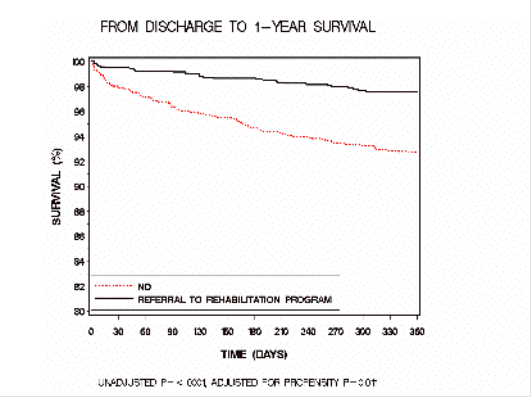
S29

Cardiac Rehabilitation Program after AMI in Israel: Factors Associated with Patients Referral

Harpaz, David[1]; Goldenberg, Ilan[2]; Mateztky, Shlomi[3]; Klempner, Robert[4]; Mazouz, Benjamin[5]; Bubyr, Liudmila[3]; Gottlieb, Shmuel[6]
[1]Gil-Oz Rehabilitation Center Associatied, Cardiology Depaetment, Rabin Medical Center, Petha-Tikva, Israel;
[2]Neufeld Cardiac Research Institute, Levaiv Heart Center, Cardiac Rehabilitation Institute, Tel-Hashomer, Israel;
[3]Neufeld Cardiac Research Institute, Levaiv Heart Center, Tel-Hashomer, Israel;
[4]Levaiv Heart Center, Cardiac Rehabilitation Institute, Tel-Hashomer, Israel;
[5]Bikur-Cholim Hospital, Cardiology Department, Jerusalem, Israel;
[6]Neufeld Cardiac Research Institute, Levaiv Heart Center, Bikur-Cholim Hospital, Cardiology Department, Jerusalem, Israel

Cardiac rehabilitation (CR) for secondary prevention after AMI is recommended by international and national guidelines, particularly in patients (Pts.) with multiple risk factors who are at moderate to high risk, in whom supervised exercise activity is warranted.
The aims of the study were to evaluate the referral pattern to CR, to assess factors associated with recommendations to participate in such programs and to evaluate survival of post-MI patients who are referred for CR.
All 4,129 Pts. enrolled in the 2006-2010 ACSIS surveys who were alive at discharge, diagnosed with AMI were included. Multivariate logistic regression analysis was used to identify factors associated with CR referral.
Only 49% who experienced AMI were referred to CR program by cardiology wards. Referred Pts. had a lower risk profile than non-referred (NR) Pts. The NR Pts. were older, had a higher prevalence of a history of MI, angina, CABG, CHF, DM, hypertension, chronic renal failure (CRF), CVA/TIA and PVD and more often left ventricular dysfunction and NSTEMI.
Independent predictors (OR; 95% CI) associated with CR referral were: male gender (1.7;1.4-2.0), the year of the index event (2008 vs. 2006; [1.7;1.4-2.0]), (2010 vs. 2006; [2.7;2.3-3.2]), Jewish origin (1.8;1.5-2.2), the existence of on site CR program (1.9;1.7-2.3) and family history of CAD (1.2;1.0-1.4), whereas increasing age (1-yr increment [0.93;0.89-0.96]), NSTEMI (0.7;0.6-0.8), history of CVA/TIA (0.6;0.5-0.8) and CRF (0.8;0.6-1.0) were negatively associated with referral for CR. Pts. who were referred for CR experienced significantly higher survival rates at 1-year as compared with the NR Pts. (unadjusted p <0.001; propensity score adjusted p=0.01



Pts. referral to CR program should be encouraged by cardiology wards, especially among those with a higher risk profile. Low availability of such programs is an obstacle for implementation of this recommendation and may affect long-term outcome after AMI.

