recovery data in CPET analysis [4]. The presence of such a discrepancy would be beneficial for further restratification of patients.

Nevertheless, a correlation between parameters during exercise and recovery is present in most cases. As summarised in the American College of Cardiology/American Heart Association Guidelines [3], impaired oxygen uptake ($\dot{V}O_2$) kinetics during recovery correlate strongly with exercise tolerance, peak $\dot{V}O_2$ ($\dot{V}O_{2peak}$) and cardiac index in congestive heart failure (CHF) patients. Diagnostic and prognostic importance have been well demonstrated for several parameters, namely $\dot{V}O_2$ kinetics [3], heart rate recovery (HRR) [3, 5], blood pressure response [3], ventricular ectopy [6] and ST changes from exercise recovery [3], in various diseases including CHF and chronic obstructive pulmonary disease. Information from the exercise recovery phase could support the interpretation of CPET results from submaximal exercise where poor effort or malinering are suspected.

Except for objective measurements during CPET, additional valuable information is gained from the continuous monitoring of patients' symptoms [7]. We believe that the dynamics of symptoms during the recovery period provides supplementary information about functional severity of diseases and worsened quality of life.

The sensitivity of the recovery phase to training, traditionally applied in the assessment of athletes' training programmes and recently documented in several state-of-the-art publications [4, 8], implies a possible use in the evaluation of various exercise training programmes.

The main recovery period parameters ($\dot{V}O_2$, carbon dioxide production and minute ventilation) fit exponential decay curves and are, therefore, best described by means of time-delays and time-constants; these demand mathematical analysis and, consequently, are not easy to apply in every-day practice. Fortunately, several simple derivatives exist, including HRR, $\dot{V}O_{2peak}/\dot{V}O_2$ recovery at the 5th minute, time to reach 50% of $\dot{V}O_{2peak}$ and respiratory exchange ratio dynamics, and have been proven to be informative [3, 5, 9, 10].

On careful analysis of the literature and our own experience, we believe that even though accessory, recovery parameters (including dynamics of symptoms) are quite informative and should be considered in the evaluation of CPET results, especially in patients prevented from achieving maximal effort criteria, those in rehabilitation programmes and for precise patient restratification.

We are eager to initiate discussion on the utility of the exercise recovery phase in different exercise tests.

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STATEMENT OF INTEREST

None declared.

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DOI: 10.1183/09031936.00016707

From the authors:

We thank S. Kostianev and co-workers for their comments relating to the recent European Respiratory Society Task Force document [1]. In contrast to the attention given to the utility of

recovery indices in athletic populations, there has been little systematic analysis of the recovery phase in a clinical context, with the few existing studies being mostly in patients with chronic heart failure [2–4]. This apart, it is not clear what advantage the inclusion of such indices might provide, particularly in prognostic evaluation and in the evaluation of therapeutic interventions. This lack of a critical mass of experimental data is the main reason why the recovery issue was not addressed in the 2007 Task Force document, which was intended to provide “the evidence-based indications to the use of exercise testing in clinical practice”.

As S. Kostianev and co-workers state, analysis of the recovery phase could well provide additional information related to the metabolic (and also ventilatory and cardiovascular) demands imposed by exercise [5]. While some “new” physiological concepts relating to issues such as pulmonary gas exchange kinetics and the power–duration relationship were included in the online supplement, we nonetheless recognise that the recovery phase in patients with ventilatory and cardiac diseases would benefit from further investigation.

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STATEMENT OF INTEREST

None declared.

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Interferon- γ release assay tests to rule out active tuberculosis

To the Editors:

We read with interest the study by VAN LEEUWEN *et al.* [1] concerning the use of the T-SPOTTM.TB (Oxford Immunotec, Oxford, UK) interferon- γ release assay (IGRA) to rule out the diagnosis of active *Mycobacterium tuberculosis* infection. We disagree, however, with the use of the IGRA tests for ruling out active *M. tuberculosis* infection, especially in immunocompromised subjects. Sensitivity of T-SPOTTM.TB in immunocompromised subjects, although most certainly higher than that of tuberculin skin test (TST), is clearly <100%. The best sensitivities reported for HIV-infected subjects with active tuberculosis (TB) are 90% [2].

A Bayesian analysis of the cases presented illustrates the limitations of relying on IGRA tests to rule out TB [3, 4]. In case A, a young female refugee from Bosnia develops a lingular infiltrate and has acid-fast bacilli (AFB) on examination of bronchoalveolar lavage (BAL). Incidence of TB in Bosnia is 52×10^{-5} [5], almost eight times that of the Netherlands. Clinical presentation is compatible with rapid progression of TB after a recent infection; HIV status is not specified. Reported sensitivity for the T-SPOTTM.TB ranges 83–100% and specificity is in the 96–100% range [6]. We would consider the probability of TB in this case as at least intermediate (0.25–

0.75) or high (>0.75). Post-test probability of TB, if T-SPOTTM.TB is negative, would be 5–34% for a sensitivity of 83% and a specificity of 98%, and 2–13% for a sensitivity of 95%; if the pre-test probability is high, post-test probability increases markedly. In both cases, a negative IGRA test definitely cannot be used to rule out active TB.

Case B is that of an immunosuppressed 54-yr-old subject with an atypical radiological presentation for TB but with AFB on BAL smears. In this case, sensitivity of the T-SPOTTM.TB assay is unknown but is, at best, 90% based on available data in HIV-infected subjects [2]. The same Bayesian approach, for an intermediate pre-test probability (*i.e.* 0.25–0.75), yields a post-test probability of disease, with a negative T-SPOTTM.TB, of 3–23%. In an immunosuppressed individual, these values are too high to rule out active TB and therapeutic decisions must rely on the identification of the organism involved by PCR and cultures.

Cases C and D are also clinical presentations with at least an intermediate probability of *M. tuberculosis* infection. In case C, nonspecified mycobacteria grow on culture media, and, in case D, AFB were found on biological samples; thus the negative T-SPOTTM.TB results in these settings at most suggest the possibility of an alternative diagnosis.