Davies *et al. Cardiovascular Diabetology* (2022) 21:144
https://doi.org/10.1186/s12933-022-01575-9

Cardiovascular Diabetology

REVIEW

Open Access

Cardiovascular outcomes trials: a paradigm shift in the current management of type 2 diabetes

Melanie J. Davies[1,2,3], Heinz Drexel[4], François R. Jornayvaz[5], Zoltan Pataky[5], Petar M. Seferović[6,7*] and Christoph Wanner[8]

Abstract

Cardiovascular disease (CVD) is the leading cause of mortality and morbidity in patients with type 2 diabetes (T2D). Historical concerns about cardiovascular (CV) risks associated with certain glucose-lowering medications gave rise to the introduction of cardiovascular outcomes trials (CVOTs). Initially implemented to help monitor the CV safety of glucose-lowering drugs in patients with T2D, who either had established CVD or were at high risk of CVD, data that emerged from some of these trials started to show benefits. Alongside the anticipated CV safety of many of these agents, evidence for certain sodium–glucose transporter 2 (SGLT2) inhibitors and glucagon-like peptide-1 receptor agonists (GLP-1 RAs) have revealed potential cardioprotective effects in patients with T2D who are at high risk of CVD events. Reductions in 3-point major adverse CV events (3P-MACE) and CV death have been noted in some of these CVOTs, with additional benefits including reduced risks of hospitalisation for heart failure, progression of renal disease, and all-cause mortality. These new data are leading to a paradigm shift in the current management of T2D, with international guidelines now prioritising SGLT2 inhibitors and/or GLP-1 RAs in certain patient populations. However, clinicians are faced with a large volume of CVOT data when seeking to use this evidence base to bring opportunities to improve CV, heart failure and renal outcomes, and even reduce mortality, in their patients with T2D. The aim of this review is to provide an in-depth summary of CVOT data—crystallising the key findings, from safety to efficacy—and to offer a practical perspective for physicians. Finally, we discuss the next steps for the post-CVOT era, with ongoing studies that may further transform clinical practice and improve outcomes for people with T2D, heart failure or renal disease.

Keywords: Cardiovascular disease, Cardiovascular outcomes trials, Chronic kidney disease, CVOTs, Cardiovascular safety, Heart failure, Glucose-lowering drug, GLP-1 RAs, Type 2 diabetes, SGLT2 inhibitors

Introduction

The prevalence of type 2 diabetes (T2D) has continued to rise over recent years. It is estimated that by 2045 there will be 693 million people diagnosed with the condition worldwide [1]. T2D poses significant health risks to individuals, with a two-fold increase in mortality compared with a population without diabetes [2], as well as an increasing global health economic burden [3]. Associations between T2D and cardiovascular disease (CVD) are well established; CVD is the leading cause of mortality and morbidity in patients with T2D [2–4], and more than 30% of patients with T2D are diagnosed with CVD [4]. The most common CVD manifestations in patients with T2D are peripheral arterial disease, ischaemic stroke, stable angina, heart failure (HF) and nonfatal myocardial infarction (MI) [3, 5]. A recent meta-analysis

*Correspondence: seferovic.petar@gmail.com

[6] University of Belgrade, Faculty of Medicine, Belgrade, Serbia
Full list of author information is available at the end of the article

showed that patients with coexisting diabetes and HF have an increased risk of all-cause death, cardiovascular (CV) death and hospitalisation [6]. Moreover, one in six patients with newly diagnosed T2D have evidence of silent MI associated with an increased risk of all-cause mortality (HR 1.26, 95% CI 1.06–1.50) and fatal MI (HR 1.49, 95% CI 1.15–1.94) [7]. Reducing CV risk is a key part of T2D disease management [3].

