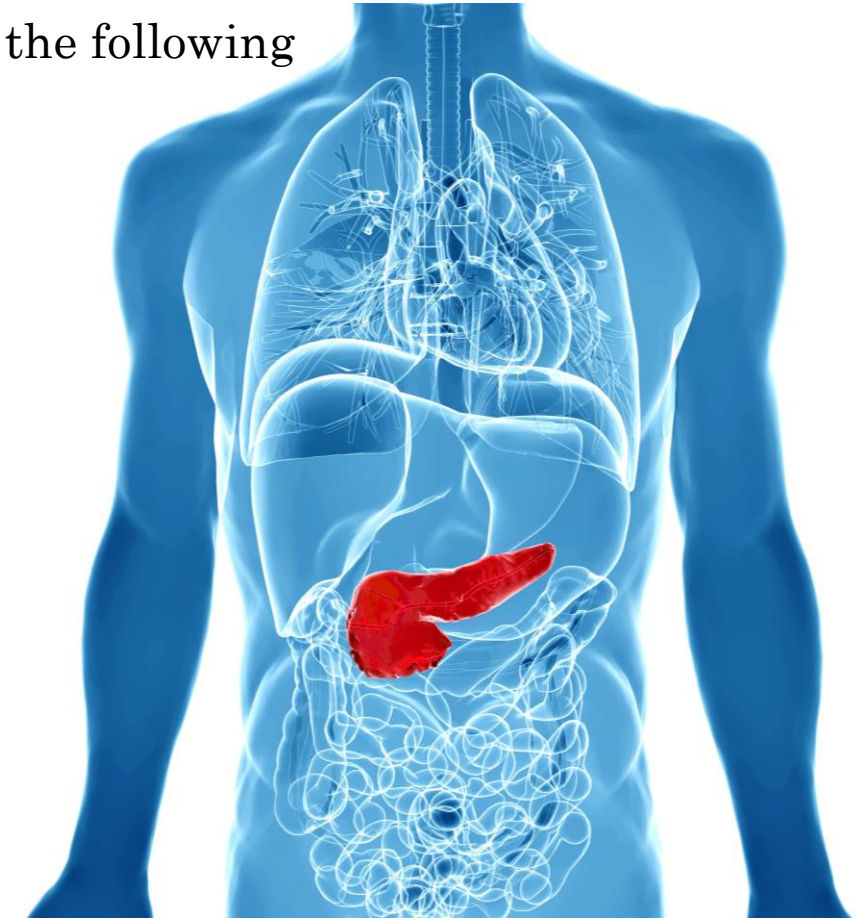
https://www.aafp.org/dam/AAFP/documents/journals/afp/sortdef07.pdf.

Objectives

- Describe the relationship between diabetes mellitus and atrial fibrillation
- Discuss evidence related to the association with SGLT2 inhibitors and atrial fibrillation development in diabetic patients
- Identify comparative data between SGLT2 inhibitors in relation to atrial fibrillation prevention

Diabetes Mellitus (DM)

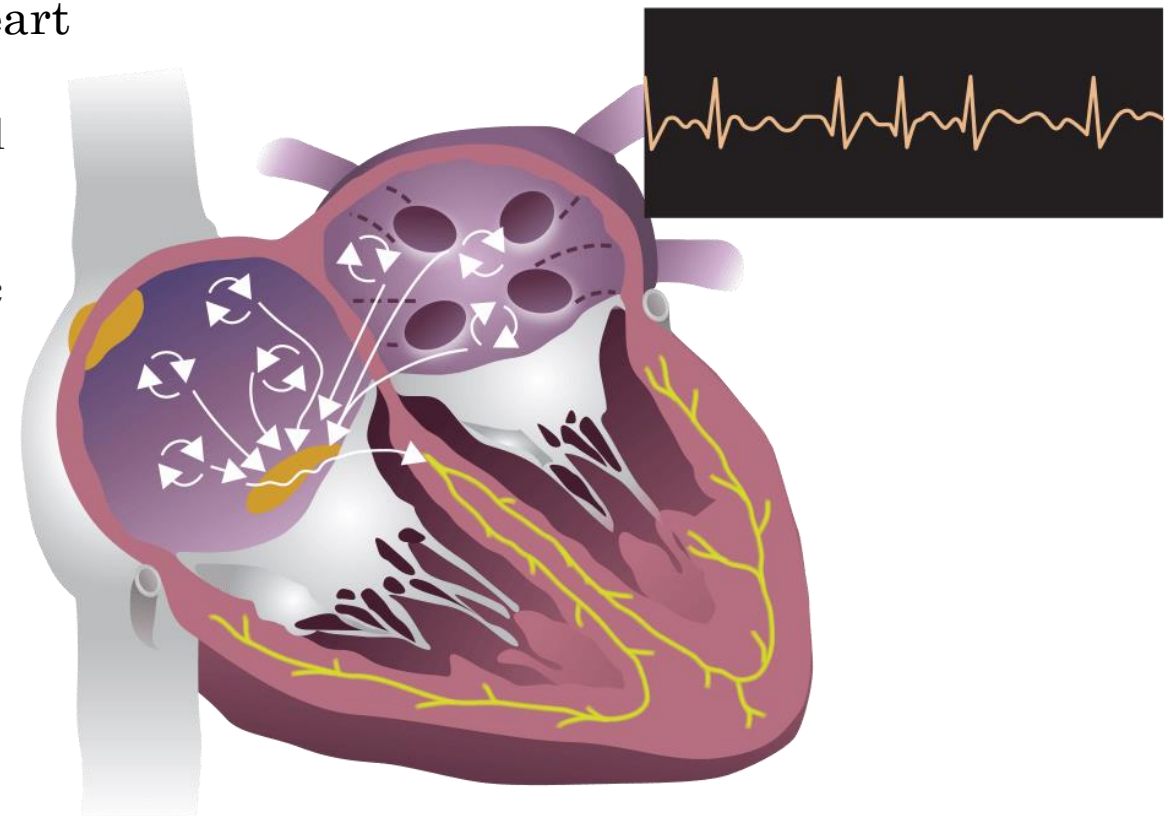
- Metabolic disorder cause by defects in one or both of the following
  - Insulin secretion
  - Insulin action (sensitivity)
- Types
  - Type 1: absolute insulin deficiency from the pancreas
  - Type 2 (T2DM): relative insulin deficiency
    - Beta-cell dysfunction
    - Insulin resistance
- DM is associated with
  - Eye and kidney disease
  - Cardiovascular (CV) events
  - Congestive heart failure (CHF)
  - Atherosclerotic disease



Trujillo J, et al. McGraw Hill; 2020.
highplainssurgical.com/pancreas

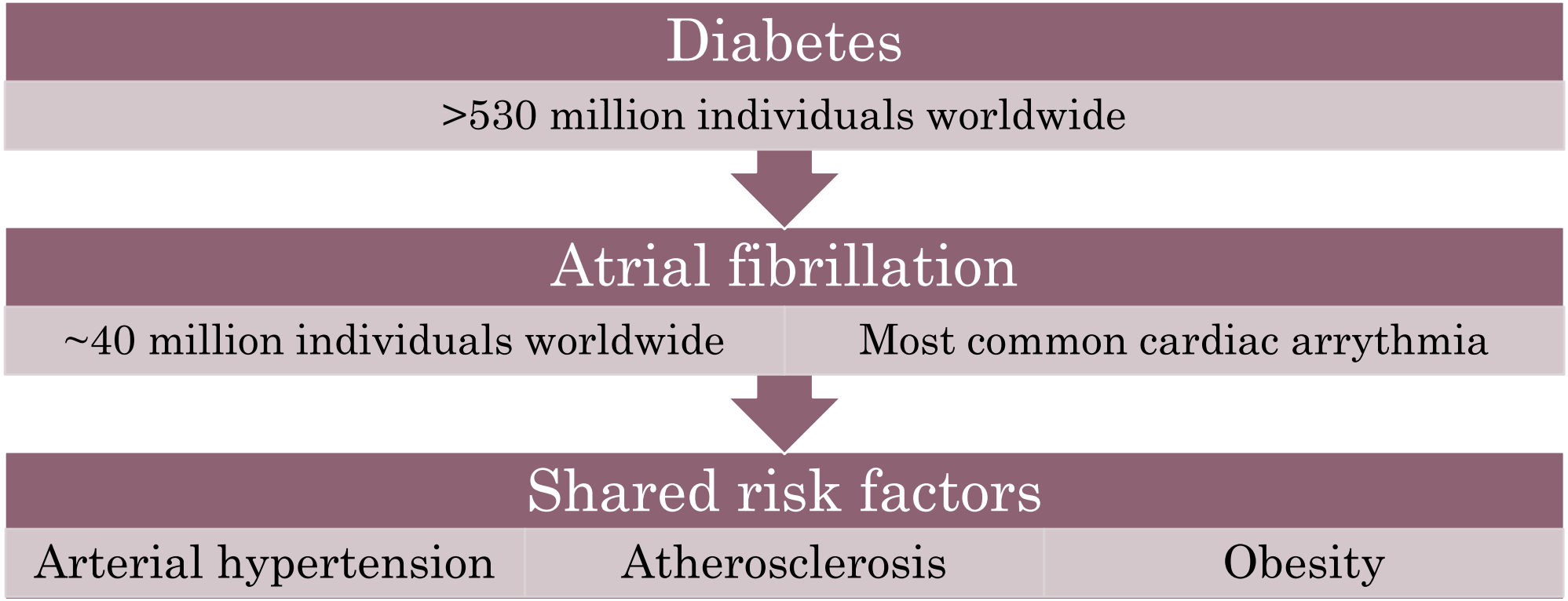
Atrial Fibrillation (AFib)

- Abnormality in the electrical conductivity of the heart leading to an irregular heart rhythm
  - Extremely rapid and disorganized atrial activation
  - Decreased atrial contraction synchronization thus decreasing cardiac output
- General causes
  - Myocardial ischemia or infarction
  - Cardiac remodeling
- Increases risk of stroke



Trujillo J, et al. McGraw Hill; 2020.
hrcmichigan.com/education/atrial-fibrillation/

