102. Pulmonary circulation: clinical aspects of PAH and associated PH

P916

Analysis of BMPR2 mutations, and endothelin-1 and nitric oxide synthase genes polymorphisms in pulmonary arterial hypertension

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PAH may be heritable. Much of what is known about the genetic basis of PAH is related to bone morphogenetic protein receptor 2 (BMPR2). We studied variants in BMPR2, endothelin-1 (ET-1) and nitric oxide synthase 2 (NOS2).

Patients with idiopathic and associated PAH were included. DNA was amplified for the 17 validated amplicons spanning the coding sequence of BMPR2 gene. For ET-1 gene the polymorphism K198N was selected because homozygous for Asn (T/T genotype) have higher levels of ET-1. NOS2 play a key role in endothelial dysfunction. CCTTT repeat polymorphism was studied.

30 PAH patients (14 idiopathic, 16 associated) and 50 controls were included. BMPR2: 21 mutations were identified in 22 patients. Six were missense, one nonsense, 3 deletions and 7 synonymous changes. According to PolyPhen software changes with involvement in the pathogenesis were present in 4 of the 30 patients (14%). Various missense polymorphisms were detected. Although these polymorphisms causes an amino-acid change, they don't reached pathologic value. Silent mutation p.R937R was present in 5 patients. ET-1: genotype GG was present in 43%, GT in 53% and TT in only 4%, the same pattern as in controls. NOS2: PAH patients have a lower number of repetitions for CCTTT polymorphism than controls (12 vs 13.5, p = 0.001).

Conclusions: Frequency of pathogenic mutations in BMPR2 in non heritable PAH was 14%. It would be interesting to perform functional studies of non pathogenic mutations to test their effect on BMP proteins. CCTTT repeat polymorphism showed statistical differences between patients and controls. K198N (G/T) polymorphism in ET-1 gene showed similar distribution.

P917

Evaluation of acute right ventricular failure in scleroderma and idiopathic pulmonary arterial hypertension

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Background: The ability to maintain adequate right ventricle (RV) function is paramount to survival in pulmonary arterial hypertension (PAH). However, little is known about RV function in patients with established PAH who are hospitalized for acute RV failure. Since RV adaptation is often worse in scleroderma-associated PAH (SSc-PAH) than in patients with idiopathic PAH (IPAH) despite similar afterload, we sought to compare RV function in hospitalized PAH patients using tricuspid annular plane systolic excursion (TAPSE), a non-invasive measurement of RV function that strongly associates with invasive hemodynamics and survival in both SSc-PAH and IPAH.

Methods: 47 patients with SSc-PAH or IPAH were evaluated during their first admission to a hospital for RV failure. All patients received transthoracic echocardiography. Vital signs and survival from time of admission were recorded.

Results: This cohort was composed of 91% females, with mean age 56 (range 23-81). There were 68% SSc-PAH and 32% IPAH patients. Mean TAPSE was 0.3 cm larger in IPAH compared to SSc-PAH (1.4cm $\pm$ 0.424, vs. 1.1cm $\pm$ 0.33, p=0.02). This relationship persisted despite controlling for age, admission vitals, and time since diagnosis. 1-year mortality was 47%. Relative risk of mortality was 53% less in the IPAH group than in those with SSc (10% $\pm$ 0.32 vs. 63% $\pm$ 0.49, p=0.004).

Conclusion: SSc-PAH patients admitted with acute RV failure had both lower TAPSE and higher 1 year mortality than those with IPAH. This association suggests that TAPSE may offer prognostic information in patients with acute RV failure. Larger studies are needed to confirm the significance of these findings.

P918

Non-invasive versus invasive heamodynamic evaluation in an heterogeneous pulmonary hypertension population: When echo goes in the cath-lab

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Aim: To evaluate the accuracy of doppler echocardiography (DE) in estimating the key measurements of right heart catheterization (RHC) in an heterogeneous pulmonary hypertension (PH) population: mean pulmonary artery pressure (mPAP), cardiac index (CI), capillary wedge pressure (CWP) and pulmonary vascular resistances (PVR).

Methods: One hundred thirty-five consecutive patients referred to our PH tertiary center from January to December 2011 underwent standard DE within 1 hour of a clinically indicated RHC.

