

中文題目：利用運動後吐氣一氧化氮濃度變化鑑別診斷氣喘相關之支氣管收縮或者慢性肺阻塞疾病造成之氣體滯積

英文題目：Change in Exhaled NO on Exercise Differentiates Asthma-Induced Bronchoconstriction from COPD-induced Air-trapping

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### **Background :**

Asthmatics with fixed airway obstruction (FAO) clinically mimic patients with COPD in terms of irreversible pulmonary function impairment and exercise induced airflow limitation. Exhaled nitric oxide (NO) has been documented as a marker of airway inflammation in asthma, but not in COPD yet. Exercise may aggravate the dynamic hyperinflation in COPD and airway hyperresponsiveness in asthma. Exhaled NO may have different consequences between COPD and asthma after exercise.

### **Materials and Methods :**

Asthma diagnosed according to ATS criteria, and COPD diagnosed according to GOLD criteria. All of the patients were clinical stable for more than 3 months, under regular medication control. Fifty-four asthmatics patients and thirty-nine COPD patients were included to this study and thirty normal subjects were also included as control group. Asthmatics with FAO were defined by their airflow limitation <12% improvement in FEV1 after inhaled salbutamol (400 µg)

Standard six-minute walking test was performed and exhaled NO was measured by a hand-held device of NIOX MINO® (Aerocrine AB, Sweden) prior and after six-minute walking test. Record pulmonary function test, inspiratory capacity, oxygen saturation and dyspnea score before and after walking, and walking distance.

### **Results :**

To examine the basal exhaled NO level and the change after exercise may differentiate asthmatics with FAO and COPD, 21 stable asthmatics with FAO and 21 stable COPD patients with air-trapping under regular combination therapy (inhaled corticosteroids + long acting  $\beta$ 2-agonists) were assessed their exhaled NO prior to and after six-minute walk test (6MWT). Basal levels of exhaled NO or the levels after exercise were not significantly different between two groups of patients. The percent change in exhaled NO was negatively correlated with the percent change in inspiratory capacity ( $\Delta$ IC)( $r = -0.691$ ,  $n = 21$ ,  $p = 0.003$ ) in asthmatics with FAO. In COPD with air-trapping, the percent change of exhaled NO was positively correlated to  $\Delta$ IC after 6MWT ( $r = 0.485$ ,  $n = 21$ ,  $p = 0.0368$ )

**Conclusion :**

We conclude that exercise induced bronchoconstriction in asthma with FAO may represent their airways with residual inflammation, while air-trapping in COPD may retain NO in the distal air-space.

Table & Figures :

Table 1 : Demographic data

	Normal subjects	Asthma		P	COPD		P
		BR	Non-BR		$\Delta IC \leq 0\%$	$\Delta IC > 0\%$	
Number	30	31	23		21	18	
Gender,(M/F)	14/16	21/10	12/11		21/0	18/0	
Age	47.9±14.3	58.4±16.4	56.3±15.7	0.64	73.9±8.2	72.8±7.1	0.64
BMI	25.6±3.9	24.5±3.6	24.6±3.6	0.89	22.1±4.4	22.3±4.4	0.89
FVC	2.8±1.0	2.6±0.8	2.5±1.1	0.98	2.2±0.9	2.0±0.4	0.42
FEV1	2.4±0.8	1.7±0.8	1.8±0.9	0.66	1.2±0.6	1.2±0.5	0.91
$\Delta IC \%$	5.5±19.4	0.7±19.3	-1.7±18.5	0.89	-12.3±8.9	16.4±14.9	<0.01
Walking distance	522.4±68.7	501.4±104.0	475.4±128.7	0.42	371±124	437±55.3	0.047
$\Delta$ Saturation	-9.1±11.7	-6.8±5.2	-7.2±4.4	0.23	-11.8±10.6	-12.2±8.9	0.89
NO before	21.1±15.7	30.1±24.8	27.3±19.1	0.65	27.9±18.3	25.7±12.3	0.77
NO after	20.3±15.6	28.7±20.2	26.2±13.9	0.62	27.4±17.4	24.2±12.6	0.53
$\Delta$ NO	-0.8±4.0	-1.5±7.4	-1.1±10.3	0.88	0.2±9	-1.4±5.1	0.52
*P for NO before and after 6 MWT	0.274	0.281	0.618		0.927	0.247	

