Virus 감염과 만성기도 질환

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유 광하

Virus와 만성 호흡기 질환의 관련성

- Pathogenesis
- Acute exacerbation
- Susceptibility

Early-life respiratory viral infections, atopic sensitization, and risk of subsequent development of persistent asthma

- 263 prospective cohort of high atopic risk children f/u for 5yr

At 5 yrs	Non-wLRI by RSV (OR)	wLRI by RSV (OR)	Non-wLRI by RV (OR)	wLRI by RV (OR)
Current asthma	1.1 (0.4-2.9)	2.1 (0.5-8.1)	0.7 (0.4-1.3)	2.9 (1.2-7.1)
Persist. Wheeze	1.1 (0.7-1.6)	2.7 (0.7-9.8)	1.1 (0.7-1.6)	2.9 (1.2-7.0)
Current wheeze	0.7 (0.3-1.7)	2.5 (1.0-11.3)	0.8 (0.5-1.2)	2.5 (1.1-5.9)

J Allergy Clin Immunol 2007;119:1105

Respiratory Syncytial Virus Bronchiolitis in Infancy Is an Important Risk Factor for Asthma and Allergy at Age 7

NELE SIGURS, RAGNAR BJARNASON, FRIDRIK SIGURBERGSSON, and BENGT KJELLMAN

- 140 children for 7 1/2 yr

Symptoms*	RSV Group (*n* = 47)	Control Group (*n* = 93)	p Value	RR	95% CI
Asthma					
Cumulative	14/47 (30%)	3/93 (3%)	< 0.0001	9.23	2.79–30.55
Current	11/47 (23%)	2/93 (2%)	< 0.001	10.88	2.51–47.11
Current, atopic	7/47	1/93	0.002	13.85	1.76–109.30
Recurrent wheezing					
Cumulative	13/47 (28%)	10/93 (11%)	0.015	2.57	1.22–5.42
Current	6/47 (13%)	0/93	< 0.001	Not calculable	

Cumulative prevalence of asthma

❖ RSV BO, 30% vs Control, 3%
P value: <0.001

Am J Respir Crit Care med 2000;161:1501

Respiratory syncytial virus in early life and risk of wheeze and allergy by age 13 years

Renato T Stein, Duane Sherrill, Wayne J Morgan, Catharine J Holberg, Marilyn Halonen, Lynn M Taussig, Anne L Wright, Fernando D Martinez

- Tucson Children's Respiratory Study: 1,246 birth cohort

Adjusted odds ratios (95% CIs) for frequent wheeze after age 3 years

Lower respiratory tract illness before age 3 years	Frequent wheeze after age 3 years			
	Age 6 (n=68/669)	Age 8 (n=56/545)	Age 11 (n=79/634)	Age 13 (n=49/469)
RSV	4·3 (2·2–8·7)*	1·9 (0·9–4·2)	2·4 (1·3–4·6)†	1·4 (0·7–2·6)
Para-influenza	2·4 (0·8–7·4)	0·4 (0·1–2·2)	2·3 (0·6–4·2)	1·3 (0·5–3·5)
Other agents	2·9 (1·1–7·8)‡	1·3 (0·4–4·4)	1·0 (0·3–3·2)	3·1 (1·3–7·6)†
Negative tests	1·9 (0·8–4·5)	2·3 (1·0–5·2)‡	2·0 (0·9–4·6)	2·1 (1·0–4·3)‡
None§	1·0	1·0	1·0	1·0

Lancet 1999;354:541

Prevalence of Asthma and Atopy in Two Areas of West and East Germany

ERIKA VON MUTIUS, FERNANDO D. MARTINEZ, CHRISTIAN FRITZSCH, THOMAS NICOLAI,

- German reunification offer a unique opportunity to study the impact of environmental factors
- West-5,030 East=2,626 children aged in 9 to 11 year old

- Atopic sensitization
  - West German : East Germany
    36.7% versus 18.2%; odds ratio [OR] = 2.6, $p < 0.0001$
- current asthma and hay fever
  - West Germany : East Germany
    5.9% versus 3.9%; OR = 1.5, $p < 0.0001$
    8.6% versus 2.7%; OR = 3.4, $p < 0.0001$, respectively)
- Bronchitis
  - West Germany : East Germany
    9.8% versus 16.9%; $p < 0.0001$

❖ Asthma and allergic disease in East Germany has been increasing and approaching that of western part since reunification

Am J Respir Crit Care Med 1994;149:358

SIBLINGS, DAY-CARE ATTENDANCE, AND THE RISK OF ASTHMA AND WHEEZING DURING CHILDHOOD

THOMAS M. BALL, M.D., M.P.H., JOSE A. CASTRO-RODRIGUEZ, M.D., KENT A. GRIFFITH, M.P.H.,

- 1,035 children f/u since birth as part of Tcuson cohort
- Incidence of asthma by physician at 6 to 13 yrs old

TABLE 2. PERCENTAGE OF CHILDREN WITH ASTHMA, HIGH SERUM IgE CONCENTRATIONS, AND SKIN-TEST REACTIVITY, ACCORDING TO THE NUMBER OF SIBLINGS AND DAY-CARE ATTENDANCE BEFORE THE AGE OF SIX MONTHS.*

OUTCOME	NO. OF CHILDREN	TWO OR MORE OLDER SIBLINGS OR DAY CARE	ONE OR NO OLDER SIBLINGS AND NO DAY CARE	RELATIVE RISK (95% CI)	P VALUE
		no./total no. (%)			
Asthma	985	36/289 (12)	144/696 (21)	0.6 (0.4–0.8)	0.002
High serum IgE	630	52/196 (27)	153/434 (35)	0.8 (0.6–1.0)	0.03
Skin-test reactivity†					
Any allergen	782	110/229 (48)	313/553 (57)	0.8 (0.7–1.0)	0.03
Alternaria	789	40/231 (17)	139/558 (25)	0.7 (0.5–1.0)	0.02

N Eng J med. 2000;343:538

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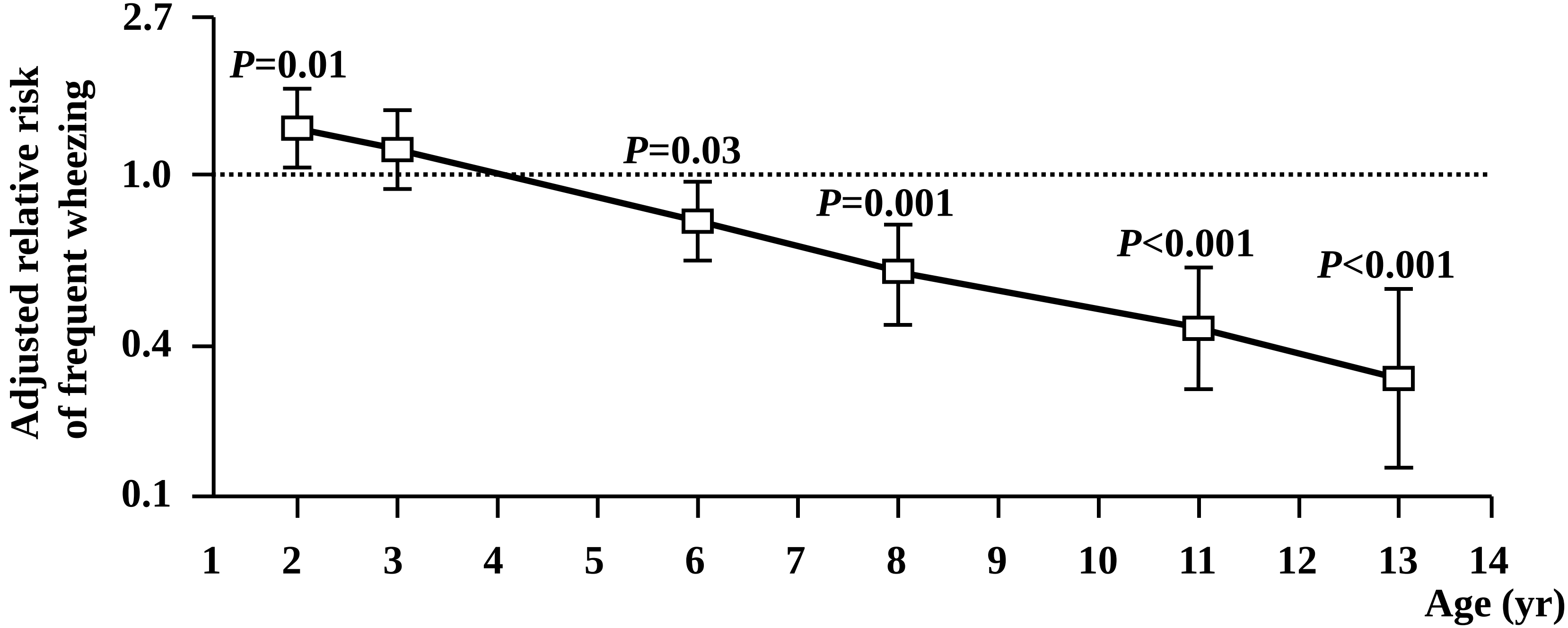