Results: Twelve/135 (9%) did not have PH. Of 123 PH patients with PH, 54 (40%) had group 1, 39 (29%) group 2, 22 (16%) group 3, and 8 (6%) group 4 PH. Echo showed a satisfactory correlation to invasive evaluation.

	RHC (mean±SD)	Echo (mean±SD)	Linear regression: RHC (y); Echo (x)	R2
mPAP (mmHg)	41±14	38±10	y=0.92x+5.7	0.42
CWP (mmHg)	15.3±7.8	14.5±6.4	y=0.95x+1.5	0.62
CI (l/min/m^2)	2.6±0.9	2.6±0.6	y=0.96x+0.2	0.62
PVR (WU)	6.7±5.8	5.8±3.4	y=0.97x+1.1	0.33 0.33

Nevertheless, it was inaccurate in defining the presence of pre-capillary (CWP $\leq$15 mmHg, groups 1, 3 and 4) versus post-capillary (CWP >15 mmHg, group 2) PH leading to a misclassification in 22/123 (18%) of analyzed patients. In particular, sensitivity of echo for pre-capillary PH was 82% and specificity 83%.

Conclusion: Doppler echocardiography is an essential tool for the screening of PH, but it provides an initial approach to the patients with suspected PH. In particular, DE is frequently inaccurate in estimating the CWP leading to an hazardous misclassification of the PH.

P919

Effect of targeted therapy on circulating endothelial progenitor cells in precapillary pulmonary hypertension

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Introduction: Endothelial dysfunction plays a key role in the development of

pulmonary hypertension (PH).Bone marrow-derived endothelial progenitors cells (EPCs) may differentiate into functioning endothelial cells and contribute to endothelial repair.
Aim: To investigate whether the number of circulating EPCs in patients with precapillary PH differs from control subjects and to assess the effects of targeted PH therapy on circulating EPCs.
Methods: 36 control subjects (55±3 yrs) and 39 treatment naïve patients with precapillary PH (50±13 yrs;mean pulmonary arterial pressure,44±13 mmHg).33 patients had pulmonary arterial hypertension (PAH) (17 idiopathic; 16 associated);and 6 had chronic thromboembolic pulmonary hypertension (CTEPH).19 patients were re-evaluated at 6 months after the initiation of targeted PH therapy.The number of circulating EPCs was measured using flow cytometry.Circulating EPCs were defined as CD34+/CD133+ cells from a population that did not express CD45bright,and expressed as the percentage of lymphomonocytic cells.
Results: In patients with precapillary PH,the number of circulating EPCs was lower than in control subjects[Md 0.060 (0.037-0.075)and 0.086 (0.063-0.120) % lymphomonocytes;p=0.001)] and was not correlated with functional class or hemodynamic measurements.After 6 months treatment,in patients with PAH (n=14)circulating EPCs increased[Md from 0.058 (0.048-0.069) to 0.073 (0.050-0.119)%;p=0.026],whereas in patients with CTEPH it did not.
Conclusion: Patients with precapillary PH have reduced numbers of circulating EPCs that seems to increase as a result of targeted PH therapy.
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P920
HbA1c in pulmonary arterial hypertension – A marker of prognostic relevance?
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Background: Patients with pulmonary arterial hypertension (PAH) exhibit impaired glucose metabolism and increased insulin resistance. The clinical consequences of these metabolic changes are not known.
Patients and methods: We assessed HbA1c levels (indicative of perturbed glucose metabolism) in 115 patients newly diagnosed with PAH (79 female, 36 male; median age 48.8 years; idiopathic n=66, collagen vascular disease n=17, congenital heart defect n=19, pulmonary veno-occlusive disease n=8, porto-pulmonary n=5). No patients had been diagnosed with diabetes, or received antidiabetic medication or systemic steroids. After initiation of pulmonary vasoactive treatment, patients remained in long-term follow-up.
Results: At initial presentation patients were in an advanced stage of disease (mean pulmonary arterial pressure 53±18 mmHg, median pulmonary vascular resistance 767 dyn.s.cm-5, cardiac index 2.3±0.8 l.min-1.m-2) with a six-minute walking distance of 334±126 m, and were categorised as NYHA functional class 3.0±0.7. The HbA1c was 5.73±0.75%. The 5-year survival rate for the entire group was 68%. Univariate Kaplan-Meier analysis and multivariate Cox proportional hazard models based on initial HbA1c levels revealed that patients in the lowest HbA1c quartile had a significantly better 5-year survival rate compared with the highest (83.6% versus 50.6%; log-rank p=0.038). Correcting for demographic and clinical covariates HbA1c was a predictor of all-cause mortality with a hazard ratio of 2.29 (95% CI, 1.20 to 4.38; p=0.012) per 1 Unit increase.
Conclusion: In patients with pulmonary arterial hypertension, the HbA1c level at time of diagnosis is an independent predictor of long-term prognosis.