Until around a decade ago, the standard of care for T2D involved the use of glucose-lowering drugs (GLDs) such as metformin, sulfonylureas, thiazolidinediones, meglitinides and α-glucosidase inhibitors [8]. However, amid uncertainty about the CV safety of GLDs [9–12], in 2008 the U.S. Food and Drug Administration (FDA) updated its guidance, mandating the assessment of all new T2D therapies in long-term CV outcomes trials (CVOTs), in addition to the requirement for registrational studies demonstrating improvements in glycaemic control [13]. In the meantime, newer GLD classes have become firmly established treatments for T2D, i.e. dipeptidyl peptidase-4 (DPP-4) inhibitors, glucagon like peptide-1 receptor agonists (GLP-1 RA) and sodium–glucose cotransporter-2 (SGLT2) inhibitors. To date, 18 CVOTs have been published for these newer GLDs (Fig. 1), which enrolled patients with T2D who had established CVD or were at high risk of CVD [13–24], and had to demonstrate a hazard ratio (HR) < 1.8 for major CV events (MACE; based on the upper bound of a two-sided 95% confidence interval [CI]). Most CVOTs included the key composite outcome of 3-point MACE (3P-MACE; comprising CV death, nonfatal MI and nonfatal stroke), with the exceptions of additional events in a 4P-MACE in the ELIXA trial of lixisenatide (hospitalisation for unstable angina) and in the AMPLITUDE-O trial of efpeglenatide (death from undetermined causes) [10, 25, 26]. Notably, some CVOTs have not only illustrated CV safety, but also reported cardioprotective benefits. The first of these was EMPA-REG OUTCOME, completed in 2015, which showed that the SGLT2 inhibitor empagliflozin reduced 3P-MACE and CV death in patients with T2D and established CVD [27]. Hospitalisation for heart failure (HHF), all-cause mortality and progression of kidney disease were also reduced with empagliflozin [27–29]. Subsequently published CVOTs, as well as a small number of HF and renal outcomes studies, have added further paradigm-shifting evidence for improvements in CV, HHF