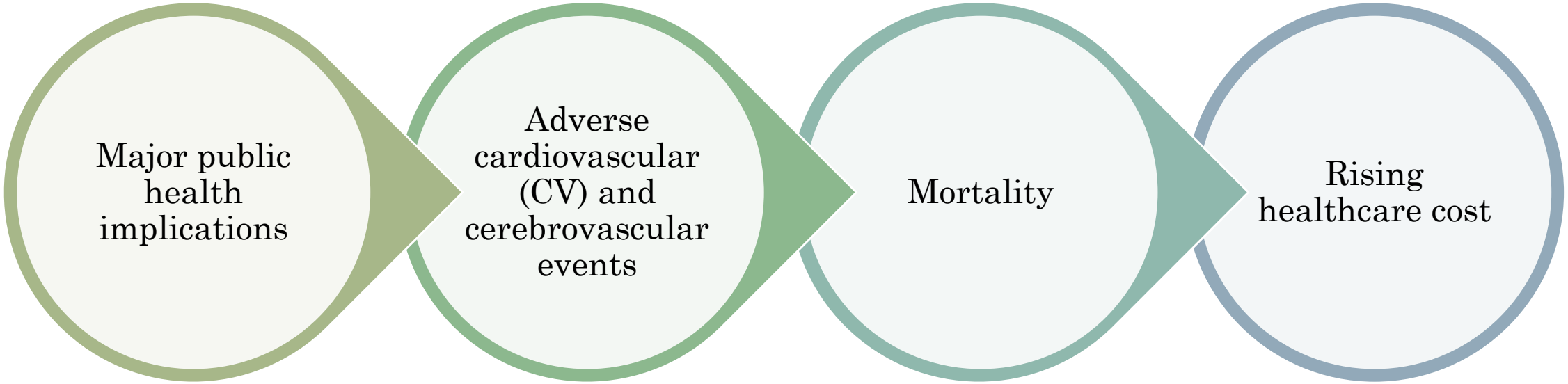
Epidemiology



Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Is there an association between DM and AFib?

Why is a DM-AFib association important to identify?



Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Independent risk factors for atrial fibrillation: The Framingham Heart Study (1994)

Objective	• Identify independent risk factors for atrial fibrillation
Methods	• Population-based cohort • n=4731 (2090 men, 2641 woman) with no history of AFib • 38-year follow-up
Results	• 562 participants developed AFib (264 male, 298 female) • Risk factors for developing AFib: diabetes, hypertension, heart failure, and valve disease
Conclusion	• First study to suggest and independent association between DM and an increased occurrence of atrial fibrillation

LOE: 1

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).
Benjamin EJ, et al. JAMA. 1994;271(11):840-844.

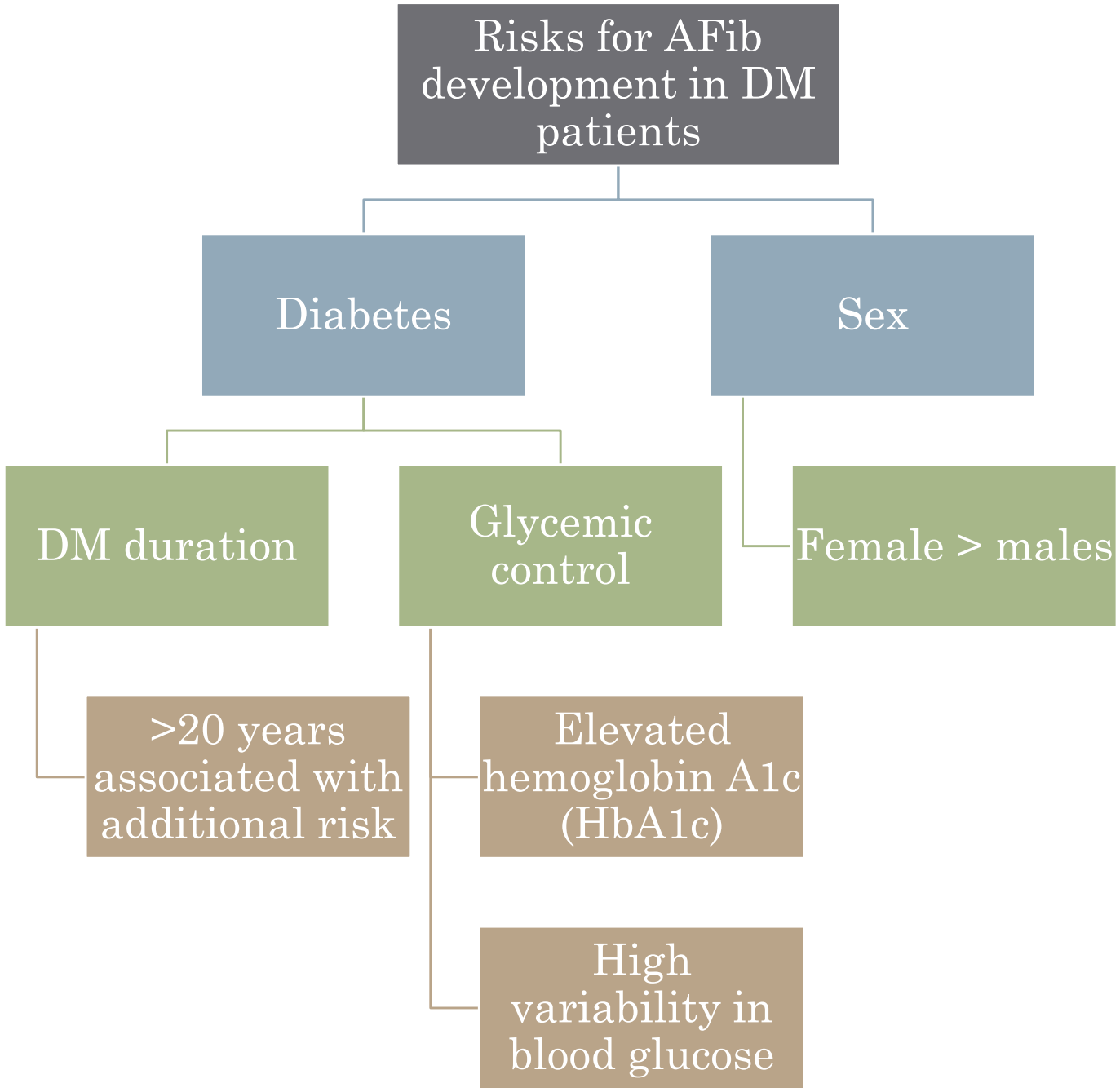
DM-AFib Relationship

No direct causal relationship between DM and AFib

Strengthened association of DM as an independent determinant for AFib development

- Regardless of DM type (1, 2, and pre-diabetes)

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).



Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Diagnostic Complications

Symptoms

- DM associated neuropathy can mask subjective symptoms of AFib
  - Delaying diagnosis and treatment

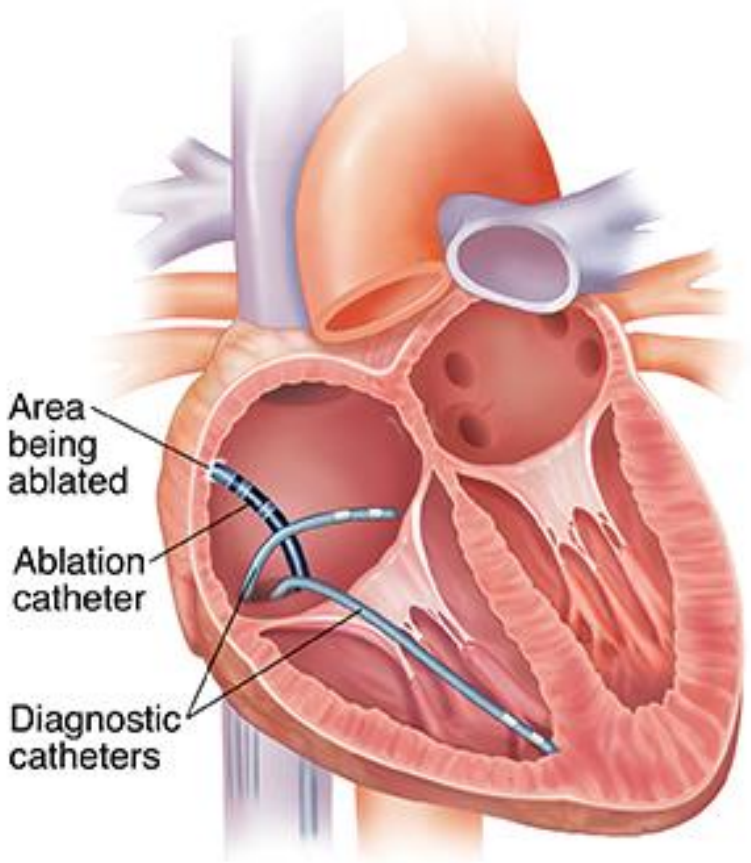
Purposed pathology

- DM associated neuropathy blunts the sensitivity of cardiac nerves
- Abnormal central processing of afferent pain messages

Should patients with DM be screened for AFib?

