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Included are the full-length peer reviewed medical research papers. For your convenience, we have also included short summaries of each article with quotes taken directly from the corresponding research study.

CARDIOPULMONARY EXERCISE TESTING

A New Standard for Exercise: It is Time to Move it to Make it a High-Level Priority

Leonard Kaminsky, Ph.D.

Summary: “The cost-effectiveness of exercise testing suggests that it should be selected as the first option in many cases... The appreciation for the importance of exercise testing has developed to the point that Arena and colleagues have proposed that the exercise test may be considered the ultimate vital sign “

“Cardiorespiratory fitness was a stronger predictor of mortality than smoking, hypertension, high cholesterol, and type 2 diabetes”

AHA Statement (Dr. Gerald Fletcher, 2013) lists common uses of exercise testing:

- Detection of coronary artery disease (CAD) in patients with chest pain [chest discomfort] syndromes or potential symptom equivalents
- Evaluation of the anatomical and functional severity of CAD
- Prediction of cardiovascular events and all-cause mortality
- Evaluation of physical capacity and exercise tolerance
- Evaluation of exercise-related symptoms
- Assessment of chronotropic competence, arrhythmias, and response to implanted device therapy
- Assessment of the response to medical interventions (such as hypertension medication)

“Given the financial challenges present in healthcare today, the cost-effectiveness of exercise tests, which have a wide spectrum of use, make it a procedure that should receive high priority. Likewise, exercise training may provide the most bang for the healthcare buck.”

Cardiopulmonary Exercise Testing and Its Applications

K Albouaini, M Eged, A Alahamar, D J Wright

Summary: “Cardiopulmonary exercise testing (CPET) has become an important clinical tool to evaluate exercise capacity and predict outcome in patients with heart failure and other cardiac conditions. It provides assessment of the integrative exercise responses involving the pulmonary, cardiovascular and skeletal muscle systems, which are not adequately reflected through the measurement of individual organ system function. CPET is being used increasingly in a wide spectrum of clinical applications for evaluation of undiagnosed exercise intolerance and for objective determination of functional capacity and impairment.”

“PVO₂ derived from CPET is a strong and independent factor in determining the prognosis of patients with CHF”

“CPET has an important role as part of a holistic approach to the assessment and management of cardiac patients.”

Cardiopulmonary Exercise Testing as a Screening Test for Perioperative Management of Major Surgery in the Elderly

Paul Older, Adrian Hall, Raymond Hader

Summary: “In elderly patients undergoing major intra-abdominal surgery, the AT, as determined by CPX testing, is an excellent predictor of mortality from cardiopulmonary causes in the postoperative period. Preoperative screening using CPX testing allowed the identification of high-risk patients and the appropriate selection of perioperative management.”

“CPX testing is an inexpensive and totally noninvasive technique used for the objective evaluation of cardiac and pulmonary function.”

Clinical, Hemodynamic, and Cardiopulmonary Exercise Test Determinants of Survival in Patients Referred for Evaluation of Heart Failure

Jonathan Myers, Lars Gullestad, Randall Vagelos, Dat Do, Daniel Bellin, Heather Ross, Michael Fowler

Summary: “Peak VO₂ outperforms clinical variables, right-heart catheterization data, exercise time, and other exercise test variables in predicting outcome in severe chronic heart failure. Direct measurement of VO₂ should be included when clinical or surgical decisions are being made in patients referred for evaluation of heart failure or those considered for transplantation.”

Cardiopulmonary Exercise Test

Koutra M, Curtis R, Rao Baikady R

Summary: “Cardiopulmonary exercise testing (CPET) allows the objective measurement of patients’ exercise capacity. In contrast to traditional and static investigations for limited exercise tolerance, CPET can provide a global and dynamic evaluation of both cardiovascular and respiratory systems and their functional interactions.”

“Poor fitness levels as measured by CPET variables are shown to be associated with perioperative morbidity and mortality. It can therefore be very useful in risk stratification, preoperative optimization, patient informed consent process for surgery and allocation of healthcare services.”

Peak Oxygen Consumption During Cardiopulmonary Exercise Test Improves Risk Stratification in Candidates to Major Lung Resection

Alessandro Brunelli, Romualdo Belardinelli, Majed Refai, Michele Salati, Laura Socci, Cecilia Pompili, Armando Sabbatini

Summary: “In conclusion, we found that peak VO₂ was reliably associated with pulmonary complications and death after major lung resection. The results of this study support a more liberal use of CPET during the preoperative functional workup of lung resection candidates compared to the most recent functional guidelines. The interpretation of CPET findings may in fact assist in optimizing the clinical pathways of care of lung cancer patients.”

Clinician’s Guide to Cardiopulmonary Exercise Testing in Adults: A Scientific Statement from the American Heart Association

Gary Balady, Ross Arena, Kathy Sietsema, Jonathan Myers, Lola Coke, Gerald Fletcher, Daniel Forman, Barry Franklin, Marco Guazzi, Martha Gulati, Steven Keteyian, Carl Lavie, Richard Macko, Donna Mancini, Richard Milani

Summary: “CPX offers the clinician the ability to obtain a wealth of information beyond standard exercise electrocardiography testing that when appropriately applied and interpreted, can assist in the management of complex cardiovascular disease.”

“Although CPX has long been used in the assessment of athletic performance and in research venues, its burgeoning value in the clinical setting has prompted the AHA to convene a writing group of experts in the field to generate this guide.”