

Pre-operative evaluation of lung function test results

To the Editors:

The European Respiratory Society/European Society of Thoracic Surgeons joint clinical guidelines on fitness for radical therapy in lung cancer patients (surgery and chemo-radiotherapy) were published in the July 2009 issue of the *European Respiratory Journal* [1]. This comprehensive and very important document provides guidelines for the risk evaluation of candidates for lung cancer surgery. We fully agree that the lung function variables forced expiratory volume in 1 s (FEV₁) and diffusing capacity of the lung for carbon monoxide (DL_{CO}), together with exercise capacity, are essential components in the risk stratification. We do not, however, agree on the recommended interpretation and evaluation of the test results. In the guidelines, lung function results are evaluated as customary in terms of percent of predicted normal values, *i.e.* corrected for sex, age, height and, for some variables, also weight (exercise test) [1]. In our opinion, the correction for age is inappropriate when estimating peri-operative risk. This is because expressing lung function results in percent of predicted normal values results in ignorance of the normal age-related decline in lung function and exercise capacity. The guidelines recommend a post-operative predicted FEV₁ value of 30% predicted to be a high-risk threshold. 30% pred normal FEV₁ for a 70-yr-old male with a height of 178 cm is 0.9 L compared with 1.3 L for a male of the same height aged 25 yrs [2]. Thus, according to the recommendations, the high-risk threshold regarding FEV₁ is 0.9 L for a 70-yr-old patient but 1.3 L for the 25 yr old! There are of course similar consequences regarding DL_{CO} and exercise capacity.

One of several possible ways to deal with this problem is to express results of lung function tests and exercise tests of adults as percent of predicted normal at age 25 yrs (% pred_{25yrs}) irrespective of the actual age. In the example above regarding the 70-yr-old patient, the guideline recommended high-risk threshold of post-operative predicted 30% pred corresponds to 0.9 L, which is equivalent to a post-operative predicted value of ~20% pred_{25yrs}. Thus, we suggest the high-risk threshold to be 20% pred_{25yrs} for FEV₁, DL_{CO} and exercise capacity.

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From the authors:

We read with interest the correspondence by B. Houltz and co-workers in which they comment on the recently suggested update of an algorithm for the functional assessment before lung resection, which forms part of the European Respiratory Society (ERS)/European Society of Thoracic Surgeons (ESTS) clinical guidelines on fitness for radical therapy in lung cancer patients (surgery and chemo-radiotherapy) [1]. This algorithm, originally proposed in 1998 [2], is based on four key parameters: 1) a cardiac evaluation according to time-honoured principles well-known in the cardiology literature (ECG, stress ECG, *etc.*); 2) a pulmonary evaluation with assessment of pulmonary mechanics using spirometry (forced expiratory volume in 1 s; FEV₁); 3) a pulmonary evaluation with assessment of gas exchange using the diffusing capacity of the lung for carbon monoxide (DL_{CO}); and 4) for patients who do not qualify/disqualify for a given amount of resection after these initial tests, a combined cardio-pulmonary exercise test with the determination of peak oxygen uptake ($V'O_{2,peak}$) is proposed. While B. Houltz and co-workers agree with all parameters used in the algorithm, they query the use of percent of predicted values for the variable age, while not contesting them for sex, height and weight. They argue that correction for age is inappropriate as the normal age-related decline in lung function and exercise capacity is ignored. Interestingly, we do not ignore this decline; on the contrary, this decline is used in order not to rule out older people from resections simply because their absolute values for a given parameter have declined. To use the example given by B. Houltz and co-workers: the new lowest cut-off for safe resection of pulmonary tissue proposed by the ERS/ESTS Task Force is 30% post-operative predicted (ppo) for FEV₁ and DL_{CO}, which for the 70-yr-old male would amount to 0.9 L for FEV₁ [3]. If this male was aged 25 yrs 0.9 L would only be 20% of predicted, therefore, B. Houltz and co-workers argue that 20% ppo adjusted for 25 yrs be used for all ages for FEV₁, and also for DL_{CO} and $V'O_{2,peak}$.

This suggestion implies that irrespective of age one needs a certain absolute value and, therefore, younger people could have a lower functional reserve when expressed in predicted values. Although this suggestion sounds interesting, we would definitely like to caution against its use. First, we are not aware of any published data supporting this view and secondly lowering the ppo values for FEV₁ and DL_{CO} from the original 40% suggested in 1998 [2] to 30% [1] is a major step and needs prospective validation in larger studies. The suggested lowering of this cut-off value to 20% adjusted for 25 yrs of age may