Finally, it is obvious that together we agree that color M-mode Doppler is a new and interesting noninvasive method for the evaluation of diastolic function.

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Is Pharmacologic Cardioversion of Atrial Fibrillation Really Preferable to Electrical Cardioversion?

Harjai et al. (1), in a nonrandomized study, conclude that patients undergoing electrical cardioversion of atrial fibrillation (AF) display a "greater degree and longer duration" of mechanical atrial dysfunction than those who convert pharmacologically or spontaneously. The authors strongly imply that this finding is a result of the mode of cardioversion. However, examination of their data reveals that this conclusion is unsupported and, indeed, that an absence of effect is more likely.

There are several flaws in the authors' analyses and logic. We would first question whether it is valid, in such a small study of cardioversion of atrial fibrillation, to include patients who spontaneously revert to sinus rhythm. Spontaneous conversions often occur in the first week of the arrhythmia (2). In a group with a median duration in excess of 1 month, inclusion of spontaneous convertors with pharmacologic converters may bias the data in favor of the latter because, as the authors point out, a duration of AF <7 to 14 days has been previously shown to be associated with better postconversion atrial recovery. Indeed, reference to Table 1 indicates that almost twice as many patients in the nonelectrical converter group had an arrhythmia duration <28 days—a difference that fails to reach statistical significance only on the basis of the very small numbers in the former group.

The arbitrary division of AF duration into those with a duration <28 or >28 days is also problematic. Because previous studies have demonstrated that an AF duration <14 days is associated with less depression of postreversion A wave height (3), the authors should have analyzed the effects of a shorter arrhythmia duration on A wave recovery. Indeed, the use of AF duration as a continuous, rather than a dichotomous, variable would have better elucidated the role of duration of AF on atrial function.

Multivariate analysis is generally accepted as the "gold" standard in determining whether a variable is truly associated with an outcome. When adjusted for several other clinical variables (AF duration, left atrial size and ejection fraction), the authors state that the mode of cardioversion was not associated with recovery of atrial electromechanical function, yet they seem to ignore this finding and conclude from "bivariate analysis" that "only the mode of cardioversion was seen to have any impact on the recovery of atrial function."

Finally, it is in our opinion, inaccurate to categorize this study as a comparison between patients undergoing either pharmacologic or electrical cardioversion. Presumably, many of the patients who subsequently underwent electrical cardioversion had been prescribed an antiarrhythmic agent either in an attempt to convert the arrhythmia or to maintain sinus rhythm after cardioversion. If this is so, then the study is predominantly a comparison of patients who responded to pharmacologic agents with those in whom pharmacologic conversion failed. Seen in this light, attributing postreversion atrial stunning to the mode of reversion is inaccurate.

Whether pharmacologic cardioversion of AF produces less atrial mechanical dysfunction than electrical cardioversion is an interesting question that may have some bearing on postconversion risk of thrombus formation. However, the answer to this question will require a randomized trial of immediate, drug-free electrical conversion compared with pharmacologic conversion. Failure to convert, either electrically or pharmacologically, will have to be treated as failure to recover mechanical atrial function. To retain a high likelihood of pharmacologic conversion, entry should probably be limited to those patients with a short (<7 or <14 days) arrhythmia duration. Only the results of such a study can give meaningful answers to the question of whether the atrium really cares how sinus rhythm is restored (4).

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Reply

We agree with Falk and colleagues that a randomized trial of electrical versus pharmacologic cardioversion would be the best way to assess the impact of mode of cardioversion on postcardioversion atrial mechanical dysfunction. Although our study (1) was not a randomized trial, it represents the only attempt so far to address this issue after multivariate adjustment for other clinical variables that could potentially influence postcardioversion atrial function. Of all the variables tested, only the mode of cardioversion was seen to have any influence on the recovery of atrial function. It is noteworthy that the delay in mechanical recovery of atrial function that was associated with electrical (vs. nonelectrical) cardioversion was significant after adjustment for pa-