

# The Specific Endurance Tennis Test (SET-Test): Design, Reliability and Validity

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## Introduction

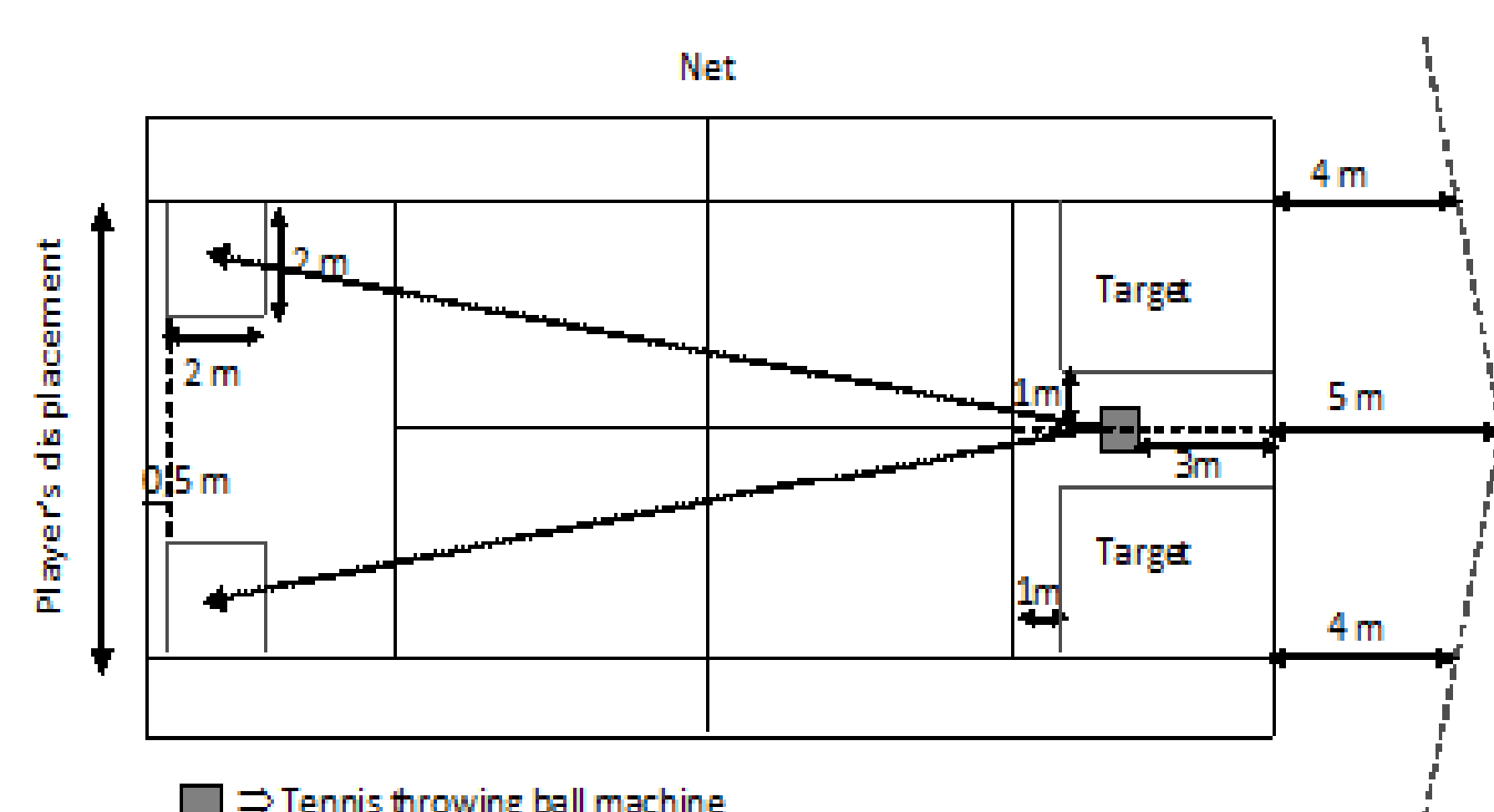
Although tennis is characterized by short efforts of intensive exercise based on a series of acyclic intermittent movements of an explosive and reactive nature, the player needs to maintain all these abilities for a prolonged time. A new procedure to assess tennis specific endurance was evaluated as to its application for testing and research purposes.

## Objectives

To propose a specific endurance field test for tennis that would take into account specific technical and functional aspects of the sport, as well as evaluating their validity and reliability, and to ascertain the main indicators of tennis performance among the physiological, load and technical effectiveness parameters measured by the test.

## Methods

38 trained male tennis players performed a maximal, incremental field test (SET-Test) conducted by a tennis ball throwing machine. 12 players performed the test three times, one with a portable gas analyzer (Cosmed K4b<sup>2</sup>). The test dynamics and reference parameters were adapted from the test used by Smekal et al. (2000). It is a maximal continuous stepped protocol, with loads imposed by a tennis ball throwing machine (Pop - Lob Airmatic 104). The players stood at the end of the court and hit the ball alternatively from right to left and left to right of the court with forehand and backhand volleys and moving laterally from one side to the other.