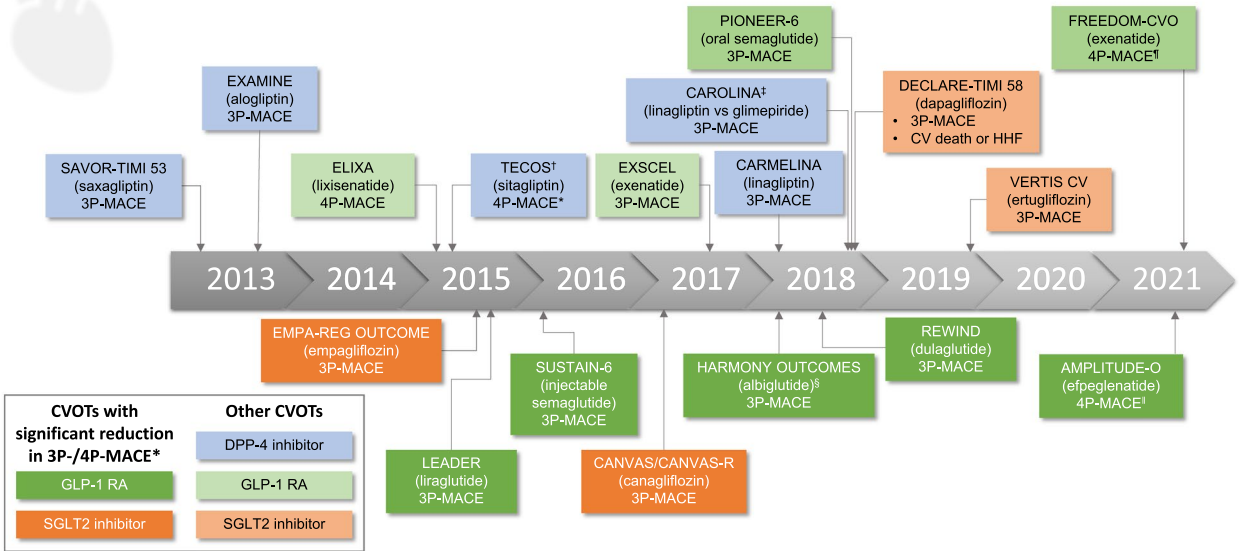

Fig. 1 A timeline of published diabetes CVOTs. The comparator in all trials was placebo, unless otherwise stated. Primary endpoints for each trial are listed. 3/4P-MACE, 3/4-point major adverse CV event; CV, cardiovascular; DPP-4, dipeptidyl peptidase-4; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HHF, hospitalisation for heart failure; SGLT2, sodium–glucose transporter 2. Source: clinicaltrials.gov. *3P-MACE is a composite of CV death, nonfatal myocardial infarction and nonfatal stroke. 4P-MACE is an expanded composite of 3P-MACE plus either hospitalisation for unstable angina (ELIXA, TECOS and FREEDOM-CVO) or death from undetermined causes (AMPLITUDE-O). †TECOS and FREEDOM-CVO included 3P-MACE as a secondary outcome. ‡CAROLINA was conducted in addition to regulatory requirements, as an active-controlled CVOT complementary to the core placebo-controlled CVOT CARMELINA. §Albiglutide is no longer a licensed treatment. ‖Efpeglenatide is not a currently licensed treatment. ¶FREEDOM-CVO (exenatide subcutaneous implant; not a currently licensed treatment) was completed in 2016, but the primary outcome (4P-MACE) was reported in 2022

and renal outcomes during treatment with other GLDs, such as the SGLT2 inhibitor canagliflozin, in patients with T2D (Table 1; Additional file 1: Table S1) [15, 16, 27, 30–37]. CVOT findings are now a major focus of updated treatment guidelines (Table 2) [38–44] and product labels [13].

The purpose of this review is to provide an expert summary that will help clinicians navigate the overwhelming wealth of CVOT data. We discuss how CVOTs can provide valuable insights for management in clinical practice, and consider remaining gaps in knowledge, as well as how diabetes CVOTs have led to further cardiorenal-focussed studies that seek to understand more about how some GLDs may improve outcomes for our patients.

Can we compare diabetes CVOTs?

In the absence of head-to-head studies, caution must be exercised when interpreting data from indirect comparison of CVOTs. Among the potential heterogeneity in trial designs and baseline characteristics, particular attention should be paid to differing baseline criteria for CVD diagnosis and CV risk in trial cohorts; patients with established CVD or CV risk factors at baseline may be more likely to progress through the continuum of CVD [45]. The proportions of patients with established CVD varied substantially between the CVOTs. For instance, all patients in ELIXA had established CVD, compared with 31–83% in LEADER, SUSTAIN-6 and REWIND (Additional file 2: Figure S1). Other key baseline characteristics that varied substantially between the CVOTs included HF diagnosis and renal impairment. There have also been suggestions of differing outcomes by region or race/ethnicity in the CVOTs, and in the HF and renal outcome trials, although these studies were not powered to reliably detect differences between subgroups [27, 30, 32, 46]. For instance, as recently reported for the LEADER CVOT of the GLP-1 RA liraglutide, 3P-MACE HR (95% CI) ranged from 0.62 (0.37–1.04) in Asia to 1.01 (0.84–1.22) in North America, although there was a lack of clear statistical evidence of interaction between regions and the outcome ($p=0.20$) [32, 47]. The task of assessing the profile of CV risk in CVOT populations is also complicated by the prevalence of unrecognised diabetic cardiac impairment in patients with T2D, which may include ischaemia, myocardial dysfunction and/or cardiac arrhythmia presenting with atypical symptoms [48]. However, it is notable that post hoc analyses of EMPA-REG OUTCOME showed consistency of CV benefits with empagliflozin across patients with different baseline CV risk factors, including prior MI [49], prior stroke [49], Thrombolysis In Myocardial Infarction (TIMI) score [49], prior coronary artery bypass graft surgery [50], left ventricular hypertrophy [51], peripheral artery disease [52] and atrial fibrillation [53]. Canagliflozin has also shown consistency in CV outcomes across subgroups, including in patients with different levels of albuminuria [54], and enhanced 3P-MACE in patients with prior diuretic usage [55].

