

## DIOCLES: Some Caveats and New Questions. Response



### DIOCLES: algunos matices y nuevas preguntas. Respuesta

#### To the Editor,

On behalf of the Scientific Committee and researchers of the DIOCLES registry,<sup>1</sup> we wish to thank Rosell-Ortiz et al for their letter and their interest in our study. The results are certainly promising in that they show a decrease in the in-hospital and 6-month mortality rates among patients with acute coronary syndrome (ACS) with respect to that recorded in the MASCARA study, the most recent large registry carried out in Spain,<sup>2</sup> and are in accordance with the progressive reduction in mortality due to ST-segment elevation acute myocardial infarction (STEMI) observed over the past 20 years. Undoubtedly, a number of factors have influenced this reduction, and the development of out-of-hospital emergency services is probably not the least important of them. Closely related to the latter aspect is the progressive incorporation of protocol-based networks for the management of patients with STEMI, in which prehospital care plays a major role.<sup>4,5</sup> We agree with the authors of the letter in that the overall mortality occurring during the acute phase of STEMI is higher than the 6.6% recorded in our study,<sup>1</sup> as this value does not take into account prehospital mortality, both to ensure coherence for comparison with previous registries<sup>2,3</sup> and because it is very difficult to reliably estimate its incidence.

We did not examine the possible differences in mortality in the overall group of ACS patients or specifically in those who also had STEMI in terms of the level of care provided by hospitals or the Spanish autonomous community, aspects of unquestionable interest.<sup>6</sup> We will attempt to analyze the data from the DIOCLES registry in this respect, but the relatively small size of the population, especially in the subgroup with STEMI, will probably make it impossible to draw firm conclusions. In this subgroup, the overall management strategy applied is almost certainly more relevant than the technological level of the treatment hospital. Extensive evidence indicates that the development of efficient regional networks to care for patients with STEMI, and that include both primary percutaneous coronary intervention and a pharmacoinvasive strategy when this intervention cannot be performed promptly, improves the percentage of reperfused patients and decreases infarction-related mortality. It was not our objective (nor is the sample size large enough) to compare the mortality rate of the patients initially treated with thrombolysis with that of those whose initial treatment was primary percutaneous coronary intervention. In any case, the results of the DIOCLES registry show that, in Spain, there is margin for improvement in the application

of both reperfusion strategies.<sup>1</sup> As is logical, care provided by an out-of-hospital emergency service was associated with a more frequent use of prehospital thrombolysis (48%), especially if the treatment was administered in a fully-equipped ambulance (56%). However, even in this setting, a significant number of patients underwent thrombolysis in the hospital.

The DIOCLES data coincide with those of previous studies<sup>2</sup> in that the patients with unclassified ACS constitute the subgroup at highest risk, and we consider the attempt to identify the determinants of this greater risk, especially the modifiable factors, to be highly relevant. We appreciate the proposal of Rosell-Ortiz et al to carry out an in-depth analysis of the data in this respect.

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## Comments on Exercise Echocardiography and Multidetector Computed Tomography for the Evaluation of Acute Chest Pain



### Comentarios a la evaluación del dolor torácico agudo mediante ecocardiografía de ejercicio y tomografía computarizada multidetectores

#### To the Editor,

I have read the article published by the group at the *Hospital Clínic de Barcelona*<sup>1</sup> with great interest, and would like to congratulate the authors publicly on their outstanding research endeavor.

Nonetheless, although the authors recommend “a balanced strategy” combining both techniques, in my reading of the article I detect an underlying conflict between them, and would like to make some comments related to this. These comments are intended in no way to diminish the authors’ extraordinary work, but rather to present “the current value” of computed tomography (CT).

- A limitation not mentioned by the authors is the long time elapsed between the conduct of the study and its publication. It may be that the intervening 6 years have brought no changes in exercise echocardiography and that older results thus remain applicable in 2014; however, developments in multidetector computed tomography (MDCT) during this period have been truly spectacular and exponential. Besides improved spatial and

temporal resolution and reduced radiation doses, these developments include the introduction of complementary explorations for the detection of ischemia (perfusion, noninvasive determination of functional repercussion of stenosis, etc.). These advances have made MDCT one of the most sensitive and specific methods for ruling out significant coronary artery disease, second only to invasive coronary angiography. The noninvasive nature of MDCT moreover brings added benefits, including the detection of subclinical coronary artery disease,<sup>2</sup> the potential to characterize high-risk plaques, and prognostic value.