N Eng J med. 2000;343:538

REVIEW ARTICLE

Exacerbation of asthma and airway infection: is the virus the villain?☆,☆☆

- To review the asc between acute viral respiratory infection and asthma exacerbation
- 42 original articles have been reviewed

❖ Prevalence rate: 36.0~92.2%

❖ Most frequently identified virus: HRV

❖ Children: 78.0%: most frequently identifed virus: HRV, RSV

J Pediatr;2014;90:542

REVIEW ARTICLE

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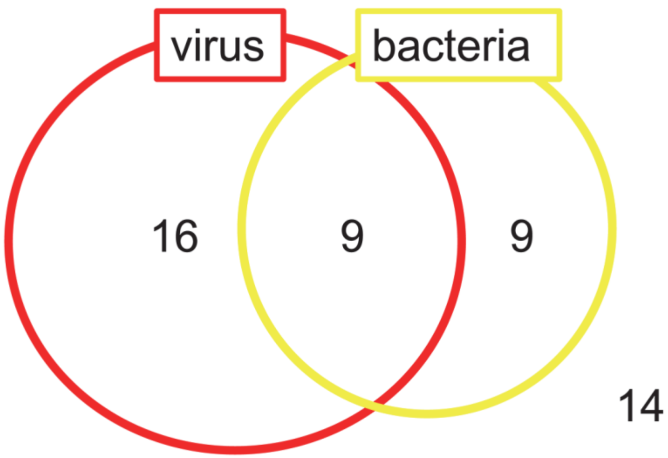
- ❖ Prevalence rate: 36.0~92.2%
- ❖ Most frequently identified virus: HRV
- ❖ Children: 78.0%: most frequently identified virus: HRV, RSV
- ❖ Virus and exacerbation severity
  M/C: HRV (26.2~87.5%)

J Pediatr;2014;90:542

The Importance of Bacterial and Viral Infections Associated with Adult Asthma Exacerbations in Clinical Practice

- Asthma exacerbation with comorbid pn or COPD
- N=48

Common cold-induced asthma attack patients （n=48）



	Asthma attack	Stable
Virus		
Rhinovirus A/B/C	10.4	5.0
Influenza A	10.4	10.0
Respiratory syncytial virus A	10.4	5.0
Parainfluenza 3	8.3	10.0
Metapneumovirus	6.3	0.0
Enterovirus	6.3	20.0
Parainfluenza 2	6.3	10.0
Parainfluenza 1	6.3	5.0
Respiratory syncytial virus B	4.2	5.0
Coronavirus 22	2.1	5.0

PLoS ONE 2015;April:e-pub

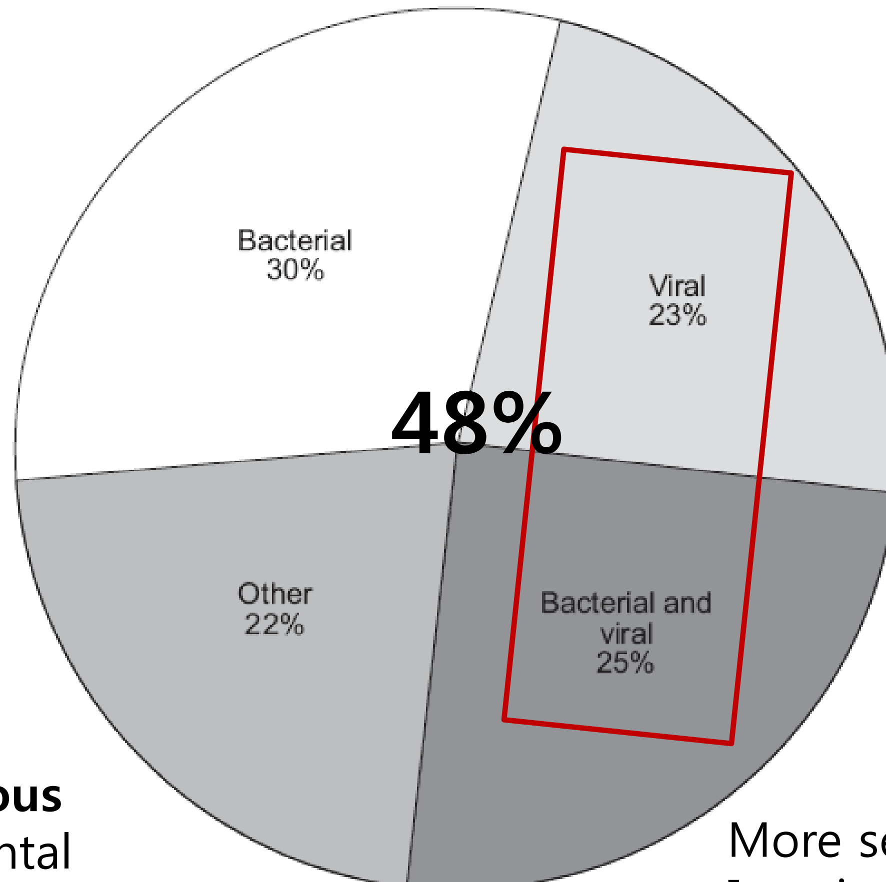
Infections and Airway Inflammation in Chronic Obstructive Pulmonary Disease Severe Exacerbations

Alberto Papi, Cinzia Maria Bellettato, Fausto Braccioni, Micaela Romagnoli, Paolo Casolari, Gaetano Caramori,

- 64 Pts with COPD required hospitalization/in stable convalescence

Viral infection

Virus only 23%
Mixed 25%



Non infectious
- Environmental
- Non compliance with Tx

More severe
Impairment

Am J Respir Crit Care Med 2006; 173: 1114

CURRENT CONCEPTS

Infection in the Pathogenesis and Course of Chronic Obstructive Pulmonary Disease

Microbe	Role in Exacerbations	Role in Stable Disease
Viruses		
Rhinovirus	20–25% of exacerbations	Unlikely
Parainfluenza virus	5–10% of exacerbations	Unlikely
Influenza virus	5–10% of exacerbations	Unlikely
Respiratory syncytial virus	5–10% of exacerbations	Controversial
Coronavirus	5–10% of exacerbations	Unlikely
Adenovirus	3–5% of exacerbations	Latent infection seen, pathogenic significance undefined
Human metapneumovirus	3–5% of exacerbations	Unlikely

- Viruses can be detected in 1/3~2/3 of AE COPD
- Viral RNA can be detected in 15% of sputum samples during stable.
- M/C viruses: rhinovirus
- M/C viruses during hospitalization: influenza

NEJM 2008;359:2355

The relevance of respiratory viral infections in the exacerbations of chronic obstructive pulmonary disease—A systematic review

W.A.R. Zwaans[a], P. Mallia[b], M.E.C. van Winden[a], G.G.U. Rohde[a,*]

- 19 studies with 1,728 COPD patients were included, detected by PCR

	%
Rhino V	16.39
RSV	9.90
Influenza	7.83
Corona V	4.08
Parainfluenza V	3.35
Adeno V	2.07
hMPV	2.78

J Clinical Virol 2014;61:181

Viral Etiology of Chronic Obstructive Pulmonary Disease Exacerbations during the A/H1N1pdm09 Pandemic and Postpandemic Period