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Treatment Complications: Catheter Ablation for AFib

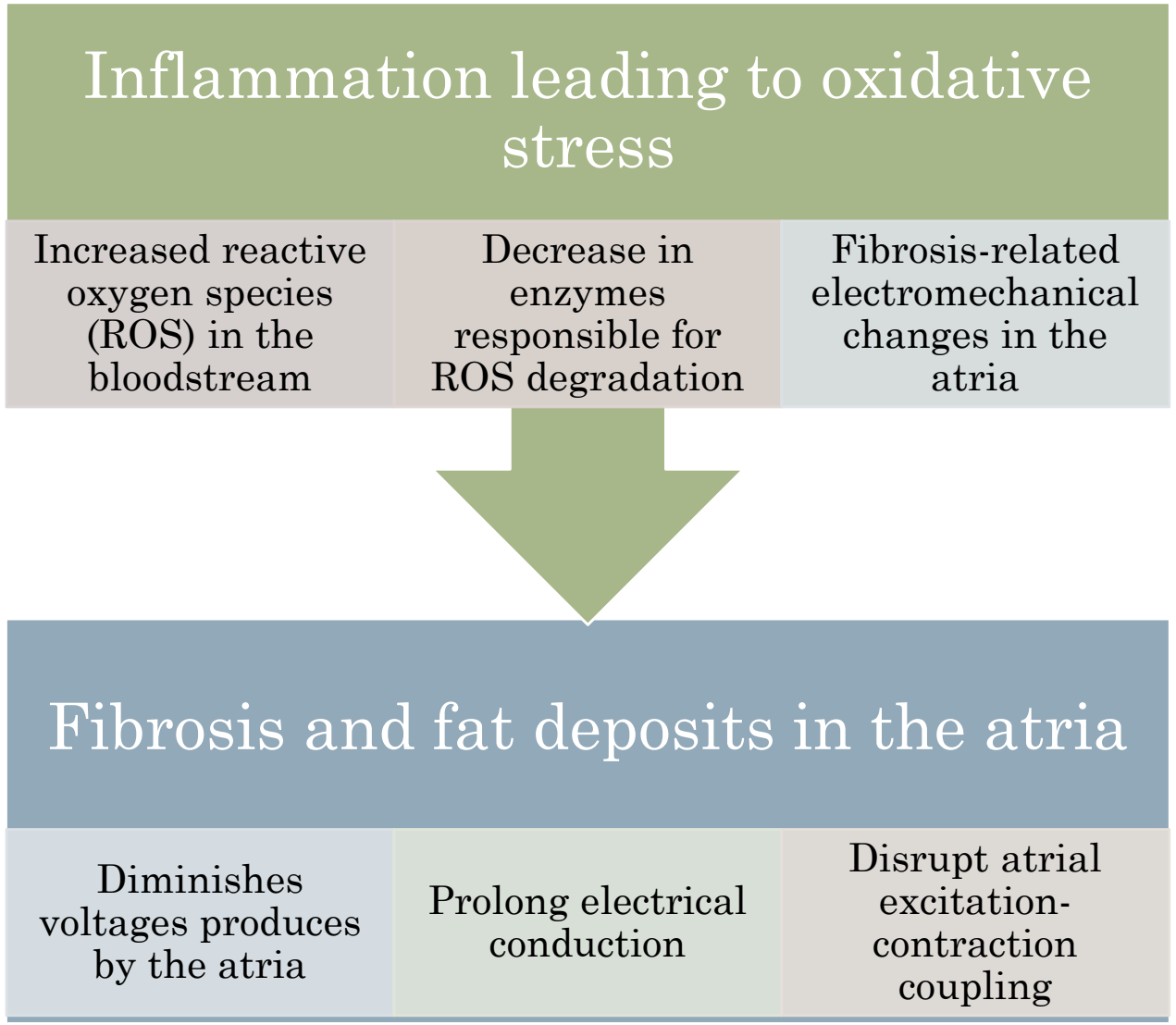


- No significant difference in peri-procedural complications, safety, or efficacy has been shown
- Arrhythmia-free survival rates are significantly lowers in DM patients
- Factors that improve peri-procedural outcomes and reduce arrhythmic recurrence
  - Younger age
  - Aggressive lifestyle modification (i.e., weight loss, glycemic control)

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).
saintlukeskc.org/health-library/having-catheter-ablation

Pathophysiology

Electromechanical Remodeling



Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Structural remodeling

Dilation and fibrosis

- Diffuse fibrosis is initiated by the production of advanced glycation end products
  - Upregulating connective tissues growth factor
- Stiffening cardiac muscle promotes diastolic dysfunction of the left ventricle (LV) and left atrium
  - Increasing LV filling pressure and left atrium dilation

LV hypertrophy

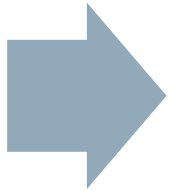
- Risk factor and modifier of AFib
- Associated with DM and abnormal glucose tolerance

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Autonomic Remodeling

DM associations

- Increased sympathetic
- Decreased parasympathetic activity of the cardiac muscle

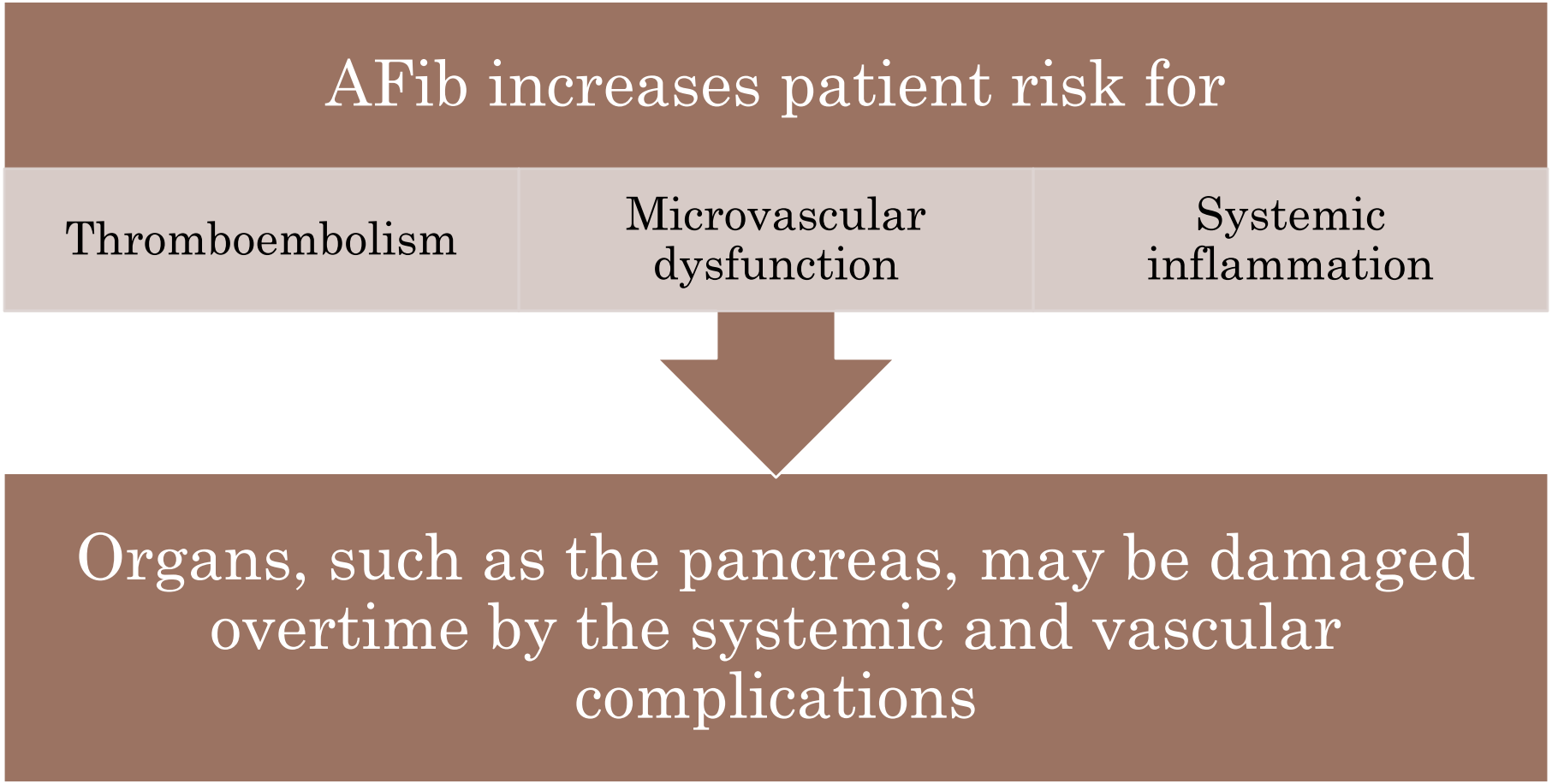


Decreased effective refractory period

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Does AFib lead to DM?

Potential Role of AFib in DM Development



Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).

Audience Question #1

- True or False
  - The theorized relationship between diabetes and atrial fibrillation includes cardiac remodeling, inflammation, and autonomic dysfunction?

Audience Question #1

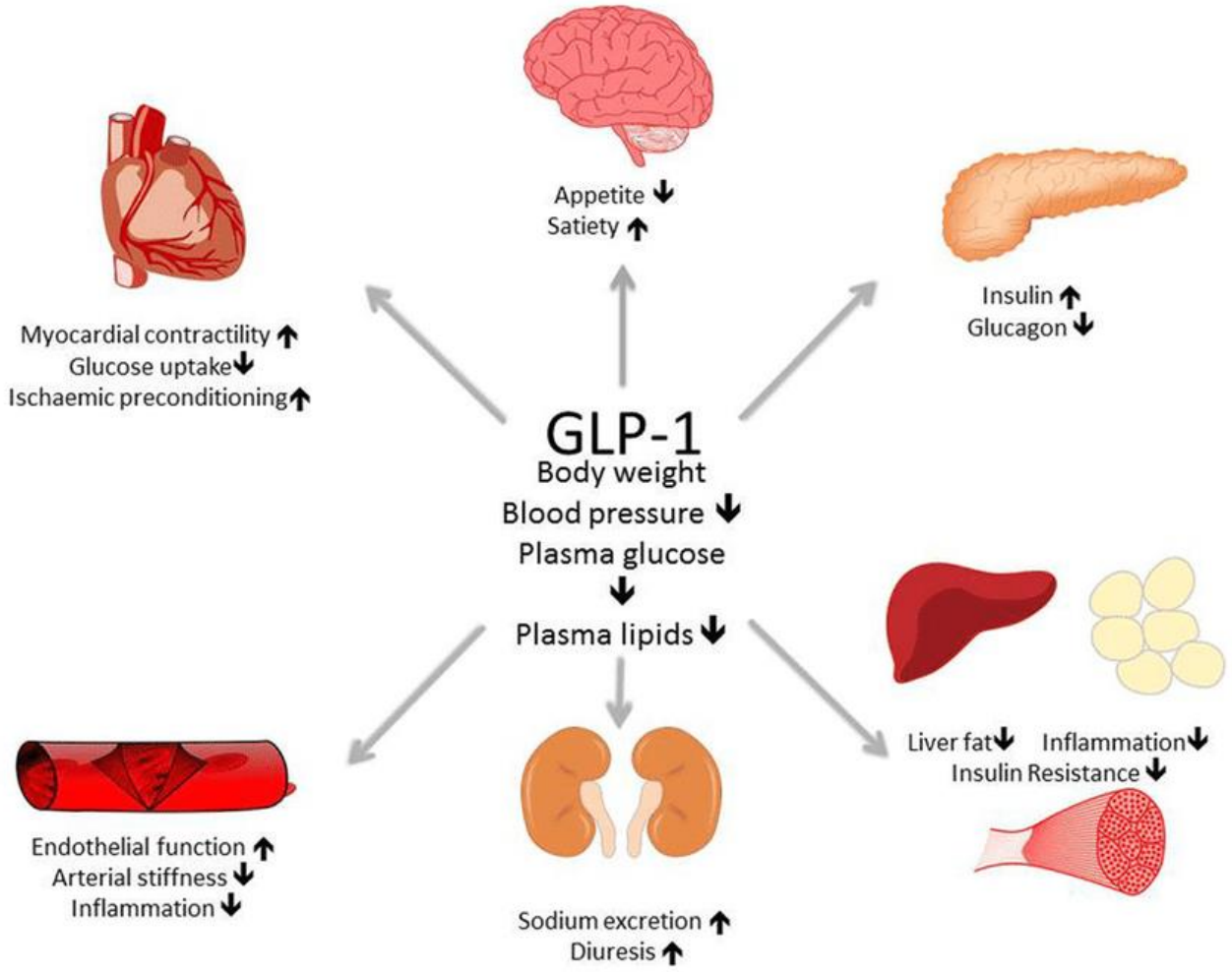
- True or False
  - The theorized relationship between diabetes and atrial fibrillation includes cardiac remodeling, pericardial fat accumulation, inflammation, and autonomic dysfunction?

