patients and also by respiratory muscle limitation in 10% of the patients.

Conclusions: Based on admission diagnosis of 40 patients, 90% were defined as subject to pulmonary rehabilitation and in 10% were receiving cardiac rehabilitation. They divided into three specific functional recovery programs: ventilatory function recovery program (60%), cardiac function recovery program (30%), respiratory muscles recovery program (10%).

Leg Muscle Blood Flow During 1 and 2-Leg Knee Extension Exercise in Patients with COPD and Aged-Controls

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Background: In chronic obstructive pulmonary disease (COPD), leg muscle blood flow may be compromised during dynamic exercise due to the competing influence of respiratory muscle work for available cardiac output. This study examined the flow demand limits of skeletal muscle flow in varying muscle mass recruitment. It employed one leg knee extension (1L-KE) and two-leg knee extension (2L-KE) to examine the mass-specific work rates at which peripheral circulatory function may become compromised due to elevated respiratory demands.

Methods: Three male COPD patients (70 ± 5 yr; $FEV_1/FVC = 42 \pm 11\%$) and two aged-controls (74 ± 1 yr; $FEV_1/FVC = 76 \pm 5\%$) completed three sets of 7-minute steady state 1L-KE and 2L-KE at 20, 40 and 65% (SS20%; SS40%; SS65%) of previously determined ergometer-specific peak power, separated by rest periods of 15 min. Leg muscle blood flow (BF) was determined using pulsed Doppler sonography of the femoral artery during incremental exercise loads and post-exercise. ECG, blood pressure, ventilatory parameters and VO_2 were obtained continuously, and

dye dilution cardiac output was measured at rest and during exercise.

Results: Preliminary data showed that, for each exercise intensity, the required VO_2 is similar in both groups. However, the workloads in COPD are between 60% and 82% of the control group workloads. During 1L-KE and 2L-KE, BF is consistently higher in COPD compared to controls. For 1L-KE, the increase in BF from rest (mean $\pm$ SD in ml/min; COPD vs controls) are SS20%: 763 ± 244 vs 105 ± 34 ; SS40%: 1157 ± 597 vs 310 ± 97 ; SS65%: 1493 ± 348 vs 424 ± 45 . BF relative to workload is at least 3-fold higher in COPD compared to controls for all exercise intensities.

Conclusions: These data suggest that mean muscle blood flow may not be compromised during knee-extensor exercise in COPD patients, and ongoing data will clarify whether this is a compensatory response to altered peripheral muscle metabolic function.

A Written Action Plan for Early Treatment of COPD Exacerbations: An Important Component to the Reduction of Hospitalizations

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Background: This study explored the role of a written action plan in reducing hospitalizations as a com-

ponent of a COPD self-management program in a recent multi-centre RCT.

Methods: Patients were randomly allocated into 2 groups: intervention or usual care. The intervention group had access to a self-management education program Living Well with COPD, the support of a case manager, and a written action plan with a self-administered prescription of antibiotics and prednisone. Patients were instructed to start both antibiotics and prednisone in case of exacerbation with a change in 2 or more symptoms (increased dyspnea, increased sputum volume and/or purulent sputum) for at least 24 hr.

Results: One hundred and sixty six patients with COPD presented with one exacerbation or more in the 12-month study period. Exacerbations (608) were confirmed by a change in at least one symptom; 429 (70.6%) by a change in 2 or more. Antibiotics were used in 61.3% of the exacerbations and prednisone in 47.7%. The combination of antibiotics and prednisone was used more often by the intervention group in exacerbations presenting changes in 2 or more symptoms (52.97% vs. 34.8%, $P<0.001$). This difference was driven by a higher use of prednisone in the intervention group (55.7% vs. 44.3%, $P<0.001$) consistent with dyspnea deterioration. In the intervention group, exacerbations treated with antibiotics and prednisone had less risk of requiring an hospitalization than those occurring in the control group (16.5% vs. 35.1%, $P<0.001$).

Conclusions: Improved access to treat exacerbations provided by the written action plan plays an important role in reducing hospitalization risk.

BNP after Cardiac Surgery in Patients with Normal Ventricular Function

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Background: Brain natriuretic peptide (BNP) is proven marker for diagnosis and stratification of patients (P) with heart failure; furthermore it can be useful for differential diagnosis of dyspnea, for detec-

tion of diastolic dysfunction and as guide and monitoring of therapy. Acute coronary syndrome, atrial fibrillation (AF), aortic stenosis and hypertrophic cardiomyopathy are other conditions in which the BNP can be raised. Little is known about the level of BNP in P undergone cardiac surgery. Aim of the study was to detect the concentration of BNP immediately after CABG and to follow the course during cardiac rehabilitation (CR).

Methods: we studied 18 P (mean age 67.8 ± 11.2 yrs) 9.1 ± 3.6 days after surgery and we repeated the evaluation after our program of CR, in average 56 days of distance from CABG. In each P was performed an echocardiogram (inclusive study of right ventricle, diastolic function and DTI), a determination of BNP (NT-proBNP) and also the six-minute walking test (SMWT). Every effort was made for not varying the therapy during the period of observation. Exclusion criteria were: MI in the last 3 months, heart and renal failure, use of inotropics drugs and AF after cardiac surgery.

Results: the concentration of BNP was high in both determinations even if it lowered in the second (BNP₁ vs BNP₂: pg/ml 1225.1 ± 873.2 vs 708.7 ± 741 $p<0.001$); also the left atrial volume decreased (ml 50.7 ± 11.6 vs 46.4 ± 8.8 $p<0.01$) while the ejection fraction didn't vary, (EF₁ vs EF₂: 57.2 ± 6.7 vs 59.8 ± 9.1 ns). There was an increase of the distance crossed to the SMWT (mt 254.7 ± 65.4 vs 435.3 ± 69.6 $p<0.001$); glycaemia and creatinine values were normal in both determinations while the hemoglobin increased (11.5 ± 1.2 vs 13.2 ± 1.3 $p<0.01$). Other echo parameters (E/A, E/Em, TAPSE, PAPs) were not meaningfully varied with the exception of DT (221.6 ± 66.3 vs 253.8 ± 72.3 $p<0.05$). We have not found correlations between Δ BNP and: Δ LAV, Δ SMWT, Δ E/A or Δ E/Em. Instead, the relationship was statistically significant with the DT ($r: 0.78$ $p<0.01$). Also the second determination of the BNP had the followings relationships:

2 nd BNP	r	p
E/A ₂	0.68	<0.01
E/Em ₂	0.58	<0.05
PAPs ₂	0.59	<0.05
EF ₂	0.63	<0.05