- Retrospective observational study
- 195 AE-COPD hospitalized patients

	Whole period studied	Pandemic	INEP1 2010	FLUEP1 2010-11	INEP2 2011	FLUEP2 2011-12	INEP3 2012
AE-COPD cases	195	124	0	40	4	25	2
Mean Age (SD)	63.9 (13.1)	62.7 (13.1)	0 (0)	61.1 (14.2)	66.5 (2.1)	67.9 (12.6)	69.5 (2.1)
Males (%)	136 (69.7)	85 (68.6)	0 (0)	25 (62.5)	2 (50)	22 (88.0)	2 (100)
Negatives (%)	100 (51.3)	65 (52.4)	0 (0)	20 (50)	4 (100)	9 (36.0)	2 (100)
Positives (%)	95 (48.7)	59 (47.6)	0 (0)	20 (50)	0 (0)	16 (64.0)	0 (0)
Pathogen most represented	H1N1pdm09	H1N1pdm09	N/A	H1N1pdm09/RSV	N/A	H3N2	N/A
H1N1pdm09 (%)	41 (21.0)	35 (28.2)	0 (0)	6 (15.0)	0 (0)	0 (0)	0 (0)
H3N2 (%)	11 (5.6)	0 (0)	0 (0)	0 (0)	0 (0)	11 (44.0)	0 (0)
Influenza B (%)	1 (0.5)	0 (0)	0 (0)	1 (2.5)	0 (0)	0 (0)	0 (0)
HREV (%)	24 (12.3)	14 (11.3)	0 (0)	5 (12.5)	0 (0)	5 (20.0)	0 (0)
RSV (%)	13 (6.7)	4 (3.2)	0 (0)	6 (15.0)	0 (0)	3 (12.0)	0 (0)
ORP (%)	12 (6.2)	6 (4.8)	0 (0)	3 (7.5)	0 (0)	3 (12.0)	0 (0)
Coinfections (%)	5 (2.6)	0 (0)	0 (0)	1 (2.5)	0 (0)	4 (16.0)	0 (0)

Advanced in Virology 2015;1

Hospitalized Patients with 2009 H1N1 Influenza in the United States, April–June 2009

Susceptibility

- Apr~Jun/09
- N= 272 H1N1 Adm Pts (73% had underlying disease)
- 25% in ICU, 7% had died

Table 2. **Underlying Medical Conditions among the Patients, According to Age Group.***

Medical Condition	All Patients (N=272)	Patients <18 yr (N=122)	Patients ≥18 yr (N=150)
		number (percent)	
Any one condition	198 (73)	73 (60)	125 (83)
Asthma	76 (28)	35 (29)	41 (27)
Chronic obstructive pulmonary disease	22 (8)	0	22 (15)
Diabetes	40 (15)	3 (2)	37 (25)
Immunosuppression	40 (15)	11 (9)	29 (19)
Chronic cardiovascular disease	35 (13)	5 (4)	30 (20)
Chronic renal disease	25 (9)	7 (6)	18 (12)
Neurocognitive disorder	20 (7)	14 (11)	6 (4)
Neuromuscular disorder	19 (7)	13 (11)	6 (4)
Pregnancy	18 (7)	1 (1)	17 (11)
Seizure disorder	18 (7)	13 (11)	5 (3)

N Engl J Med 2009;361:1935

Critical Care Services and 2009 H1N1 Influenza in Australia and New Zealand

The ANZIC Influenza Investigators*

Susceptibility

- 01/Jun~31/Aug/09
- N= 722 H1N1 Pts in ICU
- 14.3% had died

Adults with BMI >35 — no./total no. (%)‡	172/601 (28.6)
Diabetes — no./total no. (%)	112/700 (16.0)
Asthma or chronic pulmonary disease — no./total no. (%)	231/707 (32.7)
Chronic heart failure — no./total no. (%)	74/703 (10.5)
Coexisting condition — no./total no. (%)§	192/687 (27.9)
No known predisposing factors — no./total no. (%)	229/722 (31.7)

N Engl J Med 2009;361:1925

Clinical Features of the Initial Cases of 2009 Pandemic Influenza A (H1N1) Virus Infection in China

- May~Jun/09
- N= 426 H1N1 quarantine and admission

Coexisting conditions — no. (%)	
Hypertension	15 (3.5)
Asthma	7 (1.6)
Diabetes	3 (0.7)
Cancer	2 (0.5)
Coronary heart disease	2 (0.5)
Chronic obstructive pulmonary disease	1 (0.2)
Chronic nephritis	1 (0.2)

N Engl J Med 2009;361:2507

Frequency, severity, and duration of rhinovirus infections in asthmatic and non-asthmatic:

- 76 cohabiting couples (asthmatics: non-asthmatics)
- Nasal aspirate for RV every 2wks with diary cards

Symptoms	Participants with asthma (n=76)	Healthy participants (n=76)
URT		
Severity (score)	2 (0–12)	2 (0–7)
Duration (days)	3·5 (0–11)	3 (0–17)
LRT		
Severity (score)	1 (0–17)	0 (0–7)*
Duration (days)	2·5 (0–35)	0 (0–22)†

Data are median (range). *p=0·001. †p=0·005.

Severity and Duration of URT and LRT sx with RV

Lancet. 2002;359:831

Asthma and severity of the 2009 novel H1N1 influenza: a case-control study

Yong Bum Park, MD[1], Changhwan Kim, MD, PhD[1], Yong Il Hwang, MD, PhD[2], Chang Lyul Lee, MD, PhD[3], Won-Yeon Lee, MD, PhD[4], Hye Yun Park, MD, PhD[5], Jin Won Heo, MD, PhD[6], Hyun Kyung Lee, MD, PhD[7], Jae Hwa Cho, MD, PhD[8], Yong Soo Kwon, MD, PhD[9], Ji Ye Jung, MD, PhD[10], Young J. Juhn, MD, MPH[11], Barbara P. Yawn, MD, MSc[12], Kent Bailey, PhD[13], Kwang Ha Yoo, MD, PhD[14], and the Korean Asthma Study Group

	No comorbid conditions, $N=105$			
	Controls $N=49$	Cases $N=56$	Odds ratio (95% CI)	p Value
Asthma, n (%)				
No	47 (96)	48 (86)	1.0 (reference)	0.095
Yes	2 (4)	8 (14)	3.92 (0.79–19.42)	

J Asthma 2014;51:69

Asthma and severity of 2009 novel H1N1 influenza: A population-based case-control study

Carlos F. Santillan Salas, MD, MSc[1], Sonia Mehra, MD[1], Maria R. Pardo Crespo, MD, PhD[1,2], and Young J. Juhn, MD, MPH[1]

Adjusted OR for the association between asthma and the risk of H1N1-related hospitalization

History of Asthma prior to index date	Controls N=97 (%)	Cases N=46 (%)	Unadjusted OR (95% CI), p-value	‡ Adjusted OR (95% CI), p-value
No	64 (66.0)	21 (45.6)	Referent	Referent
Yes	33 (34.0)	25 (54.4)	2.59 (1.10–6.09), 0.029	2.55 (0.98–6.64), 0.055

Dx asthma before the date of hospitalization: 54.4% vs34.0% (OR 2.31, P=0.02)