True

Do all antihyperglycemic medications reduce AFib occurrence in DM patients?

Glucose-Like Peptide-1 Receptor Agonist (GLP-1 RA)

- Agonist of human glucagon-like peptide-1 receptor
- Augment glucose dependent insulin secretion
- Slow gastric emptying

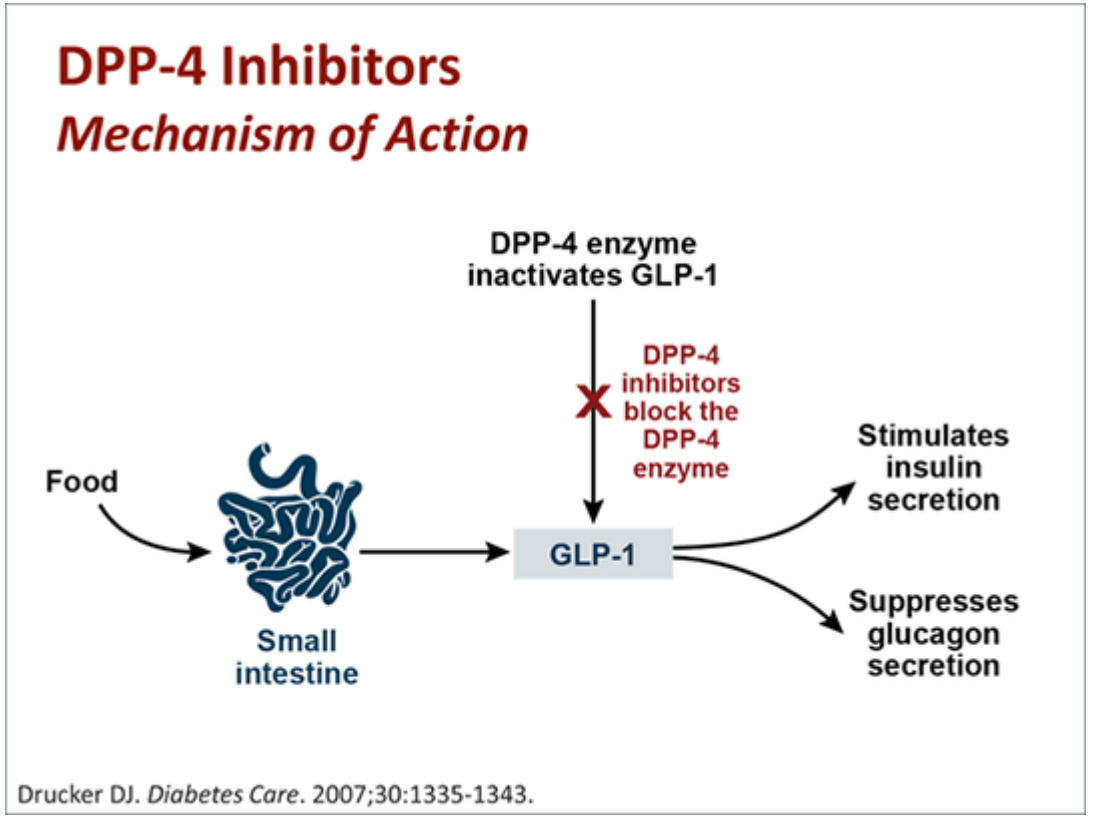


Lexicomp online; 2023
researchgate.net/figure/Mechanisms-by-which-GLP-1-agonists-may-exert-beneficial-effects-on-the-CV-system_fig1_327059592

Dipeptidyl Peptidase 4 (DPP-4) Inhibitor

Inhibits DPP-4 enzyme, increase incretin levels

- Incretin hormones (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP) regulate glucose homeostasis
- Increase insulin secretion and decreasing glucagon secretion

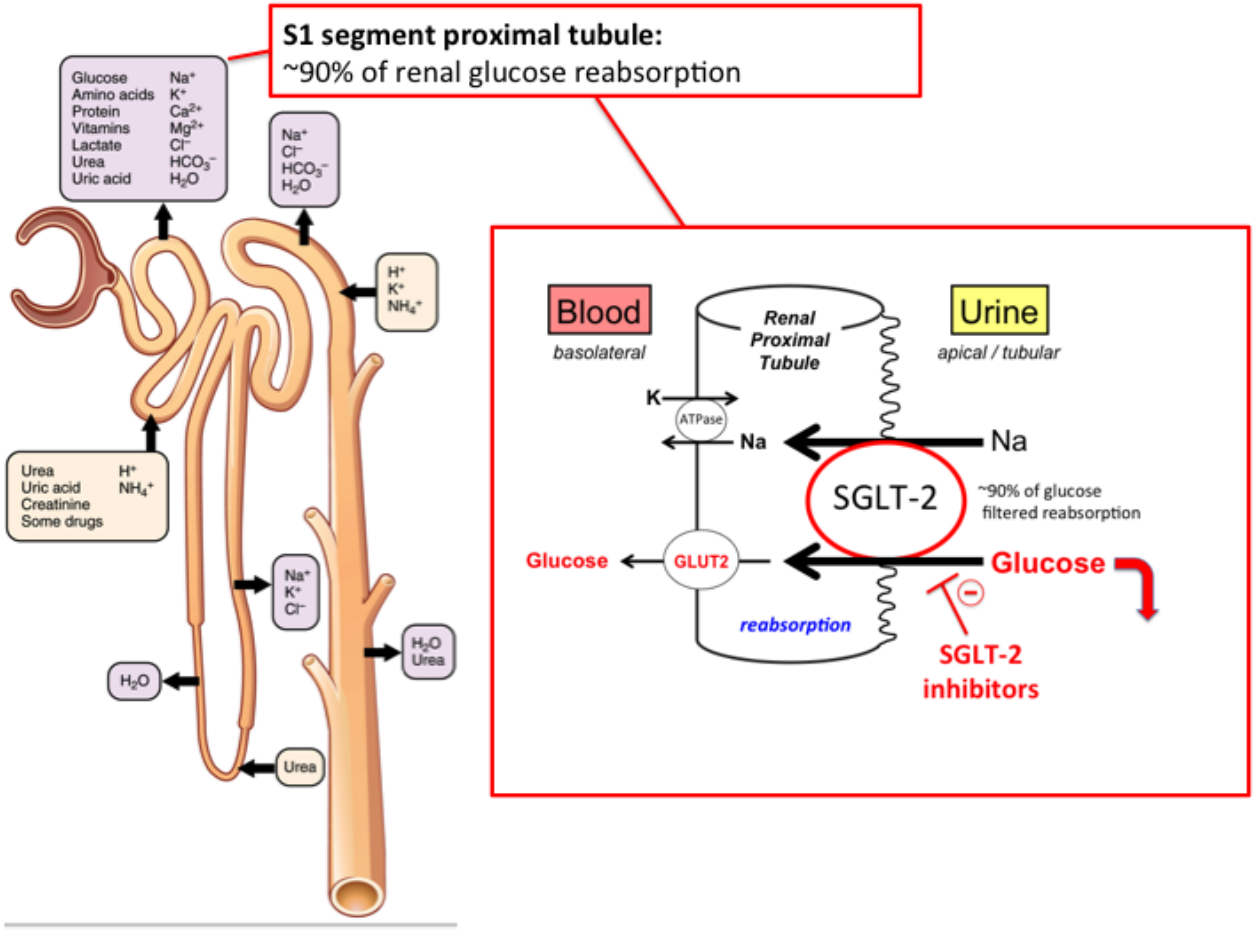


Lexicomp online; 2023
diabetesdaily.com/learn-about-diabetes/treatment/overview-of-diabetes-drugs/dpp-4-inhibitors/

Sodium-Glucose Cotransporter 2 Inhibitor (SGLT2i)

Inhibit SGLT2 in proximal renal tubules

- Reducing:
  - Reabsorption of filtered glucose
  - Renal threshold for glucose
  - Reducing plasma glucose concentrations
- Increasing
  - Urinary glucose excretion
- Dapagliflozin (Farxiga) & empagliflozin (Jardiance)
  - Reduces sodium reabsorption
  - Increasing sodium deliver to distal tubule



