*Centre, University of Leeds Medical School, United Kingdom; [8]Department of Internal Medicine, Sahlgrenska Academy, University of Gothenburg, Sweden; [9]Department of Medicine, University Kiel, Germany; [10]Respiratory Centre of Excellence, GlaxoSmithKline, Uxbridge, United Kingdom; [11]Hospital La Paz, IdiPAZ, Madrid, Spain; [12]Excellence Medicale, GSK France, Marly Le Roi, France*

**Background:** Although ischaemic heart disease (IHD) and chronic pulmonary diseases, eg COPD, share similar risk factors, the prevalence and rate of diagnosis of airflow limitation (AL) compatible with COPD, and other lung function abnormalities, in patients with IHD are largely unknown.
**Methods:** In a cross-sectional study conducted in 15 sites across nine European countries (Belgium, France, Germany, Greece, Ireland, Italy, the Netherlands, Spain, and Sweden), we investigated the prevalence of airflow limitation compatible with COPD (defined as post-bronchodilator (BD) $FEV_1/FVC < 0.70$) and other lung function abnormalities in outpatients with documented IHD who were ≥40 years, and current or former smokers. Each participant completed a core questionnaire and performed full pre- and post-BD spirometry. Quality control of spirometry readings was performed by a centralized system.
**Results:** Up to April 2012, we studied 1803 evaluable IHD patients, 86.0% male, mean±SD age of 65.0±9.8 years. The prevalence of AL was 30.6% (95% C.I. 28.5%-32.8%, n=552) and, from 547 with available data, only 29.4% (n=161) of these had a prior diagnosis of COPD. In addition, we found a restrictive lung disease prevalence of 11.0% (defined as pre BD FVC<80% predicted and post BD $FEV_1/FVC \geq 70\%$ predicted) in a subset of 1685 patients with available data.
**Conclusions:** Airflow limitation, compatible with COPD, and spirometry results suggestive of restrictive lung disease are frequent in individuals with IHD and are largely under-diagnosed, which has implications for the treatment and prognosis of both respiratory and cardiovascular diseases.

**P451**

**Prevelance of osteoporosis in steroid naive post menopausal women with COPD in Indian subjects**

Deepak Talwar, Amrit Goel, Salik Raza. *Pulmonary and Critical Care, Metro Hospita and Heart Institute, Noida, UP, India*

**Study objective:** Osteoporosis in elderly female COPD on inhaled or systemic corticosteroids had been reported. We looked into prevalence of osteoporosis by BMD analysis in steroid naive COPD patients presenting to COPD clinic for first time.
**Material & Method:** Retrospective analysis done by computerized search of patient's OPD records between Jan 10 & Dec 10.1084 patients visited clinic for COPD and 411 underwent DEXA scan within 2 weeks. 253 post menopausal women identified COPD. 122 were steroid naïve (on rescue salbutamol ± theophylline and no records of using labeled systemic or local steroids). Severity of COPD was classified as per GOLD. Statistical analysis done using one way ANOVA.
**Results:** Of 122 patients with COPD 61 (50%) had osteoporosis. 6/20 (30%) GOLD stage 1 patients, 23/53 (43.39%) stage 2, 17/27 (62.96%) stage 3 and 15/22 (68.18%) in stage 4 had osteoporosis. Low BMD (T-score at AP spine < -1) was observed in 17/20 (85%) stage 1, 44/53 (83.01%) stage 2, 23/27 (85.18%) stage 3 & 19/22 (86.36%) stage 4. Significantly lower BMD were observed in stage 1 ($0.88\pm0.11$ gm/cm$^2$),Stage 2 ($0.84\pm0.19$ gm/cm$^2$), Stage 3 ($0.83\pm0.19$ gm/cm$^2$) & Stage 4 ($0.78\pm0.16$ gm/cm$^2$) compared to normal age matched postmenopausal women ($1.10\pm0.22$ gm/cm$^2$) p-value =0.003, p value <0.001, p-value< 0.001, p value <0.001 and p-value< 0.001 respectively.
**Conclusion:** In our subset of postmenopausal steroid naïve COPD women low BMD is seen in 86% of patients being lowest in most severe COPD. Hence, it would be prudent to do DEXA scan at initial visit of such patients particularly in stage 3 and stage 4 COPD, where addon ICS could worsen BMD.

## 78. Asthma and COPD: quality of life and comorbidities

**P450**

**Prevalence and under-diagnosis of airflow limitation and other lung function abnormalities in patients with ischaemic heart disease: an interim analysis of the ALICE study**

Joan Soriano[1], Nicolas Roche[3], John Cockcroft[4], Klaus Rabe[9], Mark Kearney[7], Guy Brusselle[5], Frits Franssen[2], Francisco Garcia Rio[11], Bo Lundbäck[8], Helen Marsden[10], Hana Muellerova[10], Paul Bloomfield[10], Gilbert Nadeau[10], Mathieu Vasselle[12], Zoe Adams[10], Angus Henderson[10], Leo Fabbri[6].
*[1]Fundación Caubet-CIMERA Illes Balears, CIMERA, Bunyola, Spain; [2]Program Development Centre, CIRO, Horn, Netherlands; [3]Respiratory and Intensive Care Medicine, Hôtel-Dieu Hospital, University Paris Descartes, Paris, France; [4]Wales Heart Research Institute, Cardiff University School of Medicine, Cardiff, United Kingdom; [5]Department of Respiratory Medicine, Ghent University Hospital, Ghent, Belgium; [6]Department of Oncology Haematology and Respiratory Diseases, Section of Respiratory Diseases, University of Modena & Reggio Emilia, Modena, Italy;[7]Multidisciplinary Cardiovascular Research*

