

## EDITORIAL COMMENT

# Is Lower Better?

## HbA1c Level Is Associated With Venous Graft Patency Following Coronary Bypass Surgery\*



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Coronary artery disease (CAD) plays a major role in the prognosis and outcomes of patients with diabetes mellitus (DM). Patients with DM are 2 to 4 times more likely to die from heart disease than those without DM.<sup>1</sup> One study found that more than 50% of deaths in patients with DM were caused by cardiovascular disease (CVD),<sup>2</sup> which is the leading cause of death in both type 1 and type 2 diabetes.<sup>3</sup> In addition, patients with DM have higher mortality following myocardial infarction (MI) compared with patients without DM.<sup>1</sup>

Diabetes is also an independent risk factor for long-term mortality following coronary artery bypass grafting (CABG).<sup>4</sup> In addition, patients with DM are at higher risk for post-CABG complications, including sternal wound infection, new dialysis requirement, multisystem organ failure, and readmission with MI.<sup>5</sup>

Patients with DM are more likely to have left main and multivessel disease compared with those patients without DM.<sup>6</sup> Furthermore, diabetic patients have more diffuse disease that involves smaller vessels and have more complex anatomy, which makes percutaneous coronary intervention (PCI) more complex and technically challenging.<sup>6</sup> The FREEDOM (Future Revascularization Evaluation in Patients with Diabetes Mellitus: Optimal Management of Multivessel Disease) trial<sup>7</sup> demonstrated improved outcomes in diabetic patients with multivessel disease undergoing CABG compared with those undergoing

PCI. The 2018 European Guidelines on myocardial revascularization recommend CABG for all surgically fit diabetic patients with multivessel or left main disease.<sup>8</sup>

Glycemic control as measured by glycosylated hemoglobin (HbA1c) plays a vital role in the management of DM. Elevated HbA1c levels are associated with increased risk of CAD and cardiovascular-related mortality.<sup>9</sup> According to the American College of Physicians, goal HbA1c should be 7% to 8%, which best allows for balance of long-term benefits while decreasing short-term risks, most importantly hypoglycemia.<sup>10</sup> Strict glycemic control, defined as HbA1c <6%, has not been shown to improve the risk of cardiovascular events in type 2 DM.<sup>11</sup> The ACCORD (Action to Control Cardiovascular Risk in Diabetes) study<sup>12</sup> found that strict glycemic control led to more adverse events, namely hypoglycemia and weight gain, which led to a higher mortality.

It is known that poor glycemic control and elevated HbA1c levels are associated with worse outcomes for patients undergoing PCI and CABG.<sup>13,14</sup> It is also known that DM is itself an independent risk factor for graft occlusion following CABG.<sup>15</sup> However, the association between baseline HbA1c levels and graft outcomes following CABG is unclear.

In this issue of *JACC: Asia*, Zhu et al<sup>16</sup> looked at more than 400 patients and nearly 1,200 saphenous vein grafts from the DACAB (Different Antiplatelet Therapy Strategy After Coronary Artery Bypass Graft Surgery) trial<sup>17</sup> and found that lower baseline HbA1c was associated with higher vein graft patency 1 year after CABG. They also found that the benefit of ticagrelor and aspirin compared with aspirin alone was present regardless of HbA1c. Although not an unsurprising finding given what we know about DM and the effect it has on cardiovascular outcomes, these are very important data that may open key questions on how to improve outcomes for diabetic patients undergoing CABG. Given what this study showed, is it

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worth delaying surgery for patients with elevated HbA1c to achieve better glycemic control before surgery? Will delaying surgery outweigh the benefit of earlier revascularization? In addition, for patients who cannot wait for surgery, does improving HbA1c following surgery have any effect on graft patency?

One of the limitations of this study is that it only looked at vein grafts. With the increasing use of bilateral internal thoracic arteries, and the radial artery in CABG, it is vital to understand the effect on HbA1c on these grafts, and therefore further research is warranted in this area. Another limitation is that this study only looked at patency rates 1 year after surgery. Does the trend of improved outcomes with lower HbA1c continue at 5 and 10 years, and how does postoperative glycemic control benefit long-term graft patency rate?

In closing, based on the excellent data from Zhu et al<sup>16</sup> we can clearly say that at 1 year, venous graft patency is associated with good glycemic control, as demonstrated by low HbA1c. How we can use this information to improve outcomes in diabetic patients remains to be seen and further studies looking into arterial grafts and long-term outcomes are needed.

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**KEY WORDS** coronary artery bypass surgery, diabetes, HbA1c