Lexicomp online; 2023
tmedweb.tulane.edu/pharmwiki/doku.php/sglt-2_inhibitors

The risk of incident atrial fibrillation in patients with type 2 diabetes treated with sodium glucose cotransporter-2 inhibitors, glucagon-like peptide-1 receptor agonists, and dipeptidyl peptidase-4 inhibitors: a nationwide cohort study (2022)

Objective

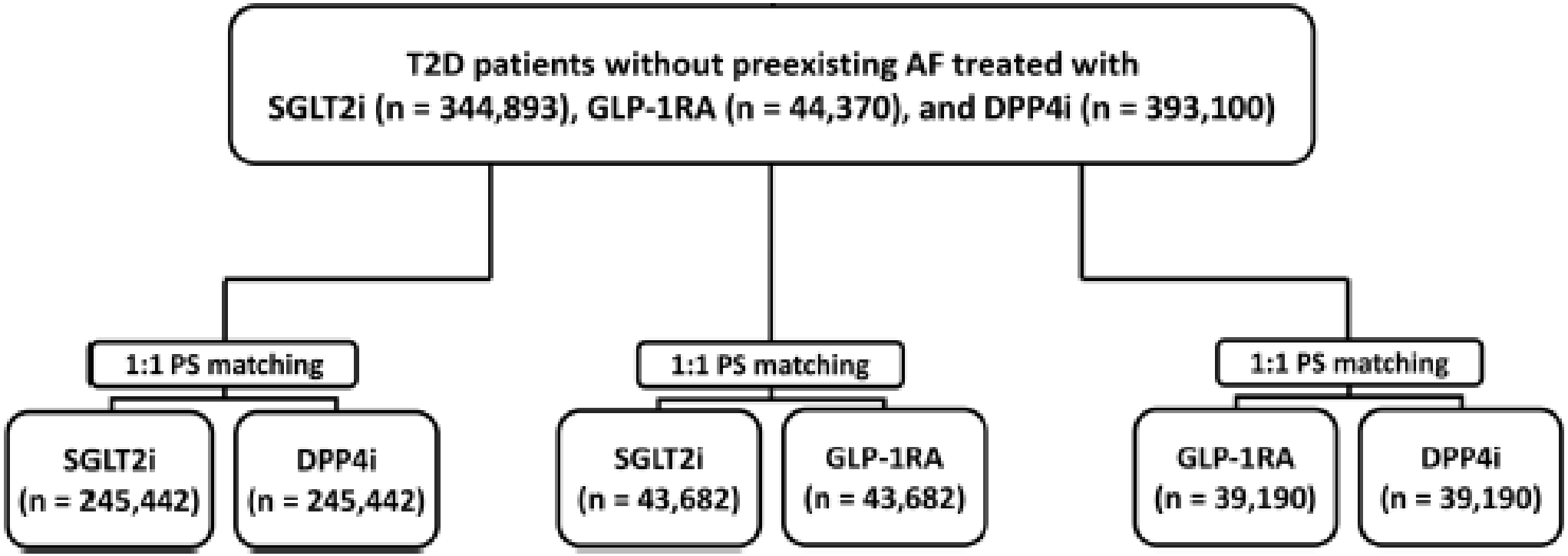
- Evaluate risk of new-onset AFib associated with SGLT2i, glucagon-like peptide-1 receptor agonists (GLP-1RA), and dipeptidyl peptidase-4 inhibitors (DPP4i)

Methods

- Nationwide retrospective cohort study: May 2016 - Dec. 2019
- Observation period: initiation of medication to first occurrence of
  - AFib
  - Death
  - Discontinuation of therapy
  - End of study period (December 31, 2020)

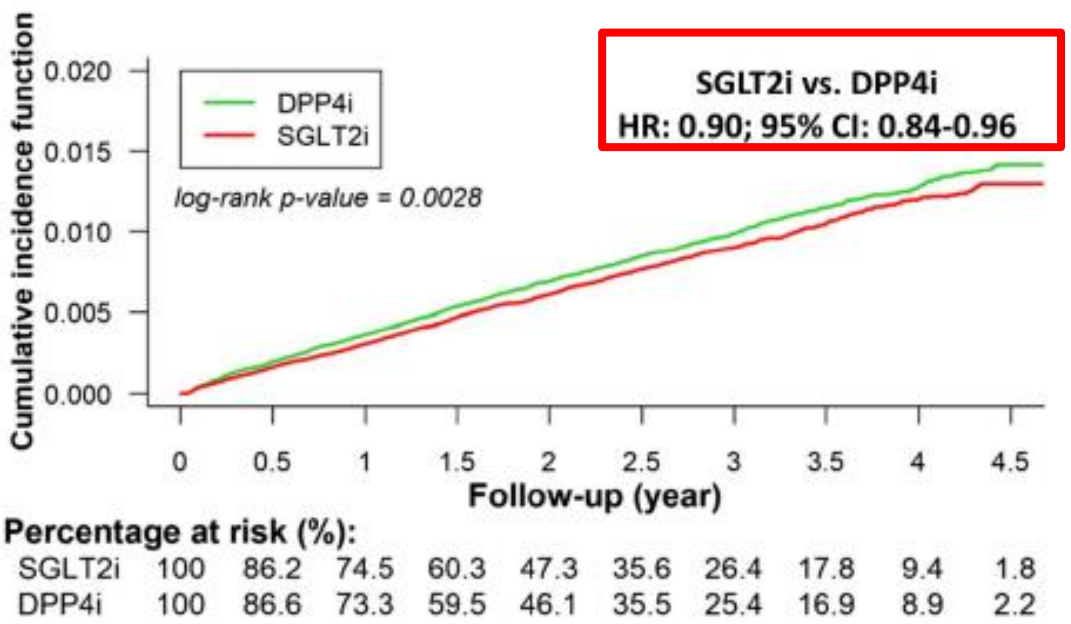
Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

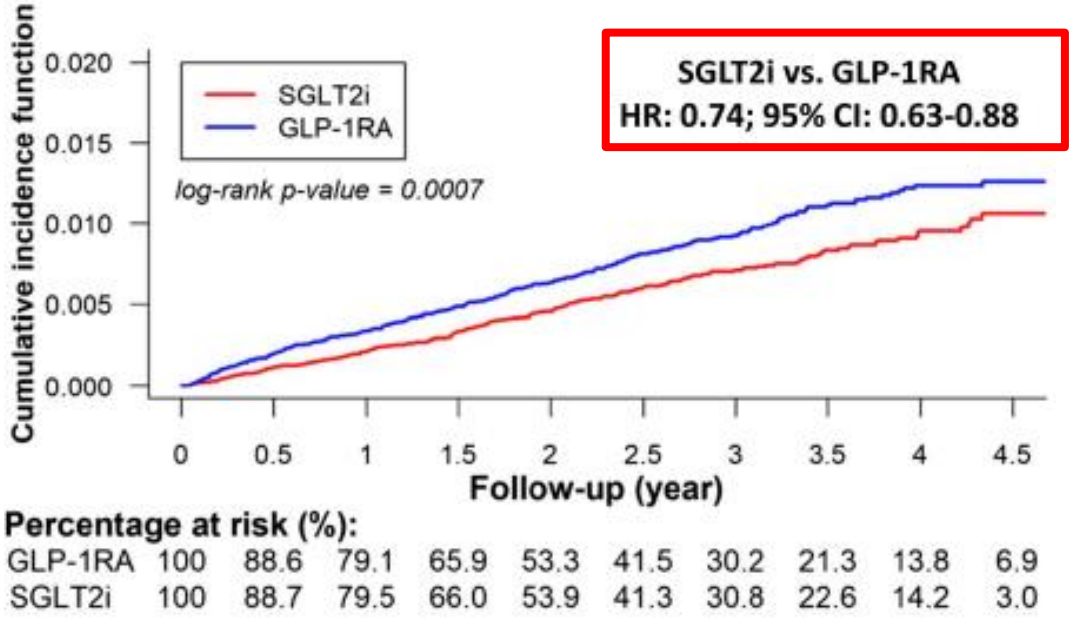
Study population



Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

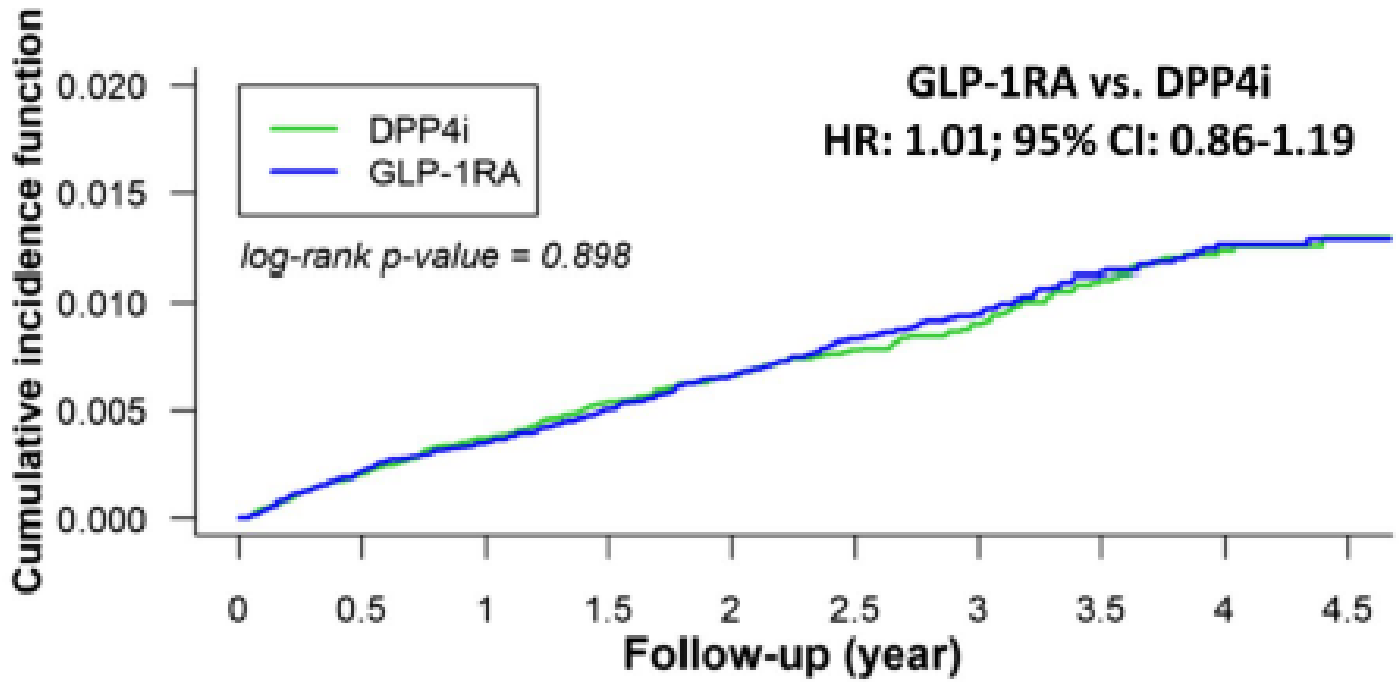
Results





Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

Results



Percentage at risk (%):