**P452**

**The prevalence of chronic obstructive pulmonary disease (COPD) in individuals with diabetes, hypertension, asthma, or mood/anxiety disorders: A Canadian population study**

Pat Camp[1], Darcy Marciniuk[2], Marieve Doucet[3], Teresa To[4], Robert Prosser[5], Anita Kozyrskyj[6], Nancy Garvey[7], Kim Reimer[8], S. Vanderloo[9], Charles Gilbert[9], Louise McRae[9], Andrea Gershon[4]. *[1]James Hogg Research Centre, University of British Columbia, Vancouver, Canada; [2]Respiratory Division, University of Saskatchewan, Saskatoon, Canada; [3]Institut National de Sante Publique, Government of Quebec, Quebec, Canada; [4]Institute for Clinical Evaluative Sciences, Institute for Clinical Evaluative Sciences, Toronto, Canada; [5]RJ Prosser and Associates, RJ Prosser and Associates, Vancouver, Canada; [6]Department of Pediatrics, University of Alberta, Edmonton, Canada; [7]Ministry of Health and Long Term Care, Government of Ontario, Toronto, Canada; [8]Ministry of Health, Government of British Columbia, Victoria, Canada; [9]Public Health Agency of Canada, Government of Canada, Ottawa, Canada*

There is little information on the prevalence of COPD among people with other chronic conditions. We determined the cross sectional prevalence of COPD among Canadians with diabetes, asthma, hypertension, and mood/anxiety disorders. We also compared the all-cause mortality between individuals with these other diseases with/without COPD.
**Methods:** Using the Canadian Chronic Disease Surveillance System (CCDSS), we analyzed 2008/2009 administrative health data for Canadians aged 35 years

and older, from 12 of 13 provinces/territories. COPD, diabetes, hypertension, mood/anxiety disorders and asthma were identified using ICD9/10 codes from physician billing and hospitalization records.
**Results:** The prevalence of COPD among Canadians aged 35 years and older was 8.2%. The prevalence of COPD among people with diabetes, hypertension, mood/anxiety disorder and asthma was respectively 11.4% (95% confidence interval (CI) 11.35, 11.44), 10.0% (95%CI 9.99, 10.04), 11.6%, (95%CI 11.57, 11.66) and 26.3% (95%CI 26.20, 26.35). In addition, a diagnosis of COPD was associated with a 140% increase in mortality among people with diabetes and a 154% increase in mortality among people with hypertension (comorbid mortality among people with asthma or mood/anxiety disorders could not be calculated because the data were not available).
**Conclusions:** COPD is a prevalent comorbid condition for individuals with asthma, mood/anxiety disorder, diabetes and hypertension and comorbid COPD is associated with higher mortality. An integrated care approach to these patients may optimize health outcomes and reduce the burden of chronic disease.

**P453**
**Comorbidity between chronic obstructive pulmonary disease and type 2 diabetes in adult twins**
Howraman Meteran[1], Backer Vibeke[1], Kyvik Kirsten Ohm[2], Axel Skytthe[3], Simon Francis Thomsen[1]. *[1]Department of Respiratory Medicine, Bispebjerg Hospital, Copenhagen NV, Denmark; [2]Institute of Regional Health Services Research & Odense Patient Data Explorative Network, University of Southern Denmark, Odense, Denmark; [3]The Danish Twin Registry, University of Southern Denmark, Odense, Denmark*

**Aim:** To examine the relationship between chronic bronchitis and chronic obstructive pulmonary disease (COPD), and type 2 diabetes in adult twins.
**Methods:** Questionnaire data on chronic bronchitis and hospital data on diagnosed COPD on 13,649 twins, 50-71 years of age, from the Danish Twin Registry, were cross-linked with hospital discharge diagnosis data on type 2 diabetes from the Danish National Patient Registry.
**Results:** The risk of type 2 diabetes was higher in subjects with symptoms of chronic bronchitis compared with subjects without symptoms of chronic bronchitis (3.5 vs. 2.3%), OR=1.53 (1.09 - 2.15), p=0.013; and in subjects with diagnosed COPD compared with subjects without diagnosed COPD (6.6 vs. 2.3%), OR=2.97 (1.95-4.53), p=0.000. The results were significant after adjusting for age, sex, and smoking. Correlations between genetic effects on chronic bronchitis and type 2 diabetes; and between genetic effects on diagnosed COPD and type 2 diabetes, respectively, were 0.25 (0.00-0.59), p=0.130 and 0.35 (0.00-0.72), p=0.134.
**Conclusions:** Patients with chronic bronchitis and COPD have an increased risk of type 2 diabetes independently of sex, age, and smoking. Furthermore, comorbidity between these diseases seemed not to be explained by shared genetic factors. The increased risk of type 2 diabetes must be accommodated in the management of patients with chronic bronchitis and COPD.