Safety and Efficacy of Exercise Training in Symptomatic Hypertrophic Cardiomyopathy Patients

Klempfner, Robert[1]; Goldenberg, Ilan[1]; Kamerman, Tamir[1]; Nahshon, Amira[1]; Arad, Michael[1]; Freimark, Dov[2]

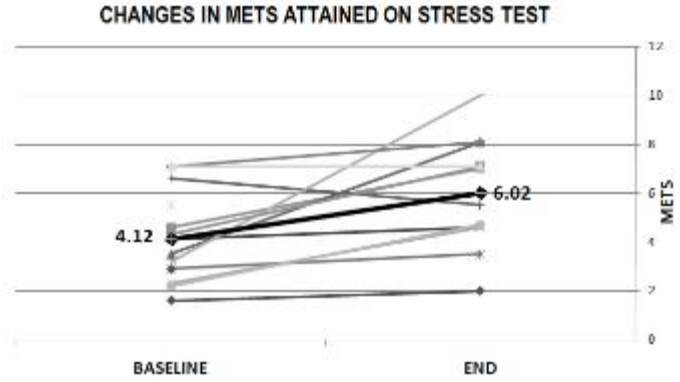
[1]Leviev Heart Center, Sheba Medical Center, Cardiac Rehabilitation Institute, Ramat Gan, Israel; [2]Leviev Heart Center, Sheba Medical Center, Heart Failure Unit, RAMAT GAN, Israel

Purpose: Exercise training (ET) is highly beneficial in heart failure patients and has been suggested to confer significant symptomatic and functional improvements in patients with diastolic dysfunction. Accordingly, the aim of this pilot study was to examine the safety and feasibility of a structured ET program in symptomatic HCM patients.

Methods: We prospectively enrolled 15 HCM patients with New York Heart Association (NYHA) functional class II (47%) or III (53%) in a structured ET program at cardiac heart failure rehabilitation center. Detailed medical examination, echocardiography study and pre-enrolment symptom limited exercise stress test (EST), were preformed prior to enrolment. Exercise prescription was based on heart rate reserve (HHR) obtained during EST and intensity was gradually increased on following training sessions (HHR increased from 60% to 85% as permitted by symptoms and perceived exertion).

Results: Enrolled patients (mean age 62±13.2) had mean LVEF of 51% ±15.8, and an average septum size of 16.3±5.6mm. Left ventricular outflow gradient was present at rest in eight patients (mean gradient 42.5±29 mmHg) while six had an implantable defibrillator. Patients completed a total of 322 hours of mainly aerobic ET. No adverse events or sustained ventricular arrhythmias occurred during the training program. Functional capacity, as assessed by the percent change in maximally attained METS, improved significantly by 46% from 4.12±1.9 to 6.02±2.2 METS p=0.01 (fig. 1). NYHA class improved from baseline by ≥1 grade in 6 patients (40%), while none experienced a deterioration in functional class during follow-up.

Conclusions: The present study is the first to show that moderately symptomatic patients with HCM can safely exercise in a cardiac rehabilitation program. Our findings suggest that symptomatic and functional gains are attainable in this high risk population. Further evaluation through a larger randomized prospective study is necessary.



Exercise Training in the Oldest Old

Rivlin, Yelena[1]; Tanchilevitch, Alon[2]; Rosenschein, Uri[3]; Goldhammer, Ehud[1]
[1]Bnei Zion Medical Center, Cardiology & Cardiac Rehabilitation, Haifa, Israel; [2]Bnei Zion Medical Center, Cardiac Rehabilitation, Haifa, Israel; [3]Bnei Zion Medical Center, Cardiology, Technion, Faculty of Medicine, Haifa, Israel

Aim: Do the oldest old accrue benefit from cardiac rehabilitation programs?
Background: The oldest old ≥ 85 years is the most rapidly growing age group in western countries. Its growth rate is twice that of those 65 and over and almost 4 times that for the total population. It is also the least physically active, and the one that generates the highest healthcare expenses.
Material & Methods: 27 patients (13 m & 14 f), age range 85 - 94 years, period - 7/2008 to 1/2011, being 2% of the entire rehabilitation group. All other 1301 patients were considered control group (CG). 21 had previous myocardial infarction, 3 pacemaker implantation, 3 valve surgery, 20 coronary angiography, 3 cerebrovascular event, 2 hip fractures, 20 hypertensives, 14 diabetics, 3 with mild cognitive impairment, and 7 considered Frail / Very Frail. Each patient underwent a symptom limited EXT on admission & 12 weeks thereafter. Each participated in an ≥12 weeks program of strength, flexibility, balance, coordination (chair-based exercise for the ¡°frail¡±), and treadmill/bicycle/arm bicycle/cross trainer sessions for 30 min/3-4 /week, at 70-80% of their maximal HR. QOL questionnaire (modified EQ-5D-5L) for health status evaluation was used.
Results: Adherence time was 14 wks +/- 2.1 compared to 11.5 wks +/- 3.0 in CG , $p < 0.05$, Ool baseline EXT Mets = 2.8 +/- 0.7 compared to 12 weeks EXT Mets = 4.1 +/- 0.7, $p<0.01$, (47%), Ool baseline Mets = 2.8+/-0.7 compared to 5.9+/-1.5 CG baseline, $p<0.01$, 12 weeks EXT Mets = 4.1+/-0.7 (Ool) vs 7.2+/-1.3 (CG), $p<0.01$. Total re-hospitalization rate was 11.1% in Ool compared to 3.9% in CG , $p<0.01$, while cardiac re-hospitalizations rates were 3.7% and 2.15% consecutively, $p<0.01$. Health status scale improved significantly 7+/-1.3 to 10+/-1.1, $p<0.01$ with maximal benefit seen in mood parameters (anxiety/depression).
Conclusions: Exercise training in the oldest old age group is feasible and relatively safe. Fitness and QOL gain can be achieved as well.

