THE CASE FOR TOTAL ARTERIAL REVASCULARISATION Reply to the Editor:

We thank our long-time colleagues Drs Habib and Schwann for their continuing interest in our work and in our study. Their contribution to the field of arterial conduits and long-term survival benefits after coronary artery bypass grafting is substantial, and we have been grateful for data they have previously shared with us. They rightly point out that we omitted to cite their 2009 article on the same subject matter,¹ which was an oversight. Their data are comparable with our own, except with regard to the magnitude of the benefit of total arterial revascularization (TAR). The greater effect that they showed may reflect the difficulties both studies encountered in correcting for the differences between patients who undergo TAR and those who do not, irrespective of whether TAR is applied broadly as in our series (with other than TAR reserved for a minority subset) or selectively as in their series (with TAR used only for a selected minority).¹ Although the clinical practice may differ between countries, the statistical problem remains equivalent in trying to estimate the effect of TAR on survival.

With reference to the 3 points made by our colleagues, we state the following: (1) We agree that a primary point of interest in our study, which is not known from their previous series, is that the benefit of TAR extends to older patients. We have recently presented elsewhere² data showing that the benefit of a radial artery as a second arterial graft to supplement the left internal thoracic artery (ITA) can be demonstrated in older patients, even when TAR is not performed. Both these findings run counter to preconceptions that the benefits of multiple or all arterial grafts are confined to young patients, although it is acknowledged that these are nonrandomized data, however carefully propensity matched. Our Radial Artery Patency and Clinical Outcomes trial is due to report 10-year outcomes later this year, with random assignment of a smaller number patients older than 70 years to receive a radial or saphenous vein graft for the second graft, and this may offer further information in this field. (2) The impact of complete versus incomplete revascularization is difficult to quantify, because when 2 grafts are performed in a patient with 3-vessel disease, it is not clear whether the third graft would have made any clinical contribution to outcome. In retrospective analyses from databases, key information about whether the third graft was “rightly” or “wrongly” withheld may risk assumptions unless considerable explanatory information is available (was this an inadequate or insignificant target, infarcted territory of runoff, what was the degree of collateralization from other patent or grafted vessels, etc). For this reason, we did not include completeness of revascularization in our analysis. Whereas their series¹ suggested that

completeness of revascularization increases the benefit from TAR, the reverse has been reported by Kieser and colleagues,³ who suggested that in their Canadian experience the use of arterial grafts in fact negated (or mitigated) the impact of incomplete revascularization.³ (3) The application of TAR in our series has been broader than that reported in their¹ and other published series, which likely reflects some international differences in practice, although we believe that the results can be generalized. We are not certain, however, whether the use of TAR could be even higher, as our colleagues have suggested, because of the rise in radial angiography and uncertainty regarding the safety of using as bypass conduits radial arteries that have been cannulated for angiography. If not, even to maintain current rates of TAR will require an increase in use of bilateral ITAs, which may or may not be acceptable to surgeons. Because our as yet unpublished data suggest, however, that in patients undergoing TAR the survival benefit is greater when bilateral ITAs and a single radial artery are used than when a single ITA and bilateral radial arteries are used, such a shift might increase the actual survival benefit from TAR relative to left ITA and vein strategies.

We again thank Drs Habib and Schwann for their comments and interest.

Philip Hayward, MRCP, FRCS^a
Brian Buxton, MD^b
^aAustin Hospital
Melbourne, Victoria, Australia
^bVictorian Heart Centre
Richmond, Victoria, Australia

References

1. Zacharias A, Schwann TA, Riordan CJ, Durham SJ, Shah AS, Habib RH. Late results of conventional versus all-arterial revascularization based on internal thoracic and radial artery grafting. *Ann Thorac Surg*. 2009;87:19-26.e2.
2. Shi WY, Hayward PA, Fuller JA, Tatoulis J, Rosalion A, Newcomb AE, et al. Is the radial artery associated with improved survival in older patients undergoing coronary artery bypass grafting? An analysis of a multicentre experience. *Eur J Cardiothorac Surg*. February 10, 2015 [Epub ahead of print].
3. Kieser TM, Curran HJ, Rose MS, Norris CM, Graham MM. Arterial grafts balance survival between incomplete and complete revascularization: a series of 1000 consecutive coronary artery bypass graft patients with 98% arterial grafts. *J Thorac Cardiovasc Surg*. 2014;147:75-83.

<http://dx.doi.org/10.1016/j.jtcvs.2015.03.031>

HYBRID PALLIATION FOR HYPOPLASTIC LEFT HEART SYNDROME: NAVIGATING THE GRAY ZONE

To the Editor:

We read the article by Davies and colleagues¹ with great interest. The hybrid procedure has emerged in the last decade as an alternative stage I palliation for neonates with hypoplastic left heart