HIV Speeds Lung Function Decline in Cohort of Smokers

March 12, 2012 By Tim Horn

HIV is an independent risk factor for lung disease, according to new data reported Wednesday, March 7, at the 19th Conference on Retroviruses and Opportunistic Infections. Though the study results from a Johns Hopkins University School of Medicine team note that people living with HIV—particularly those with viral loads not being kept in check with antiretroviral (ARV) therapy—have reduced lung strength and a more rapid loss of pulmonary function compared with HIV-negative controls, the researchers also point out that cigarette smoking was very common in the cohort studies and remains an important risk factor to contend with.

As explained by Michael Drummond, MD, of Johns Hopkins during his introductory remarks, HIV infection has been shown to increase the risk of obstructive lung diseases (OLD), such as emphysema and chronic bronchitis—both under the umbrella of chronic obstructive pulmonary disease (COPD)—and asthma.

According to a study reported in 2000, there was a greater prevalence of emphysema—documented using chest X-rays—in smokers living with HIV. And in a 2006 study, HIV infection was found to independently increase the risk of a COPD diagnosis by 47 percent.

More recently, in a study authored by Drummond and his colleagues in 2011, an HIV viral load in excess of 200,000 copies was associated with a 3.4-fold increase in the odds of having an OLD diagnosis using gold-standard pulmonary function tests. The cohort has enrolled more than 4,000 injection drug users, roughly a quarter of whom are people living with HIV.

To further explore pulmonary function in people living with HIV, compared with HIV-negative controls, Drummond's team turned to the AIDS Linked to Intravenous Experience (ALIVE) cohort, a community-based study of injection drug users.

Roughly 1,000 of the 4,000 cohort volunteers—30 percent of whom were living with HIV—participated in the pulmonary function study, looking specifically at forced expiratory volume in 1 second (FEV1). The FEV1 is the volume exhaled during the first second of a forced expiration maneuver started after a deep inhale. It's considered to be one of the best measures of obstruction (a decreased ability to effectively move air out of the lungs).

Sixty-five percent of the cohort participants were male, averaging nearly 50 years old, and 91

percent were African American. Importantly, 94 percent had a history of smoking and 88 percent were still smoking while participating in the pulmonary function studies.

Drummond noted that the results comparing HIV-positive and HIV-negative study volunteers had been adjusted to account for differences in age, race, sex, body mass index, smoking history and earlier pulmonary infections between the two groups. In other words, any differences in lung function between the two groups were those that occurred in addition to smoking history or current cigarette use.

Beginning with a control group example, Drummond showed that in an average 50-year-old African-American male who wasn't living with HIV or didn't have a history of pneumonia, but was currently smoking with a 20 pack-year history (in other words, a pack a day for 20 years), the FEV1 at the start of the study was 3.15 liters and decreased by 23.6 milliliters (mL) per year over the 2.75-year follow-up period.

Cohort volunteers living with HIV started the study with an FEV1 that was 139 mL lower than the HIV-negative controls, with an annual FEV1 decrease of 35.7 mL. Though the slope of lung function decline appeared steeper when comparing the two groups, the difference was not statistically significant, meaning it could have been due to chance.

A statistically significant difference in the slope of lung function decline did emerge, however, when Drummond and his colleagues looked specifically at viral load levels in those living with HIV in the study. Those with HIV viral loads in excess of 75,000 copies saw their FEV1 decline 99.1 mL a year during the 2.75-year follow-up period, compared with a 23.4 mL annual loss in the HIV-negative control group and 29.9 mL a year among those who were living with HIV but had viral loads below 75,000 copies.

There was also an association with CD4 cell counts in the study. Those with CD4 counts below 100 experienced an annual FEV1 loss of 80.1 mL, a significantly steeper slope of loss compared with the HIV-negative controls and those with CD4 counts above 200. Among those with CD4s between 100 and 199, the FEV1 loss was 57.9 mL a year, which was also significantly worse than the annual loss in lung function seen in the HIV-negative controls and those with CD4s above 200.

"Markers of advanced and uncontrolled HIV disease are associated with more rapid decline in lung function," Drummond concluded, adding that "FEV1 decline associated with uncontrolled HIV exceeds the effect of smoking in the general population."

As for the implications of these findings, Drummond noted the importance of ARV therapy and suggested that HIV suppression may diminish accelerated lung decline.
