Student's t test and Mann-Whitney to analyze continuous variables. Fisher test to analyze categorical variables. Statistical analysis with SPSS (v.15, SPSSInc., Chicago, Illinois). P<0.05 was considered as statistically significant.
Results: From 6308 patients included in the study, 45% were males and medium age 68. Global mortality during the 30 days after diagnosis was 4.6% and due to PE 2.2%.

	Overall death	Alive	Fatal PE	No fatal PE
Patients, N				
Clinical characteristics,				
Age >80 years	73 (40%)#	1344 (22%)	10 (32%)	1399 (22%)
Gender (males)	73 (43%)	2716 (46%)	25 (45%)	2840 (46%)
Creatinine levels >1.2 mg/dL	52 (59%)#	1124 (40%)	17 (63%)*	1155 (41%)
Cancer	53 (45%)#	1033 (17%)	13 (32%)#	1086 (18%)
Chronic heart disease	36 (26%)#	595 (9.2%)	11 (26%)*	630 (9.4%)
Chronic lung disease	34 (19%)*	799 (13%)	12 (21%)	820 (13%)
Physical examination,				
Heart rate >110 bpm	61 (33%)#	1305 (22%)	25 (46%)#	1361 (22%)
SBP levels <100 mm Hg	36 (20%)#	623 (10%)	13 (23%)#	649 (10%)
Electrocardiogram,				
Atrial fibrillation	34 (19%)#	508 (8.3%)	12 (21%)#	530 (8.5%)
Right bundle branch block	48 (26%)#	1070 (18%)	13 (25%)#	1160 (19%)
S1Q3T3 pattern	27 (17%)	1175 (21%)	11 (22%)	1191 (21%)
Negative T wave	44 (25%)	1362 (25%)	16 (25%)	1411 (25%)
Laboratory,				
PO_2 <60 mm Hg	78 (56%)#	1631 (43%)	28 (72%)#	1671 (43%)
Sat O_2 <90%	78 (61%)#	1629 (36%)	29 (79%)#	1678 (37%)
Echocardiogram,				
Right atrial dilatation	65 (46%)#	1765 (29%)	43 (71%)#	1811 (29%)
Right ventricle dyskinesia	62 (38%)#	1435 (24%)	30 (58%)#	1482 (24%)
PAP > 35 mm Hg	112 (89%)#	2519 (70%)	43 (93%)#	2681 (70%)
Ratio RV/LV > 1.0	8 (32%)	187 (22%)	3 (16%) *	192 (22%)

	Overall death RR (95%)	Fatal PE RR (95%)
Age >80 years	2.01 (1.44-2.73)#	ns
Cancer	3.59 (2.62-4.92)#	2.24 (1.26-4.01)*
Heart rate >110 bpm	1.46 (1.04-2.05)*	ns
SBP levels <100 mm Hg	ns	2.67 (1.36-4.88)*
Right bundle branch block	1.42 (1.00-2.01)*	ns
Right atrial dilatation	1.81 (1.30-2.51)#	4.04 (2.03-8.00)#

Conclusions: 1. The presence of RA enlargement is significantly associated with mortality from all causes during the first month after diagnosis. 2. This association is particularly strong with mortality caused by PE itself. 3. Compared to patients with normal RA, the risk of dying from PE during the first month is 4 times higher in patients with RA dilatation.

309. Pulmonary circulation: end-points and biomarkers

2827
Right atrial enlargement and prognosis in the hemodinamically stable pulmonary embolism
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Introduction: The Right-Atrium (RA) is easily accessible from the apical 4-chamber view (4Cv) and its enlargement is easily verifiable.
Aim: To study if RA enlargement is associated with increased short-term mortality in patients with acute symptomatic hemodinamically stable PE.
Methods: The RIETE Registry is international registry of patients with symptomatic acute VTE. Patients diagnosed of hemodinamically stable PE were included in the current study. RA enlargement was considered if the RA End-Systolic (ES) area in the apical 4Cv, was greater than the Left Atrium ES area. Right Ventricle/Left Ventricle (RV/LV) ED ratio and RV dyskinesia were also determined.

2828
A novel echo-score for evaluating the pre-test probability of pre-capillary versus post-capillary pulmonary hypertension
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Aim: To provide an echo-score for evaluating the pre-test probability of pre-capillary (pre-PH) vs post-capillary (post-PH) pulmonary hypertension (PH).
Methods: One hundred thirty-five consecutive patients underwent Doppler echocardiography (DE) within 1 hour of a clinically indicated right heart catheterization (RHC). The DE was scored on the basis of features suggesting pre-PH: right atrium (RA) > left atrium (LA), right ventricle (RV) > left ventricle (LV), apex forming RV, LV eccentricity index (EI) <0.9, pericardial effusion (PE), systolic notch at right ventricular outflow tract (RVOT), dilated and fixed inferior cava vein (ICV) (yes = 1, no = 0), or post-PH: LV ejection fraction (EF) ≤40%, moderate/severe aortic and/or mitral disease (yes = -1, no = 0). Patients were divided in 3 groups: low score (-2 to 0), medium score (1 to 2) and high score (3 to 7).
Results: Twelve/135 patients did not have PH at RHC; 84 showed pre-capillary (54 group 1) and 39 post-capillary PH (group 2). The probability of pre-PH was 37% in presence of low, 86% in presence of medium and 95% in presence of high echo-score. LV-EF ≤40% had 100% specificity for post-PH. The majority of echo features showed an high specificity but a low sensitivity for pre-PH.