From CV safety to CV efficacy in patients with T2D

DPP-4 inhibitors: no evidence for cardioprotection

The first T2D CVOTs to be reported, SAVOR-TIMI 53 and EXAMINE, assessed the CV safety of the DPP-4 inhibitors saxagliptin and alogliptin, respectively. Before publication of these two CVOTs in 2013, post hoc analyses of phase 2 and 3 trials suggested a trend for lower incidence of major CV events with DPP-4 inhibitors than with placebo or other comparators [56]. Similarly, both CVOTs demonstrated non-inferiority in 3P-MACE for saxagliptin (HR [95% CI] 1.00 [0.89–1.12]) and alogliptin (HR [95% CI] 0.96 [upper < 1.16]), compared with placebo (Additional file 1: Table S1) [57, 58]. However, saxagliptin had a significantly elevated risk of HHF compared with placebo (HR [95% CI] 1.27 [1.07–1.51], $p<0.01$) [57] and there was a suggestion of increased risk of HHF in patients treated with alogliptin vs placebo (HR [95% CI] 1.19 [0.90–1.58]), which led to the FDA issuing a safety warning for both alogliptin and saxagliptin [59]. Overall, subsequent CVOTs for DPP-4 inhibitors (sitagliptin and linagliptin) have demonstrated acceptable CV safety, consistently showing a neutral effect on 3P-MACE [13, 14, 60]. CARMELINA (linagliptin) included a cohort with a majority of patients presenting with prevalent chronic kidney disease (CKD) at baseline (mean estimated glomerular filtration rate [eGFR], 55 mL/min/1.73 m^2) [20]. In the CAROLINA CVOT (mean eGFR at baseline, 77 mL/min/1.73 m^2), linagliptin was non-inferior to glimepiride, based on 3P-MACE [21].

SGLT2 inhibitors: cardioprotection with empagliflozin and canagliflozin

Cardioprotective benefits of GLDs were first observed in the EMPA-REG OUTCOME trial, in which the SGLT2 inhibitor empagliflozin showed a 14% reduction in the risk of 3P-MACE compared with placebo (HR [95% CI] 0.86 [0.74–0.99], $p=0.04$) in patients with T2D and established CVD [27]. Among the components of 3P-MACE, the risk of CV death was reduced by 38% with empagliflozin (HR [95% CI] 0.62 [0.49–0.77], $p<0.001$), while the impact on each of nonfatal stroke and nonfatal MI was neutral [27] (Table 1; Additional file 1: Table S1).

The canagliflozin CVOT programme, comprising CANVAS and CANVAS-R, also demonstrated a 14% reduction in 3P-MACE (HR [95% CI] 0.86 [0.75–0.97], $p=0.02$) in patients with established CVD or high CV risk, although no significant reduction in CV deaths (HR

