

## Supplimentary files

### Methods

#### Classification of pneumoconiosis by chest radiograph

Pneumoconiosis was classified into three stages according to the International Labour Organization classification system.<sup>1</sup> Briefly, each lung field was divided into three zones (upper, middle, lower) on the posterior chest radiographs. When the highest density of small opacities was  $\geq 1/0$ , the distribution affected two or more zones and pleural plaques were apparent, the patients were diagnosed as Stage I. When the highest density of small opacities was  $\geq 2/1$  and the distribution affected more than four zones, or the highest density of small opacities was  $\geq 3/2$  and the distribution affected four or more zones, the patients were diagnosed as Stage II. When the highest density of small opacities was  $\geq 3/2$  and the distribution affected four or more zones with aggregation of small or large opacities, or the diameter of the largest opacity was  $\geq 20 \times 10$  mm, the patients were diagnosed as Stage III. The interobserver correlation was good, and the  $\kappa$  value was 0.81.

#### High-resolution computed tomography

The size of large opacities were categorized as follows: (1) Type A: one or more opacities with total area  $\leq 1/4$  of the right side of the CT slice at the carina; (2) Type B: one or more opacities with total area  $>1/4$  and  $\leq 1/2$  of the area of the right side of the CT slice at the carina; and (3) Type C: one or more opacities with total area  $>1/2$  of

the right side of the CT slice at the carina.<sup>2</sup> Two experts independently assessed the presence of large opacity on HRCT, according to the International Classification of HRCT for Occupational and Environmental Respiratory Diseases (ICOERD),<sup>2</sup> with good interobserver correlation (0.78).

## References

1. International Labour Office. International Classification of Radiographs of Pneumoconiosis, revised. *Occupational Safety and Health Serie* 2011; 22: Rev 2011.
2. Kusaka Y, Hering KG, Parker JE. International classification of HRCT for occupational and environmental respiratory diseases. *Springer, Tokyo* 2005.

Table S1 Pulmonary function tests of the patients with combined COPD and pneumoconiosis

Variables	All (n=675)	COPD and pneumoconiosis (n=221)	Pneumoconiosis alone (n=454)	<i>p</i> -value
FVC, %pred	97.80 (82.30-109.40)	91.25 (76.00-109.18)	99.40 (85.50-110.15)	0.001
FEV <sub>1</sub> , %pred	88.80 (71.40-102.20)	68.25 (49.45-86.33)	95.00 (82.80-105.95)	<0.001
FEV <sub>1</sub> /FVC, %	74.18 (66.18-79.92)	61.21 (50.76-66.35)	77.97 (74.00-81.81)	<0.001
DLco SB, %pred	86.10 (68.20-99.60)	79.40 (60.25-92.95)	89.30 (74.25-100.65)	<0.001
TLC, %pred	93.50 (81.40-102.90)	99.30 (87.30-109.73)	90.50 (79.45-99.65)	<0.001
RV, %pred	102.20 (86.30-121.15)	120.95 (101.43-146.30)	95.00 (82.20-111.90)	<0.001
RV/TLC, %	40.53 (34.83-48.10)	46.47 (39.71-54.45)	37.81 (33.07-44.55)	<0.001
PEF, %pred	93.25 (74.23-109.00)	68.90 (46.43-86.05)	101.60 (89.00-115.10)	<0.001
MEF <sub>75</sub> , %pred	79.10 (52.75-105.00)	41.20 (22.95-56.55)	95.30 (77.25-112.60)	<0.001
MEF <sub>50</sub> , %pred	58.40 (38.40-79.50)	29.45 (18.10-41.48)	72.50 (56.05-89.45)	<0.001
MEF <sub>25</sub> , %pred	45.65 (29.70-61.90)	28.05 (19.75-37.35)	56.00 (42.40-69.95)	<0.001
PaO <sub>2</sub> , mmHg	89.00 (83.00-96.00)	87.00 (81.00-93.00)	91.00 (85.00-97.00)	<0.001
CPI	13.80 (4.22-26.11)	15.78 (3.47-27.10)	12.90 (4.57-24.55)	0.314

Values were given as the median (IQR).

Abbreviations: FVC: forced vital capacity; FEV<sub>1</sub>: forced expired volume in the first second; DLco SB: diffusion capacity for carbon monoxide of the lung single breath; TLC: total lung capacity; RV: residual volume; PEF: peak expiratory flow; MEF<sub>25</sub>: maximal expiratory flow after 25% of the FVC has been not exhaled. MEF<sub>50</sub>: maximal expiratory flow after 50% of the FVC has been not exhaled; MEF<sub>75</sub>: maximal expiratory flow after 75% of the FVC has been not exhaled; PaO<sub>2</sub>: arterial partial pressure of oxygen; CPI: composite physiologic index; IQR: interquartile range.