GLP-1RA	100	89.6	80.8	68.0	55.3	43.3	31.9	22.6	14.7	7.5
DPP4i	100	89.2	79.5	66.6	54.2	42.5	31.4	22.7	14.7	3.6

Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

The risk of incident atrial fibrillation in patients with type 2 diabetes treated with sodium glucose cotransporter-2 inhibitors, glucagon-like peptide-1 receptor agonists, and dipeptidyl peptidase-4 inhibitors: a nationwide cohort study (2022)

Results

- Treatment with SGLT2i
  - Dapagliflozin n=179,004 (51.9%)
  - Empagliflozin n=144,058 (41.8%)
  - Canagliflozin n=21,762 (6.3%)

Conclusion

- SGLT2i treatment was associated with lower risk of AFib compared to DPP4i or GLP-1RA irrespective of underlying comorbidities
- No difference in AFib risk between DPP4i and GLP-1RA

LOE: 1

Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

Antihyperglycemic AFib Risk

Medications with no association of worsening AFib occurrence

- DPP4i
- GLP-1RA
- TZDs

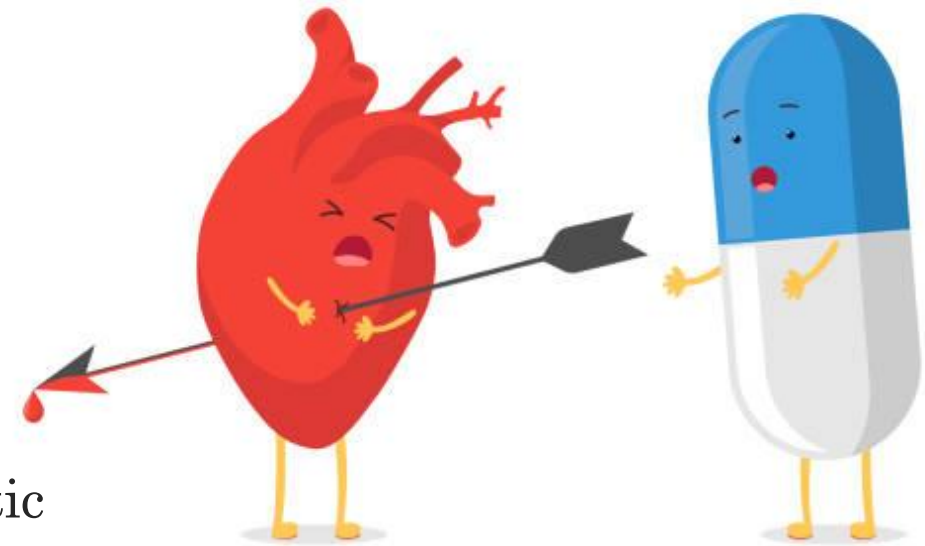
Medications with potential risk reduction for AFib

- Metformin
- SGLT2i

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).
Li WJ, et al. Cardiovasc Diabetol. 2020;19(1):130. 2020 Aug 26.

Antihyperglycemics With Increased Risk for AFib

- Potential negative association
  - Insulin
  - Sulfonylureas
- Speculated cause
  - Hypoglycemia
  - Glycemic fluctuations
  - Stimulation of the sympathetic nervous system



istockphoto.com
Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).
Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

Do SGLT2i reduce AFib occurrence?

Opposing Data

DAPA-HF

- Dapagliflozin did not significantly reduce risk of new-onset AFib compared to patients with HF and HFrEF

Zelniker TA, et al. Circulation. 2020.
Butt JH, et al. Eur J Heart Fail. 2021.

Dapagliflozin Effect on Cardiovascular Events-Thrombosis in Myocardial Infarction (DECLARE-TIMI 58) (2019)

Objective

- Study the efficacy and safety of SGLT2 inhibitor dapagliflozin compared to placebo

Patient population

- T2DM patients with either
  - Multiple risk factors for atherosclerotic cardiovascular disease (ASCVD)
  - Known ASCVD

Conclusion

- Patient with T2DM and previous myocardial infarction (MI) are at a high risk for major adverse cardiovascular events (MACE)
- Dapagliflozin
  - Reduced relative risk of MACE by 16%
  - Absolute risk reduction 2.6%
- No effects were seen in patients without a history of MI

LOE: 1

Furtado RHM, et al. Circulation. 2019 May 28;139(22):2516-2527.

Effect of Dapagliflozin on Atrial Fibrillation in Patients with Type 2 Diabetes Mellitus: Insight from the DECLARE-TIMI 58 Trial (2020)

Objective

- Explore the effect of dapagliflozin on the first and total number of AFib/atrial fluttter (AFL) events in patients with and without prevalent AFib/AFL

Methods

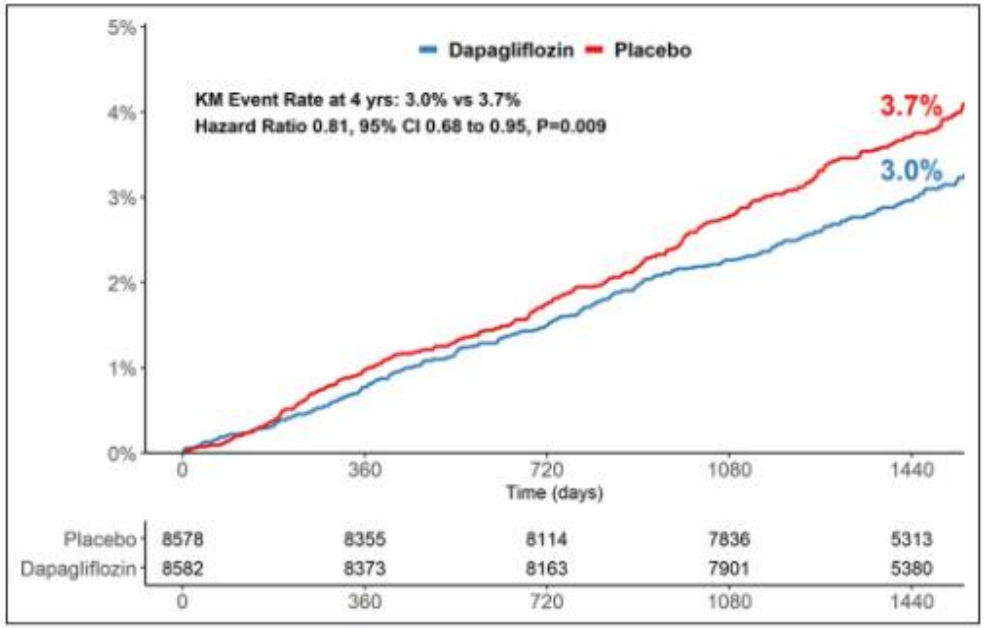
- Placebo n= 8578; dapagliflozin n= 8582
- AFib/AFL events identified by safety database
- History of AFib/AFL reported by local investigators
  - History of AFib/AFL in placebo (3.8%) and dapagliflozin (3.1%)
- Baseline ECG were not mandated by the study protocol, therefore not available

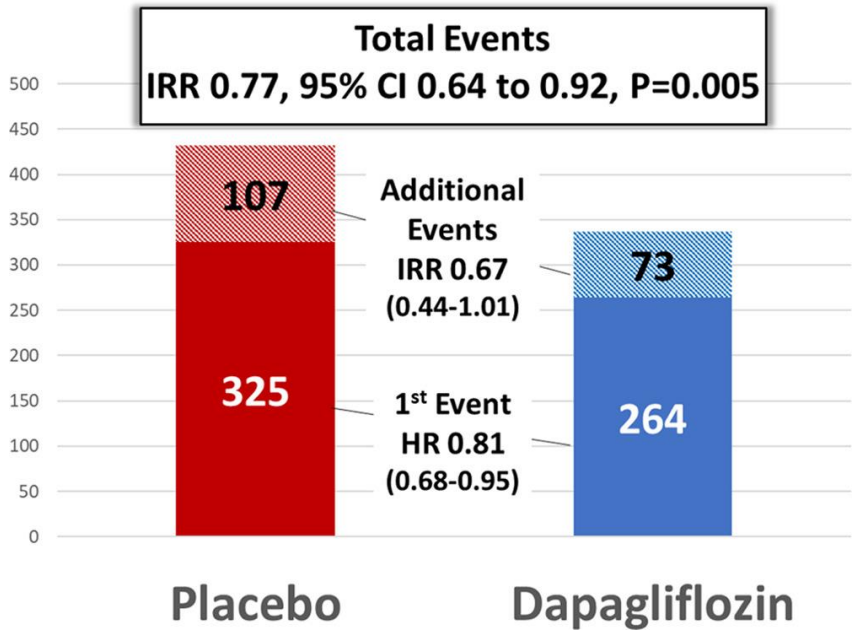
Zelniker TA, et al. Circulation. 2020.

Effect of Dapagliflozin on Atrial Fibrillation in Patients with Type 2 Diabetes Mellitus: Insight from the DECLARE-TIMI 58 Trial (2020)

Results

- 769 AFib/AFL events occurred in 589 patients
- Mean follow-up 4.2 years





Zelniker TA, et al. Circulation. 2020.