**P454**
**Angiotensin II receptor blockers, ACE inhibitors, lung function and percent emphysema; the MESA lung study**
Megha Parikh[1], Eric Hoffman[2], Joseph Schwartz[1], Jaime Madrigano[3], John Austin[4], Ravi Kalhan[5], Gina Lovasi[6], Karol Watson[7], Karen Hinkley Stukovsky[8], R. Graham Barr[1]. *[1]Department of Medicine, Columbia Univerity College of Physicians and Surgeons, New York, NY, United States; [2]Department of Radiology, University of Iowa, Iowa City, IA, United States; [3]Department of Environmental Health Sciences, Mailman School of Public Health, Columbia University, New York, NY, United States; [4]Department of Radiology, Columbia Univerity College of Physicians and Surgeons, New York, NY, United States; [5]Division of Pulmonary and Critical Care Medicine, Northwestern University, Chicago, IL, United States; [6]Institute for Social and Economic Research and Policy, Columbia University, New York, NY, United States; [7]Division of Cardiology, UCLA School of Medicine, Los Angeles, CA, United States; [8]Department of Biostatistics, University of Washington, Seattle, WA, United States*

In a murine model of emphysema, angiotensin receptor blockers (ARB) improved airway and airspace architecture and lung function. We hypothesized that use of ARBs and angiotensin-converting enzyme (ACE) inhibitors would be associated with higher lung function and less emphysema on computed tomography (CT).
The Multi-Ethnic Study of Atherosclerosis (MESA) recruited participants age 45-84 years free of clinical cardiovascular disease. Percent emphysema was estimated on full-inspiration cardiac CT scan using a threshold of -910 HU. Spirometry was measured following ATS/ERS guidelines. Linear regression models adjusted for age, sex, race/ethnicity, body mass index, smoking status, pack-years, exposure to second-hand smoke, educational attainment, hypertension, diabetes, asthma, family history of emphysema, statin use, female hormone replacement therapy, fish oil use and scanner type.
Among 3,599 participants (mean age 61±10 years, 51% female; 35% white, 26% black, 22% Hispanic, 16% Chinese), the proportion of participants using ARBs and ACE inhibitors was 5.5% and 11.8%, respectively. The mean square root transformed percent emphysema was 3.85±1.52, the mean FEV1 (L) was 3.5±0.7. Participants using ARBs or ACE inhibitors had slightly less square root transformed percent emphysema (-0.12, 95% CI: -031, 0.07; P=0.22) and participants using ACE inhibitors had slightly higher levels of FEV1 (19 mL; 95% CI: -35, 73; P=0.50) compared to others, but neither difference was statistically significant. In cross-sectional analysis, adjusting for various confounders, there was no evidence that use of ARB or ACE inhibitors was associated with less emphysema or better lung function.

**P455**
**Inflammatory biomarkers and comorbidities in chronic obstructive pulmonary disease**
Mette Thomsen[1], Morten Dahl[3], Peter Lange[2], Jørgen Vestbo[4], Børge Nordestgaard[1]. *[1]Clinical Biochemistry, Herlev Hospital, Copenhagen University Hospital, Herlev, Denmark; [2]Respiratory Section, Hvidovre Hospital, Copenhagen University Hospital, Hvidovre, Denmark; [3]Clinical Biochemistry, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark; [4]Respiratory Research Group, Manchester Academic Health Science Centre, University Hospital South Manchester NHS Foundation Trust, Manchester, United Kingdom*

**Background:** Patients with chronic obstructive pulmonary disease (COPD) have evidence of systemic inflammation that may be implicated in the development of comorbidities. We tested the hypothesis that elevated levels of three inflammatory biomarkers are associated with increased risk of comorbidities in COPD.
**Methods:** We measured baseline C-reactive protein (CRP), fibrinogen, and leukocyte count in 10,052 COPD patients from two large population studies. During a median 5-years follow-up we recorded hospital admissions due to ischemic heart disease, myocardial infarction, heart failure, type II diabetes, lung cancer, pneumonia, pulmonary embolism, hip fracture, and depression as endpoints.
**Results:** Multifactorially adjusted risk of ischemic heart disease was increased by a factor of 2.19 (95% confidence interval 1.48 to 3.23) in individuals with three biomarkers elevated (CRP above 3 mg per liter, fibrinogen above 14 μmol per liter, and leukocyte count above 9 x109 per liter) versus individuals with all three biomarkers at or below these limits. Corresponding hazard ratios were 2.32 (1.34 to 4.04) for myocardial infarction, 2.63 (1.71 to 4.04) for heart failure, 3.54 (2.03 to 6.19) for diabetes, 4.00 (2.12 to 7.54) for lung cancer, and 2.71 (2.03 to 3.63) for pneumonia. There were no consistent differences in risk of pulmonary embolism, hip fracture, or depression as a function of these three biomarkers.
**Conclusions:** Simultaneously elevated levels of CRP, fibrinogen, and leukocyte count are associated with a 2 to 4-fold increased risk of major comorbidities in COPD. These findings may enable clinicians to conduct stratified management of comorbidities in COPD patients.