Echo features for pre-capillary PH

	RA >LA	RV >LV	Apex RV	LV EI <0.9	PE	RVOT notch	Dilated-fixed ICV
Sensitivity (%)	48	52	56	31	35	27	12
Specificity (%)	92	92	92	96	96	77	96
Odds ratio	11.1	12.9	15.1	11.1	13.2	1.2	3.2

Conclusion: RHC remains the gold standard for the diagnosis of PH. Nevertheless, a novel easy and integrated echo-score provides a good pre-test probability of having a pre-capillary rather than post-capillary PH.

2829
The long-term prognostic value of extracted thrombus and hemodynamics and in chronic thromboembolic pulmonary hypertension
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Background: Chronic thromboembolic pulmonary hypertension (CTEPH) is surgically treatable by pulmonary endarterectomy (PEA). The purpose of this study was to assess the role of RV afterload parameters compared with the quantity of extracted thrombi on long-term survival in patients with CTEPH undergoing PEA.

Methods and results: We monitored steady flow parameters (pulmonary vascular resistance (PVR), steady component of afterload (SCA =mPAP-mPCWP), pulmonary vascular pressure gradient (PVG=dPAP-mPCWP)) and pulsatility parameters (pulmonary arterial compliance (PAC=stroke volume/sPAP-dPAP), pulsatile component of afterload (PCA=mPAP-dPAP)) prior to and within 3 days (immediate) after PEA in 110 consecutive patients, who were followed for 34.5 (11.9; 78.3) months. The quantity of extracted vascular obstructions were expressed as the total number and total length of small-vessel thrombus appendages, and correlated inversely with immediate postoperative PVR ($p<0.0001$, $r=-0.566$; $p<0.0001$, $r=-0.580$). Cox regression analysis revealed only steady flow parameters immediate PVR, SCA and PVG predictors of long-term survival/freedom of lung transplantation ($p<0.0001$, $p=0.02$, $p=0.04$).
Patients with immediate PVR<590 dynes.s.cm-5 or SCA<26.5mmHg or PVG<21.5mmHg had a better long-term outcome (Logrank tests; $p<0.0001$, $p=0.0006$, $p<0.0001$).
Conclusions: Steady flow parameters PVR, SCA and PVG assessed immediately postoperative were predictors of long-term survival in CTEPH patients undergoing PEA. PVR was the most important hemodynamic predictor of survival, and was correlated with the number of thrombus limbs extracted from the distality.

2830

Hemodynamic assessment of pulmonary hypertension in grown-up congenital heart disease

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Purpose: Pulmonary arterial hypertension (PAH) associated with congenital heart disease (CHD) is included in group 1 of the pulmonary hypertension (PH) clinical classification. The persistent exposure of the pulmonary vasculature to increased blood flow due to systemic-to-pulmonary shunts as well as increased pressure may result in a typical pulmonary arteriopathy that leads to an increase in invasively measured mean pulmonary arterial pressure (mPAP) ≥25mmHg at rest.
Methods: 3107 right and left heart catheterizations were analyzed. Diagnoses were validated on the grounds of patient histories, imaging, clinical data and pathoanatomic evidence (2369 complete data sets). 257 data sets were from patients with CHD.
Results: Underlying diagnoses were: pre-tricuspid defects in 172 patients, post-tricuspid defects in 38 patients and complex lesions in 47 patients. Of the 257 patients with CHD (38 were corrected), 141 patients had normal hemodynamics ("Non-PH" mPAP<25mmHg). Of the remaining 116 patients with PH (with wedge tracings missing or insufficient in 19 cases), 51 qualified as pre-capillary PH (CHD-PAH; PCWP≤15mmHg), 46 had CHD with elevated left ventricular filling pressures (CHD-PH; mPCWP>15mmHg; Table 1).

Table 1. Hemodynamic data of patients with CHD and pulmonary hypertension

	CHD-PAH PCWP ≤15mmHg (n=51)	CHD-PH PCWP >15mmHg (n=46)
Age	51,3±17	60.6±15
sPAP (mmHg)	63.4±26.2	64.7±20.6
dPAP (mmHg)	26.1±11.5	26.9±9.2
mPAP (mmHg)	40,3±16,3	41.4±13.1
mPCWP (mmHg)	10.1±3.4	24.2±6.2

Conclusion: The data demonstrate that a significant proportion (almost 50%) of patients with PH in grown-up congenital heart disease suffer from post-capillary pulmonary hypertension.