Schematic set-up for the SET-Test

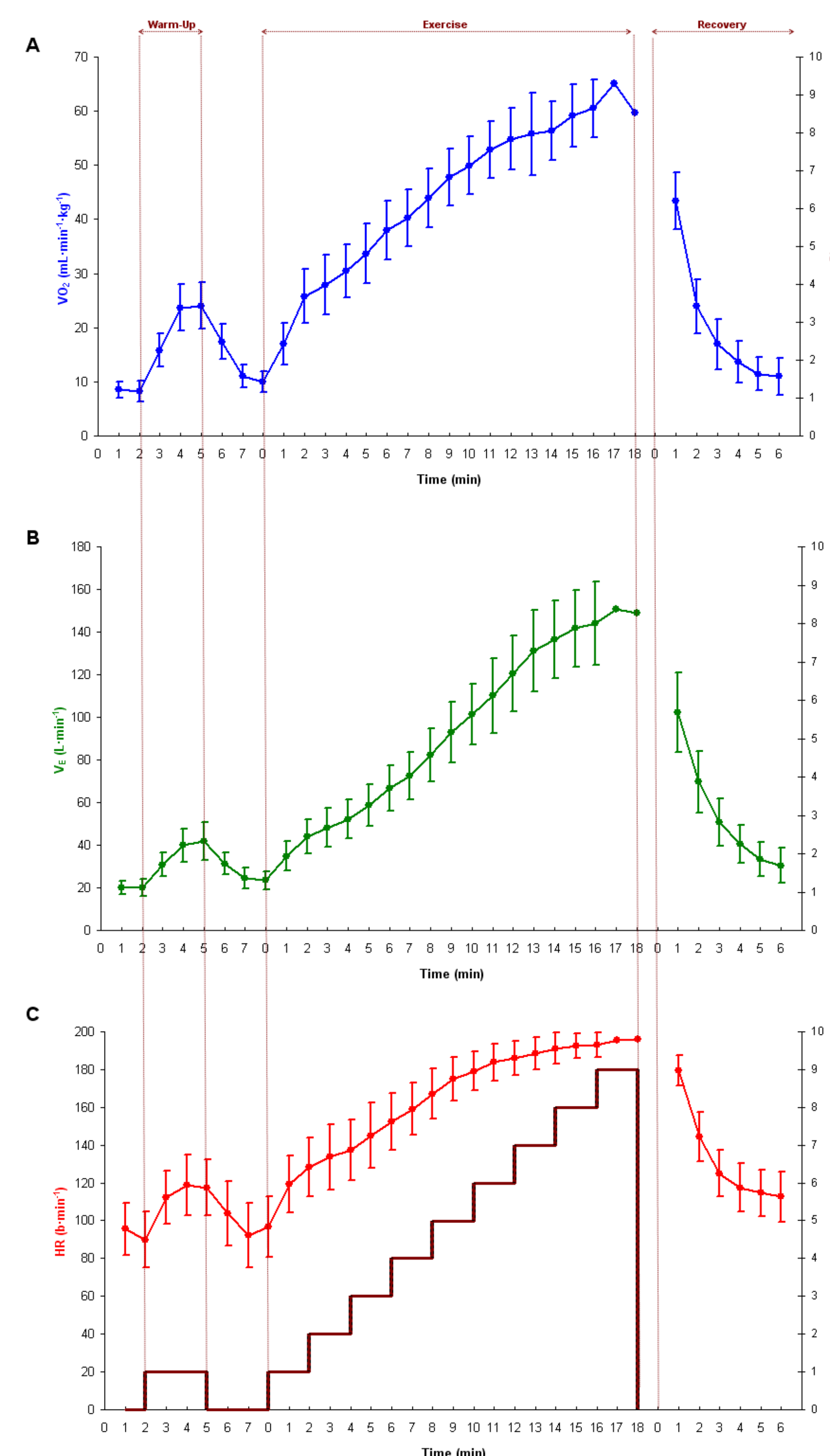
## Results

Test duration was 13:39 ± 01:34 min:s (6.61 ± 0.82 stages); VO<sub>2</sub>max was 57.0 ± 6.0 mL·kg<sup>-1</sup>·min<sup>-1</sup>; technical effectiveness (TE) was 63.1 ± 9.1 % of successful shots. A TE deflection point (TEDP) was observed at stage 5.2 ± 1.1 (79.6 ± 14.6 % of final stage). A heart rate deflection point (HRDP) was observed in 92% of the subjects at an average of 178.6 ± 8.7 beats·min<sup>-1</sup> (92.2 ± 2.7 % of HRmax); HRDP significantly correlated with the second ventilatory threshold (VT2) (r = 0.87, p<0.001). Low to moderate significant correlations (0.35 < r < 0.55, p<0.05) were found between test results and the competitive level of the players. TE together with VT2 and

VO<sub>2</sub>max, respectively, explained 56% and 53% of competitive level. Physiological and load parameters showed good

consistency (HRmax: ICC: 0.91, CV 1.4%; HRDP: 0.87, 2.5%; final stage: 0.85, 2.0%), somewhat higher than

TE parameters (TE: 0.72, 4.7%; TEDP: 0.59, 6.1%). No differences in performance were found when using the portable gas analyzer.



Oxygen uptake (VO<sub>2</sub>), minute ventilation (VE), heart rate (HR), and stage (#) during the SET-Test (n = 38). Mean and SD are depicted. Values are 15-s averages.

## Conclusions

- The SET-Test is an objective, valid, and reliable field test for the assessment of load, physiological, and technical efficiency parameters, allowing estimations of the VT2 in tennis players.
- Performance predictive capacity is moderate according to the multifactorial character of the game.

## References

- Baiget E. Doctoral dissertation. Barcelona: Universitat de Barcelona; 2008.
- Smekal G et al. Int J Sports Med 2000;21(4):242-9.