**P456**
**Comorbidity in chronic obstructive pulmonary disease (COPD): Data from the fourth Korean National Health and Nutrition Examination Survey (KNHANES IV)**
Chansoo Moon, Sae Byol Kim, Kyung Soo Chung, Seon Cheol Park, Won Jai Jung, Eun Young Kim, Ji Ye Jung, Young Ae Kang, Moo Suk Park, Young Sam Kim, Se Kyu Kim, Chul Min Ahn, Joon Chang. *Division of Pulmonology, Department of Internal Medicine, Yonsei University College of Medicine, Seoul, Republic of Korea*

**Introduction:** Many comorbidities frequently coexist with chronic obstructive pulmonary disease (COPD) and they could influence on poor prognosis. We tried to determine which comorbidities frequently coexist in individuals with COPD using population based nationwide survey.
**Method:** We used data obtained in the first (2007) and second year (2008) of the Fourth Korean National Health and Nutrition Examination Survey (KNHANES IV) and included participants aged ≥40 years. Subjects with $FEV_1/FVC<0.7$ was defined as individuals with COPD. Participants with history of asthma, pulmonary tuberculosis and bronchiectasis were excluded.
**Result:** Baseline characteristics were not significantly different between COPD group (n=357) and control group (n=357) except spirometric findings. COPD group was associated with increased risk of low BMI (<18.5 $kg/m^2$) (OR 3.53, 95% CI 1.29-9.68; p=0.014) and associated with decreased risk of hypertension (OR 0.73, 95% CI 0.54-0.99; p=0.042) and hypercholesterolemia (OR 0.59, 95% CI 0.37-0.93; p=0.022). The incidence of low BMI uniquely increased with the severity of airflow obstruction (1.4% in control subjects, 3.6% in GOLD stage I, 4.5% in GOLD stage II and 30% in GOLD stage III+; p<0.0001). However, the incidence of hypertension and hypercholesterolemia did not.
**Conclusion:** Incidence of low BMI uniquely increased with the severity of airflow limitation. However, more study is needed to confirm whether low BMI is the cause of COPD or the result of COPD.

**P457**
**Ventilatory function and markers of metabolic disorders in young adults**
Vanessa Garcia Larsen[1], Peter Burney[1], Ioannis Bakolis[1], Hugo Amigo[2], Patricia Bustos[2], Roberto Rona[3]. *[1]Respiratory Epidemiology & Public Health, National Heart and Lung Institute, Imperial College London, London, United Kingdom; [2]Department of Nutrition, Faculty of Medicine, University of Chile, Santiago, Chile; [3]Department of Psychological Medicine, Weston Education Centre, King's College London, United Kingdom*

**Background:** Metabolic disorders are related to poor lung health in adults but

there is limited evidence of this effect in young adults. Early identification of these markers might contribute to improve lung function and to prevent COPD later in life. In this study we investigated the relationship between measures of ventilatory function and markers of metabolic disorders in young adults.
**Methods:** A cross-sectional study was performed in 1000 subjects aged 22-28 years old from a semi rural area in Chile. Forced vital capacity (FVC) and the ratio $FEV_1$/FVC were the outcomes. Serum levels of fasting insulin, high-density lipoprotein, triglycerides and plasma glucose were also measured. Insulin resistance status (Homeostatic Model Assessment (HOMA-IR)) and metabolic syndrome (MS) were calculated.
**Results:** 970 participants had valid lung function data and complete information on exposures. The mean value of HOMA-IR was 2.59 in males and 2.48 in females (reference cut off point 2.53). 12% of males and 11% of females had MS (defined according the ATP III guidelines). After adjusting for potential confounders, FVC (L) was statistically negatively related to high HOMA-IR (difference of means -0.11 (95% Confidence Interval [CI] -0.17 to -0.05, *P* value <0.0001). FVC was also statistically negatively associated with MS (difference of means -0.18 (95% CI -0.27 to -0.09, *P* value <0.001). No association was found between $FEV_1$/FVC and these markers.
**Conclusion:** Presence of metabolic disorders had a deleterious effect on ventilatory function in the young adults studied.

**P458**
**Waist circumference and lung function parameters: The PLATINO study**
Ana Maria B. Menezes[1], Fernando C. Wehrmeister[1], Rogelio Perez-Padilla[2], Maria V. Lopez[3], Adriana Muiño[4], Carlos Talamo[5], Maria Montes de Oca[5], Jose R. Jardim[6], Gonzalo Valdivia[7]. *[1]Post-Graduate Program in Epidemiology, Federal University of Pelotas, Brazil; [2]National Institute of Respiratory Diseases, National Institute of Respiratory Diseases, Mexico City, Mexico; [3]University of the Republic, University of the Republic, Montevideo, Uruguay; [4]Hospital Maciel, Hospital Maciel, Montevideo, Uruguay; [5]Central University of Venezuela, Caracas, Venezuela; [6]Federal University of Sao Paulo, Federal University of Sao Paulo, SP, Brazil; [7]Catholic University of Chile, Santiago, Chile*