P921
Efficacy and safety of oral bosentan in patients with Down's syndrome and pulmonary arterial hypertension due to congenital heart disease
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Aim: To evaluate the long-term effects of oral bosentan in adult patients with pulmonary arterial hypertension (PAH) due to congenital heart disease (CHD) with and without Down's syndrome.
Methods: WHO functional class, 6-minute walk test (6MWT) and hemodynamics were assessed at baseline and after 12 months of bosentan therapy in CHD-PAH patients with and without Down's syndrome.
Results: Seventy-four consecutive patients were enrolled: 18 with and 56 without Down's syndrome. After 12 months of bosentan therapy, both groups showed an improvement in WHO functional class, 6-minute walk distance and hemodynamics. No differences in the efficacy of therapy were observed between the two groups.
Conclusions: Bosentan was safe and well tolerated in adult patients with CHD-related PAH with and without Down's syndrome during 12 months of treatment. Clinical status, exercise tolerance, and pulmonary hemodynamics improved, regardless of the presence of Down's syndrome.

Clinical and haemodynamic variables before and after oral bosentan treatment in patients with and without Down's syndrome

	Down's syndrome (n=18)			No Down's syndrome (n=56)		
	Basal	Follow-up	p	Basal	Follow-up	p
WHO functional class	2.9±0.6	2.5±0.5	0.005	2.9±0.5	2.5±0.5	0.000002
Travelled distance (m)	239±74	288±71	0.0007	343±86	389±80	0.00003
mPAP (mmHg)	66±21	60±17	0.06	74±18	73±21	0.6
QP (l/min/m^2)	3.5±1.4	4.0±1.6	0.006	2.8±1.0	3.5±1.4	0.0005
QP/QS	1.0±0.4	1.4±0.7	0.003	0.9±0.3	1.1±0.7	0.012
PVRi (WU.m^2)	20±13	15±9	0.007	26±15	20±10	0.002

mPAP, mean pulmonary arterial pressure; QP: pulmonary cardiac index; QP/QS, pulmonary to systemic cardiac index ratio; PVRi, pulmonary vascular resistances index.

P922
Assessment of left ventricular function in COPD
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Introduction/Background: To evaluate the left ventricular (LV) function in chronic obstructive pulmonary disease (COPD) in absence of known LV disease by echocardiography.
Methods: The study was an observational cross sectional study including 50 cases of stable COPD patients. Confirmation of cases for COPD were done by GOLD criteria and staged accordingly. Known cases of LV disease diagnosed on the basis of history, clinical findings, electrocardiography and other investigations were excluded from the study. All cases were subjected to 2D echocardiography for LV evaluation.
Results: LV diastolic dysfunction was noted in 84% cases and both systolic and diastolic dysfunction was recorded in 2% case. We found statistically significant positive correlation of the LV diastolic dysfunction with the age of the patients, duration of symptoms and stage of diseases. But we did not find any significant co-relation between LV dysfunction with nature of symptoms and chest x-ray findings.
Conclusions: We concluded that there was a definite association between LV diastolic dysfunction and COPD even if the known causes of LV disease were excluded. We suggested that left ventricular function should be evaluated in COPD patients not responding to usual management even in absent of clinical evidence of LV disease.

