often imposed with increasing speed), in order to get an idea of the prognosis (prediction of peak VO2) or submaximal at a constant speed or a self-selected comfortable speed (6-minute walk, for example). Submaximal tests are considered as valuable benchmarks for measuring the response to a standardized activity typically encountered in everyday life. This performance evaluation can be performed before and after an intervention (surgery, medication, rehabilitation) in order to assess its effects. It can also help to assess the quality of life and could be a tool to personalize training programs.

Field tests have the advantage of being simple to perform, well tolerated, require few expertise and equipment, and appear well connected with daily activities. However, they have usually a modest correlation with peak VO2, and appear strongly influenced by familiarity and influence the motivation of the subject. The aim of this update is to describe the main walk tests used in the cardiac rehabilitation, their psychometric properties and interests in clinical practice, performed in addition to or instead of maximal stress tests.

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**Are ventilatory treshold and 6-minute walk test heart rates interchangeable?**

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**Keywords:** Cardiac rehabilitation; 6-minute walk test; Ventilatory treshold; Heart rate; Assessment

**Objectives.**– Heart rate (HR) at the ventilatory threshold (VT) remains a benchmark often used in the prescription of exercise intensity in cardiac rehabilitation. Some studies have reported no significant difference between the mean HR at VT and HR measured at the end of the a 6 minutes walk test (6MWT) [1,2]. The aim of this work was to assess the potential equivalence between those parameters with a more appropriate statistical approach.

**Method.**– Three groups of subjects performed a stress test and a 6MWT: 22 healthy elderly subjects (GES, \(7 \pm 3.7\) years), 10 patients in cardiac rehabilitation after a myocardial infarction (GMI, \(53.9 \pm 4.2\) years) and 30 patients with chronic heart failure (GHF, \(63.3 \pm 10\) years). We analyzed the correlation, bias, 95% confidence interval (95% CI) of the bias and the magnitude of the bias between the HR at the end of 6MWT and HR at the ventilatory threshold.

**Results.**– There was no significant difference in the mean HR of 6MWD and at VT in the 3 groups, but the 95% CI was wide (30% for the GES, 15% for GMI, 40% for the GHF). The correlation was moderate for GMI (\(r = 0.78\), and low for GES and GHF (\(r = 0.48\) and 0.55, respectively).

**Conclusion.**– The HR of 6MWT and HR at VT do not appear interchangeable at the individual level in these groups of subjects. To this date, when training prescription aims to target HR at VT, it remains necessary to perform a stress test, or to develop other walk tests after with an exhaustive study of their cardiometabolic requirements.

**References**


**CO06-004-e**

**Validity of the Acti’MET calculator: A new tool for estimating physical activity in cardiac rehabilitation**

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**Keywords:** Validation tool; Physical activity; Energy expenditure; Therapeutic education

**Introduction.**– The Acti’MET calculator was created to provide a quick estimate of weekly energy expenditure, to promote the prescription of personalized Physical Activity (PA) and facilitate support for patients in their practice.

**Objectives.**– To test the reproducibility of this new tool: inter-rater and intra-examiner validity; To study the correlation between the results obtained with the calculator and those obtained with other evaluation methods validated in coronary artery disease: the Dijon Physical Activity Score (SAP) [1] and the six-minute walk test (6MWT).

**Method.**– Nineteen patients (59 ± 10 years) hospitalized for cardiac rehabilitation were successively evaluated with the calculator by two observers (interval of 2 hours). They answered the SAP questionnaire and performed a 6MWT. The same criteria were retested on the 3rd day.

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**Keywords:** Maximal oxygen fitness; Field test; Prediction of maximal oxygen uptake; Aerobic capacity

**Introduction.**– Maximal oxygen uptake (VO2max) is considered as one of the best indicators of aerobic fitness. It is an important parameter for assessing military populations, particularly in operational units as submariners, to better evaluate their operational abilities.

**Purpose.**– The objective of this study is to compare the results of an indirect measurement of VO2max with a field-test, and those of a questionnaire for estimating VO2max with the direct measurement of VO2max in laboratory.

**Methods.**– Forty-seven submariners (aged 29 ± 4.93, 76.7 ± 9 kg weight, regular sports) underwent a progressive maximal cardiorespiratory test on an electromagnetic cycle ergometer and completed the Huet questionnaire the same day. We also obtained data from latest VAMEVAL field-test conducted annually to determine the athletic ability of the military.

**Results.**– The mean maximal oxygen uptake found for each test were 46.1 ± 6.3 ml/kg/min for laboratory test on a cycle ergometer, 46.8 ± 7.14 ml/kg/min for the field test VAMEVAL, and 52.2 ± 5.4 ml/kg/min for the Huet questionnaire. A positive correlation was found between the field test and the laboratory test (\(r = 0.40, P = 0.0001\)), and a good agreement of results. The Huet questionnaire and laboratory test also showed a positive correlation (\(r = 0.47, P = 0.005\)) but without a good agreement rate.

