coronary artery bypass graft surgery (CABG) by Takagi and colleagues.¹ The inclusion criteria comprised prospective randomized studies with the incidence of postoperative neurocognitive decline as the primary end point. However, there was significant clinical heterogeneity in the studies that were included in the meta-analysis. In particular, the definitions used to define neurocognitive decline between the trials varied markedly.^{2,3} As a result, we question whether the incidences of neurocognitive decline can be reliably compared. Furthermore, studies that derive an incidence value for neurocognitive impairment after CABG are prone to the statistical phenomenon of regression to the mean (RTM).⁴ RTM explains much of the neurocognitive deficits that have been reported with the use of incidence analysis.

At present, there is no agreement as to what degree of change constitutes neuropsychological dysfunction. In one study of patients undergoing CABG, the incidence of postoperative neurocognitive dysfunction varied considerably according to the definition of neurocognitive decline.⁵ Incidence figures superficially provide a convenient summation of the extent of impairment, but they are calculated by imposing an arbitrary statistical constraint on individual test measures. As such, overall incidence data will vary according to which statistical criteria are used, the sensitivity and number of tests used, and the type of cognitive domains they assess.⁵ Any approach that essentially dichotomizes patients as “impaired” or “unimpaired” is a costly way of data handling that reduces statistical power.

Whereas a specific definition of neurocognitive impairment is required when the study objective is to determine the incidence of postoperative neurocognitive dysfunction, it is not necessary when one wants to test a specific hypothesis such as the effects of an intervention, for example, off-pump surgery. It is far better to use continuous measures inasmuch as they provide greater statistical power and allow more sophisticated analyses. Recently, we⁶ reported neurocognitive outcomes in 212 patients prospectively randomized to on-pump or off-pump CABG. We derived composite scores from all the individual test scores and avoided categorizing patients as “cognitively impaired or not,” thus treating the test scores as a continuous variable. Therefore, any subtle changes in test scores will

have contributed to the overall effect size. In addition, we compared the postoperative scores having adjusted for preoperative scores by using analysis of covariance. This takes RTM into account and is a powerful method of analysing test–retest data.

In summary, asking how often neurocognitive dysfunction occurs after CABG, and expecting a simple one-sided answer to suffice, is simplistic, however desirable. When neuropsychologic tests are used to test a certain hypothesis, as in this investigation, one does not need to set an arbitrary definition of neurocognitive decline to categorize individuals into those with or without a neurocognitive deficit. Instead, one can look at change and its relative difference between groups, which greatly enhances the power of the analysis.

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Reply to the Editor:

We appreciate Drs Motallebzadeh and Jahangiri's letter to the editor regarding our meta-analysis¹ of randomized controlled trials of neurocognitive decline after off-pump versus on-pump coronary artery bypass graft surgery. Although the definitions of neurocognitive decline varied among the trials, as mentioned in their letter, we could not but include only studies reporting neurocognitive dysfunction dichotomously because there is no standard definition for neurocognitive dysfunction. We excluded a randomized controlled trial by Dr Motallebzadeh and associates² in our meta-analysis¹ because it did not report neurocognitive dysfunction dichotomously, and all except for the trial did not report composite neurocognitive scores. Dr Motallebzadeh and colleagues derived composite neurocognitive scores from all of the individual test scores and avoided categorizing patients dichotomously, thus treating the test scores as a continuous variable. If a number of randomized controlled trials reporting composite neurocognitive scores are published, we would like to perform another meta-analysis.

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Surgical techniques for posterior aortic root enlargement

To the Editor:

We have read with extreme interest the paper by Dhareshwar and colleagues,¹ published in a recent issue, describing their results with patients undergoing posterior aortic root enlargement.

We absolutely agree that there is still considerable confusion in the literature regarding the techniques proposed by the enlargement techniques described by Nicks, Cartmill, and Bernstein² and by Manouguian and Seybold-Epting,³ as was obvious even in subsequent discussion of the article by Dhareshwar and associates.¹

Although the authors have correctly presented Nicks' posterior aortic root enlargement procedure in a paragraph describing the surgical technique (aortotomy is extended into the noncoronary sinus toward its belly to, but not beyond, the annulus), they have added more embarrassing details with the subsequent description of Figure 2. Let me quote from the legend to Figure 2 from their article:

"Figure 2. A: a, Nicks' aortic root enlargement is accomplished by extending the aortotomy incision across the aortic annulus into the anterior leaflet of the mitral valve. b, Care must be taken to carry this incision posteriorly into the center of the anterior leaflet...."¹

Here is a citation from the original manuscript by Nicks, Cartmill, and Bernstein² concerning the surgical technique:

".....When it is revealed that the aortic annulus is small, aortic incision is carried downwards posteriorly through the non-coronary aortic sinus across the aortic ring as far as the origin of the mitral valve (Figs 2a, b and 3). A tongue of woven Dacron material, cut from a prosthetic tubular arterial graft and with its natural curvature facing the lumen, is sutured down to the fibrous origin of the mitral ring with two mattress sutures...."

Thus, it is obvious that Nicks' method of posterior aortic root enlargement does not include penetration of the incision into the anterior mitral leaflet.

Surgical techniques of posterior aortic root enlargement reported so far are presented schematically in Figure 1. Although Manouguian's technique (the aortic incision is extended through the commissure of the left coronary cusp and noncoronary cusp to the anterior mitral leaflet and the left atrial roof) was correctly reported, we would like to remind the readers of the technique of Nuñez and colleagues⁴ reported back in 1983. After resection of the aortic cusps, the adventitia of the aorta is separated by blunt dissection distally beyond the posterior commissure. Then, the aortic incision is further extended from the top of the noncoro-

Figure 1. Surgical techniques of posterior aortic root enlargement reported so far (Nicks'-white arrow, Nuñez's-black arrow, Manouguian's-black plus black dotted arrows). NCC, noncoronary cusp; LCC, left coronary cusp; RCC, right coronary cusp; AML, anterior mitral leaflet.

nary cusp-left coronary cusp commissure (the same direction as in Manouguian's technique, Figure 1) to just above the confluence of the interventricular fibrous trigone, left atrial wall, and mitral valve annulus, thus avoiding injury and reconstruction of the left atrial roof and anterior mitral leaflet. Furthermore, a patch inserted to enlarge the annulus and to facilitate closure of the aortotomy is attached to firm structures—the fibrous base of the anterior mitral leaflet and the aortic wall. This elegant and safe technique enables insertion of a prosthetic valve possibly two sizes larger in the small aortic root, and long-term survival as well as freedom from valve-related complications are satisfactory (actuarial freedom from death of 88.2% at 15 years has been reported).⁵

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Reply to the Editor:

We are delighted that our article stimulated such interest from our colleagues across the Atlantic and, in particular, that it has stimulated a discussion of every surgeon's two favorite topics—history and anatomy! We appreciate the authors' expression of sympathy for us, describing our figure legend as "embarrassing." Not at all! We stand by our comments and encourage the debate. There is too little such good-natured banter among the members of our profession.