esophagus (around 3–5 mm) and a thickness of the myocardium of the posterior atrial wall of around 2 to 3 mm.^{2,3} It is thus difficult to obtain valid conclusions with such variations in the endocardium-esophagus distance. Computer simulations using the finite-element method have suggested that the most important factor in esophageal lesions is precisely this distance.⁴ In the simulation in which the total distance between the endocardium and the esophagus was fixed, neither variations in the thickness of the linking tissues nor in the thermoelectrical properties had an effect on the thermal pattern.

Regarding the temperature measurement in the esophageal lumen, variations were not found in any case. This result is fairly surprising because there were cases of severe esophageal damage. With regard to this, although temperature monitoring had been proposed as a control method for esophageal lesions during radiofrequency catheter ablation, recent studies have questioned this strategy. Meade and associates⁵ showed experimentally that the esophageal temperature failed to increase when the sensors were positioned more than 1.3 cm apart. Effective measuring of the esophageal temperature depends on the position of the temperature probe relative to the heated cardiac tissue and also on good contact with the esophageal mucosa. Therefore the temperature probe, which is advanced under fluoroscopic guidance, should be placed in the optimum position at the level of the ablation lesion. Previous computer results have shown that it is possible to underestimate the maximal temperature reached in the esophagus when the temperature probe is not located exactly under the center of the electrode and on the same plane.⁶ This could explain the results obtained by Aupperle and colleagues.¹

The study concludes that marked lesion were principally induced by endocardial unipolar radiofrequency. In fact, these lesions were small but reached deep into the tissue. It is possible that this conclusion was reached as a result of the higher capability of the irrigated electrodes (bipolar or unipolar) to shift the location of the hottest point toward a deeper zone compared with the case of dry electrodes (bipolar or unipolar).

Finally, it is important to point out that although the acute inflammatory reaction in the lesion caused by cryoablation can be

comparable with those created by hyperthermia, it is well known that the lesion is ultrastructurally different and reaches different characteristics in the chronic phase.⁷ We do not think that the degree of tissue damage in the hyperthermic lesion is similar to that of the hypothermic lesion, even though both have a similar acute inflammatory reaction from a light microscopy level. Although the esophageal inflammatory reaction described in this study implies a thermal lesion, its clinical outcome is uncertain in the cryoablation case and probably different than those created by the ablation systems based on hyperthermia.

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Reply to the Editor:

We have reviewed the letter to the editor from Hornero and Berjano, who presented some comments and questions on our paper.¹ The first points on which they remarked were the definite distance between the esophagus and the atrium in the sheep model, as well as the thickness of the ovine left atrial wall. The model we used has been established and controlled by magnetic resonance imaging.¹ The distance between the esophagus and the atrium (4 mm) showed minimal individual differences (LIT2) and is not responsible for the differences between the groups. As described by Aupperle et al.,² the thickness of the atrial wall in the investigated sheep was 3.2+/-0.8 mm,² and variations of the thickness did not correlate with the effectiveness of atrial ablation.^{2,4,5}

Temperature measurement in the esophageal lumen was controlled by palpation to confirm the correct position of the tube, which had several measurement points.¹ The inner mucosal layer was not affected in any case, which makes an incorrect measurement more unlikely but confirms the thesis that the temperature inside the esophageal lumen did not increase. Furthermore, we discussed that the animals' body temperature was decreased (32°C) by the application of endocardial techniques,¹ probably leading to a protection of the tissue.

Clinical reports of human patients described cases of esophageal lesions after atrial ablation after unipolar radiofrequency.³ These clinical data corresponded well to our findings, that the risk of esophageal lesions in the sheep model was highest after application of endocardial unipolar radiofrequency. The results of the histomorphologic investigations of the ablated hearts in that study² showed that endocardial unipolar radiofrequency and cryoablation resulted in sharply demarcated transmural necrosis of the atrial tissue, which did not lead to severe thrombosis. In contrast, laser and microwave energy induced wide non-demarcated transmural lesions and severe thrombosis.

We agree that hypothermically and hyperthermically induced lesions depend on different pathomechanisms,⁴ however, in our experiment involving acute lesions, we only could speculate about variations in subsequent wound healing processes. We think that the esophageal lesions, although

small, reflect the early stages and the pathogenesis of fatal human cases.

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Use of autologous adult stem cell for treatment of congestive heart failure To the Editor:

I read the article by Patel entitled "Surgical treatment for congestive heart failure with autologous adult stem cell transplantation: A prospective randomized study" with great interest.¹⁻⁴ Clearly the authors have demonstrated the effectiveness of injected autologous bone marrow stem cells to improve the functional capacity of the failing heart.³⁻⁵ In this clinical study they had the opportunity to take biopsy specimens of myocardium at the injection sites, but the nature of the cell findings are not reported.

Did the biopsy specimens show the CD34 marker?

Because no information is available in regard to the presence of fibroblasts or scar tissue, would it be possible that these tissues are transforming through dedifferentiation into myocardial tissue instead of stem cell transformation? The implication of this concept will allow investigators to concen-

trate more on the transduction signal pathway rather than stem cells alone.

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Positron emission tomographic scanning in the diagnosis and staging of non-small cell lung cancer 2 cm in size or less To the Editor:

We read with interest the publication by Port and colleagues.¹ In fact, there is little information in the literature on the role of positron emission tomography (PET) in assessing lung lesions of this size range for malignancy, and well-defined studies are needed. However, the current publication has several shortcomings.

Most importantly, standard uptake value (SUV) should not have been used to assess the lung lesions for malignancy. SUV is a semiquantitative measure of the tracer uptake in the region of interest, which normalizes the lesion activity to the injected dose and body weight; SUV does not have a unit. Despite initial enthusiasm, it is generally accepted that SUV should not be used to differentiate malignant from benign processes and that the visual interpretation of PET studies by an experienced reader provides the highest accuracy in diagnosing malignancy.²⁻⁵ There are many factors influencing the calculation of SUV, such as

the body weight and composition, the time between tracer injection and image acquisition, the spatial resolution of the PET scanner, and the image reconstruction algorithm. The clinical role of SUV in therapy monitoring and as a measure of tumor aggressiveness is currently under investigation.

Furthermore, the intensity of malignant lesions on PET is influenced by the location in the body. During PET acquisition, which takes several minutes, lung lesions move up and down, and their effective acquisition time is reduced. Therefore the fluorodeoxyglucose avidity of small lung lesions is often underestimated. Consequently, it is justified to use a "sensitive reading" and consider tumors of mild intensity to be malignant, although this likely reduces the specificity. Additionally, the non-attenuation-corrected (NAC) images should be reviewed while dealing with small lung lesions. Considering the mildly intense appearance of small malignant lung lesions on PET, it is reasonable to use the NAC images and compare the tumor uptake with the surrounding normal lung tissue and not with the mediastinal blood pool activity, as is the case while reading the attenuation-corrected (AC) images. Although large and markedly intense malignant foci would likely be recognized on both NAC and AC images, this might not be the case for small foci. Also, the pathophysiologic basis of fluorodeoxyglucose PET rests on increased expression of Glut, upregulation of hexokinase activity, and downregulation of glucose-6-phosphatase activity in the cancer cells compared with the normal cells of the same organ, the lung in this case.

In our experience PET can be very helpful in detecting malignancy in lung lesions measuring 6 to 10 mm, provided the images are read with attention to the issues mentioned (NAC images, sensitive reading, and avoidance of SUV thresholds). Sensitivity and specificity of PET for detecting malignancy in small lung lesions (6-10 mm) is currently being evaluated by us in an ongoing prospective study.

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