**Conclusion.**– This study shows that, for submariners population, the field test VAMEVAL is correlated and concordant with the results of maximal oxygen uptake measured in laboratory. However, this correlation is mild. The Huet questionnaire allows an assessment if the test is not feasible but with less reliability.

**Further reading**


Eccentric training in chronic heart failure: Feasibility and functional effects. Results of a comparative study

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Keywords: Chronic heart failure; Eccentric exercise; Rate of perceived exertion; Six-minute walk test

Introduction.– The positives effects of exercise training in chronic heart failure (CHF) have been demonstrated for concentric exercises (CON). However, eccentric training (ECC) could represent a valuable alternative to CON, thanks to its larger impact on muscle uction, despite lower requirements for the cardiorespiratory system [1] not assessed in CHF patients. This is mainly due to the absence of consensus on personalization strategy, exposing to muscle deleterious effects. Our objective was to evaluate the feasibility and functional impact on the practice of regular physical activity.

Results.– The inter-rater reproducibility is very good (ICC 3, 1 = 0.894 (P < 0.0001)), as well as intra-examiner reproducibility (ICC 1, 1 = 0.964 (P < 0.0001)). However, the Acti’MET results are not correlated with SAP (r = 0.254, P = 0.25) nor with the 6MWT (r = 0.157, P = 0.5). SAP is correlated with 6MWD (r = 0.623, P = 0.004).

Discussion.– Acti’MET calculator is a tool easy to use, reproducible and suitable for estimating PA amount over a short period, but not over a longer period such as SAP. To confirm these results, we will compare Acti’MET with the IPAQ questionnaire [2], which explores the same period. It will also be necessary to follow patients to assess the sensitivity to change of the calculator. A second part of the study will explore the educational aspect of the tool and its impact on the practice of regular physical activity.

References

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The 6 minute walk test and before bariatric surgery: Which interest?

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Keywords: Obesity; Bariatric surgery; 6 minute walk test

Introduction.– Obesity is responsible of a decrease in the ability to walk. The 6 minute walk test (6MWT) is an easy test for the evaluation of the functional ability of patients with cardiac, respiratory diseases and it is highly reproducible in obese individuals [1].

Objective.– To evaluate the correlations between the markers of obesity and different parameters measured before and after a 6MWT.

Population.– One hundred and thirty-three patients (mean age 40.2 years) seen in a multidisciplinary evaluation before bariatric surgery. The mean Body Mass Index (BMI) was 48.5 kg/m², the mean waist circumference (WC) was 132 cm.

Methods.– All the patients have realised a 6MWT. Have been measured: the total distance, the percentage to the theoretical distance (% DT) and the walk-work (WW), the SaO2, the frequence rate (FR), the blood pressure before and after the test, the relative cardiac cost (RCC), and the painful articular score.

Results.– The distance was significantly and negatively correlated with the BMI (r = −0.5, P < 0.0001), the WC (r = −0.36; P < 0.0006), the articular score (r = −0.25; P < 0.01) and the kinésiopathia (P < 0.04). The speed, the SaO2 before and after the test were correlated negatively with the BMI. The RCC was correlated significantly with the distance, the % DT and the WW. The WW was different between the sex (P < 0.005) but the distance and the % DT were not. A high diastolic pressure after the test was the only parameter associated to the Borg scale before and after the test (P < 0.01).

Conclusions.– The distance of the 6MWT is negatively correlated to the BMI. It implies that all the process that diminish the BMI have a potential impact on this parameter. Our study has found an association between the results of the 6MWT and the number of painful articular localisations but not with only gonarthrosis and kinésiopathia, factors that must be evaluated also in the post-surgical outcome. Finally, a high perception of effort (Borg’s scale) was only associated with the cardiac consequences of the test, in favor of a central origin.

Reference

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Impact of insulin resistance on muscle strength in obese women

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Keywords: Muscle strength; Obesity; Insulin sensibility; Isokinetic

Introduction.– Obesity is a public health problem that can induce alone or because of its comorbidities disabilities. The main metabolic complication of obesity is type 2 diabetes, characterized by insulin resistance. Studies show that this population has a poor muscle strength compared to a non-diabetic population and this deficit is associated with a higher insulin resistance index (HOMA) [2]. Peripheral muscle strength (flexion-extension of quadriceps) in pre-menopausal women is lower in obese women compared to lean women when correcting for fat-free mass [1]. The association between insulin resistance and muscle strength in this population should be studied, which has been suggested by theoretical estimate. In this study, we examined whether quadriceps muscle strength is reduced in relation to insulin resistance (HOMA) in well-functioning ambulatory non-diabetic obese women by a cross-sectional analysis.