Effect of Dapagliflozin on Atrial Fibrillation in Patients with Type 2 Diabetes Mellitus: Insight from the DECLARE-TIMI 58 Trial (2020)

Conclusion

- Dapagliflozin decreased incidence of AFib/AFL events in high-risk patients with T2DM
- Effects consistent regardless of the patient's history of AFib, ASCVD, or CHF

Limitations

- ECGs not collected
- AFib/AFL events not confirmed
- AFib/AFL were not prespecified outcomes of the origional trial

LOE: 1

Zelniker TA, et al. Circulation. 2020.

SGLT2 inhibitors and atrial fibrillation in type 2 diabetes: a systematic review with meta-analysis (2020)

Objective	• Pool data from all placebo-controlled RCT trials that evaluate AFib outcomes of SGLT2i
Methods	• 16 randomized controlled trials • 38,355 patients with T2DM
Results	• SGLT2 inhibitors significantly reduced AFib compared to placebo (RR: 0.76; 95% CI 0.65-0.90; p=0.001)
Conclusion	• SGLT2i may confer AFib reduction benefits in T2DM patients • Effects may be attributed to decreasing HbA1c, body weight, blood pressure, and occurrence of CHF

LOE: 1

Li WJ, et al. Cardiovasc Diabetol. 2020;19(1):130. 2020 Aug 26.

SGLT2i

Significant reduction in AFib incidence with SGLT2i therapy >2 years

Effects are consistent regardless of

- Age
- HbA1c
- Blood pressure
- Body weight

Decreased rates of

- Heart failure related hospitalization
- CV death
- All cause mortality in younger patients

Papazoglou, A.S., et al. Cardiovasc Diabetol 21, 39 (2022).
Li WJ, et al. Cardiovasc Diabetol. 2020;19(1):130. 2020 Aug 26.

In-hospital arrhythmic burden reduction in diabetic patients with acute myocardial infarction treated with SGLT2-inhibitors: Insights from the SGLT2-I AMI PROTECT study (2022)

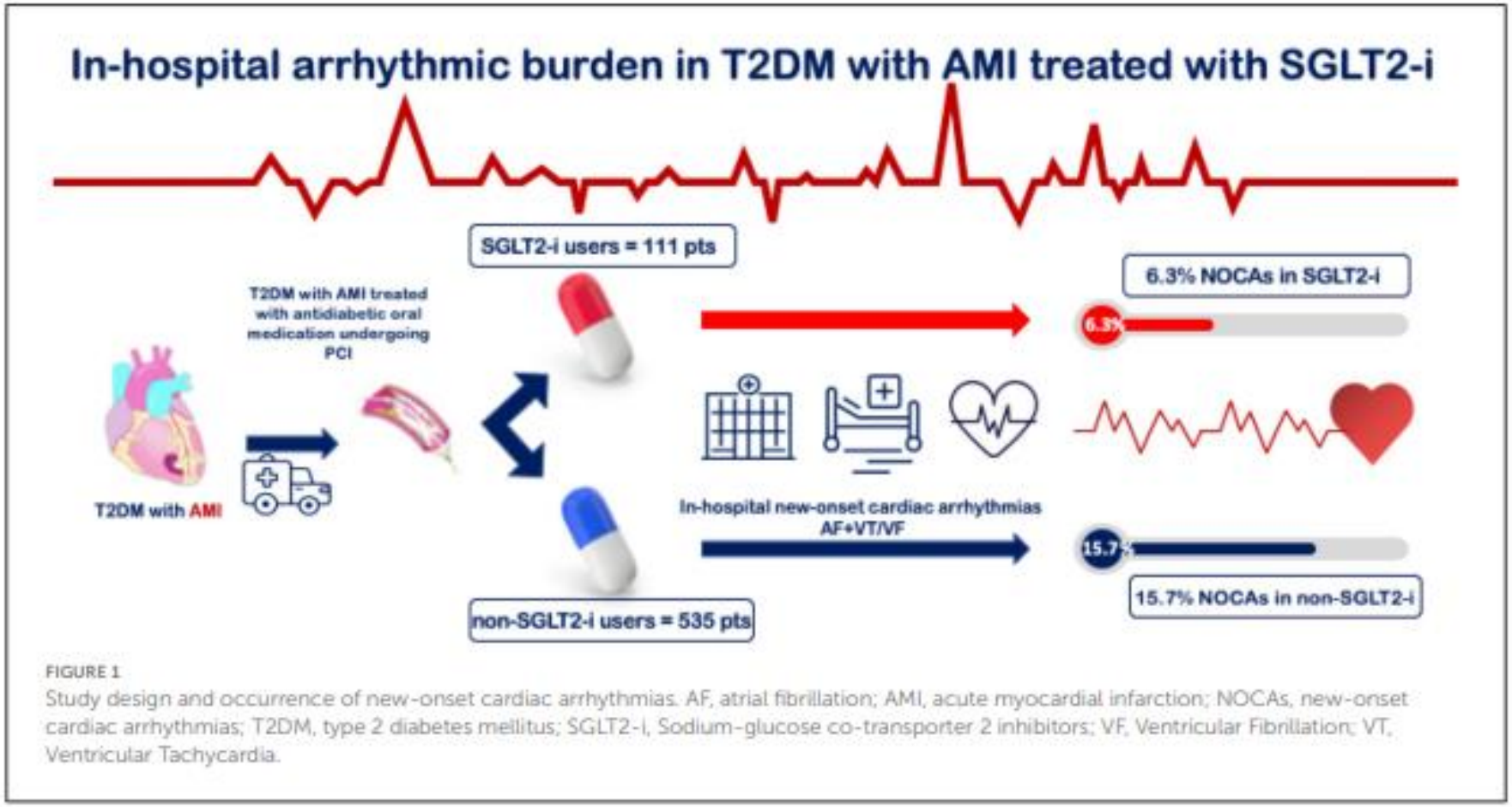
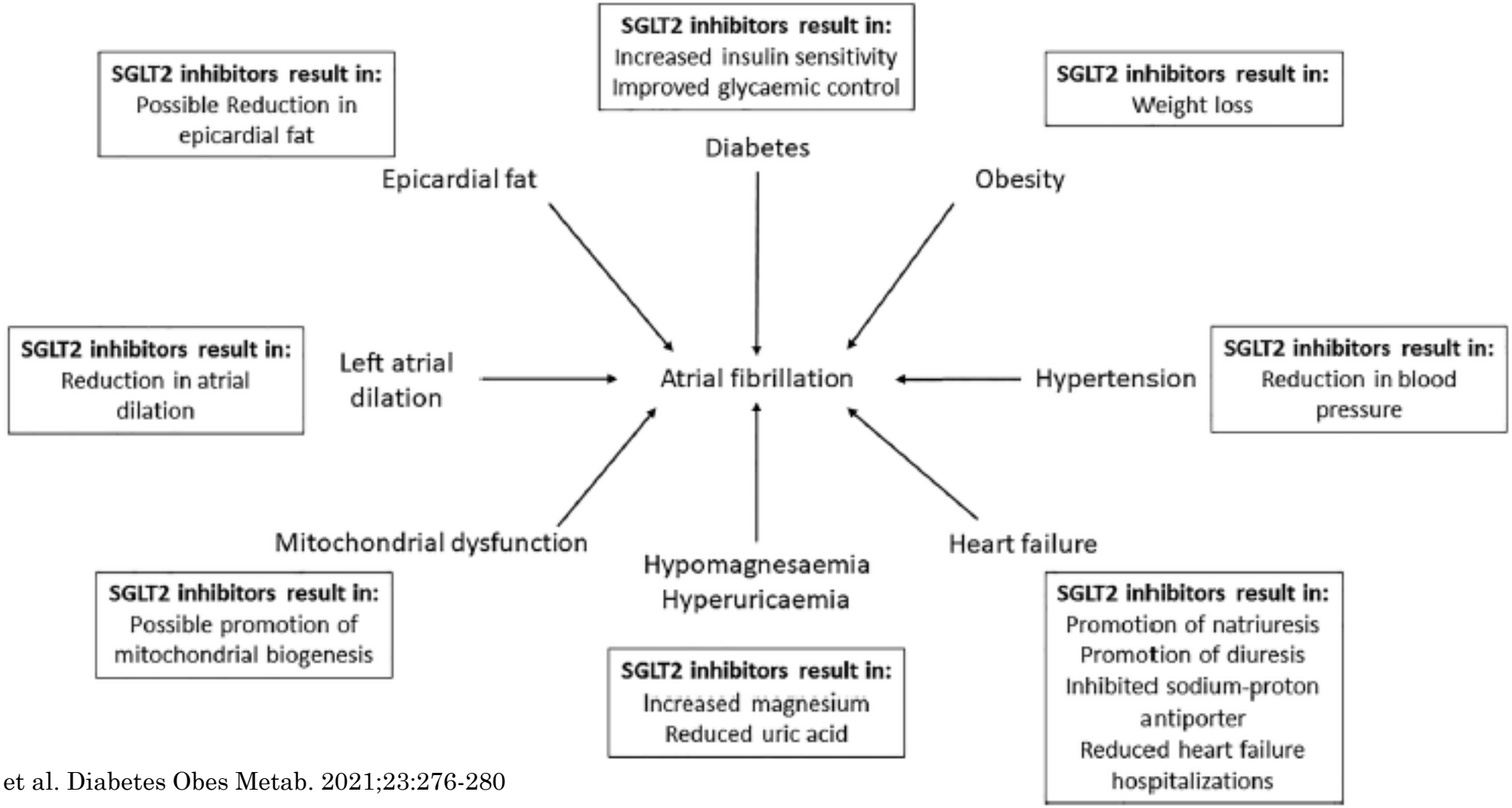


FIGURE 1
Study design and occurrence of new-onset cardiac arrhythmias. AF, atrial fibrillation; AMI, acute myocardial infarction; NOCAs, new-onset cardiac arrhythmias; T2DM, type 2 diabetes mellitus; SGLT2-i, Sodium-glucose co-transporter 2 inhibitors; VF, Ventricular Fibrillation; VT, Ventricular Tachycardia.

LOE: 2

Cesaro A, et al. Front.Cardiovasc.Med. 9:1012220.