2831

Asymmetric dimethylarginine, a biomarker for the effects of drug therapy in pulmonary hypertension

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Rationale: Asymmetric dimethylarginine (ADMA), a potent endogenous nitric oxide synthase inhibitor, is increased in pulmonary hypertension (PH), and associated with unfavorable outcome. We hypothesized that plasma ADMA may serve as a biomarker to monitor disease progression under PH-specific treatment.
Methods: ADMA was measured at baseline and at least after 24 weeks of treatment in consecutive patients (pts) under advanced PH-targeted treatments. Therapy responders were defined by decrease of pulmonary vascular resistance (PVR) of at least 200dynes.cm-1.s-5, 6-minute walking distance > 380m, and improvement of WHO at follow-up and were compared with non-responders.
Results: 51 consecutive patients (44 pts with pulmonary arterial hypertension and 7 patients with PH due to lung disease) were enrolled in this study. According to our definition; there were 16 non-responders, and 23 responders to treatments. 11 patients showed no change.
ADMA plasma levels did not change significantly under treatment in the whole group. There was a significant drop of ADMA in responder group ($p<0.0001$). Furthermore, ADMA change in responders and nonresponders was significantly different ($p=0.003$).
The decrease of ADMA correlated with the decrease of PVR ($r=0.56$, $p<0.0001$), with the decrease of mean pulmonary arterial pressure ($r=0.44$, $p=0.001$). Furthermore, the difference of ADMA correlated with the increase of cardiac index ($r=-0.38$, $p=0.005$) and mixed venous saturation ($r=-0.3$, $p=0.03$).
Conclusions: ADMA parallels the hemodynamic benefit of PH-specific treatment in patients with PH of various etiologies. ADMA can serve as a biomarker for the effect of PH-specific treatments.

2832

Respiratory event hospitalizations are reduced in heart failure patients with comorbid chronic obstructive pulmonary disease using a wireless implanted pulmonary artery pressure monitoring system

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Introduction: Respiratory event hospitalizations (REH) from COPD exacerbations, bronchitis, pneumonia, and other respiratory events frequently occur in patients with heart failure (HF). Pulmonary artery pressure (PAP) monitoring and treatment has been shown to reduce heart failure hospitalizations.
Objectives: We performed a retrospective analysis to see if PAP monitoring impacts REH in HF patients who had a medical history of COPD and/or were receiving COPD therapies.
Methods: The CHAMPION trial enrolled 550 patients with NYHA class III HF who were followed for an average of 15 months. In all patients PAP data were monitored using a novel, implantable hemodynamic system. In the treatment group, clinicians used PAP data to guide therapy decisions in addition to standard of care versus standard of care alone in the control group.
Results: REH rates were higher in the COPD subgroup compared to the entire CHAMPION cohort. In the COPD subgroup (91 treatment vs. 96 control), treatment experienced a 62% reduction in REH rates (0.12 vs. 0.31, HR 0.38, 95% CI 0.21-0.71, p=0.0023, Anderson-Gill). In the CHAMPION cohort (270 treatment vs. 280 control), treatment experienced a 49% reduction in REH rates (0.07 vs. 0.14, HR 0.51, 95% CI 0.44-0.81, p=0.0009).
Conclusions: Treating HF patients with an implantable hemodynamic monitoring system significantly reduced REH in all patients with even greater benefit in COPD patients. Further investigations that analyze the relationship between PAP, COPD, and REH in chronic HF patients and its implication towards new treatment strategies are warranted.

2833

Pulmonary vascular gradient: A predictor of prognosis in pulmonary hypertension due to left heart disease

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Purpose: Pulmonary hypertension (PH) is defined by a mean pulmonary artery pressure (mPAP) ≥25mmHg. The disease can be further classified into pre- (pulmonary capillary wedge pressure, PCWP≤15mmHg) and post-capillary PH (PCWP>15mmHg). The driving pressure across the pulmonary circulation is often referred to as the transpulmonary gradient (TPG). In the current guidelines post-capillary PH with a TPG>12mmHg is labeled as "out-of-proportion" PH, as opposed to what is labeled as "passive" PH, i.e. PH as the consequence of elevated left ventricular filling pressures. The difference between the diastolic pulmonary artery pressure and mean PCWP theoretically represents the pressure gradient between the major pulmonary arteries and the left atrium, comprising the anatomical space of arterioles, capillaries and pulmonary veins. We refer to this hemodynamic value as pulmonary vascular gradient (PVG), and hypothesize that it reflects resistance created in the vascular compartment affected by classical pulmonary arteriopathy. The aim of this study was to test the prognostic value of PVG in post-capillary PH.
Methods: 3107 diagnostic right and left heart catheterizations at rest were analyzed. 1094 of 2351 complete datasets were from patients post-capillary PH. Patients were followed for 137 months.
Results: Survival analysis identified a TPG>12mmHg as a predictor of death in patients with PH. In patients with out-of-proportion PH median survival with a PVG≥7mmHg (p=0.010) was worse (78 months) than in matched patients with a PVG<7mmHg (101 months).
Conclusion: Our data show that a PVG threshold of 7mmHg identifies patients with out-of-proportion PH who have an increased mortality.