Returning to Work After Myocardial Infarction - Do We Adhere to the Guidelines?

Yasky, Sebastian[1]; Eyal, Arnona[1]; Sluzky, Osvaldo[2]; Cafri, Carlos[2]; Ilia, Ruben[2]; Kobal, Segio L.[2]

[1]Clalit Health Services, Department of Occupational Medicine, , Beer Sheva, Israel; [2]Soroka Medical Center, Department of Cardiology, Beer Sheva, Israel

Background: Ischemic heart disease is common in the working age population, causing significant economic damage. Recommendations on reintegration of post acute myocardial infarction (AMI) patients to work have been published. Cardiac rehabilitation has been proved useful. We aimed to study if the recommended guidelines are realized in clinical practice and how cardiac rehabilitation impacts on post AMI patients on labor reintegration.
Methods: Thirty post AMI workers of the Negev area participated in a cardiac rehabilitation program. Demographic, clinical and work characteristics were collected by phone. The data was compared to a matched-control group who did not participate in any rehabilitation program. Type of work was defined as white collar (office work) and blue collar (non-office work).
Result: Age (50 ± 9 years), male gender (80%), normal LVF (30%) and type of work (73% involved in blue collar labors) were similar between the two groups. Of the patients participating in cardiac rehabilitation, 90% of them returned to work at the same job after a convalescent period of 64 ± 45 days. In contrast, 73% of the patients in the matched-control group returned to their previous employment after a longer convalescent period of 93 ± 41 days. The table depicts other differences between groups according to type of work and remaining LVF. The mean convalescent period for the overall studied population with normal LVF of 65 days was significantly longer than that recommended in the guidelines.
Conclusions: Cardiac rehabilitation is beneficial for work reintegration after AMI and helps to reduce the convalescent period. However, the convalescent period according to the remaining LVF, also in the rehabilitation patients is significantly longer than that recommended in the clinical guidelines. The reason for this longer convalescent period was not investigated in our study.

Parameters	Rehabilitation group	Comparison group
Convalescent period according to type of work (mean days ± SD)	White collar: 49 ± 42 Blue collar: 71 ± 46	White collar: 95 ± 55 Blue collar: 92 ± 37
Convalescent period according to LVF (mean days ± SD)	Normal LVF: 48 ± 26 Abnormal LVF: 73 ± 53	Normal LVF: 82 ± 45 Abnormal LVF: 105 ± 36

Eight Year Mortality in 1024 CABG Surgery Israeli Patients According to Their Physical Activity Habits

Dankner, Rachel[1]*; Ziv, Arnona*[2]*; Novikov, Ilya*[3]*; Goldbourt, Uri*[4]

[1]*The Gertner Institute for Epidemiology and Health Policy Research, Unit for Cardiovascular Epidemiology, Sheba Medical Center, Ramat Gan, Israel;* [2]*The Gertner Institute for Epidemiology and Health Policy Research, Information and Computer Unit, Sheba Medical Center, Ramat Gan, Israel;* [3]*The Gertner Institute for Epidemiology and Health Policy Research, Biostatistics, Sheba Medical Center, Ramat Gan, Israel;* [4]*School of Public Health, Epidemiology and Preventive Medicine, Tel Aviv University, Sackler Faculty for Medicine, Tel Aviv, Israel*

Studies have shown that coronary artery bypass surgery (CABG) surgery outcomes are better in cardiac patients who were physically active prior to the surgery. Cardiovascular morbidity and mortality were also shown to be lower in coronary patients who became or remained physically active. It has been shown that more cardiac patients engage in leisure time physical activity after CABG surgery. In Israel in the early 90's, about 30% of first acute myocardial infarction patients living in the center of Israel reported of habitual physical activity. Of those who survived the first year (n=1123) 39.8% reported habitual physical activity.

