Association between lung and cognitive dysfunction in men with HIV infection

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Introduction

- Lung dysfunction associated with chronic obstructive pulmonary disease (COPD) is common in HIV and a risk factor for developing cognitive dysfunction[1,2,3]
- Cognitive dysfunction is a well-recognized comorbidity among persons living with HIV[4,5]
- We evaluated the relationship between lung and cognitive function in men with and without HIV infection

Methods

- We performed a cross sectional analysis of participants in the Multicenter AIDS Cohort Study (MACS)
- Participants underwent pulmonary function testing including:
  - Diffusing capacity for carbon monoxide (DL_{CO}; a measure of oxygen diffusion from the lungs to blood)
  - Forced expiratory volume in one second/forced vital capacity ratio (FEV1/FVC; a measure of airway obstruction used to diagnose COPD)
- The neuropsychological test battery assessed Executive Function, Speed (of information processing), Attention and Working Memory, Learning, Memory, and Motor functional domains
- A T score was derived for each domain of the neuropsychological test
- Multivariate linear regression models estimated the association between the measures of lung and cognitive function

Results

- Among 866 participants, 477 (55.1%) had HIV infection
- The mean age (standard deviation) of the participants was 55 (12) years with the majority being Caucasian (58.1%)
- Although a lower DL_{CO} was associated with a lower Executive Function among men without HIV infection (β=0.10; p=0.01), this was not the case among the HIV-infected men (β=0.07; p=0.11)
- Lower levels of DL_{CO} were associated with lower Speed scores among HIV-infected men (β=0.10; p=0.03), but not among the uninfected men (β=0.00; p=0.91)

Table 1. Relationship between lung and cognitive function in individuals with and without HIV

Cognitive Functional Domains	Pulmonary Function Test	Individuals with HIV		Individuals without HIV		Interaction p†
		β (95% CI)*	p	β (95% CI)*	p	
Executive	FEV1/FVC	6.59 (-9.48–22.65)	0.92	-2.94 (-18.42–12.53)	0.71	0.92
	DL_{CO}	0.07 (-0.02–0.15)	0.11	0.10 (0.02–0.18)	**0.01**	0.24
Speed	FEV1/FVC	1.24 (-15.30–17.78)	0.88	-7.44 (-25.80–10.92)	0.43	0.93
	DL_{CO}	0.10 (0.01–0.19)	**0.03**	0.00 (-0.08–0.09)	0.91	0.27
Attention and Working memory	FEV1/FVC	-9.19 (-22.25–3.88)	0.17	-4.27 (-18.26–9.71)	0.55	0.26
	DL_{CO}	0.04 (-0.04–0.11)	0.35	-0.02 (-0.09–0.06)	0.65	0.78
Learning	FEV1/FVC	8.02 (-6.20–22.23)	0.27	19.64 (3.03–36.25)	**0.02**	0.13
	DL_{CO}	0.01 (-0.06–0.08)	0.83	0.06 (-0.01–0.14)	0.09	0.07
Memory	FEV1/FVC	4.71 (-10.09–19.51)	0.53	21.63 (4.89–38.37)	**0.01**	**0.04**
	DL_{CO}	-0.01 (-0.07–0.05)	0.82	0.05 (-0.02–0.13)	0.18	**0.02**
Motor	FEV1/FVC	0.74 (-19.65–21.12)	0.49	-2.75 (-20.19–14.69)	0.76	0.49
	DL_{CO}	0.02 (-0.09–0.13)	0.73	0.09 (0.00–0.18)	0.06	0.48

FEV1/FVC = forced expiratory volume in one second/forced vital capacity; DL_{CO} = diffusing capacity for carbon monoxide
***Adjusted for age, race, education, recruitment site, hypertension, diabetes mellitus, hepatitis C, intravenous drug use, and smoking**
†Interaction p for HIV status

Results

- Among men without HIV infection, a lower FEV_1/FVC was associated with associated reduced Learning (β=19.64; p=0.02) and Memory scores (β=21.63; p=0.01)
- However, among the HIV-infected men, the association of FEV_1/FVC with Learning (β=8.02; p=0.27) and Memory (β=4.71; p=0.53) did not reach statistical significance

Conclusions

- Reduced lung function was associated with poorer cognitive function in the domains of Executive Function, Speed, Learning, and Memory
- The associations between lung and cognitive function differed by HIV status
- Future studies are needed to better elucidate the pathophysiologic mechanisms by which airway obstruction (measured by FEV_1/FVC) and reduced oxygen diffusion in the lungs (measured by DL_{CO}) interact with HIV status to contribute to cognitive dysfunction

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