P923
Role of right ventricular ejection fraction by electrocardiogram- gated 320-slice CT in pulmonary hypertension
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Purpose: Right ventricular function is an important determinant of exercise capacity and survival in pulmonary hypertension (PH). We aimed to study correlation of right ventricular ejection fraction (RVEF) determined by 320-slice CT with hemodynamic factors in patients with PH.
Materials and methods: 59 subjects (17 male, 56±13 yrs) with PH (41 chronic thromboembolic pulmonary hypertension and 18 pulmonary arterial hypertension) underwent enhanced retrospective ECG-gated volume 320-slice CT (Aquilion ONE, Toshiba) and right heart catheterization (RHC). CT images were reconstructed every 5% from 0-95% of the R-R interval. RV end-systolic and end-diastolic true volumes were measured from 3-dimensional reconstruction and used to calculate RVEF. We compered RVEF with the results of RHC.
Results: In 320-slice CT, RVEF were 46.4±14.8. In RHC, mean PAP (mPAP), PVR, systolic volume (SV) were 41.5±11.3 mmHg, 655±317 dyne•sec•cm-5 and 63.7±17,7ml, respectively. The correlation coefficient of RVEF with mPAP, PVR, SV were -0.52 (P<0.001), -0.63 (P<0.001) and 0.61 (P<0.001), respectively.
Conclusions: RVEF by ECG-gated 320-slice CT correlated significantly with PVR and SV in subjects with PH.

P924
Relevance of persistent foramen ovale in PAH patients on pulmonary vasoactive treatment
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Background: Persistent foramen ovale (PFO) has been suggested to improve outcome in pulmonary arterial hypertension (PAH), despite causing hypoxaemia.
Methods: We evaluated the impact of a PFO on long term follow up in patients with PAH and severe hypoxaemia (pO2 < 65 mm Hg in air) on pulmonary vasoactive treatment. PFO was detected on contrast-enhanced transcranial doppler sonography (TCD). After diagnosis of PAH the patients were started on treatment with PDE 5 inhibitor, endothelin receptor antagonist or prostanoids and remained in regular follow up.

Results: Between January 2010 and December 2011 we detected 65 patients with PAH and severe hypoxaemia (age 57,4±14,8 years, 34 males, 39 IPAH, 18 PAH associated with CTD, 5 portopulmoary hypertension, others: 3). In 27 patients a PFO was detected on TCD (group 1). In 26 patients a PFO could be excluded (group 2). 12 patients had to be excluded because of ambiguous result in TCD.
Both patient groups exhibit the same baseline haemodynamic and clinical characteristics (pO2 63,8±11,9 mm Hg, pCO2 32,9±4,7 mm Hg, mPAP 48±12 mm Hg, PVR 925±467 dyn s cm^{-5}, CO 3,94±1,5 l/min, 6MWD 300±150 m, 9,5% NYHA II, 57,1% NYHA III, 33,4% NYHA IV, BNP 247 (median) 314 (IQR) pg/ml). After 6, 12 and 24 months treatment patients improved in haemodynamics and exercise capacity. There was no difference between patient groups concerning haemodynamics, exercise capacity, oxygenation, and clinical stability on monotherapy or overall survival.
Conclusion: In our patient population, PFO is found in approx. 40% of PAH patients with hypoxemia. PFO is not associated with better outcome in PAH on pulmonary vasoactive treatment.

P925
Pulmonary arterial hypertension associated to HIV infection
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Introduction: HIV-associated pulmonary hypertension (HIV-PAH) is an uncommon complication of the natural history of HIV infection and an independent factor of death in HIV infected patients, regardless the use of High Activity Antiretroviral Therapy (HAART).
Patients and methods: Review of HIV-infected patients with follow-up in our specific outpatient clinic (N=1226). Clinical data of patients with a formal diagnosis of HIV-PAH were reviewed, and they were followed-up for 2 years with special focus on comorbidities, immunological statement and response to treatment.
Results: 3 patients were diagnosed as HIV-PAH (prevalence 0.25%). All the patients were coinfected with Hepatitis C virus (HCV). All of them were on treatment with HAART at the moment of diagnosis of PAH. All of them had an initial positive response to therapy with bosentan. At two years from the beginning of the follow 2 patients had dead by congestive cardiac failure.
Conclusions: Like the bibliography reflects, coinfection with HIV-HCV is very common in the patients with PAH-HIV. There is a big variability in the evolution of the disease, the immunological status of the patients and the development of PAH. We did not find any predictive clinical or laboratory markers regarding which patients would have a poor prognosis. Because of PAH is the main cause of death in patients with HIV infection, and its low prevalence, a strategy for active search could increase early diagnosis so making easier both treatment and control of the disease.

