Reply

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high RF energy, as performed by the investigators (1), could result in charring and ineffective lesions. No data were reported on important parameters including tip orientation, temperature, RF energy, and impedance values before and at the time of charring formation. We presume that parameters and potential changes were collected throughout, but surprisingly were not reported precluding any possible interpretation and discussion to explain why charring formation and ineffective lesions were so frequent in their experience. We know that even a single RF application of long duration by a soft magnetic catheter requires an accurate and continuous monitoring of all parameters to evaluate potential changes to prevent catheter tip charring. Remote ablation is a novel and simple system, but at the beginning, it may be complex because it is totally different from the conventional system. Optimization of RF application by this system is crucial and may be challenging at the beginning, requiring a learning curve. However, once familiarized with this system, "effective" remote ablation can be easily performed. Currently, in our laboratory, "joystick" ablation is performed by many electrophysiologists after widely different learning curves. In our pilot study, we specified that remote ablation was performed by a single expert operator after his learning curve. How many of the 20 reported investigators (1) actually performed the initial 48 procedures and how many the final ones? It is surprising that remote ablation was demonstrated to be safe and effective in eliminating even left-sided accessory pathways and not atrial potentials. On the other hand, it is well known that prolonged RF applications can result in charring even with manual catheters. It seems that the purpose of that study was to limit the enthusiasm of preliminary encouraging results of joystick ablation. However, this will not delay robotic development because irrigated-tip magnetic catheters are already available, making remote procedures less challenging.

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Reply

We thank Drs. Pappone and Santinelli for their interest in our paper (1).

Overall, our study (1) demonstrated that remote magnetic navigation is feasible and safe for mapping in the left atrium. Our major concern was limited to the use of the 4-mm catheter tip (the only one available at the time of the study) which, in our experience, was unable to create effective lesions to achieve complete electrical isolation of the pulmonary vein antrum; in addition, ablation with this catheter was associated with charring in a large number of patients (1).

Regarding the specific questions contained in their letter, our reply follows.

In the first 48 cases (considered the learning curve), we did not perform ablation. These cases were used to practice mapping and navigation in the left atrium and no radiofrequency energy was delivered.

Two of the 20 authors performed all the procedures in the learning curve group and subsequently performed the ablation procedures in the 45 patients who were the object of the study.

As far as the alignment of the catheter tip and the abatement of the atrial potentials are concerned, it is well established (2) that reduction of local electrograms does not necessarily reflect the transmurality of the lesions. In addition, in our experience, the soft tip did not appear to increase the ability to position the catheter parallel to the tissue plane. However, regardless of the catheter orientation, lesion formation should follow the same biophysical principles. Indeed, previous experimental data show that the time to steady-state tissue temperature during radiofrequency catheter ablation is approximately 60 to 90 s (3,4).

In the patients undergoing ablation, the duration and maximum power were reduced from 60 to 45 s and from 50 to 40 W once charring was observed. This did not abolish charring, which was observed even after a few seconds of energy delivery.

The setting parameters during catheter ablation were clearly reported in the Methods section. Similarly, we mentioned that to prevent charring, we tried to reduce lesions duration and maximum power, and realized, by monitoring with intracardiac echo, which was not used in the Pappone et al. (5) study, that charring can form within a few seconds and most of the time it is not associated with any change in impedance. On average, there was no difference in delivery settings between lesions with and without charring. Besides direct visualization of the charring with intracardiac echo, the only indirect clue observed at times was a sudden drop of the delivered power.

Our results were shared and endorsed in the editorial of Lindsay (6), who appeared to have experienced similar problems. In this respect, even ablation of left side pathways has been associated with a wide range of success (from 67% to 92%) based on the catheter design (7).

We do not share the conclusions of Drs. Pappone and Santinelli that our study "limits the enthusiasm of preliminary encouraging results of joystick ablation" with magnetic navigation. We are enthusiastic about remote catheter ablation. We are currently using the new 8-mm catheter tip and are waiting for the development of the irrigated cool tip catheter, because we are sure that it will improve the results.

