

# The Targeted Role of SGLT2 Inhibitors in Patients with Diabetic Cardiomyopathy

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**Abstract:** *Diabetic cardiomyopathy (DCM) is myocardial contractile dysfunction due to the clustered effects of left ventricular hypertrophy, fetal gene reactivation and lipid accumulation in cardiomyocytes. Structural and functional abnormalities of the myocardium, beyond the elicitation of ischemia or hypertension, have been emphasised and called diabetic cardiomyopathy*

**Keywords:** Diabetic cardiomyopathy

## REFERENCES

- [1]. Bugger H, Abel ED. Molecular mechanisms of diabetic cardiomyopathy. *Diabetologia*. 2014; 57:660–671. doi: 10.1007/s00125-014-3171-6.
- [2]. Battiprolu PK, Hojavey B, Jiang N, Wang ZV, Luo X, Iglewski M, Shelton JM, Gerard RD, Rothermel BA, Gillette TG, Lavandero S, Hill JA. Metabolic stress-induced activation of FoxO1 triggers diabetic cardiomyopathy in mice. *J Clin Invest*. 2012; 122:1109–1118. doi: 10.1172/JCI60329.
- [3]. Trachanas K, Sideris S, Aggeli C, et al. Diabetic cardiomyopathy: from pathophysiology to treatment. *Hellenic J Cardiol* 2014;55:411–421.
- [4]. Finck BN, Lehman JJ, Leone TC, et al. The cardiac phenotype induced by PPAR $\alpha$  overexpression mimics that caused by diabetes mellitus. *J Clin Invest* 2002;109:121–130.
- [5]. Aneja A, Tang WH, Bansilal S, Garcia MJ, Farkouh ME. Diabetic cardiomyopathy: insights into pathogenesis, diagnostic challenges, and therapeutic options. *Am J Med* 2008;121:748–757.
- [6]. Lee, W. J., & Kim, J. (2017). Diabetic cardiomyopathy: where we are and where we are going. *The Korean Journal of Internal Medicine*, 32(3), 404–421. <https://doi.org/10.3904/kjim.2016.208>
- [7]. Rubler, S.; Dlugash, J.; Yuceoglu, Y.Z.; Kumral, T.; Branwood, A.W.; Grishman, A. New type of cardiomyopathy associated with diabetic glomerulosclerosis. *Am. J. Cardiol*. 1972, 30, 595–602.
- [8]. Elliott, P.; Andersson, B.; Arbustini, E.; Bilinska, Z.; Cecchi, F.; Charron, P.; Dubourg, O.; Kuhl, U.; Maisch, B.; McKenna, W.J.; et al. Classification of the cardiomyopathies: A position statement from the European Society Of Cardiology Working Group on Myocardial and Pericardial Diseases. *Eur. Heart J*. 2008, 29, 270–276.
- [9]. Regan, T.J.; Lyons, M.M.; Ahmed, S.S.; Levinson, G.E.; Oldewurtel, H.A.; Ahmad, M.R.; Haider, B. Evidence for cardiomyopathy in familial diabetes mellitus. *J. Clin. Investig*. 1977, 60, 884–899.
- [10]. Cai L, Li W, Wang G, Guo L, Jiang Y, Kang YJ. Hyperglycemia-induced apoptosis in mouse myocardium: mitochondrial cytochrome C-mediated caspase-3 activation pathway. *Diabetes* 2002;51:1938–1948.
- [11]. Aragno M, Mastrocola R, Medana C, et al. Oxidative stress-dependent impairment of cardiac-specific transcription factors in experimental diabetes. *Endocrinology* 2006;147:5967–5974.
- [12]. Du X, Matsumura T, Edelstein D, et al. Inhibition of GAPDH activity by poly(ADP-ribose) polymerase activates three major pathways of hyperglycemic damage in endothelial cells. *J Clin Invest* 2003;112:1049–1057.
- [13]. Mahabadi AA, Berg MH, Lehmann N, et al. Association of epicardial fat with cardiovascular risk factors and incident myocardial infarction in the general population: the Heinz Nixdorf Recall Study. *Journal of the American College of Cardiology*. 2013;61(13):1388-1395. doi:10.1016/j.jacc.2012.11.062

- [14]. Laksono S, Hosea GT, Nurushofa Z. Diabetic Cardiomyopathy: Pathophysiology and Novel Therapies. *Brown J Hosp Med.* 2022;1(3). doi:10.56305/001c.37850
- [15]. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM, Deswal A, Drazner MH, Dunlay SM, Evers LR, et al. 2022 AHA/ACC/HFSA guideline for the management of heart failure: a report of the American college of cardiology/American heart association joint committee on clinical practice guidelines. *J Am Coll Cardiol.* 2022. <https://doi.org/10.1016/j.jacc.2021.12.012>.
- [16]. Packer M, Anker SD, Butler J, Filippatos G, Pocock SJ, Carson P, Januzzi J, Verma S, Tsutsui H, Brueckmann M, et al. Cardiovascular and renal outcomes with empagliflozin in heart failure. *N Engl J Med.* 2020;383(15):1413–24.
- [17]. McMurray JJV, Solomon SD, Inzucchi SE, Køber L, Kosiborod MN, Martinez FA, Ponikowski P, Sabatine MS, Anand IS, Bělohávek J, et al. Dapagliflozin in patients with heart failure and reduced ejection fraction. *N Engl J Med.* 2019;381(21):1995–2008.
- [18]. Kato ET, Silverman MG, Mosenzon O, Zelniker TA, Cahn A, Furtado RHM, Kuder J, Murphy SA, Bhatt DL, Leiter LA, et al. Effect of dapagliflozin on heart failure and mortality in type 2 diabetes mellitus. *Circulation.* 2019;139(22):2528–36.
- [19]. Liang, B., Gu, N. Sodium-glucose co-transporter-2 inhibitors in the treatment of diabetes with heart failure. *Cardiovasc Diabetol* 21, 84 (2022). <https://doi.org/10.1186/s12933-022-01526-4>
- [20]. Neumiller JJ, Lienhard FJ, Alicic RZ, Tuttle KR. Clinical Evidence and Proposed Mechanisms for Cardiovascular and Kidney Benefits from Sodium-Glucose Co-transporter-2 Inhibitors. *touchREV Endocrinol.* 2022 Nov;18(2):106-115. doi: 10.17925/EE.2022.18.2.106. Epub 2022 Nov 29. PMID: 36694888; PMCID: PMC9835817.
- [21]. Heidenreich PA, Bozkurt B, Aguilar D, Allen LA, Byun JJ, Colvin MM et al.. 2022 AHA/ACC/HFSA guideline for the management of heart failure: executive summary: a report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* 2022;145:e876–e894.
- [22]. McDonagh TA, Metra M, Adamo M, Gardner RS, Baumbach A, Bohm Met al.. 2021 ESC guidelines for the diagnosis and treatment of acute and chronic heart failure. *Eur Heart J* 2021;42:3599–3726.
- [23]. Monzo L, Ferrari I, Cicogna F, Tota C, Calò L. What proportion of patients with heart failure and preserved ejection fraction are eligible for empagliflozin? *J Cardiovasc Med (Hagerstown)* 2022;23:567–569.
- [24]. Monzo L, Ferrari I, Cicogna F, Tota C, Calò L. Sodium-glucose co-transporter-2 inhibitors eligibility in patients with heart failure with reduced ejection fraction. *Int J Cardiol* 2021;341:56–59.