P926
Effects of oral dual ERA therapy on pulmonary function testing and 6MWT in patients with idiopathic pulmonary fibrosis and pulmonary hypertension
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PH can be present in 37% to 59% of patients with IPF and is a predictor of mortality, which appears to be the cause of additional burden of exercise capacity. The aim of study was to investigate the role of oral dual ERA therapy in 2 groups of patients with PH associate to IPF with or without Bosentan therapy during 24 months. The primary endpoint was the change of exercise capacity up to month 24, measured by a modified 6MWT.We evaluated retrospectively 16 patients: 8 pts (6 M; mean age of 72 yrs old) with moderate-severe PH and IPF (mPAP measured by RCH estimated as a mean value of 38±4.8 mmHg), treated with Bosentan (PH-IPF ERA group); 8 pts (5 M; mean age of 70 yrs old) with moderate PH and IPF not treated with Bosentan (PH-IPF control group).At baseline, there were differences about hemodynamic and pulmonary functional test profile between two groups of pts. At T 24, the 6MWT increased in PH-IPF ERA group showing a mean increase of +150 mt, while in the PH-IPF control group we observed a reduction of 41% compared to the 6MWT values baseline (*p 0,0003*).In PH-PID group treated with ERA, FVC% and DLCO% were reduced of 8% and 32%, respectively, while in PH-IPF control group were reduced of 6,6% and 22% compared to the baseline (*p 0,009*).The NYHA functional class was decreased in group treated with ERA (3,5 vs 2; *p 0,009*) and improved in control group (2,12 vs 3,25; *p 0,007*). In patients with moderate-severe PH and idiophatic pulmonary fibrosis, treated by Bosentan, there was a clinical improvement, measured by a six minute-walk test and a change in NYHA functional class, without affecting pulmonary functional test.

P927
Efficacy of exercise training in congenital heart disease associated pulmonary hypertension
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Objective: This prospective study was to assess the efficacy of exercise training as add-on to medical therapy in patients with pulmonary arterial hypertension associated with congenital heart disease (CHD-APAH).
Methods: Patients with invasively confirmed CHD-APAH received in-hospital exercise training for 3 weeks and continued at home. Efficacy parameters were evaluated at baseline, after 3 weeks and 15 weeks. Medical treatment remained unchanged during 15 weeks after baseline. The survival rate was assessed in a follow-up period of 21±14 months.
Results: Twenty consecutive patients (16 female, 4 male, mean pulmonary arterial pressure 60±23mmHg, 9 patients were operated, 10 ASD, 11 VSD, 1 PFO, 2 PDA, 10 Eisenmenger syndrome) were included. Patients significantly improved the mean distance walked in 6 minutes compared to baseline by 63±47 meters after 3 weeks ($p<0.001$) and by 67±59 meters after 15 weeks ($p=0.001$). Quality of life-score ($p= 0.050$), peak oxygen uptake ($p=0.002$) and maximal workload ($p=0.003$) improved significantly by exercise training after 15 weeks. The 1- and 2 year survival rates were 100%. In one patient lung transplantation was performed 1 year after exercise training.
Conclusion: Exercise training as add-on to medical therapy may be effective in patients with CHD-APAH, improving quality of life, work capacity and further prognostic relevant parameters. It was also associated with an excellent long-term survival. Further randomized controlled studies are needed to confirm these results.

P928
The utility of brain natriuretic peptide in patients with stable chronic lung diseases
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Background: Cor pulmonare and pulmonary hypertension with chronic lung diseases are related to low exercise capacity and poor prognosis. Plasma brain natriuretic peptide (BNP) is a useful biomarker for monitoring of heart failure.
Objective: The aim of our study is to investigate the utility of BNP in stable chronic lung diseases (COPD, intestinal pneumonia, post-tuberculous lung disorder and others).
Methods: 111 patients with chronic lung diseases (male/female=73/38, mean74.8±8.0yrs; excluding Af rhythm, LVEF≤40% and renal dysfunction) who were admitted to a three-weeks comprehensive inpatient pulmonary rehabilitation program, were assessed by pulmonary function tests, 6-minute walking test, and health-related quality of life as evaluated by SF-36. Plasma BNP was measured and echocardiography was also performed.
Results: It made no difference among types of lung disease for BNP (56.4±57.2pg/ml, mean38.5), RVPs (44.4±12.2mmHg, mean44.0) and LVEF (62.3±6.5%, mean62.0). LVEF was not correlated with BNP. Compared BNP normal group (<18.4pg/ml) with high group (≥18.4pg/ml), there was a difference for Borg scale at rest (0.84±0.77, 2.02±0.57 p=0.0047*) and 6MWD (262.2±73.3m, 188.5±93.0m p=0.0044*). BNP was significantly correlated with 6MWD (r=-0.2270, p=0.0457*). RVPs was also correlated with 6MWD and SpO2 both at rest and on effort. But no significant correlation was shown between BNP and RVPs (r=0.1541, p=0.1540). Also, BNP was not correlated with QOL score (SF-36) and pulmonary function.
Conclusions: Plasma BNP was correlated with exercise capacity in stable chronic lung diseases. BNP may be a useful biomarker for administrating cor pulmonare and pulmonary hypertension with chronic lung diseases.