Table 1 Overview of CVOTs reporting significant reductions in 3P/4P-MACE

Class*†	SGLT2 inhibitors		GLP-1 receptor agonists			
Study	**EMPA-REG OUTCOME Empagliflozin**	**CANVAS Programme Canagliflozin**	**AMPLITUDE-O Liraglutide**	**LEADER Liraglutide**	**SUSTAIN-6 Semaglutide**	**REWIND Dulaglutide**
MACE‡ HR (95% CI) **ER** drug vs placebo/1,000 PY	0.86 (0.74–0.99) 37 vs 44	0.86 (0.75–0.97) 27 vs 32	0.73 (0.58–0.92) 39 vs 53	0.87 (0.78–0.97) 34 vs 39	0.74 (0.58–0.95) 32 vs 44	0.88 (0.79–0.99) 24 vs 27
CV death HR (95% CI)	0.62 (0.49–0.77) All-cause death also reduced	0.87 (0.72–1.06)–*N.S*	0.72 (0.50–1.03)–*N.S*	0.78 (0.66–0.93) All-cause death also reduced	0.98 (0.65–1.48)–*N.S*	0.91 (0.78–1.06)–*N.S*
Nonfatal MI HR (95% CI)	0.87 (0.70–1.09)–*N.S*	0.85 (0.69–1.05)–*N.S*	0.78 (0.55–1.10)–*N.S*	0.88 (0.75–1.03)–*N.S*	0.74 (0.51–1.08)–*N.S*	0.96 (0.79–1.16)–*N.S*
Nonfatal stroke HR (95% CI)	1.24 (0.92–1.67)–*N.S*	0.90 (0.71–1.15) – *N.S*	0.80 (0.48–1.31) – *N.S*	0.89 (0.72–1.11) – *N.S*	0.61 (0.38–0.99)	0.76 (0.61–0.95)
Other cardiorenal benefits (individual secondary endpoints)	Protective effect on: • HHF • Impaired renal function • Albuminuria	Protective effect on: • HHF • Impaired renal function • Albuminuria	Protective effect on: • HF • A composite of impaired renal function or albuminuria • Albuminuria	Protective effect on albuminuria	Protective effect on albuminuria	Protective effect on: • Impaired renal function • Albuminuria
Cohort composition						
Number of participants	7020	10,142	4076	9340	3297	9901
Established CVD % pts	99%	65%	91%	82%	83%	31%
Mean eGFR mL/min/1.73 m^2	74	77	73	80	76	75
Key inclusion criteria (in addition to T2D)	Age ≥ 18 years with established CVD	• Age ≥ 30 years with symptomatic ASCVD • or ≥ 50 years with ≥ 2 CV risk factors	• Age ≥ 18 years with history of CVD • or ≥ 50 years (male) or ≥ 55 years (female) with kidney disease and ≥ 1 CV risk factor	• Age ≥ 50 years with ≥ 1 CV condition • or ≥ 60 years with ≥ 1 CV risk factor	• Age ≥ 50 years with established CVD, chronic HF or chronic kidney disease (> stage 3) • or ≥ 60 years with ≥ 1 CV risk factor	• Age ≥ 50 years with vascular disease • or ≥ 55 years with ≥ 1 cardio-renal condition • or ≥ 60 years with ≥ 2 CV risk factors
Subgroup analyses						
Secondary vs primary CVD prevention MACE‡ HR (95% CI)	N/A	Secondary prevention group: 0.82 (0.72–0.95) Primary prevention group: 0.98 (0.74–1.30) P = 0.18	Secondary prevention group: 0.71 (0.57–0.90) Primary prevention group: 1.71 (0.48–6.07)	Secondary prevention group: 0.83 (0.74–0.93) Primary prevention group: 1.20 (0.86–1.67) P = 0.04	Secondary prevention group: 0.72 (0.55–0.93) Primary prevention group: 1.00 (0.41–2.46) P = 0.49	Secondary prevention group: 0.87 (0.74–1.02) Primary prevention group: 0.87 (0.74–1.02) P = 0.97
Other subgroups	Relative risk reduction for 3P-MACE was in most cases broadly similar across demographic and clinical baseline characteristics, including a range of cardiovascular and renal characteristics					

(For detailed overview of all diabetes CVOTs, and renal outcomes and HF studies, see Additional file 1: Table S1). Primary and key secondary endpoints, patient cohort composition, and key subgroup analyses for glucose-lowering agents that have demonstrated ASCVD benefits in diabetes CVOTs [15, 27, 28, 31, 32, 34, 96, 97]. As most CVOTs were not head-to-head trials, direct comparisons of agents cannot be made, due to possible differences in study design, definitions and cohorts. For example, absence of a demonstrated benefit may be due to such factors, especially for secondary outcomes where studies may not be powered to reach statistical significance. Differences in baseline CV risk are substantial between CVOTs, and even the definition of CV risk and individual risk factors differs between trials. CVOTs excluded here include: DECLARE-TIMI 58 (dapagliflozin), which did not show a significant effect on 3P-MACE, and a reduced risk for the composite of CV death or HHF was driven by reduction in HHF [37]; EXSCEL (once-weekly exenatide) found a non-significant trend towards a reduction of 3P-MACE [33]. References: EMPA-REG OUTCOME [27–29, 62]; CANVAS Program [30, 62, 92]; AMPLITUDE-O [23]; LEADER [32, 96]; SUSTAIN-6 [31, 136–138]; REWIND [34, 97]