J Asthma 2013;10:1069

MERS in Korea

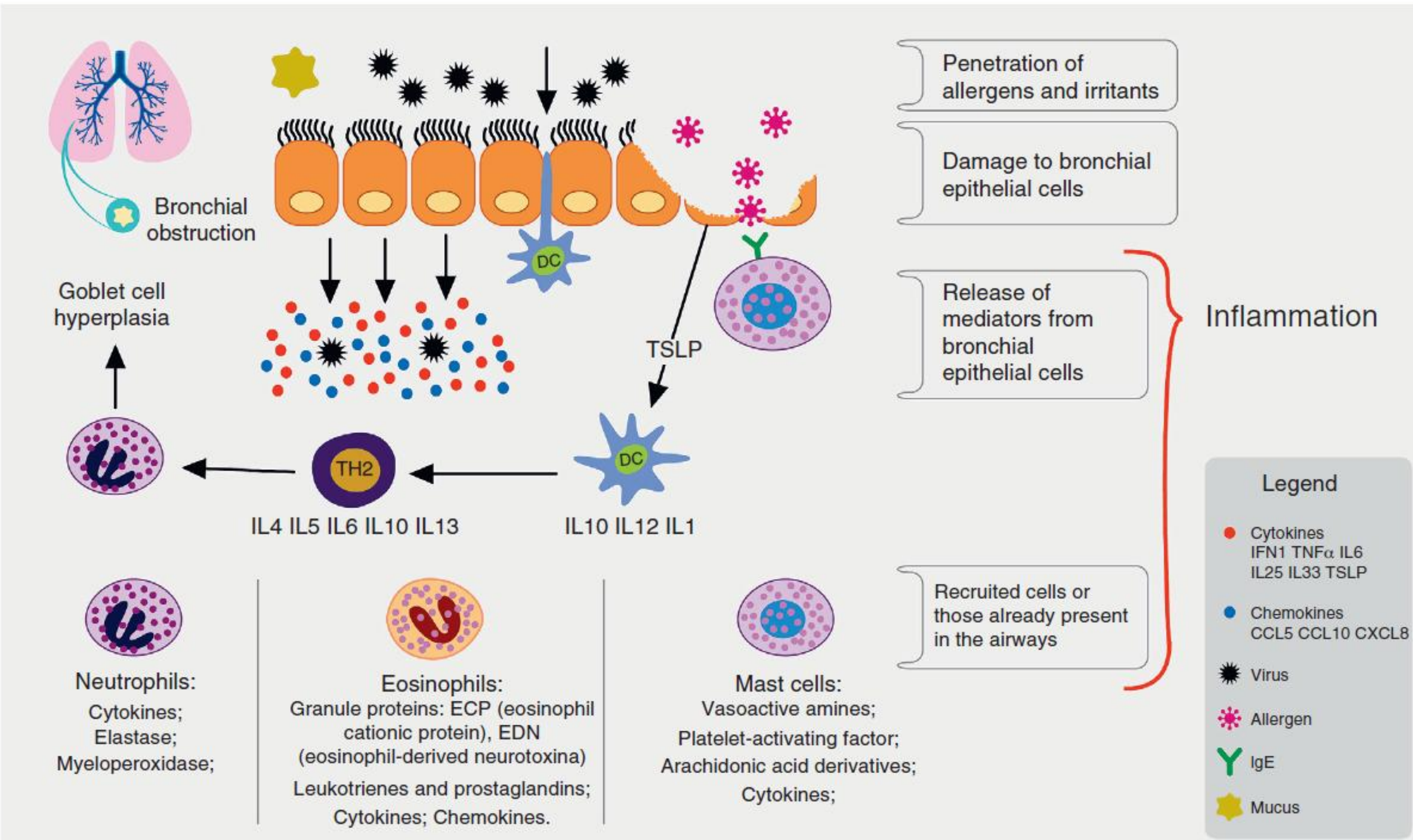
- So far 15 articles
- Korean Authors: 7

?

REVIEW ARTICLE

Exacerbation of asthma and airway infection: is the virus the villain?☆,☆☆

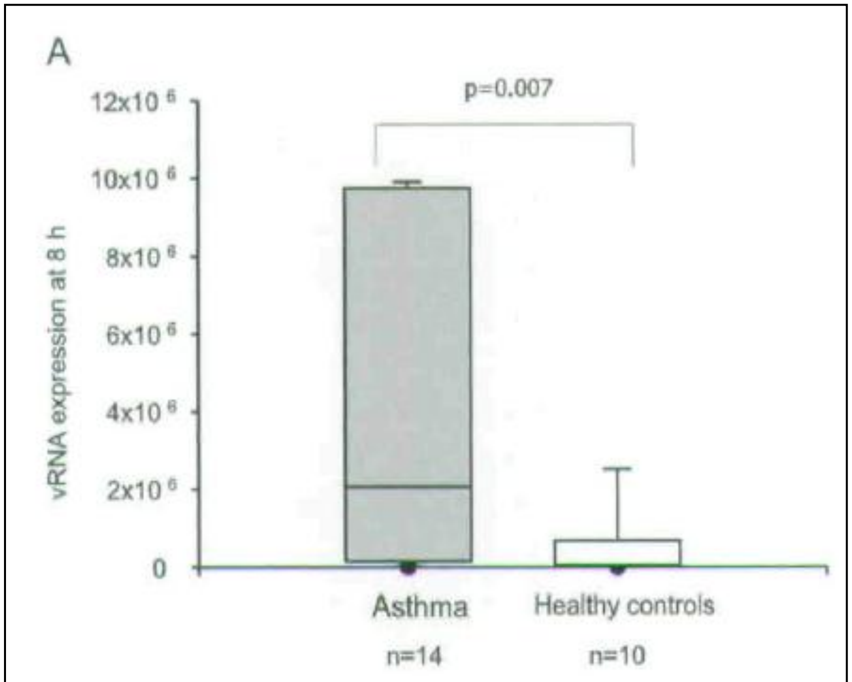
Exacerbation of asthma and viral infection



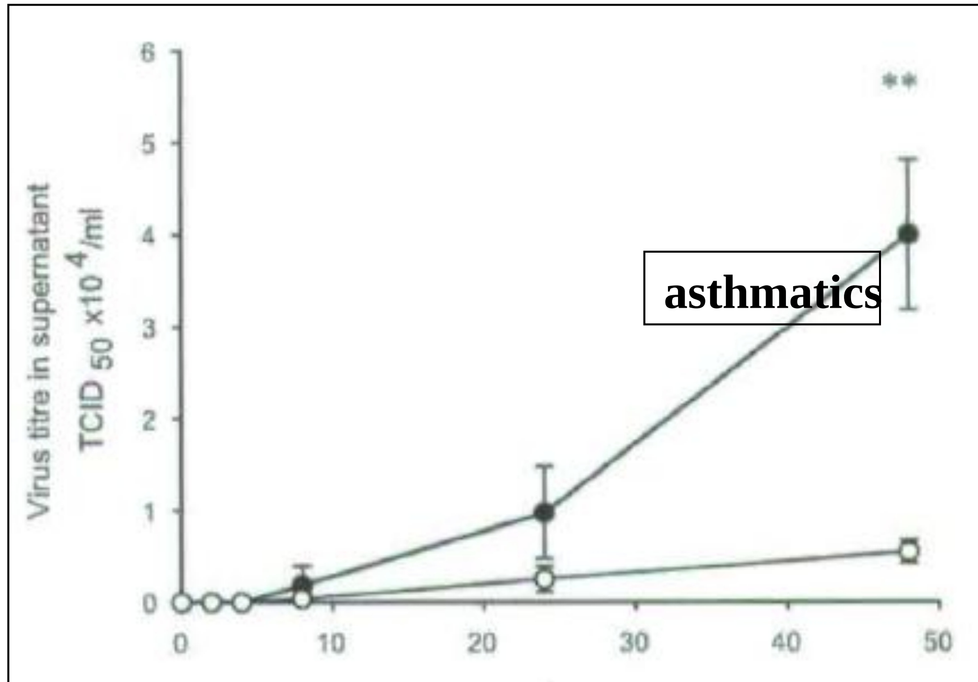
J Pediatr;2014;90:542

Asthmatic bronchial epithelial cells have a deficient innate immune response to infection with rhinovirus

•1° bronchial epithelial cell from asthmatics (n=14), non asthmatics (n=10)



RV 16 mRNA expression (> 50 fold)

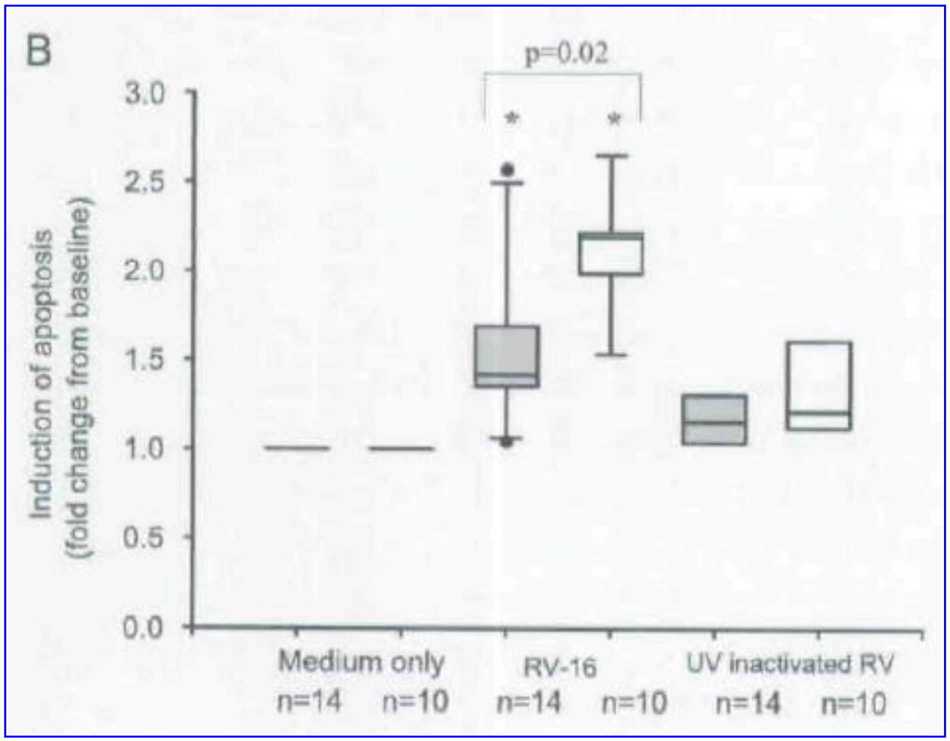


Late virus release into supernatant (> 7 fold)

