

- 4 Kienzle MG, Ferguson DW, Birkett CL, Myers GA, Berg WJ, Mariano DJ. Clinical, haemodynamic and sympathetic neural correlates of heart rate variability in congestive heart failure. *Am J Cardiol* 1992;69:761-7.

Dipyridamole and dobutamine for myocardial perfusion imaging

SIR,—Kumar and colleagues conclude that dipyridamole is better than dobutamine during thallium myocardial perfusion tomography.¹ We also prefer to use a vasodilator routinely (we use adenosine) and we reserve dobutamine for patients who are unable to exercise and in whom adenosine is contraindicated.^{2,3} Kumar and colleagues give several reasons to justify their conclusion, including greater stress perfusion scores in the lateral wall and apex of the left ventricle when dipyridamole is used. In the light of a recent editorial pointing out the importance of rigorous statistical methods in biomedical research,⁴ we question whether the conclusion and hence the title of the paper is valid.

Without a prior hypothesis of regional differences it is not appropriate to make multiple statistical comparisons of individual segments. Analysis of variance is the preferred test statistic, using a nonparametric method (Kruskal-Wallis) given the discontinuous nature of the scoring system, followed by an appropriate post hoc test for individual segments only if there is evidence of heterogeneity. Any regional differences detected in this way should then be tested prospectively in a separate group of patients. The claimed segmental difference between the two forms of pharmacological intervention is unlikely to be real because there is no plausible reason why these segments should differ from the remainder of the myocardium. Kumar *et al* make no attempt to explain this anomaly.

They also claim a better correlation of perfusion score with a score derived from the *x* ray angiogram when dipyridamole rather than dobutamine is used. There is no description of the statistical methods used in this analysis, and therefore the validity of this claim cannot be judged from the data provided.

We therefore suggest an alternative conclusion: that the null hypothesis of equivalence in efficacy for dipyridamole and dobutamine cannot be rejected, and that practical matters such as cost and duration of protocol should determine which is used in individual circumstances.

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- 1 Kumar EB, Steel SA, Howey S, Caplin JL, Aber CP. Dipyridamole is superior to dobutamine for thallium stress imaging: a randomised crossover study. *Br Heart J* 1994; 71:129-34.
- 2 Pennell DJ, Underwood SR, Swanton RH, Walker JM, Ell PJ. Dobutamine thallium myocardial perfusion tomography. *J Am Coll Cardiol* 1991;18:1471-9.
- 3 Pennell DJ, Underwood SR, Ell PJ. Safety of dobutamine stress for thallium-201 myocardial perfusion tomography in patients with asthma. *Am J Cardiol* 1993;71:1346-50.
- 4 Altman DG. The scandal of poor medical research. *Br Med J* 1994;308:283-4.

This letter was shown to the authors, who reply as follows:

SIR,—We sought statistical advice from a professional statistician on the methods used in our paper. It was suggested that Student's *t* test was appropriate for comparison of perfusion scores obtained with the two pharmacological stressing agents. The original hypothesis was that there was no difference in the effect of the two agents on myocardial perfusion and we therefore expected no difference in perfusion scores. We did do multiple analysis and agree with Dr Underwood and Professor Wood that this may have been the cause of the segmental differences.

Because dobutamine and dipyridamole induce abnormalities of perfusion by different mechanisms there may be a "true" difference in their ability to produce segmental hypoperfusion. The correlation of perfusion score with angiographic score was performed by linear regression according to the methods in Draper and Smith (*Applied regression analysis*. 2nd ed. New York: Wiley, 1981;84).

Our study undoubtedly showed that studies with dipyridamole are cheaper, better tolerated, and less time consuming than dobutamine studies, without any loss in the ability to detect abnormal myocardial perfusion.

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Long-term results of the corridor operation for atrial fibrillation

SIR,—The corridor operation for atrial fibrillation¹ is an ingenious operation in which the surgeons isolate the left and right atrial free walls from the atrial septum, leaving a corridor of contiguous tissue between the sinus and atrioventricular nodes, thereby permitting chronotropically responsive atrioventricular conduction.

Unfortunately, because both atria remain in fibrillation, the corridor procedure fails to address the two major consequences of atrial fibrillation—namely, the loss of atrial transport function and thromboembolism. Therefore, it seems that the corridor procedure has no advantage over His bundle ablation and currently it is a major cardiac surgical procedure. I note that in the series of 36 patients reported by van Hemel *et al* His bundle ablation was performed and a pacemaker implanted in five patients "in whom the corridor operation was unsuccessful".

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- 1 van Hemel NM, Defauw JJAMT, Kingma JH, Jaarsma W, Vermeulen FEE, de Bakker JMT, Guiraudon GM. Long-term results of the corridor operation for atrial fibrillation. *Br Heart J* 1994;71:170-6.

This letter was shown to the authors, who reply as follows:

SIR,—We welcome the opportunity to respond to Professor Cheng's concern.

According to the Frank-Starling law, right atrial contraction and right filling pressures are the main determinants of cardiac function¹; in addition, diminished or absent left atrial contraction is not associated with alteration of cardiac function.² The normal heart acts as a suction pump during normal diastole. So, at least in the normal heart, the atrial contribution to cardiac function is negligible.³

Because chronotropic sinus node function is the main determinant of increasing cardiac output during exercise,⁴ preservation of the physiological chronotropic response is one of the aims of the corridor concept. The maintenance of native chronotropic sinus function prevents impaired exercise tolerance and avoids the lifelong dependency on a pacemaker that is one of the consequences of His bundle ablation.⁵ Our long-term results show that sinus node function remained undisturbed in most of our patients.

During the corridor operation the left atrial appendage, which is commonly the origin of atrial thrombosis in patients with atrial fibrillation, is excised. Possibly, resection of the left atrial appendage alone could prevent systemic emboli in patients with lone atrial fibrillation. This measure has not been tried in patients in whom atrial fibrillation continues after catheter ablation of the His bundle for rate control of drug refractory atrial fibrillation. Their risk of thromboembolism is not negligible.

Though corridor surgery did not suppress atrial fibrillation in all our patients, postoperative atrial fibrillation occurred only in the left atrium and never de novo in the corridor. The operation was sometimes unsuccessful because we failed to create a persistent conduction block between the left atrium and the coronary sinus. This is why some of our patients needed His bundle ablation. Such surgical failures require technical improvement, but they do not detract from the corridor concept.

Currently, it is impossible to make a valid comparison between a non-selective and less invasive procedure such as His bundle catheter ablation⁶ and selective surgery for atrial fibrillation.⁷ This is because of the differences in selection criteria, patient population, and the end point of treatment. The comparison is not even scientifically valid, because atrial fibrillation is a multifactorial protean disease.⁸ In the face of excellent long-term results, we strongly believe that surgical procedures for atrial fibrillation will become a well-established treatment in some subgroups of patients—for example, those who do not want to be dependent on a pacemaker and those who need cardiac surgery for other reasons.

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- 1 Robinson TF, Factor SM, Sonnenblick EH. The heart as a suction pump. *Scientific American* 1986;254:84.