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Progressive damage on high-resolution computed tomography

To the Editors:

We were interested to read the article by DE JONG *et al*. [1]. We are writing to you following enquiries by a number of clinical colleagues who have expressed concerns regarding the regular use of a high-dose technique (*i.e.* high-resolution computed tomography) with groups of young patients and the implications for the substantial radiation doses that may result.

The clinical potential of the procedure has, we are sure, been clearly shown. However, given the very high radiation doses involved and the young age of these patients, there is concern that relatively little information had been given to allow adequate justification of this procedure, in accordance with the relevant European directive [2], which concerns the health protection of individuals against the dangers of ionising radiation in relation to medical exposures.

We would be interested to hear the authors′ views, and, in particular, whether they are able to provide any information to allow a formal risk–benefit analysis to be carried out.

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From the authors:

We thank D. Rawlings and colleagues for their highly relevant question. Our study [1] was performed to compare high-resolution computed tomography (HRCT) with lung function in the assessment of disease progression in cystic fibrosis (CF). It was beyond the scope of this paper to evaluate the complex question of radiation risk *versus* clinical benefit of HRCT in these patients. Determining the risk–benefit profile of HRCT in CF patients is currently a research topic of high priority in our group. At this time, we believe that the use of HRCT in CF patients is consistent with the 1997 European directive [2]. In 1996, we reviewed the literature and performed a systematic review of our chest radiograph results; we concluded that routine chest radiographs were insensitive, and, due to variable techniques, we were unable to provide valid objective data on disease progression. As such, yearly bilateral chest radiographs were exposing patients to unnecessary radiation exposure. In addition, we and others concluded that lung function testing underestimated the severity and progression of lung disease in many CF patients. The question at that time was whether we should stop doing routine chest radiographs or introduce an examination that was undeniably more sensitive, but which provided greater radiation exposure, *i.e.* HRCT. Simply eliminating chest imaging would have left us unable to assess disease progression, which we believed was clinically unacceptable. CF-related lung disease results in a substantial reduction in life expectancy, substantial morbidity and requires the use of aggressive, potentially toxic and expensive therapies. For this reason, enhanced monitoring of disease progression was considered essential. In close collaboration with our radiology department, we designed the monitoring protocol that we have reported [1].

We have found that HRCT findings have allowed us to accurately estimate disease severity and tailor treatment. This conclusion has been confirmed by the retrospective analysis described in our publication [1]. We are currently extending this study with longer-term evaluation of our patients. In addition, we have compared our results to those in a cohort from a Swedish CF centre (Queen Silvia Children′s Hospital, Gothenburg, Sweden) that has used a similar HRCT routine since 1997. Preliminary results from this centre are in agreement with the results we have published in the *European Respiratory Journal* [1].

We agree with D. Rawlings and colleagues that we should aim for the minimal possible radiation exposure that provides acceptable diagnostic information. Recent improvements in scanner technology have allowed us to reduce the radiation dose to one-tenth of our initial protocol with no substantial decrease in image quality. We believe it is likely that further scanner technical advances will allow further reduction in computed tomography radiation dose.

This response is not meant to suggest that we negate the potential risk of regular high-resolution computed tomography in cystic fibrosis children. The risk–benefit ratio for early and regular high-resolution computed tomography