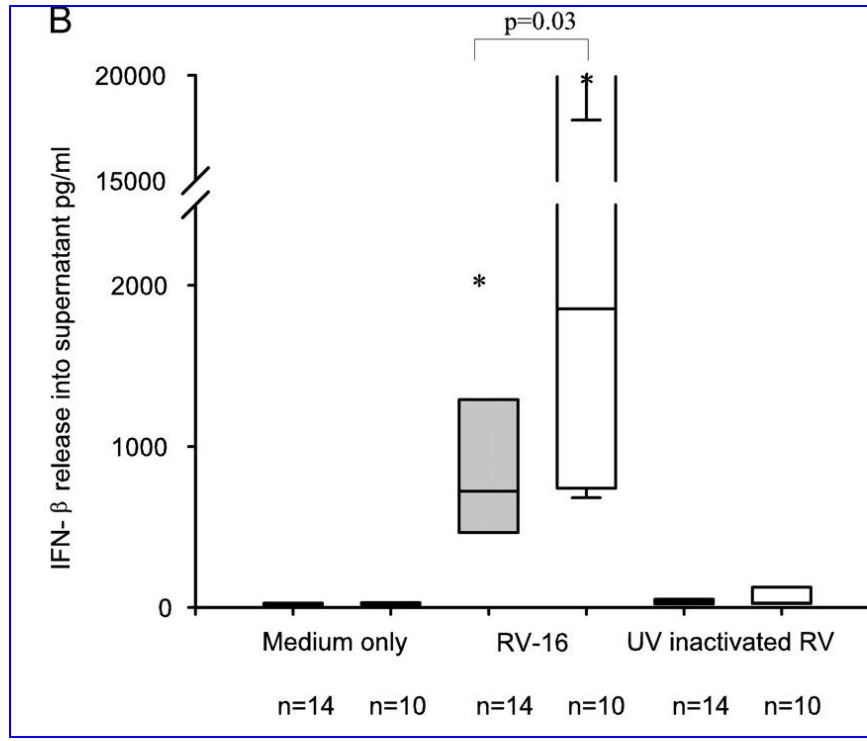
J exp Med 2005;201:937

Asthmatic bronchial epithelial cells have a deficient innate immune response to infection with rhinovirus

- INF induce apoptosis of virally infected cells itself and neighbor cell as well: key protective mechanism for virally infected normal cells



Induction of apoptosis (2.2 time less)

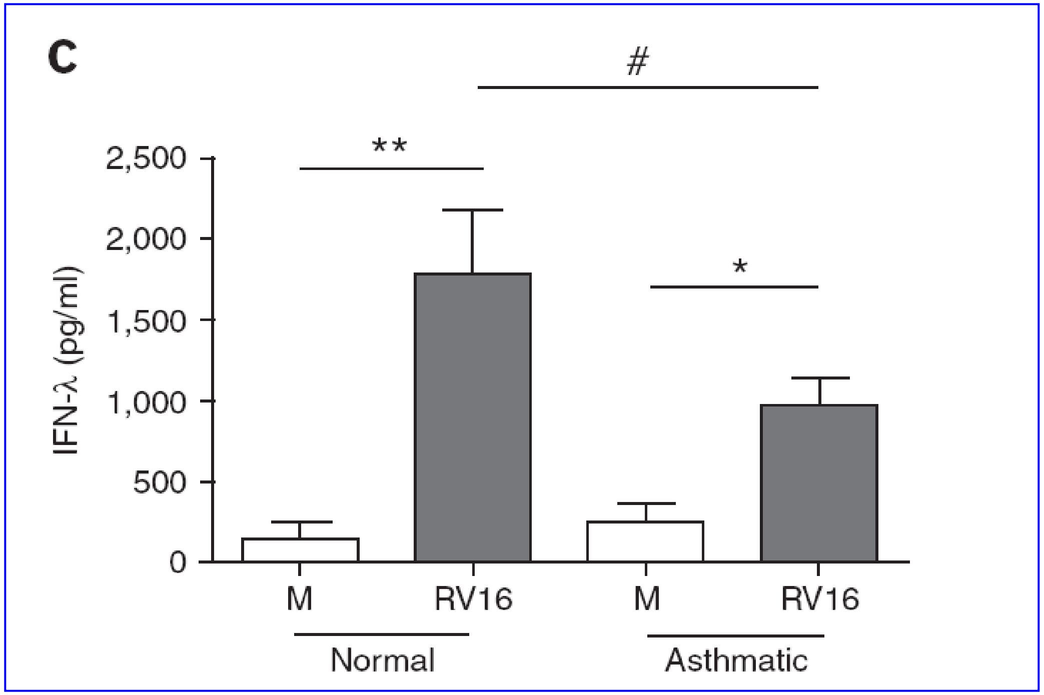


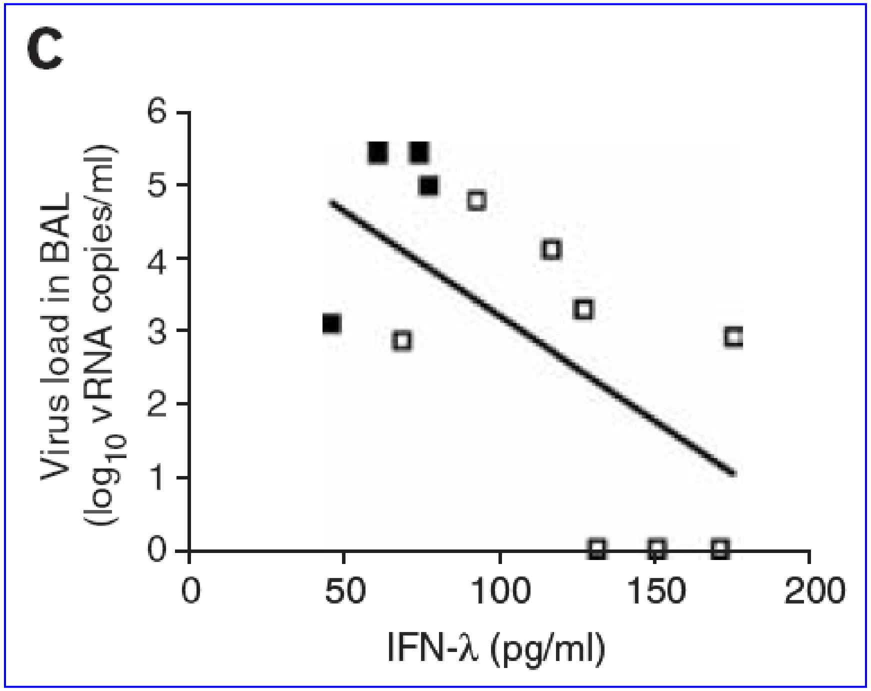
INF-β production (2.5 times less)

J exp Med 2005;201:937

Role of deficient type III interferon-lambda production in asthma exacerbations

- The recently discovered type III IFNs, have properties similar to type I INF, but their role in the pathogenesis of asthma exacerbations is unknown.





Deficient RV16 virus RNA and INF-gamma in primary human BEC from asthma and non asthmatics

Nature Medicine2006;12:1023

Assessment of humoral and cell-mediated immune response to measles–mumps–rubella vaccine viruses among patients with asthma

Kwang Ha Yoo, M.D., Ph.D.,[1,2] Kanishtha Agarwal, M.D.,[2] Michael Butterfield, B.A.