**Background:** Obesity is a known risk factor for chronic diseases. Recently, studies have shown that abdominal fat, measured by waist circumference, rather than BMI, is a more important predictor for the development of non-communicable chronic diseases.
**Objective:** To evaluate the association between waist circumference (WC) and lung function parameters among adults.
**Methods:** A cross-sectional study was performed in five Latin America countries (Brazil, Chile, Mexico, Uruguay and Venezuela), named the PLATINO study. The data were collected between 2002 and 2004 among adults aged ≥40 years old. FVC and FEV1 were measured using spirometry pre and post bronchodilator. WC was measured by trained interviewers. Data analyses were performed using multiple linear regression models and were stratified by sex.
**Results:** The correlation coefficients (r) between WC and FVC and FEV1 were negative, although for WC and FEV1/FVC the coefficients were positive. After adjusting for age, height, weight, BMI and smoking, the increase of 1 cm in WC decreased FEV1 by 0.018 liters [95%CI -0.023; -0.013] in males, and 0.009 liters [95%CI -0.011; -0.006] in females. For FVC, the results showed the same direction, but were more expressive (males β = -0.024 [95%CI -0.057; -0.018] and females β = -0.014 [95%CI -0.017; -0.011]). When we evaluated the predicted values for FEV1 and FVC, an inverse relationship with WC was also found. For FEV1/FVC, only females showed a direct relationship with WC (β = 0.066 [95%CI 0.018; 0.114]).
**Conclusion:** WC has an inverse relationship with lung function parameters in both males and females adults in Latin America, constituting an important public health issue requiring interventions.

**P459**
**Effects of BMI changes on lung function in COPD subjects from two longitudinal general population studies**
Francesco Pistelli[1], Laura Carrozzi[1], Francesco Di Pede[2], Anna Angino[2], Marzia Simoni[2], Sara Maio[2], Matteo Bottai[3], Sandra Baldacci[2]. *[1]University Pulmonary Unit, Cardiothoracic and Vascular Dept., Univ. Hospital, Pisa, Italy; [2]Pulmonary Environmental Epidemiology Unit, CNR Institute of Clinical Physiology, Pisa, Italy; [3]Division of Biostatistics, Inst. of Environmental Health, Karolinska Institutet, Stockholm, Sweden*

**Background:** Longitudinal studies have shown that increases in BMI can lead to a reduction in pulmonary function, and the nature of this association remains under investigation in COPD.
**Aim:** To evaluate the effects of BMI changes over an 8.2-17.5 year follow-up on, FEV1and FVC in COPD subjects from a longitudinal general population study.
**Methods:** Subjects (n = 1472, >24years of age) participating in both baseline and follow-up survey from two different longitudinal general population studies in Italy (Po river delta and Pisa) were investigated. COPD subjects (n=230) were defined those with FEV1/FVC<0.70 at baseline. Longitudinal changes (Δ) in BMI, FVC, and FEV1 were computed as absolute differences between the values at follow-up and those at baseline. Linear regression models for ΔFEV1, ΔFVC, and with ΔBMI, gender, baseline age, baseline smoking habits, and baseline BMI as covariates were applied.
**Results:** ΔBMI varied from -3.91 to 8.65 kg/m$^2$ in subjects with COPD, and from -12.76 to 14.54 kg/m$^2$ in subjects without COPD. In COPD subjects, longitudinal changes in BMI were significantly associated with reduction in lung function parameters. Estimated coefficients of ΔBMI were -0.142, p = 0.024, and -0.184, p = 0.004, for ΔFEV1 and ΔFVC, respectively. These associations were independent from gender, baseline smoking habit and baseline BMI, while were affected by baseline age. Analogous results were observed in subjects without COPD.
**Conclusions:** Longitudinal BMI changes affect lung function in subjects with and without COPD. On average an accelerated decline of lung function is observed in those COPD subjects with higher increase of BMI over follow-up.

**P460**
**Nocturnal gastroesophageal reflux, asthma and symptoms of obstructive sleep apnea: A longitudinal, general population study**
Össur Ingi Emilsson[1], Anna Bengtsson[2], Karl Franklin[2,3], Kjell Torén[4], Bryndís Benediktsdóttir[1,5], Amir Farkhooy[6], Joost Weyler[7], Sandra Dom[7], Wilfried De Backer[8], Thórarinn Gíslason[1,5], Christer Janson[6]. *[1]Faculty of Medicine, University of Iceland, Reykjavík, Iceland; [2]Department of Respiratory Medicine, Umeå University, Umeå, Sweden; [3]Department of Surgery, Umeå University, Umeå, Sweden; [4]Section of Occupational and Environmental Medicine, Institute of Medicine, University of Gothenburg, Sweden; [5]Department of Respiratory Medicine and Sleep, Landspitali University Hospital, Reykjavík, Iceland; [6]Department of Respiratory Medicine and Allergology, Uppsala University, Uppsala, Sweden; [7]Department of Epidemiology and Social Medicine, University of Antwerp, Belgium; [8]Department of Pulmonary Medicine, University of Antwerp, Belgium*