3P/4P-MACE, 3-/4-point major adverse cardiovascular event; ASCVD, atherosclerotic CVD; CI, confidence interval; CKD, chronic kidney disease; CV, cardiovascular; CVD, CV disease; CVOT, CV outcomes trial; eGFR, estimated glomerular filtration rate; ER, event rate; GLP-1, glucagon-like peptide 1; HR, hazard ratio; MI, myocardial infarction; N.S., not significant; PY, patient-years; SGLT2, sodium–glucose transport protein 2; T2D, type 2 diabetes

*All drugs shown are currently licensed for T2D, except for efpeglenatide

† In addition to the CVOTs shown, the HARMONY OUTCOMES trial showed reduced risks of 3P-MACE and MI with the GLP-1 receptor agonist albiglutide [35]; however, albiglutide is no longer an approved treatment

‡ 3P-MACE is shown for all CVOTs (a composite of CV death, nonfatal MI and nonfatal stroke), except for 4P-MACE for AMPLITUDE-O (3P-MACE outcomes plus death from undetermined causes)

Table 2 Current recommendations based on CVOTs for patients with established CVD or at high risk for CVD

Guidelines	Selected recommendations for CVD management based on diabetes CVOTs
ADA 2022	For patients with T2D who have established ASCVD or high / very high CV risk, SGLT2 inhibitors or GLP-1 RA with proven cardiovascular benefit are recommended as part of glycaemic management:* • Either a GLP-1 RA with proven CVD benefit or an SGLT2 inhibitor with proven CVD benefit • If further intensification is required or the patient is now unable to tolerate a GLP-1 RA and/or SGLT2 inhibitor choose agents demonstrating CV safety; consider adding the other class (GLP-1 RA or SGLT2 inhibitor) with proven CVD benefit†
ACC 2020	For patients with T2D who have established or high risk of ASCVD consider an SGLT2 inhibitor or GLP-1 RA with proven CV benefit
ADA and EASD 2019	For patients with T2D who have established ASCVD, an SGLT2 inhibitor or GLP-1 RA with proven cardiovascular benefit is recommended as part of glycaemic management: • First-line therapy is metformin • Add an GLP-1 RA with proven CVD benefit or, if eGFR is adequate, an SGLT2 inhibitor with proven CVD benefit • If further intensification is required or the patient is now unable to tolerate a GLP-1 RA and/or SGLT2 inhibitor, choose agents demonstrating CV safety†
ESC (in association with EASD) 2019	Consider CV risk independently of Hb1Ac; for patients with T2D who have ASCVD, or high/very high CV risk (target organ damage or multiple risk factors) • SGLT2 inhibitor or GLP-1 RA *(either as first add-on to metformin or as monotherapy; however, drug labels stipulate that metformin should be first line)* • If HbA1c is above target, consider adding the other class (GLP-1 RA or SGLT2i) with proven CVD benefit

A summary of recommendations in major international guidelines that are based on evidence from diabetes CVOTs. These guidelines include the American Diabetes Association (ADA) Standards of Medical Care in Diabetes 2022 [44]; American College of Cardiology (ACC) 2020 Expert Consensus Decision Pathway on Novel Therapies for Cardiovascular Risk Reduction in Patients with Type 2 Diabetes and Atherosclerotic Cardiovascular Disease [39]; Management of hyperglycaemia in type 2 diabetes, 2018: A consensus report by the ADA and the European Association for the Study of Diabetes (EASD), together with its 2019 update [40, 42]; 2019 European Society of Cardiology (ESC) Guidelines on diabetes, pre-diabetes, and cardiovascular diseases developed in collaboration with the EASD [38]