- Compare virus-specific IgG level and lymphoproliferative response to MMR vaccine

PBMC lymphoproliferative response to measles vaccine virus (mean ± SE)		
Asthma status		
Yes	1.59 ± 0.24	0.189
No	1.86 ± 0.08	
Family history of asthma		
Yes	1.42 ± 0.16	0.010
No	1.94 ± 0.10	
PBMC lymphoproliferative response to rubella vaccine virus (mean ± SE)		
Asthma status		
Yes	0.77 ± 0.20	0.041
No	1.20 ± 0.07	
Family history of asthma		
Yes	0.78 ± 0.16	0.009
No	1.26 ± 0.10	

Allergy Asthma Proc 2010;31:499

Asthma Status and Waning of Measles Antibody Concentrations after Measles Immunization

Kwang Ha Yoo, MD, PhD,† Robert M. Jacobson, MD,† Gregory A. Poland, MD,‡ Amy Weaver, MS*

- 838 eligible children with 281 asthmatics

The Elapsed Time Since vaccination in 1–7th Deciles (Before Significant Waning of Measles Antibody)					
Asthma Status Defined Using 2 Categories	Measles Antibody (Mean ±SD)	*P* value 2-sample *t* test	Asthma Status Defined Using 3 Categories	Measles Antibody (Mean ± SD)	Overall *P* Value by F test From 1-way ANOVA
Non-asthmatics (N = 385)	1.88 (0.80)	0.15	Non-asthmatics (N = 385)	1.88 (0.80)	
Asthmatics (N = 201)	1.99 (0.84)		Asthmatics at enrollment (N = 106)	1.98 (0.86)	0.34
			Asthmatics after enrollment (N = 95)	2.00 (0.82)	
Asthma status defined using 2 categories	Seropositivity (%)	*P* value χ^2 test	Asthma status defined using 3 categories	Seropositivity (%)	*P* value χ^2 test
Non-asthmatics (n = 385)	339 (88.0%)	0.99	Non-asthmatics (N = 385)	339 (88.0%)	
Asthmatics (n = 201)	177 (88.1%)		Asthmatics at enrollment (N = 106)	93 (87.7%)	*P* = 0.99
			Asthmatics after enrollment (N = 95)	84 (88.4%)	
The Elapsed Time Since Vaccination in 8–10th Deciles (After Significant Waning Of Measles Antibody)					
Asthma Status Defined Using 2 Categories	Measles Antibody (Mean ±SD)	*P* value 2-sample *t* test	Asthma Status Defined Using 3 Categories	Measles Antibody (Mean ± Sd)	Overall *P* Value by F test From 1-way ANOVA
Non-asthmatics (N = 172)	1.67 (0.69)	0.008	Non-asthmatics (N = 172)	1.67 (0.69)	
Asthmatics (N = 80)	1.42 (0.67)		Asthmatics at enrollment (N = 51)	1.38 (0.60)	0.024*
			Asthmatics after enrollment (N = 29)	1.49 (0.77)	
Asthma status defined using 2 categories	Seropositivity (%)	*P* value χ^2 test	Asthma status defined using 3 categories	Seropositivity (%)	*P* value χ^2 test
Non-asthmatics (n = 172)	144 (83.7%)	0.038	Non-asthmatics (N = 172)	144 (83.7%)	
Asthmatics (n = 80)	58 (72.5%)		Asthmatics at enrollment (N = 51)	39 (76.5%)	*P* = 0.057
			Asthmatics after enrollment (N = 29)	19 (65.5%)	

Pediatr Infect Dis J 2014;33:1016

Susceptibility to viral infections in chronic obstructive pulmonary disease: role of epithelial cells

- Mucus
- Mucociliary movement
- Tight junction
- Epithelial cell
- Pattern Recognition molecule
- - antiviral substance
- Pro inflammatory cytokines
- Recruits other innate immune cell
- Initiated adaptive immunity

→

- Impair innate defense mechanisms
- Increasing susceptibility to viral infection

- 50~60% of AECOPD ire due to infections and half of these are asc with viruse

Curr Opin Pulm Med 2013;19:125

Respiratory Viral Infections in Adults With and Without Chronic Obstructive Pulmonary Disease

STEPHEN B. GREENBERG, MARTHA ALLEN, JOAN WILSON, and ROBERT L. ATMAR

- A longitudinal cohort of COPD stratified by FEV1
- Control, mild COPD: few ER visits or hospitalization
- Mod to severe COPD: ~1/2 ER visits or hospitalization
- RTVIs documented in 23% of hospitalization

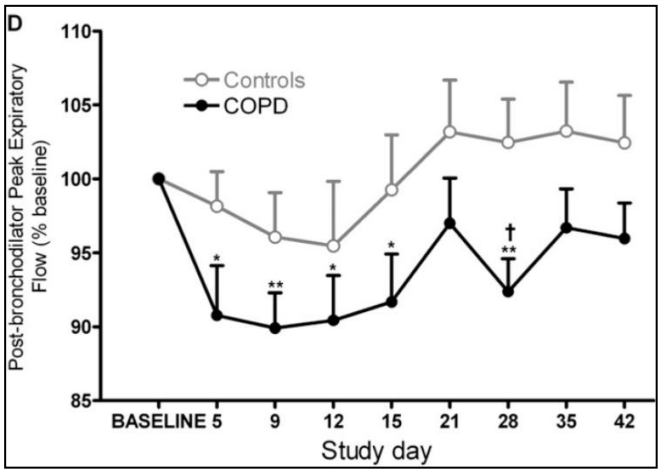
	Control Subjects	COPD Subjects		
			Enrollment FEV_1	
	Total (*n* = 55)	Total (*n* = 62)	Mild (*n* = 30)	Moderate/Severe (*n* = 32)
No. of subjects with RTVI (% of total)	41 (75%)	32 (52%)*	15 (50%)	17 (53%)
No. (annual rate) of RTVIs	87 (0.54)	61 (0.45)	27 (0.38)	34 (0.52)
No. (% total) of RTVI-associated:				
Office visits	27 (31%)	36 (58%)†	9 (32%)	27 (79%)
Emergency-center visits	0 (0)	4 (6%)*	0 (0)	4 (12%)
Hospitalizations	0 (0)	12 (19%)	0 (0)	12 (35%)‡

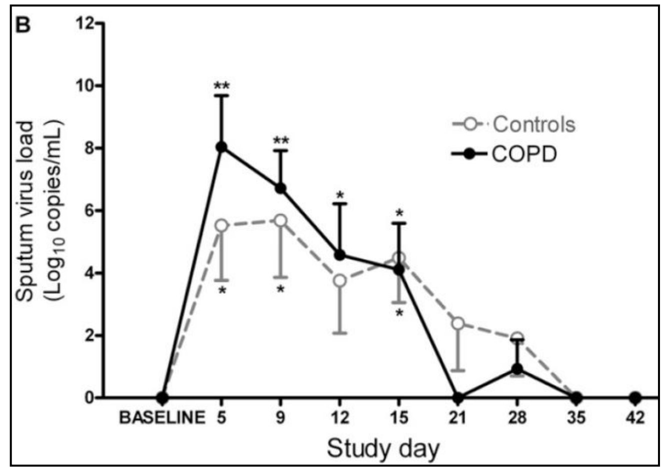
Am J Respir Crit Care Med. 2000;162:167

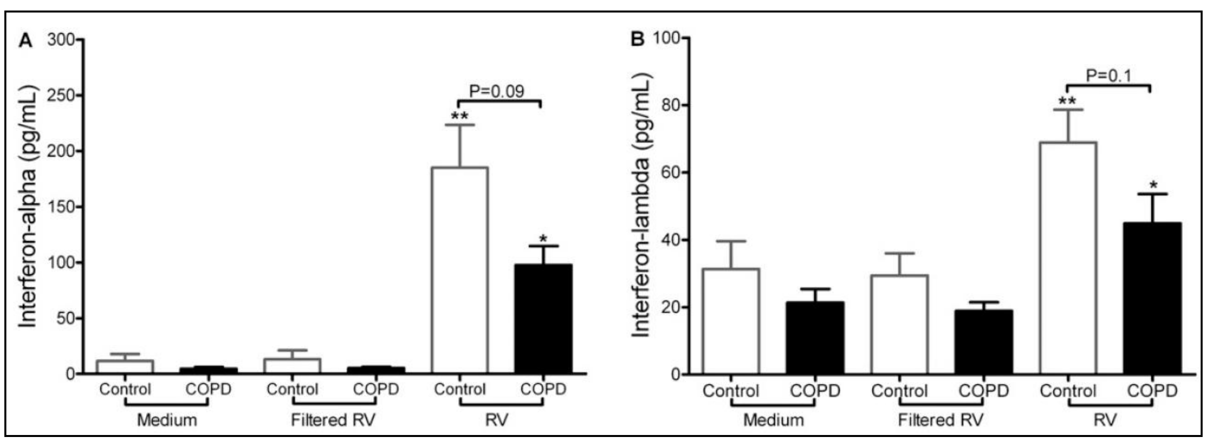
Experimental Rhinovirus Infection as a Human Model of Chronic Obstructive Pulmonary Disease Exacerbation