**Background:** Nocturnal gastroesophageal reflux (nGER) is associated with asthma and obstructive sleep apnea (OSA) in observational studies, but prospective epidemiological studies are lacking. Our aim was to investigate whether nGER is a risk factor for onset of asthma, respiratory and OSA symptoms in a prospective population based study.
**Methods:** We invited 2640 randomly selected subjects from Iceland, Sweden and Belgium for two evaluations with a nine years interval (participation rate 66.7%). They participated in a structured interview, answered a questionnaire regarding respiratory symptoms, sleep and nGER, underwent spirometry and a methacholine challenge. Blood samples were analyzed for specific IgE.
**Results:** Subjects with persistent nGER (n = 123) had an increased risk of asthma at follow-up after 9 years, independent of gender, age, location, smoking history, BMI at baseline and change in BMI [OR (95% CI): 2.3 (1.1-4.9)]. Persistent nGER was also independently related to the onset of various respiratory symptoms (OR (95% CI): 3.0 (1.6-5.6)). The risk of developing symptoms of OSA was increased in subjects with new onset of nGER and persistent nGER [OR (95% CI): 2.2 (1.3-1.6) and 2.0 (1.0-3.7), respectively]. No significant independent association was found between nGER and lung function or bronchial responsiveness.
**Conclusions:** Persistent nocturnal gastroesophageal reflux contributes to the development of asthma and respiratory symptoms. The risk of new onset of OSA symptoms is also higher among subjects with nGER. These findings further support the conclusion that nGER may play a causative role in the genesis of respiratory symptoms and diseases.

**P461**
**Patients with depressive symptoms presenting to the emergency department for asthma have worse clinical status**
Carol A. Mancuso, Margaret G.E. Peterson, Jose L. Fernandez, Robert H. Birkhahn, Theodore J. Gaeta. *Medicine, Hospital for Special Surgery/Weill Cornell Medical College, New York, NY, United States Research Division, Hospital for Special Surgery, New York, NY, United States Emergency Medicine, New York Presbyterian Hospital, New York, NY, United States Emergency Medicine, New York Methodist Hospital, Brooklyn, NY, United States*

**Background:** Depressive symptoms are associated with worse long-term asthma but less is known about their effects on acute exacerbations.
**Methods:** This analysis compared clinical characteristics according to depressive symptoms among 296 patients presenting for asthma to emergency departments (EDs) in New York City. At presentation patients completed valid surveys measuring asthma variables and depressive symptoms. Patients received follow-ups for 16 weeks.
**Results:** Mean age was 44 years, 72% were women, and 23% had a positive screen for depression. Compared to those with a negative screen, those with a positive screen were more likely not to know what triggered the exacerbation (11% vs 22%, p=.01), and to report worse asthma-related quality of life (p<.0001), worse asthma control (p=.0002), and worse asthma self-efficacy (p<.0001). These relationships persisted in multivariate analysis when controlled age, sex, and long-term asthma severity (p≤.02). There were no differences in hospitalization rates for the current exacerbation based on depressive symptoms, but among those admitted (n=184), more patients with a positive screen had a length of stay that exceeded the median of 3 days (45% vs 71%, p=.004). At 4 weeks (n=269) and 16 weeks (n=281) patients with a positive screen were more likely to have taken rescue beta agonists (67% vs 84%, p=.01) and to have had a repeat ED visit for asthma (17% vs 27%, p=.09), respectively.
**Conclusions:** Asthma ED patients with a positive screen for depression had worse self-report clinical status and more short-term resource utilization. Depres-

sive symptoms may be modifiable and should be addressed in relation to acute exacerbations.

**P462**

**The combined association of anxiety or depression symptoms and obesity with incident asthma: The HUNT study**

Ben Brumpton, Linda Leivseth, Yue Chen, Arnulf Langhammer, Pål Romundstad, Xiao-Mei Mai. *Department of Public Health and General Practice, Norwegian University of Science and Technology, Trondheim, Norway Department of Epidemiology and Community Medicine, University of Ottawa, Canada*

Anxiety and depression may increase the risk of developing asthma. We conducted a prospective study to test this hypothesis and additionally investigate the potential joint effect of these symptoms and obesity.
We studied 23,199 adults who were 19-55 years old at baseline in the Norwegian Nord-Trøndelag Health Study (HUNT). The participants were followed for 11 years. The Hospital Anxiety and Depression Scale (HADS) was used to measure anxiety (HADS-A $\geq$8, range 0-21) and depression (HADS-D $\geq$8, range 0-21) symptoms. Obesity was classified as having a body mass index of $\geq$30.0 kg/m$^2$. Incident asthma was self-reported. Odds ratios (ORs) for incident asthma associated with anxiety or depression were calculated using logistic regression models. To test the joint effect of anxiety or depression and obesity we calculated the relative excess risk due to interaction (RERI).
At baseline 4,151 participants (17.9%) had anxiety or depression symptoms. There was a significant association of anxiety or depression with incident asthma (OR 1.36, 95% confidence interval (CI) 1.15-1.60). Compared to non-obese without anxiety or depression, non-obese with anxiety or depression (OR 1.23, 95% CI 1.02-1.49) and obese subjects without anxiety or depression (OR 1.51, 95% CI 1.21-1.88), subjects with both obesity and anxiety or depression had a significantly higher risk of incident asthma (OR 2.82, 95% CI 2.08-3.81). The RERI for incident asthma with anxiety or depression and obesity was 1.08 (95% CI 0.20-1.95).
This study suggests that anxiety and depression symptoms contribute to incident asthma in adults. Obesity may interact with anxiety and depression symptoms in increasing the risk of asthma.