P929
Resolution of portopulmonary hypertension (POPH) following liver transplantation
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Background: Pulmonary artery hypertension, a consequence of portal hypertension, is referred to as portopulmonary hypertension (POPH). Untreated moderate to severe POPH is a relative contraindication to liver transplantation (LT).

Aims: To summarize the Mayo Clinic medical management and LT outcomes in moderate to severe POPH.
Methods: From 2002-2012, we analyzed the pulmonary vasomodulating (PV) treatments and LT outcomes in consecutive POPH patients with right heart catheterization (RHC) criteria: mean pulmonary artery pressure - MPAP ≥ 35 mmHg and pulmonary vascular resistance - PVR ≥ 3 Wood units). All patients underwent sequential transthoracic echocardiography (TTE; both pre and post-LT) and RHC (pre-LT baseline, with therapy and intraop; not done post-LT). TTE assessed right ventricle (RV) size, function and RV systolic pressure estimate (RVSP).
Results: We managed 65 POPH patients; LT was attempted in 13/65 patients only if PV therapies resulted in MPAP < 35 mmHg and PVR < 5 wood units or normalization of PVR (< 3 Wood units). RV size and function were abnormal in all patients pre-LT. Mean pre-LT baseline vs treated hemodynamics were significantly improved; MPAP (44 → 32 mm Hg, p<.04); CO = 6.1 → 9.7 L/min, p<.005); and PVR (5.9 → 2.3 Wood units, p<.02). Intraoperative death (1), transplant hospitalization death (2) and late death (1) occurred. All survivors (9/13) normalized RV function; 6 normalized RV size; 6/9 were weaned off PV therapies. Post-LT mean RVSP improved significantly vs pre-LT (33 mmHg; range 26-41 vs 71 mmHg; range 45-91. p<.001).
Conclusions: LT can result in POPH resolution (defined by sequential TTE) and liberation from PV therapies in selected patients.

P930

Factors determining outcome in patients with heart failure and normal ejection fraction

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Background: Patients with heart failure and normal left ventricular ejection fraction (HFNEF) face an adverse outcome. Our aim was to identify factors that determine prognosis.
Methods: Patients diagnosed according to current ESC guidelines were recruited. Death and/or hospitalization for HF were defined as primary outcome variables. Outcome groups were compared with respect to potential prognostic predictors using the t-test. Multivariable logistic regression analysis determined whether parameters of interest were associated with adverse outcome. P<0.05 indicated statistical significance.
Results: Between December 2010 and January 2012, 49 patients (34 f/15 m, mean age 70±8 years) were registered. After a mean follow-up of 5±9 months, 14 (29%) patients were hospitalized or died. The adverse outcome group was characterized by higher body mass index (BMI, 35±7 versus 29±5, p=0.004), higher systolic pulmonary pressure on echo (sPAP in mmHg, 69±15 versus 55±14, p=0.004), shorter 6-minute walk distance (6-MWD in m, 271±131 versus 364±100, p=0.019), higher transpulmonary gradient (TPG in mmHg, 15±4 versus 12±4, p=0.013) and a higher pulmonary vascular resistance (PVR in dynes.s/cm^5, 257±97 versus 198±71, p=0.030). Diabetes mellitus II (DM II, 75% versus 24%, p=0.002) and atrial fibrillation (92% versus 51%, p=0.013) were more prevalent among patients with adverse outcome. In the multivariable regression model, only DM II (OR 25.34[95% CI, 2.06 to 311.45]; p=0.012), BMI (OR 1.25[95% CI, 1.00 to 1.56]; p=0.048), and PVR (OR 1.02[95% CI, 1.00 to 1.05]; p=0.032) remained independent predictors of outcome.
Conclusions: Presence of DM II, higher BMI and higher PVR worsen prognosis in HFNEF patients.