Table S2 Characteristics of 221 patients with combined COPD and pneumoconiosis

COPD and pneumoconiosis	n	%
Classification of airflow limitation severity*		
GOLD stage I	70	31.7
GOLD stage II	93	42.1
GOLD stage III	46	20.8
GOLD stage IV	12	5.4
BDT, positive	65	29.4
AHR <sup>†</sup>	64	57.1
Blood eosinophil count		
≥100 cells/μL	97	43.9
≥300 cells/μL	17	7.5

Abbreviations: COPD: chronic obstructive pulmonary disease; BDT: bronchial dilation test; AHR: airway hyperresponsiveness.

\* GOLD stage I: mild, FEV<sub>1</sub> ≥80% predicted; GOLD stage II: moderate, FEV<sub>1</sub> ≥50% to <80% predicted; GOLD stage III: severe, FEV<sub>1</sub> ≥30% to <50% predicted; GOLD stage IV: very severe, FEV<sub>1</sub> <30% predicted.

<sup>†</sup>Bronchial challenge test was performed in patients with FEV<sub>1</sub> predicted more than 60%. In present cohort of combined COPD and pneumoconiosis, 57.1% (64/112) was shown AHR.

Table S3 Logistic regression model for 280 combined COPD and pneumoconiosis in nonsmokers

	Univariate analysis			Multivariate analysis		
	OR	95%CI	<i>p</i> -value	OR	95%CI	<i>p</i> -value
Age, yrs						
20-39	1.00	(ref)		1.00	(ref)	
40-59	NS			NS		
≥60	NS			NS		
Male gender	0.92	0.54-1.57	0.770	0.95	0.43-2.08	0.946
BMI, kg/m <sup>2</sup>						
<18.5 (underweight)	NS			NS		
18.5-24.9 (Normal)	1.00	(ref)		1.00	(ref)	
≥25.0 (Overweight and	1.06	0.62-1.80	0.846	1.35	0.735-2.47	0.335
Exposure duration, yrs						
0-15	1.00	(ref)		1.00	(ref)	
16-30	1.22	0.65-2.27	0.533	0.85	0.41-1.75	0.651
31-45	0.69	0.19-2.54	0.576	0.67	0.16-2.87	0.590
Exposure type						
Asbestos	1.00	(ref)		1.00	(ref)	
Silica	2.76	1.35-5.63	<b>0.005</b>	3.88	1.49-10.12	<b>0.006</b>
Coal	2.47	1.14-5.36	<b>0.022</b>	3.85	1.12-13.18	<b>0.032</b>
Other dust	0.57	0.12-2.77	0.488	1.18	0.21-6.72	0.849
Stage of pneumoconiosis						
I/II	1.00	(ref)		1.00	(ref)	
III	4.93	2.65-9.17	<b>&lt;0.001</b>	4.74	2.38-9.43	<b>&lt;0.001</b>
BDT						
Negative	1.00	(ref)		1.00	(ref)	
Positive	1.57	0.85-2.87	0.147	1.50	0.75-3.03	0.256

Abbreviations: COPD: chronic obstructive pulmonary disease; OR: odds rate; BMI: body-mass index; BDT: bronchial dilation test.

Table S4 Cumulative effects of cigarette smoking with occupational exposure on COPD in pneumoconiosis

Exposure type	Smoking status	COPD and	Pneumoconiosis	OR	95%CI	p-value
		pneumoconiosis	alone			
Asbestos/Other dust	<20	22 (13.5)	141 (86.5)	1.00	(ref)	
Asbestos/Other dust	≥20	15 (34.9)	28 (65.1)	3.43	1.59-7.43	0.002
Silica/Coal	<20	115 (33.7)	226 (66.3)	3.26	1.97-5.39	<0.001
Silica/Coal	≥20	48 (46.2)	56 (53.8)	5.49	3.04-9.93	<0.001
Stage of pneumoconiosis	Smoking status					
I/II	<20	74 (19.1)	314 (80.9)	1.00	(ref)	
I/II	≥20	35 (32.4)	73 (67.6)	2.03	1.26-3.27	0.003
III	<20	63 (54.3)	53 (45.7)	5.04	3.23-7.87	<0.001
III	≥20	28 (71.8)	11 (28.2)	10.8	5.14-22.6	<0.001

Values were given as n (%) or OR (95%CI).

Abbreviations: COPD: chronic obstructive pulmonary disease; OR: odds rate.