Patrick Mallia[1,2], Simon D. Message[1,2], Vera Gielen[1], Marco Contoli[1,3], Katrina Gray[1,2], Tatiana Kebadze[1],

- To evaluate the mechanisms of virus induced AE COPD
- Using experimental rhinovirus infection in COPD subjects
- 13 COPD vs 13 controls



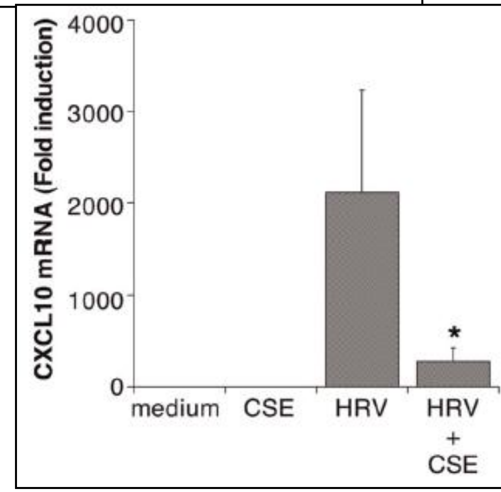


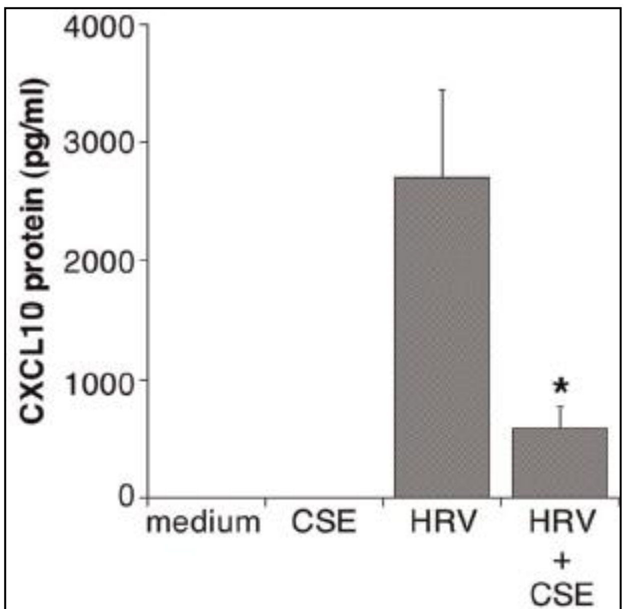


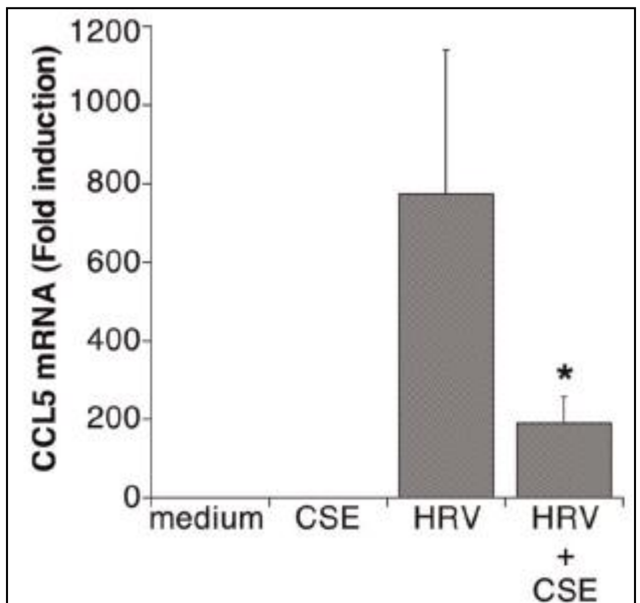
Am J Respir Crit Care Med 2011;183:734

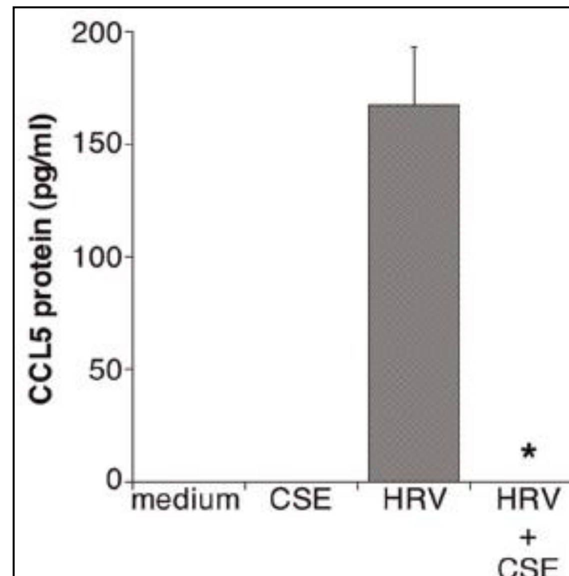
Cigarette Smoke Modulates Expression of Human Rhinovirus-Induced Airway Epithelial Host Defense Genes

- CCL-5, CXCL-10 recruit activated T lympho and NK cell
- Exposure to cigarette smoking decrease RV induced CCL-5 and CXCL-10
- Negative impact immune responses