Potential Mechanism of SGLT2i

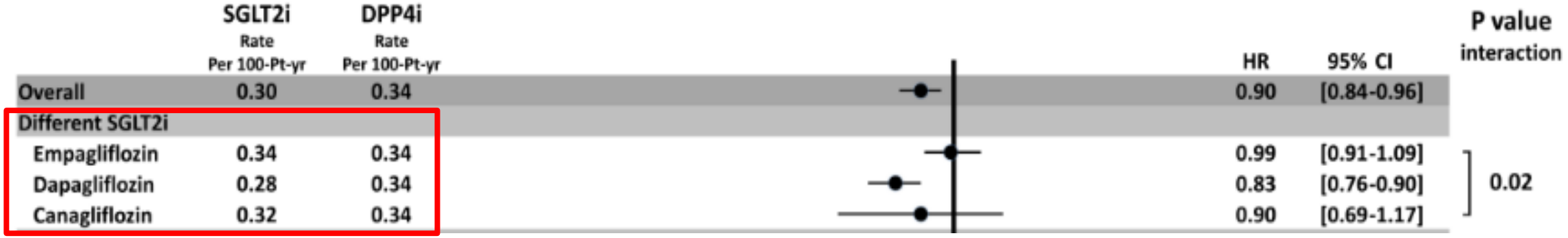


Okunrintemi V, et al. Diabetes Obes Metab. 2021;23:276-280

Are all SGLT-2 inhibitors equally effective?

The risk of incident atrial fibrillation in patients with type 2 diabetes treated with sodium glucose cotransporter-2 inhibitors, glucagon-like peptide-1 receptor agonists, and dipeptidyl peptidase-4 inhibitors: a nationwide cohort study (2022)

- Subgroup analysis



Chan, YH., et al. Cardiovasc Diabetol 21, 118 (2022).

SGLT2 inhibitors and atrial fibrillation in type 2 diabetes: a systematic review with meta-analysis (2020)

- Dapagliflozin associated with significant reduction in AFib risk
- Canagliflozin and empagliflozin showed no evident effect

Dapagliflozin	RR: 0.73; 95% CI 0.60-0.89	P = 0.02
Canagliflozin	RR: 0.84; 95% CI 0.62-1.13	P=0.24
Empagliflozin	RR: 0.91; 95 CI 0.32-2.56	P = 0.6

- Rates of urinary tract infections was higher in the dapagliflozin group than the other two SGLT2i

Li WJ, et al. Cardiovasc Diabetol. 2020;19(1):130. 2020 Aug 26.

Audience Question #2

- Based on the literature presented, all of the following are insulin-independent mechanisms that theoretically support the use of SGLT-2 inhibitors in preventing development of arrhythmias over other antihyperglycemic therapies, except:
- A. Reduced epicardial adipose tissue
- B. Reduction in atrial dilation
- C. Reducing pericarditis
- D. Increasing serum magnesium

Audience Question #2

- Based on the literature presented, all of the following are insulin-independent mechanisms that theoretically support the use of SGLT-2 inhibitors in preventing development of arrhythmias over other antihyperglycemic therapies, except:
- A. Reduced epicardial adipose tissue
- B. Reduction in atrial dilation
- **C. Reducing pericarditis**
- D. Increasing serum magnesium

Audience Question #3

- Based on the evidence reviewed, which of the following factors was associated with the most atrial fibrillation protection in patients with diabetes taking a SLGT2 inhibitor?
- A. Duration of use
- B. Hemoglobin A1c
- C. Body weight
- D. Systolic blood pressure

Audience Question #3

- Based on the evidence reviewed, which of the following factors was associated with the most atrial fibrillation protection in patients with diabetes taking a SLGT-2 inhibitor?
- **A. Duration of use**
- B. Hemoglobin A1c
- C. Body weight
- D. Systolic blood pressure

Future Considerations

Further data on SGLT2i in new AFib

- Large RCT

SGLT2i in recurrent AFib

Screening in DM patients

- Especially high CV risk

Identify HbA1c goals

Biomarkers other than HbA1c

Summary

DM is an independent determinant for AFib development

- Regardless of DM type (1, 2, and pre-diabetes)

Pathology include electromechanical, structural, and autonomic remodeling

In patients with T2DM, treatment with SGLT2i have shown a potential to reduce AFib development

Additional large RCT are needed to further validate this finding

References

- Okunrintemi V, Mishriky BM, Powell JR, Cummings DM. Sodium-glucose co-transporter-2 inhibitors and atrial fibrillation in the cardiovascular and renal outcome trials. Diabetes Obes Metab. 2021;23(1):276-280. doi:10.1111/dom.14211
- Li WJ, Chen XQ, Xu LL, Li YQ, Luo BH. SGLT2 inhibitors and atrial fibrillation in type 2 diabetes: a systematic review with meta-analysis of 16 randomized controlled trials. Cardiovasc Diabetol. 2020;19(1):130. Published 2020 Aug 26. doi:10.1186/s12933-020-01105-5
- Cesaro A, Gragnano F, Paolisso P, et al. In-hospital arrhythmic burden reduction in diabetic patients with acute myocardial infarction treated with SGLT2-inhibitors: Insights from the SGLT2-I AMI PROTECT study. Front Cardiovasc Med. 2022;9:1012220. Published 2022 Sep 27. doi:10.3389/fcvm.2022.1012220
- Zelniker TA, Bonaca MP, Furtado RHM, et al. Effect of Dapagliflozin on Atrial Fibrillation in Patients With Type 2 Diabetes Mellitus: Insights From the DECLARE-TIMI 58 Trial. Circulation. 2020;141(15):1227-1234. doi:10.1161/CIRCULATIONAHA.119.044183
- Özgür Barış V, Dinçsoy B, Gedikli E, Erdemb A. Empagliflozin significantly attenuates sotalol-induced QTc prolongation in rats. Kardiol Pol. 2021;79(1):53-57. doi:10.33963/KP.15666
- Azam MA, Chakraborty P, Si D, et al. Anti-arrhythmic and inotropic effects of empagliflozin following myocardial ischemia. Life Sci. 2021;276:119440. doi:10.1016/j.lfs.2021.119440
- Chan YH, Chao TF, Chen SW, et al. The risk of incident atrial fibrillation in patients with type 2 diabetes treated with sodium glucose cotransporter-2 inhibitors, glucagon-like peptide-1 receptor agonists, and dipeptidyl peptidase-4 inhibitors: a nationwide cohort study. Cardiovasc Diabetol. 2022;21(1):118. Published 2022 Jun 28. doi:10.1186/s12933-022-01549-x
- Bonora BM, Raschi E, Avogaro A, Fadini GP. SGLT-2 inhibitors and atrial fibrillation in the Food and Drug Administration adverse event reporting system. Cardiovasc Diabetol. 2021;20(1):39. Published 2021 Feb 11. doi:10.1186/s12933-021-01243-4

References

- Hanefeld M, Ganz X, Nolte C. Hypoglykämie und Herzrhythmusstörungen bei Patienten mit Diabetes Typ 2 [Hypoglycemia and cardiac arrhythmia in patients with diabetes mellitus type 2]. Herz. 2014;39(3):312-319. doi:10.1007/s00059-014-4086-1
- Lexi-Drugs. Lexicomp online. UpToDate Inc. Accessed January 26, 2023.
- Papazoglou, A.S., Kartas, A., Moysidis, D.V. et al. Glycemic control and atrial fibrillation: an intricate relationship, yet under investigation. Cardiovasc Diabetol 21, 39 (2022). https://doi.org/10.1186/s12933-022-01473-0
- Fernandes GC, Fernandes A, Cardoso R, et al. Association of SGLT2 inhibitors with arrhythmias and sudden cardiac death in patients with type 2 diabetes or heart failure: A meta-analysis of 34 randomized controlled trials. Heart Rhythm. 2021;18(7):1098-1105. doi:10.1016/j.hrthm.2021.03.028
- Zelniker TA, Bonaca MP, Furtado R, Mosenzon O, Kuder JF, Murphy SA, Bhatt DL, Leiter LA, McGuire DK, Wilding JPH, et al. Effect of dapagliflozin on atrial fibrillation in patients with type 2 diabetes mellitus: insights from the DECLARE-TIMI 58 trial. Circulation. 2020. https:// doi. org/ 10. 1161/CIRCU LATIO NAHA. 120. 049841.
- Butt JH, Docherty KF, Jhund PS, de Boer RA, Bohm M, Desai AS, Howlett JG, Inzucchi SE, Kosiborod MN, Martinez FA, et al. Dapagliflozin and atrial fibrillation in heart failure with reduced ejection fraction: insights from DAPA-HF. Eur J Heart Fail. 2021. https:// doi. org/ 10. 1002/ ejhf. 2381.
- Trujillo J, Haines S. Diabetes Mellitus. In: DiPiro JT, Yee GC, Posey L, Haines ST, Nolin TD, Ellingrod V. eds. Pharmacotherapy: A Pathophysiologic Approach, 11e. McGraw Hill; 2020. Accessed February 09, 2023. https://accesspharmacy-mhmedical-com.roseman.idm.oclc.org/content.aspx?bookid=2577&sectionid=228901946
- Furtado RHM, Bonaca MP, Raz I, Zelniker TA, Mosenzon O, Cahn A, Kuder J, Murphy SA, Bhatt DL, Leiter LA, McGuire DK, Wilding JPH, Ruff CT, Nicolau JC, Gause-Nilsson IAM, Fredriksson M, Langkilde AM, Sabatine MS, Wiviott SD. Dapagliflozin and Cardiovascular Outcomes in Patients With Type 2 Diabetes Mellitus and Previous Myocardial Infarction. Circulation. 2019 May 28;139(22):2516-2527. doi: 10.1161/CIRCULATIONAHA.119.039996. Epub 2019 Mar 18. PMID: 30882239.

Record your Attendance by SMS Text

To enable the SMS texting feature, login to your account @ http://cce.upmc.com .
Click the "Mobile" tab to add your ten-digit mobile phone.

Receive credit instantly by texting the following code:

HUWKAV

to

412-312-4424

Code MUST be texted by today at 11:59pm.