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**Flavonoids May Slow Lung Function Decline Due to Aging**

ATS 2018, San Diego, CA – A type of flavonoid found in dark-pigmented fruits like red grapes and blueberries may slow the lung function decline that occurs with aging, according to new research presented at the ATS 2018 International Conference.

Previous research has shown that the plant-produced chemicals known as flavonoids have beneficial antioxidant and anti-inflammatory properties. Anthocyanins, the type of flavonoid investigated in the current study, have been detected in lung tissue shortly after being ingested, and in animals models of [chronic obstructive pulmonary disease](#) (COPD). The plant chemicals appear to reduce mucus and inflammatory secretions.

However, “the epidemiological evidence on the association between flavonoids and lung function is very scant,” said lead study author Vanessa Garcia-Larsen, PhD, assistant professor in the Human Nutrition Division of the Department of International Health at the Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland. “So we wanted to investigate whether dietary intake and anthocyanins are associated with lung function decline in middle-age adults.”

The researchers analyzed data from 463 adults (average age: 44) who participated in the second and third European Community Respiratory Health Surveys from 2002 to 2012. Those included in the current study completed a dietary questionnaire and underwent [spirometry](#) at enrollment and upon follow-up. A common lung function test, spirometry measures the amount of air that a person can forcefully exhale in one second (FEV<sub>1</sub>), the total amount of air a person can exhale

after taking a deep breath (FVC) and the ratio of the two, FEV<sub>1</sub>/FVC. Participants were then grouped into quartiles based on the amount of anthocyanins they consumed.

The study found individuals in the highest, compared to the lowest, quartile of anthocyanin intake had:

- a slower rate of annual decline in FEV<sub>1</sub> than those in the lowest quartile: -9.8 milliliters per year (mL/yr) vs. -18.9 mL/yr.
- a slower rate of annual decline in FVC than those in the lowest quartile: -9.8 mL/yr vs. -22.2 mL/yr.
- a slower rate of annual decline in FEV<sub>1</sub>/FVC: -0.02/yr.

The researchers also analyzed the association between anthocyanin consumption and lung function in smokers, those who had never smoked and those who quit. The association between high consumption of the flavonoids and reduced lung function decline appeared to be stronger among both never smokers and those who had quit than in the general study population. Among smokers, the study did not find an association between anthocyanin intake and lung function.

The study adjusted for a wide range of factors, including characteristics of participants' diets, gender, height, body mass index and socioeconomic status. Another strength of the study was its inclusion of participants from two countries, Norway and England. The study was limited by its relatively small size and the fact that diets were self-reported.

“Our study suggests that the general population could benefit from consuming more fruits rich in these flavonoids like berries, particularly those who have given up smoking or have never smoked, Dr. Larsen said. “For smokers, quitting remains the best thing they can do to protect their health.”

The first European Community Respiratory Health Survey began in 1990 in response to a worldwide increase in [asthma](#) prevalence. The scope of the surveys has expanded to include information about the associations between behavioral and environmental factors that might also affect the development of COPD.

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## Abstract 15028

### Dietary Intake of Anthocyanin Flavonoids and Ten Year Lung Function Decline in Adults from the European Community Respiratory Health Survey (ECRHS)

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**Background:** Flavonoids have antioxidant and anti-inflammatory properties which could slow down the decline of lung function and reduce risk of chronic obstructive pulmonary disease (COPD), but epidemiological evidence is lacking. Anthocyanins, a subclass of flavonoids, have been detected in lung tissue, and have attenuated mucus and infiltration of inflammatory exudates in experimental models of COPD.

**Aim:** To investigate the association between dietary intake of anthocyanins and lung function decline in two representative cohorts of adults in Europe.

**Methods:** Participants were 463 adults (44.5 ±6.3y at baseline) from England and Norway taking part in the ECRHS2 and ECRHS3 surveys, with valid spirometry and dietary data collected at both baseline (2002) and follow-up (2012). To investigate the effect of anthocyanin intake on forced vital capacity (FVC), forced expiratory volume in 1 second (FEV<sub>1</sub>) and the ratio FEV<sub>1</sub>/FVC, separate linear mixed models were used, with a random centre and participant specific intercepts. Anthocyanin intake was categorised into quartiles (lowest quartile of reference from baseline survey). We estimated the adjusted difference in annual change in lung function over time associated with anthocyanin intake via an interaction between each anthocyanin quartile (lowest quartile as reference) and age of the participant. All models were adjusted for age, height, sex, socio-economic status, education, body mass index, total fruit and vitamin C intakes, total energy intake, and smoking habit in the two surveys. Stratified analyses by smoking status were also done.

**Results:** Individuals with the lowest quartile of anthocyanin intake had an adjusted mean annual change of -18.9mL/yr (standard error mean [SEM] ±2.2), and -22.2mL/yr (SEM ±2.2) for FEV<sub>1</sub> and FVC, respectively. Participants with the highest quartile of anthocyanin intake had slower annual rates of decline in FEV<sub>1</sub> (-9.8 mL/yr; 95% CI, -15.5, -4.1) and FVC (-9.8mL/yr; 95% CI -17.3, -2.3). The FEV<sub>1</sub>/FVC ratio decline was also slower (highest vs lowest quartile of anthocyanin intake -0.02/yr; 95% CI -0.03, -0.01). The linear trend for adjusted difference in annual change across quartiles of increasing anthocyanin intake was also

significant for FEV<sub>1</sub>/FVC (p-trend: <0.001) and FEV<sub>1</sub> (p-trend: 0.019), and but not for FVC (p-trend: 0.08). Stratified analyses showed significantly slower rates of decline in the FEV<sub>1</sub>/FVC ratio associated with increased anthocyanin intake among never smokers and those who had quit before ECRHS2.

### **Conclusion**

Dietary intake of sources of anthocyanins is associated with significantly slower decline in lung function in the general population, specifically in never-and ex-smokers but not among smokers.