**P463**

**Asthma in pregnancy and risk of preterm delivery**

David Olsson[1], Lennart Bråbäck[1,2], Bertil Forsberg[1]. *[1]Public Health and Clinical Medicine, Umeå University, Umeå, Sweden; [2]Research and Development, Sundsvall Hospital, Sundsvall, Sweden*

The effects of asthma on pregnancy outcomes differ between studies. A recent review indicates that the conflicting results are related to study design, where larger database studies have reported increased risks, and smaller clinical prospective cohort studies have not found significantly increased risks. We study the effect of asthma within a large study of air pollution and preterm birth; is there an increase in preterm birth and how common are exacerbations in pregnancy resulting in outpatient hospital visits?
Our study cohort from Stockholm, Sweden, is constructed by matching live births 1998-2006 from the Medical Birth Registry with information on the mother from the Patient Registry (1987-2010 for hospital admissions and 2001-2010 for outpatient hospital visits) and information from the drug register (July 2006 -2011). We define all mothers who had at least one hospital visit for asthma or had asthma medication as having asthma. We used logistic regression to assess the relation between asthma and preterm birth. We adjusted the model for education, previous preterm birth, origin, parity, date of conception and maternal age.
The prevalence of preterm birth was 5.4% among mothers with asthma (n=13 261) and 4.4% in the rest of the population (n= 111 931). The odds ratio for giving birth preterm was 1.27 ($p < 0.01$) for women with asthma compared to non-asthmatic mothers. 1.9% of the asthmatic mothers had a hospital contact for asthma during pregnancy, and 8.4% of them delivered preterm.
Asthma is associated with an increased risk of preterm birth, particularly in women with exacerbations of the asthma during pregnancy.

**P464**

**Respiratory function in elderly with 'senile' or 'juvenile' pulmonary phenotype: Results from the KORA-Age study**

Holger Schulz[1], Jürgen Behr[2], Rudolf M. Huber[3], Dennis Nowak[4], Joachim Heinrich[1], Annette Peters[5], Rudolf A. Jörres[4], Stefan Karrasch[4]. *[1]Institute of Epidemiology I, Helmholtz Zentrum München, Neuherberg/Munich, Germany; [2]Department of Internal Medicine III, University Hospital Bergmannsheil, Ruhr-University, Bochum, Germany; [3]Division of Respiratory Medicine, Department of Medicine, Innenstadt, Ludwig-Maximilians-University, Munich, Germany; [4]Institute and Outpatient Clinic for Occupational, Social and Environmental Medicine, Ludwig-Maximilians-University, Munich, Germany; [5]Institute of Epidemiology II, Helmholtz Zentrum München, Neuherberg/Munich, Germany*

**Background:** Lung function, typically assessed by spirometry, is a strong predictor for overall morbidity and mortality. To improve our mechanistic understanding we examined whether poor spirometric lung function is associated with general respiratory limitations in elderly subjects with apparently healthy lungs.
**Methods:** Spirometry was performed in a random population sample from the region of Augsburg, Germany (n=935, aged 65-90y). From subjects free of lung disease (COPD, Asthma) two subgroups with either poor ('senile'; n=87) or favourable ('juvenile'; n=82) lung function were selected from the lower and upper 10% of the FEV1%pred distribution. TLC, DLCO, peak inspiratory pressure at RV (Pimax), the decrease in airway pressure at 0.1s (P01), and 6MWD were determined.
**Results:** P01 and P01/MV were not affected by age, while spirometric values, DLCO/VA and Pimax showed an age dependent decline. 'Senile' phenotype subjects had 10% lower DLCO ($p<0.05$), while DLCO/VA was not affected. P01, P01/MV and P01/Pimax were increased by at least 45% and Pimax reduced by 13% in the 'senile' group ($p<0.05$). Multiple regression analysis in 'senile' and 'juvenile' subjects revealed that limitations in DLCO and Pimax contribute to a reduced 6-MWD.
**Discussion:** Elderly subjects with poor spirometry, while being free from overt lung disease, also suffer from age related limitations in gas exchange capacity, reduced muscle strength, and increased workload during breathing. This limited respiratory capacity may contribute to reduced physical fitness and morbidity.
Supported by German Federal Ministry of Education and Research (BMBF FKZ 01ET0713) as part of the 'Health in old age' program.

**P465**

**Poorer quality of life in asthma patients is associated with rhinosinusitis, smoking and decreased lung function – Results from the Swedish GA$^2$LEN survey**

Alexandra Ek[1], Roelinde Middelveld[2], Helén Bertilsson[3], Linda Ekerljung[4], Jan Lötvall[4], Andrei Malinovschi[5], Chatrin Wahlgren[3], Sven-Erik Dahlén[2], Christer Janson[5]. *[1]Experimental Asthma and Allergy Research, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; [2]The Centre for Allergy Research, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; [3]Department of Occupational and Environmental Medicine, Umeå University, Umeå, Sweden; [4]Krefting Research Centre, Institute of Medicine, Sahlgrenska Academy, University of Gothenburg, Sweden; [5]Department of Medical Sciences, Uppsala University, Uppsala, Sweden*