2. Technical considerations. The diagnostic performance of MDCT could have been improved with an optimized spatial resolution of the reconstructions, achievable by modifying the slice thickness, the between-slice increase and filters as described by other authors<sup>3</sup> working with exactly the same type of scanner. Additionally, given the mean body surface area observed in the study population (although the benchmark parameter in cardiac CT is body-mass index), a tube potential of 100 kV would have improved luminal contrast in the coronary arteries, thereby facilitating image interpretation and exponentially reduces the radiation dose. Such dose reductions are line with Society of Cardiovascular Computed Tomography guidelines, which recommend the establishment of quality assurance procedures to meet the following objectives: sufficient diagnostic quality in  $\geq 95\%$  of scans, a demonstrable diagnostic accuracy at least 75% that of invasive coronary angiography, and a mean radiation dose at the reference level (12 mSv according to the most recent guidelines).<sup>4</sup> Today, with a careful acquisition protocol and the latest scanners, doses are normally in the region of 1–2 mSv or even lower, well below the 7–10 mSv in invasive coronary angiography and the 8–10 mSv in isotope studies with gamma radiation, demonstrated to be more harmful than X rays.
3. Methodological considerations. An Agatston score  $> 400$  is not equivalent to the detection of significant coronary artery disease by MDCT because this threshold drags down the specificity of the method, with 20% of patients with this score having no disease.<sup>5</sup> The authors' statement in the Discussion that "MDCT has low diagnostic specificity" seems to me to be inappropriate. What limits specificity is setting the significance threshold at  $\geq 50\%$  when the "reference pattern" is  $\geq 70\%$  for invasive coronary angiography (luminogram) and MDCT is based on this same "luminogram", with the advantage of assessing the coronary wall. The  $\geq 50\%$  significance threshold was established

in the cited study by Hoffmann, in which final cost-effectiveness did not reach statistical significance. In contrast, the Goldstein study, using a significance threshold of  $\geq 70\%$ , showed a significantly positive cost-effectiveness for MDCT (\$2137 for MDCT compared with \$3458 for standard;  $P < .0001$ ).

The major scientific societies now accept the diagnostic value of both techniques and their complementary nature, especially in non-diagnostic MDCT studies and studies that indirectly evaluate the functional repercussion of intermediate or limiting stenosis, an evaluation achieved directly with pressure guides in invasive coronary angiography.

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#### To the Editor,

We would like to thank Dr Catalán for her comments and to clarify certain points.

Although major technological progress has been made in cardiac multidetector computed tomography (MDCT) since 2008 when the above-mentioned study was started, it is important to recognize that both the myocardial perfusion study and the recent evaluation of functional repercussion using MDCT discussed by Dr Catalán are emerging techniques that are not included in

clinical practice guidelines.<sup>1</sup> Noninvasive estimation of the coronary reserve flow using MDCT, whose analysis is still not widely available, could be promising in the future, but its diagnostic value in addition to MDCT angiography is still to be determined for acute chest pain.

Dr Catalán states that the results could have been improved by a different image reconstruction according to the study by Rixe et al.<sup>2</sup> The device used in our study provides a rotation time of 370 ms, inferior to the 330 ms used by Rixe et al. To compensate for the loss of sharpness of the coronary lumen, we used 0.7 mm slices and 0.4 mm increments instead of the  $0.6 \times 0.3$  mm suggested by Rixe et al, resulting from the tests performed and consensus among 3 observers. For the same reasons, a tube current of 120 kV was maintained, similar to that used by Rixe et al, instead of the suggested 100 kV.

Our article acknowledges the specificity of MDCT was affected by the 50% stenosis cut-off value, which is why we conducted another analysis at 70%, producing a considerable improvement in