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Session B93: Thinking about Lung Health and Defining Early COPD

Monday, May 16, 2016, 3:45-4 p.m.

Location: Room 130-132 (North Building, Lower Level), MOSCONE CENTER

Being Fit May Slow Lung Function Decline as We Age

ATS 2016, SAN FRANCISCO – Being fit may reduce the decline in lung function that occurs as we grow older, according to research presented at the ATS 2016 International Conference.

“While everyone’s lung function declines with age, the actual trajectory of this decline varies among individuals, “ said Lillian Benck, MD, a medical resident at Northwestern University Feinberg School of Medicine, Chicago, Illinois, and study lead investigator. “What is less known is, beyond smoking, what factors affect this rate of decline.”

Dr. Benck added that even though the majority of people will not develop lung disease in their lifetime, “declining lung function is known to increase overall morbidity and mortality even in the absence of overt pulmonary disease.”

Dr. Benck and her colleagues analyzed data from the National Heart, Lung, and Blood Institute’s CARDIA (Coronary Risk Development in Young Adults Study), which began in 1985-86 with 5,115 healthy black and white men and women, aged 18-30. The study has measured participant’s cardiopulmonary fitness periodically over 20 years using a graded treadmill test. At the beginning of the study and at each follow-up assessment, pulmonary function (PF) was also assessed by measuring forced expiratory volume in one second (FEV₁) and forced vital capacity (FVC).

After adjusting for age, smoking, body mass index and change in BMI, the association between fitness and lung function remained statistically significant.

Researchers found that participants:

- in the top quartile of baseline fitness experienced the least annual decline in PF.

- with the greatest decline in fitness experienced the greatest decline in FEV₁ and PF over 20 years.
- with sustained or improved fitness experienced the least decline in PF over 20 years.

Dr. Benck said that the last finding is noteworthy because it indicates that fitness matters, not just at a single point in time but over many years. “Fitness early in life and at middle age appears to attenuate this natural decline,” she said, noting that the benefit of fitness was even seen among smokers.

Because it is an observational study, researchers cannot claim cause and effect. However, they noted several important strengths, including a large study population and long-term follow-up and objective measurements of fitness and lung health.

Dr. Benck said that CARDIA will continue to follow participants and may eventually provide insights into whether fitness not only preserves lung function, but also reduces the risk of developing lung disease.

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Abstract 10510

Sustained or Relative Increases in Cardiopulmonary Fitness Are Associated with Preserved Lung Health from Young Adulthood to Middle Age

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Rationale: Beyond smoking there are limited data on factors associated with changes in lung health. We evaluated whether cardiopulmonary fitness is associated with preservation of lung health over time in a cohort of healthy young adults. We hypothesized that both maintaining and improving to a relatively high-level of fitness is associated with less loss of lung health compared to maintaining or worsening to a low-level of fitness independent of obesity and smoking.

Methods: The CARDIA study was initiated in 1985 among healthy 18 to 30 year old black and white individuals. Cardiopulmonary fitness was measured by symptom-limited, graded treadmill test at years 0 and 20. Cardiopulmonary fitness was divided into race-sex specific quartiles by

baseline fitness (N=3330) and longitudinal fitness change (N=2733). Sustained higher fitness was defined as being above the race-sex specific median at years 0 and 20, sustained lower fitness as below the median at years 0 and 20, relatively increased fitness as below the median at year 0, above at year 20, relatively decreased fitness as above the median at year 0, below at year 20. Multivariable linear regression was used to determine year 20 FVC and FEV1 and decline in FVC and FEV1 from peak to year 20 across baseline fitness quartiles and longitudinal fitness change groups adjusting for age, race-sex group, smoking, BMI, and BMI change.

Results: Participants in the highest quartile of baseline fitness had significantly less decline in FVC compared to individuals in the first (535 mL vs 574 mL; $p=0.02$) and second (535 mL vs. 562 mL; $p=0.04$) quartiles. Participants with sustained higher fitness had significantly less decline in lung function than those with sustained lower fitness (FEV1: 539 mL vs. 626 mL; $p<0.001$; FVC: 477 mL vs. 580 mL; $p<0.001$) and relatively decreased fitness (FEV1: 539 mL vs. 654 mL; $p<0.001$; FVC: 477 mL vs. 615 mL; $p<0.001$). Participants with relatively increased fitness had significantly less decline in lung function compared to sustained lower fitness (FEV1: 533 mL vs. 626 mL; $p<0.001$ and FVC: 473 mL vs. 580 mL; $p<0.001$), and relatively decreased fitness (FEV1: 533 mL vs. 654 mL; $p<0.001$; FVC: 473 mL vs 615 mL; $p<0.001$).

Conclusion: Greater cardiopulmonary fitness in young adulthood and achieving relatively increased level of fitness from young adulthood to middle age are associated with less decline in pulmonary function over time, suggesting an association with preservation of lung health independent of BMI and smoking.