P931

Pulmonary hypertension frequency in patients with chronic obstructive pulmonary disease exposed to biomass or tobacco smoke

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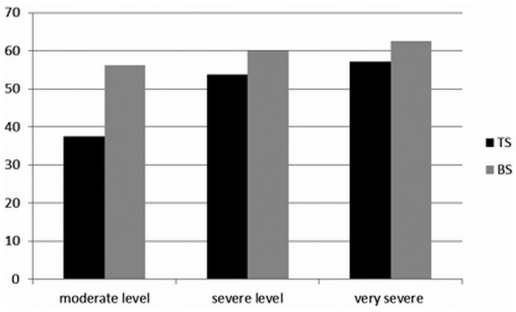
Introduction and aim: Pulmonary hypertension (PH) is a common complication of COPD. This study was designed to investigate the PH frequency and its relations in hospitalized tobacco and biomass exposed COPD patients.
Methods: The study was a retrospective review of inpatients with COPD defined as a history of tobacco or biomass smoking, Pulmonary function tests (PFTs) within stable status, an echocardiogram within stable status. PH was defined as sPAP>35 mmHg.
Results: All Females were biomass exposer and males were tobacco smoker. The Prevalance of PH was found more frequent in females than males. It was more prominent in moderate level COPD cases (56,2% and 37,5%, P<0,002).
There were no differences in terms of $PaCO_2$ and PaO2. However, FEV1% was lower in males than females (p<0,005). On the other hand, FVC % was significantly lower in the females compared with the males (p<0.02). To analyze whether risk factors for PH differ with COPD level, multiple logistic regressions were performed for each COPD severity group separately. The influence of FVC% on the risk of a person having PH increased with increasing COPD level.
Conclusion: Our study demonstrated that PH frequency is higher in female COPD cases due to biomass smoke than in male COPD cases due to Tobacco smoke, and



this difference is prominent in moderate COPD level. Independent factors of PH are differed among the groups of COPD level.

P932

A study of suspected pulmonary embolism (PE) in pregnancy management and a survey of guideline awareness

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Introduction: A recent report showed PE as a major cause of maternal death in the UK (CMACE,BJOG 2011;118(Suppl.1):1-203); delays in diagnostic tests, treatment and poor knowledge of radiological safety are contributing factors. The Royal College of Obstetricians & Gynaecologists provides a protocol for suspected PE (Greer, I.A.et al.RCOG Green-top Guideline No.28 Feb 2007).
Aims: To gauge the level of guideline-awareness in medical trainees and evaluate the management of suspected PE in pregnancy in a UK District Hospital.
Methods: A survey of medical trainee knowledge of investigative pathways, radiation-exposure risks and guideline awareness. We also analysed management of pregnant women with suspected PE between 2009-11.
Results: 76% of medical trainees and 58% of Respiratory SpRs were unaware of guidelines and had poor knowledge of radiation risks.

Table 1. Respondents' score of relative radiation risk to fetus: lowest (1) to highest (4) from the four most commonly used investigations

Fetal	Actual	Average Score	Difference
USS	1	1	0.0
CXR	2	2.4	0.4
CTPA	3	3.8	0.8
QSCAN	4	2.7	-1.3

N=25 respondents.

41 women had symptoms of PE and were investigated as shown.

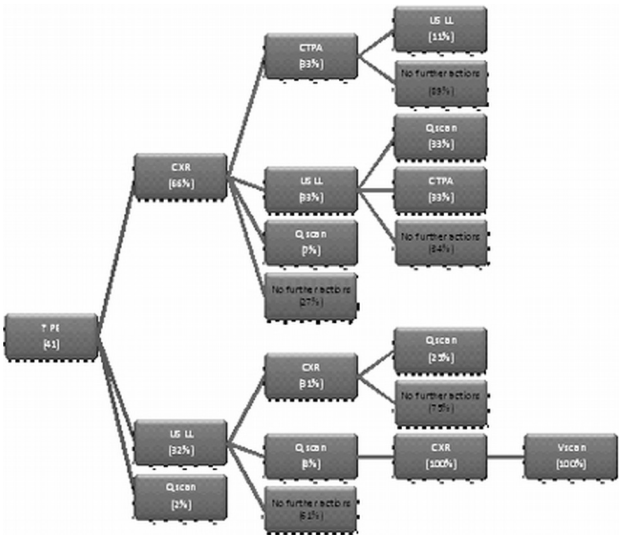

Figure 1. Sequence of investigations.