ASCVD, atherosclerotic cardiovascular disease; CV, cardiovascular; CVD, cardiovascular disease; CVOT, cardiovascular outcomes trial; GLP-1 RA, glucagon-like peptide-1 receptor agonist; Hb1Ac, haemoglobin A1c; SGLT2, sodium–glucose transporter 2

*Other options are thiazolidinediones, DPP-4 inhibitors if not on GLP RA, basal insulin, sulfonylureas

† Based on the flowchart of treatment of patients with T2D in the ADA 2022 guidelines, "first-line therapy depends on comorbidities, patient-centred treatment factors, including cost and access considerations, and management needs and generally includes metformin and comprehensive lifestyle modification", and treatment choices are subsequently shown on the flowchart according to the presence/absence of ASCVD, indicators of high risk, heart failure, and chronic kidney disease

[95% CI] 0.87 [0.72–1.06]) [30]. The beneficial effect of canagliflozin on 3P-MACE was confirmed in patients with T2D and CKD in a subsequent renal outcomes trial, CREDENCE (HR [95% CI] 0.80 [0.67–0.95], p = 0.01), which also showed a trend towards a reduction in CV deaths that neared significance (HR [95% CI] 0.78 [0.61–1.00], p = 0.05) [36]. CKD in patients with T2D has been strongly linked to CV events and mortality in CVOTs [14], although the prevalence of CKD in diabetes CVOTs was typically much lower than in CREDENCE [14, 36].

A recently reported meta-analysis of 11 clinical trials demonstrated cardiorenal benefits across the SGLT2 inhibitor class versus placebo. CV benefits included a 12% reduction in 3P-MACE (without significant heterogeneity; $I^2 = 21.2\%$, p = 0.19), based on six cardiorenal studies that reported this outcome, and a 16% reduction in CV death [61]. However, these results should be caveated; there were differences in outcomes, study designs, patient populations, and medications across the cardiorenal studies included in the meta-analysis. The 12% reduction in 3P-MACE was based on data from EMPA-REG OUTCOME, CANVAS, CREDENCE, DECLARE-TIMI 58 (dapagliflozin), VERTIS CV (ertugliflozin) and SCORED (sotagliflozin). Notably, sotagliflozin has both SGLT1 and SGLT2 inhibitory activity and is not a licensed treatment for T2D (but is licensed for type 1 diabetes in Europe), and SCORED was a cardiorenal study (patients had T2D and CKD) that used a different 3P-MACE outcome (CV death, HHF and urgent visits for HF) than the other studies (CV death, nonfatal MI and nonfatal stroke). The dapagliflozin CVOT, DECLARE-TIMI 58, did not show a benefit in either 3P-MACE (HR [95% CI] 0.93 [0.84–1.03], p = 0.17) or CV deaths (0.98 [0.82–1.17]) [37, 62]. However, DECLARE-TIMI 58 had a very different profile of baseline characteristics to EMPA-REG OUTCOME and CANVAS, as a majority of patients had high CV risk but not established CVD, and there were fewer patients with CKD [37]. Therefore, the different outcomes in DECLARE-TIMI 58, compared with EMPA-REG OUTCOME and CANVAS, may be due to differences in study design and cohort composition rather than intrinsic differences between the study drugs. Two HF and renal outcomes studies, designed to assess the effect of dapagliflozin vs placebo in patients with HF with reduced ejection fraction (HFrEF; DAPA-HF) or CKD (DAPA-CKD) with or without T2D, both reported trends towards reductions in CV death in the T2D subgroups (HR [95% CI] 0.79 [0.63–1.01] and 0.85 [0.59–1.21], respectively) [63, 64]. In the VERTIS CV study of ertugliflozin, all patients had established CVD at

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.