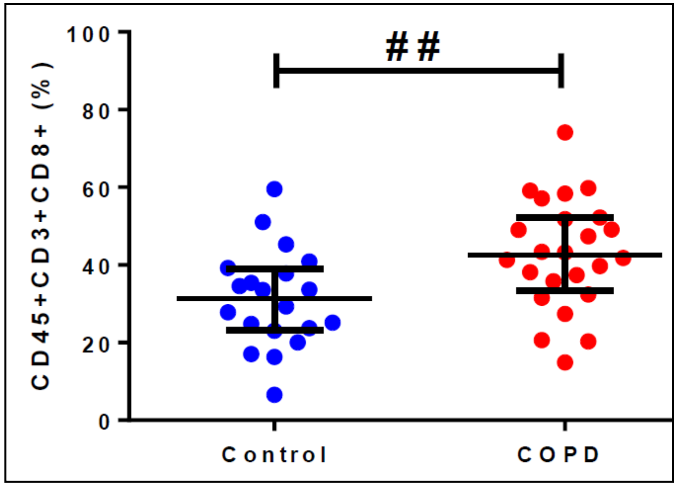


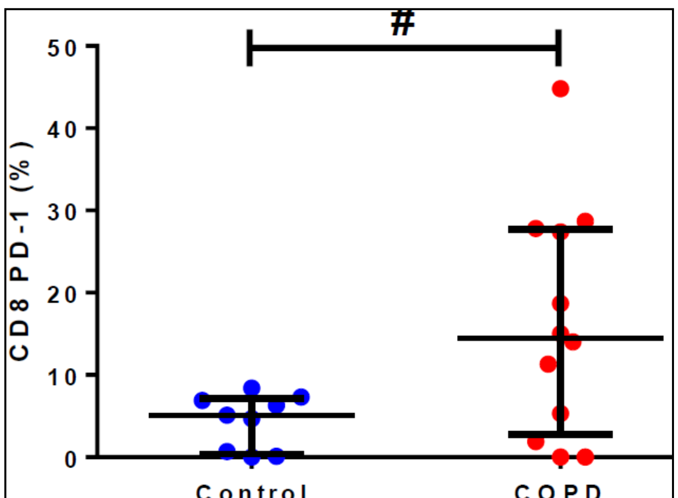


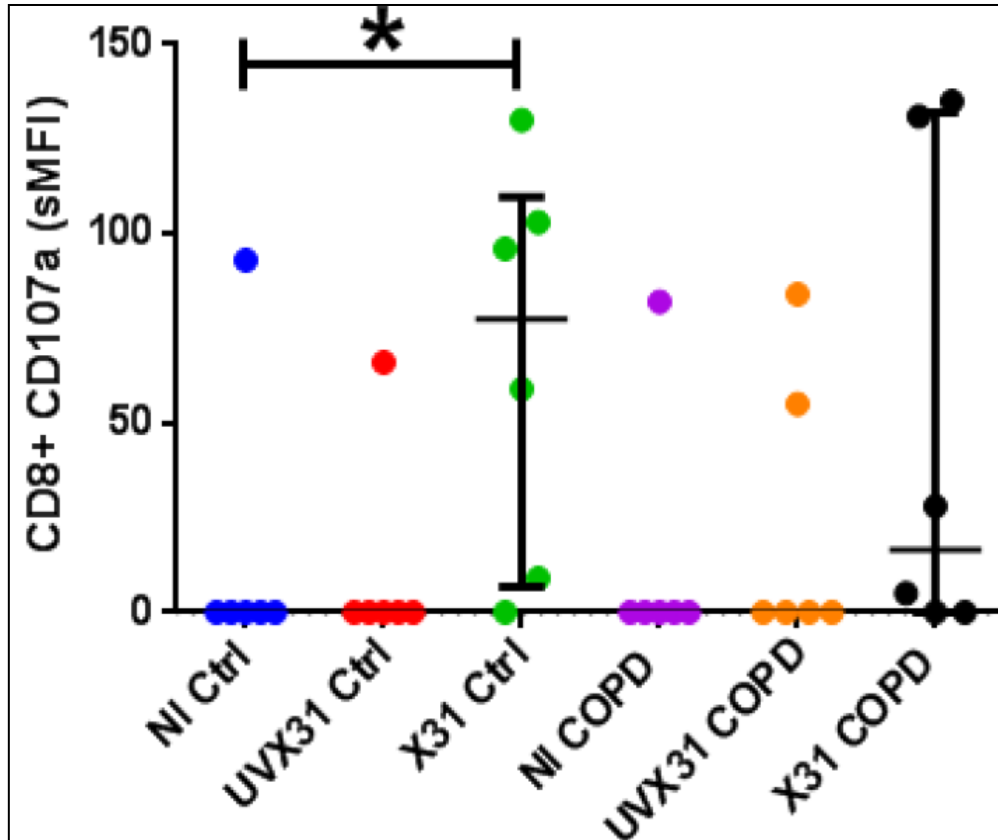
PLoSONE 2012;7:e40762

Dysregulation of anti-viral function of CD8+T cells in the COPD lung: role of the PD1/PDL1 axis

- Whether CD8+ T cell fail to protect against infection and contribute to immunopathology of the disease
- Resected human lung tissue from thoracic surgical unit





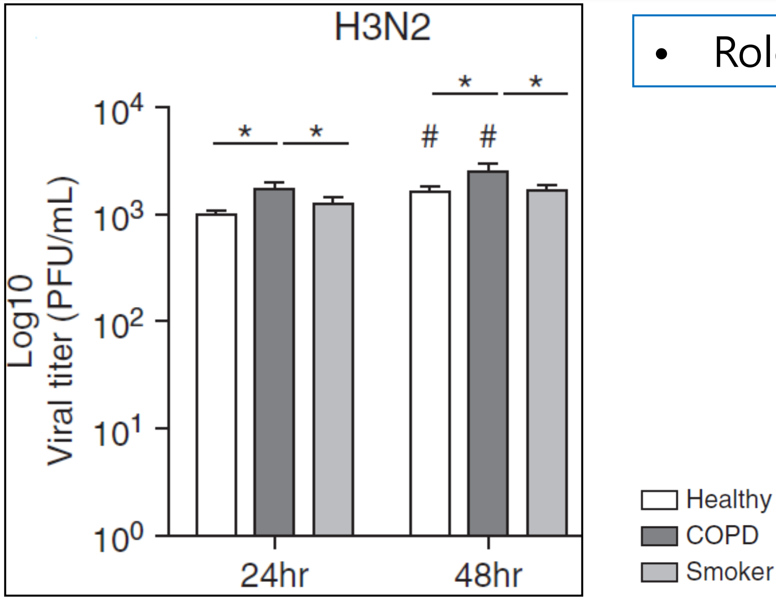


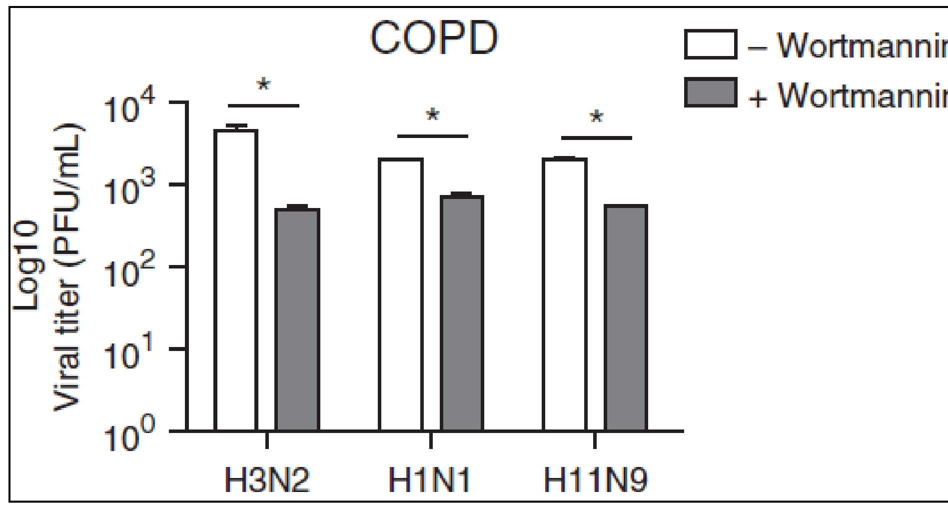
Am J Crit Care Med 2015;Oct:e-pub

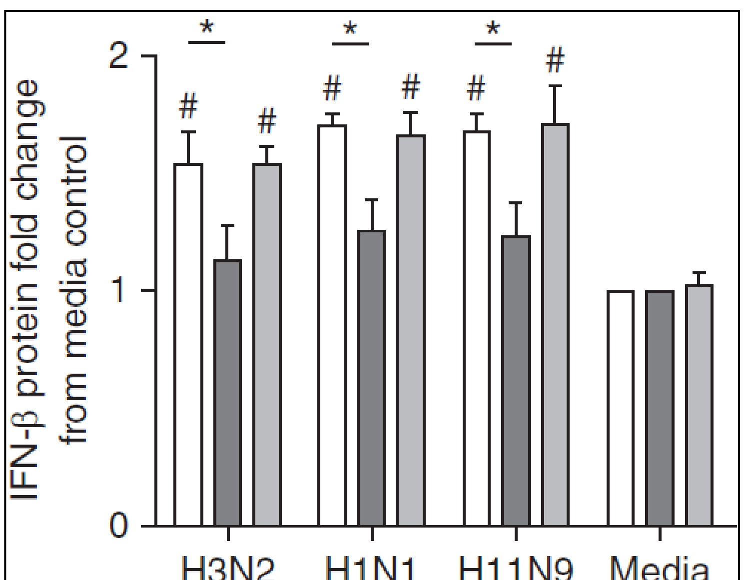
Targeting PI3K-p110α Suppresses Influenza Virus Infection in Chronic Obstructive Pulmonary Disease

Alan Chen-Yu Hsu[1]*, Malcolm R. Starkey[1], Irwan Hanish[1,2], Kristy Parsons[1], Tatt Jhong Haw[1], Linda J. Howland[1],

- Role of PI3K pathway was characterized







Am J Crit Care Med 2015;191:1012

Conclusions

- **Pathogenesis**: 바이러스 감염에 의한 천식 발생 – 가능성 있음

- Hygiene hypothesis와 상반된 가설

- **Acute exacerbation**: Virus 감염에 의한 asthma, COPD 모두 급성 악화 발생 – 근거 있음

- 급성 악화 정의 부족, 검체 방법, 진단 기법, 타 질환 배제 원칙

- 전향적 연구 부족,기도 감염 예방으로 급성 악화 감소 증거는 부족

- **Increased susceptibility**: 바이러스 감염에 대한 감수성이 높음 – 가능성 있음

- 대부분 단면 연구 혹은 코호트 연구, 일부 사이토카인 연구 결과가 상반, URI과의 연관성 해결

Thank You !