3 patients had PE confirmed (7.3%). Only 15% of women were investigated as per RCOG guidelines.
Conclusion: Our study revealed poor guideline-awareness for PE in pregnancy highlighting the need for better dissemination of these guidelines to medical trainees.

P933

VO_2 equations revised: Is the use of assumed oxygen consumption acceptable?

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LaFarge/Miettinen's formula for the assumption of oxygen consumption (VO_2) is one of the most used in hemodynamic calculations. Considering the importance of VO_2 for the calculation of hemodynamics needed for disease evaluation (e.g. pulmonary hypertension), the need for an acceptable agreement between assumed and measured VO_2 becomes obvious. A well known variation of the original formula is the one by Bergstra. In both equations, age, sex and BSA are factors determining the VO_2, plus the heart rate (HR) in the original formula.
We compared directly measured VO_2 with values calculated by both the LaFarge/Miettinen and the Bergstra equations.
VO_2 of 122 volunteers (20-65y) was directly measured by the Innocor™ (Innovision). VO_2 was then recalculated by both the equations. Directly measured VO_2 (VO_2^{INN}) was 363±84ml/min in males, 224±52ml/min in females. VO_2 calculated by Bergstra was 298±24ml/min in males, and 233±24ml/min in females. VO_2 by LaFarge/Miettinen was 258±24ml/min in males, 182±21ml/min in females. Direct comparison of VO_2^{INN} with calculated VO_2 showed significant differences between all the methods. Factors found to be influencing the VO_2 in our cohort included sex, HR and BSA whereas age seemed to have no effects. Significant correlations were found between VO_2 and hemoglobin, oxygen saturation (SpO_2), fitness level and systolic blood pressure.
Comparison of directly measured VO_2 values with assumed data obtained by both the LaFarge/Miettinen and Bergstra equations showed that none of the formula is satisfying in terms of agreement with measured data. Using VO_2 equations may result in major bias of hemodynamics and we therefore urge that resulting data should be interpreted critically.

P934

Impaired peripheral brachial endothelial function in IPAH and CTEPH without cardiovascular risk factors

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Background: Pulmonary hypertension (PH) is associated with dysfunction of pulmonary endothelium. Shearstress dependent peripheral arterial endothelial dysfunction has been found in various cardiovascular diseases and data in PH is limited. The aim of this study was to evaluate peripheral endothelial function in IPAH and CTEPH and the relation to right heart function.
Methods: Flow mediated dilation (FMD) of the brachial artery was determined in 26 patients (55.5±15.5y, PAPm: 48.0±13.7mmHg, PVR: 837.6±476.8dyn*s*cm-5) with IPAH or CTEPH and 14 healthy controls. FMD was defined as the maximum change in vessel diameter after reactive hyperemia. Right ventricular function was examined by echocardiography.
Results: Patients and controls were similar in terms of peripheral flow conditions and cardiovascular risk factors including Intima-media thickness (IMT) (IMT: 0.57±0.14 vs. 0.59±0.14 mm, p=0.39). Patients with PH demonstrated impaired peripheral endothelial function (FMD absolute change: 0.17±0.15 vs. 0.26±0.14 mm, p=0.008, relative change: 5.32±5.31 vs. 8.12±5.51%, p=0.01). There were no differences in peripheral endothelial function between IPAH and CTEPH (FMD: 3.39±5.76 vs. 4.12±3.80%, p=0.69). A correlation with right atrial enddiastolic area (RAAd) was found (r=-0.43, p=0.01).
Conclusions: In addition to changes of the pulmonary vascular bed, PH is associated with peripheral arterial endothelial dysfunction in patients with IPAH and CTEPH. An increased RAAd points to chronically increased RV filling pressures and therefore a failing ventricle. The negative correlation with FMD might be regarded as result of impaired hemodynamics rather than a primary endothelial defect.