**Introduction:** We have previously reported that patients with both asthma and rhinosinusitis have impaired quality of life compared to asthma patients without rhinosinusitis.
**Aim:** The aim of the current study is to further analyze quality of life in asthma. The study was part of the Global Allergy and Asthma European Network (GA$^2$LEN) survey and follow-up.
**Methods:** A total of 499 asthmatics (age 17-76) completed the Juniper mini-Asthma Quality of Life Questionnaire (mAQLQ) in four centres in Sweden, as part of a clinical follow-up visit of the GA$^2$LEN survey. Lung function and exhaled nitric oxide (FeNO) were measured, and the patients were interviewed. Asthma was defined as self-reported diagnosis of asthma and presence of at least one asthma symptom or use of asthma medication. Rhinosinusitis was defined as having at least two sinusitis symptoms, providing that nasal blockage or nasal discharge were reported. Multiple regression analysis was used.
**Results:** The overall mAQLQ score was related to having rhinosinusitis (-0.51 units, $P<0.0001$), current smoking (-0.42 mAQLQ units, $P=0.015$), lower $FEV_1$ (-0.08 units per 10% predicted decrease, $P=0.004$) and high age (62-76 years compared to 17-32 years;-0.44 units, $P=0.009$). The analysis did not show any significant relationship between mAQLQ and BMI or FeNO. These results remain statistically significant also after adjusting for gender, centre and inhaled corticosteriod use.
**Conclusion:** Co-current rhinosinusitis, current smoking, lower lung function and high age are related to poorer quality of life in asthma patients.

**P466**

**Improvement in asthma quality of life in patients enrolled in a trial to increase lifestyle physical activity**

Carol A. Mancuso[1], Tiffany N. Choi[2], Heidi Westermann[2], Suzanne Wenderoth[2], Martin T. Wells[3], Mary E. Charlson[2]. *[1]Medicine, Hospital for Special Surgery/Weill Cornell Medical College, New York, NY, United States; [2]Medicine, Weill Cornell Medical College, New York, NY, United States; [3]Statistical Sciences, Cornell University, Ithaca, NY, United States*

**Background:** Asthma patients know the benefits of exercise but often avoid physical activity because they are concerned it will exacerbate asthma.
**Objective:** To assess longitudinal asthma status in 256 primary care patients in New York City enrolled in a trial to increase lifestyle physical activity.
**Methods:** Patients were randomized to 2 protocols to increase physical activity during 12 months. At enrollment patients completed the Asthma Quality of Life Questionnaire (AQLQ) and the Asthma Control Questionnaire (ACQ), and received asthma self-management instruction through an evaluative test and workbook. Exercise and self-management were reinforced every 2 months. The AQLQ was repeated every 4 months and the ACQ was repeated at 12 months.
**Results:** Mean age was 43 years, 75% were women. At 12 months there were clinically important increases in physical activity with no differences between groups; thus data were pooled for asthma analyses. The enrollment AQLQ score was 5.0±1.3 and increased to 5.9±1.1; corresponding to a clinically important difference. Correlations between AQLQ and physical activity were approximately

0.35 ($p<0.0001$) at each time point. In a mixed effects model, variables associated with improvement in AQLQ scores over time were male sex, less severe asthma, not taking maintenance asthma medications, fewer depressive symptoms, and increased physical activity (all variables $p\leq0.03$). According to the ACQ, asthma was well controlled in 38% at enrollment and in 60% at 12 months ($p<0.0001$).
**Conclusions:** With attention to self management, increased physical activity did not compromise asthma control and for most patients was associated with improved asthma.

**P467**
**Associations between obstructive sleep apnea syndrome (OSAS) and chronic airflow limitation in a general Norwegian population**
Trygve Jonassen[1], Tomas M.L. Eagan[1,2], Sverre Lehmann[1,2,3]. *[1]Department of Thoracic Medicine, Haukeland University Hospital, Bergen, Norway; [2]Section of Thoracic Medicine, Institute of Medicine, University of Bergen, Norway; [3]The Norwegian Medical Centre for Home Mechanical Ventilation, Haukeland University Hospital, Bergen, Norway*

**Background:** Several studies have investigated associations between OSAS and obstructive airway disease, with inconsistent results.
**Aim:** To study the relationship between OSAS and pulmonary function in a general Norwegian population.
**Methods:** An age and sex stratified random sample of all adults aged 47-48 and 71-73 living in Bergen, Norway, were invited to a cross-sectional study. The 3506 attendants completed a questionnaire including symptoms of OSAS. Subjects were classified as having OSAS if they reported snoring, breathing cessations, and daytime sleepiness using the Karolinska Sleep Questionnaire, previously validated against polysomnography. Spirometry including bronchodilator test inhaling 400 ug Salbutamol was performed by all subjects. Logistic regression analyses, including interaction analyses between sex and pulmonary function, were used to examine associations between OSAS and pre- and postbronchodilator (postBD) FEV1, FVC and FEV1/FVC.
**Results:** The prevalence of OSAS was 4,8% (20/322) in subjects with chronic airflow limitation as defined by postBD FEV1/FVC<0.7 and 4,4% (119/2829) in subjects with FEV1/FVC>0,7 [P=0.74]. FEV1 and FVC (% of predicted) were not associated with increased risk of OSAS, after adjustment for age, sex, BMI, waist-hip ratio and smoking. Women with postBD FEV1/FVC<0.7 had an increased risk of OSAS with an OR of 3.53 (1.17, 10.60) compared to women with an FEV1/FVC>0.7, but this relationship was not present among men; OR 0,70 (0.31-1.58).
**Conclusions:** Chronic airflow limitation, assessed by post bronchodilator spirometry, was associated with OSAS among women only. There was no relationship between OSAS and FEV1 or FVC.

≤