Significant variation in radiographic presentation of pulmonary tuberculosis across a high resolution of CD4 strata

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Background
One major challenge to diagnosing pulmonary tuberculosis (PTB) is alteration of the presentation of PTB due to HIV infection. However, it remains unclear whether these alterations occur at a specific CD4 cell threshold or throughout HIV infection.

Objectives
- To characterize the variation in clinical and radiographic presentation of pulmonary TB (PTB) among HIV-infected cases across a high resolution of CD4 strata
- To determine the CD4 threshold above which HIV infected and uninfected PTB cases no longer differ in radiographic presentation
- To evaluate the predictors of a normal chest x-ray at presentation with culture-confirmed PTB

Methods
- The initial presentation of adult cases of sputum culture-confirmed PTB seen at the National Tuberculosis and Leprosy Programme (NTLP) clinic at Mulago Hospital in Kampala, Uganda from 2004 to 2008 were studied.
- All subjects underwent an initial screening interview, a physical examination, chest x-ray, sputum acid fast bacilli (AFB) smear, MTB culture and HIV antibody testing.
- Clinical and radiographic characteristics of culture-confirmed PTB were compared by HIV status and across eleven strata of CD4 cell counts from 0-50 to >500 cells/µL.

Results
- 2,014 subjects had a sputum culture positive for MTB.
- 873 (43%) were HIV/TB co-infected.
- Among HIV-infected subjects, all radiographic manifestations of PTB displayed significant trends across CD4 strata.
- Among HIV-infected PTB cases with CD4 <50, 21% had a normal chest x-ray vs. 2% with CD4 >500, with a continuous trend across all CD4 strata (test for trend, p<0.001).

Conclusions
- Variations in chest x-ray appearance and AFB smear correlate with CD4 decline in significant, continuous trends.
- The CD4 thresholds above which there was no significant difference in x-ray appearance between HIV-infected vs. uninfected PTB cases varied by radiographic characteristic.
- Normal chest x-ray is a major obstacle to PTB diagnosis in advanced HIV infection.

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