Figure 1 : Baseline exhaled NO

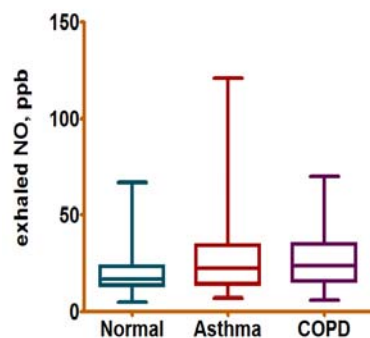


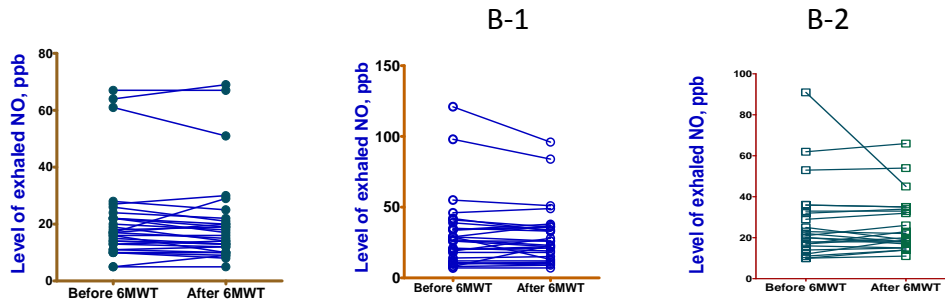
Figure 2 : Exhaled NO change

(A) Normal subjects

(B) Asthmatic :

B-1 response to bronchodilator

B-2 : no response to bronchodilator



(C) COPD

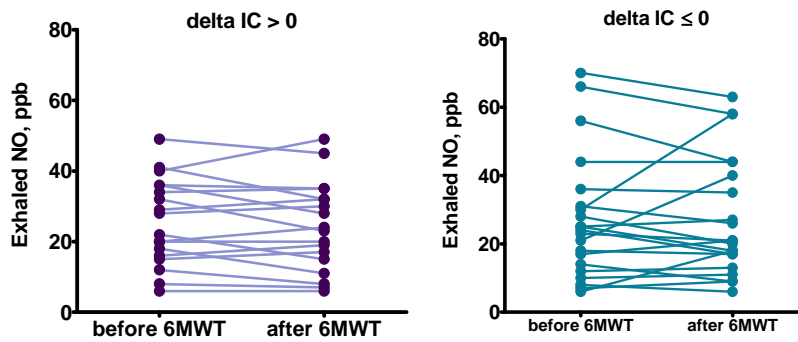
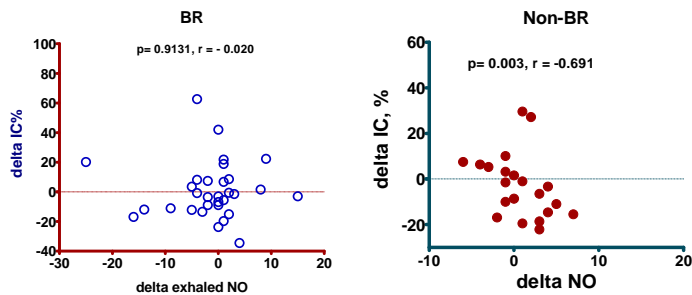


Figure 3 : Correlation of exhaled NO & delta IC%

(A) Asthmatics



(B) COPD