On the other hand, we do not understand why Drs. Pappone and Santinelli are so eager to use the new cool tip catheter considering that they had no problems with the standard 4-mm catheter tip. It is ironic that they consider the irrigated tip catheter important in moving this technology forward.

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Right Ventricular Asynergy as a Prognosticator

Bangalore et al. (1) looked at the prognostic value of right ventricular (RV) asynergy during routine stress echocardiography in patients with known or suspected coronary artery disease and concluded that an abnormal RV can further stratify risk and prognosticate the results. We have 2 concerns with the study. 1) Rest- or stress-induced RV dysfunction and enlargement could also be from primary or secondary pulmonary hypertension apart from coronary artery disease. The investigators did not give any information on chronic obstructive pulmonary disease prevalence in this cohort, which could be a confounding variable and could have an impact on survival. 2) Regional stress-induced RV dysfunction (McConnell sign) (2) is also seen in acute pulmonary embolism apart from RV infarction. Ramanath et al. (3) reported a case of pulmonary embolism that was detected in a patient with a normal resting echocardiogram but a markedly abnormal post-treadmill exercise echocardiogram revealing RV dilatation from a pulmonary embolism. Again, Bangalore et al. (1) did not comment on any risk factors for pulmonary embolism in these patients that could have an impact on survival.

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Reply

We thank Drs. Punnam and Dhoble for their interest in our paper (1) and agree with their comments about the nonischemic causes of right ventricular (RV) asynergy, for example, primary or secondary pulmonary hypertension and pulmonary embolism. However, in our series of 2,703 patients with a mean age of 63 ± 12 years the incidence of primary pulmonary hypertension and pulmonary embolism is low in this cohort of patients referred for stress echocardiography. We do not, however, have the data for either pulmonary hypertension or for pulmonary embolism. Most of the RV wall motion abnormalities were accompanied by left ventricular (LV) wall motion abnormalities, thus decreasing the likelihood of a noncoronary artery disease etiology.

Because smoking is a major risk factor for chronic obstructive pulmonary disease, we reanalyzed the data in nonsmokers. Among the 1,806 nonsmokers, stress RV wall motion score index was able to effectively risk-stratify a normal versus abnormal subgroup (event rates 0.0%/year vs. 11.7%/year; $p = 0.006$), similar to the main results. When stress LV wall motion analysis was also taken into consideration, RV wall motion analysis was able to further risk-stratify

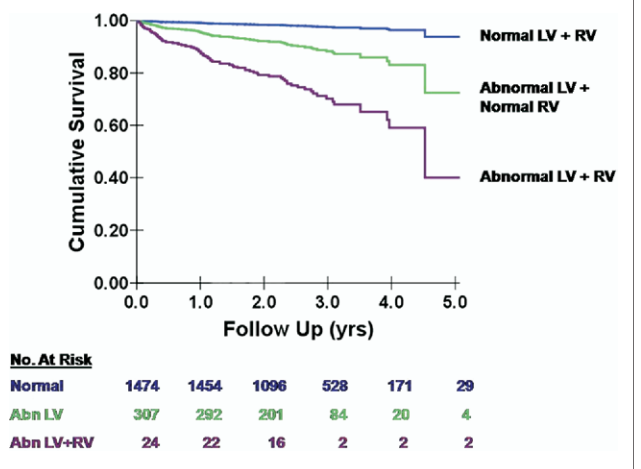

Figure 1 **Event-Free Survival as a Function of LV and RV Stress Echocardiography Results in Nonsmokers**

The number of patients at risk for each follow-up period is given **below the graph**. Right ventricular (RV) wall motion analysis during stress further risk stratified the results of stress echocardiography on the basis of the left ventricle (LV). Patients with both an abnormal RV and LV had the worst prognosis. Abn = abnormal.

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