We followed up a cohort of 1024 CABG surgery patients operated on in 5 cardiothoracic units in Haifa, Tel Aviv, Petach Tikva and Jerusalem during 2004-2006, in order to describe the 8-year mortality in relation to physical activity habits prior to the surgery and at 1-year follow up. Physical fitness before and 1-year after CABG surgery was calculated as well.

Rates of participation in physical exercise increased from 34% to 45% during the 1-year follow up, and while 65% of those who were physically active during baseline participated in cardiac rehabilitation programs after the surgery only 23% of the sedentary patients attended a cardiac rehabilitation program during that time. Calculated oxygen capacity (VO2) improved only in patients who attended cardiac rehabilitation programs, regardless of their baseline Charlson co-morbidity index. In an 8-year mortality follow up, age and co-morbidity index adjusted death rates were significantly higher in the sedentary group as compared to the physically active one ($p=0.0009$).

Physical activity rates in Israeli cardiac patients have remained stable during the past 20 years. We conclude that patients should be motivated to be physically active before the coronary surgery as well as be referred to cardiac rehabilitation programs after the surgery to increase their survival after CABG surgery.

Heart Rate Variability and Cardio-Metabolic Risk in Patients with Type 2 Diabetes

Golan, Rachel[1]; Shai, Iris[1]; Katz, Amos[1]; Baham-Harman, Ilana[2]; Gepner, Yftach[1]; Schwarzfuchs, Dan[3]; Shelef, Ilan[4]; Henkin, Yaakov[5]

[1]Ben Gurion University of the Negev, Epidemiology, Beer Sheva, Israel; [2]Soroka University Medical, Internal Medicine and Diabetes, Beer Sheva, Israel; [3]Nuclear Research Center Negev, Dimona, Israel; [4]Soroka University Medical Center, Radiology, Beer Sheva, Israel; [5]Soroka University Medical Center, Cardiology, Beer Sheva, Israel

Purpose: Patients with type 2 diabetes (T2D) are at risk of autonomic neuropathy (AN). An analysis of Heart-Rate-Variability (HRV) is useful in detecting AN.
Methods: Patients with T2D (n=45; age=56±6 years) underwent 24h ambulatory-ECG-monitoring, 24h ambulatory-blood-pressure-monitoring and fasting blood tests. A subset of the patients (n=27) had further abdominal magnetic resonance imaging (MRI) measurements. Time and frequency domain HRV parameters analyzed included 24-h triangular-index(TI), mean time interval between two R-waves (MeanRR), root-mean-square successive difference (RMSSD), standard deviation of all normal RR (SDNN), SDNN-index and High and low frequency(HF, LF).
Results: In multivariate regression models adjusted for age, sex, and waist, 24h TI (beta=.461; p=.011), MeanRR (beta=.514;p= .007), RMSSD, (beta=.445, p=.013), SDNN (beta=.348 p=.078) and SDNNi, (beta=.741 p<0.001) were associated with increased levels of HDL-c and with decreased levels of triglycerides (TG) (beta=-.656, p<0.001; beta=-.371, p= .050; beta=-.345, p=.048, beta=-.409, p=.029; beta=-.400, p=.023 respectively) but not with HbA1c or blood pressure. HF was significantly associated with decreased levels of TG (beta=-.472, p=.018). When lipid-lowering drugs, beta-adrenergic blockers and hypertensive medications were added to the models, the associations remained unchanged. 24-h TI was associated with decreased deep subcutaneous fat tissue (beta=-.453, p=0.033), but not with other abdominal adipose tissues i.e. superficial subcutaneous fat.
Conclusions: In patients with T2D, elevated TG and decreased HDL-c levels are mostly associated with poor HRV parameters. Thus, early subclinical detection of autonomic dysfunction is important for risk stratification and subsequent management.