Smoking and Cough

국민건강보험 일산병원 호흡기내과
박선철

- Smoking should be considered a chronic disorder rather than a simple habit because nicotine increases dopamine and other neurotransmitters in the brain, causing addiction in smokers.

WHO Fact sheets - Tobacco

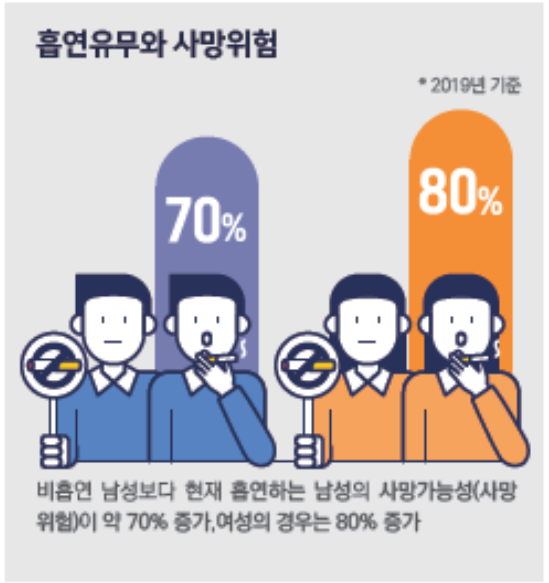
- Tobacco kills up to half of its users who don't quit.

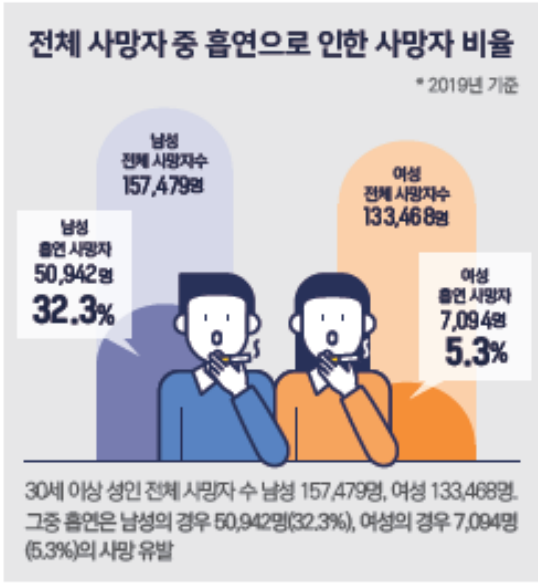
- Tobacco kills more than 7 million people each year, including an estimated 1.6 million non-smokers who are exposed to second-hand smoke.

https://www.who.int/news-room/fact-sheets/detail/tobacco

국내 흡연에 의한 사망, 사회경제적 부담

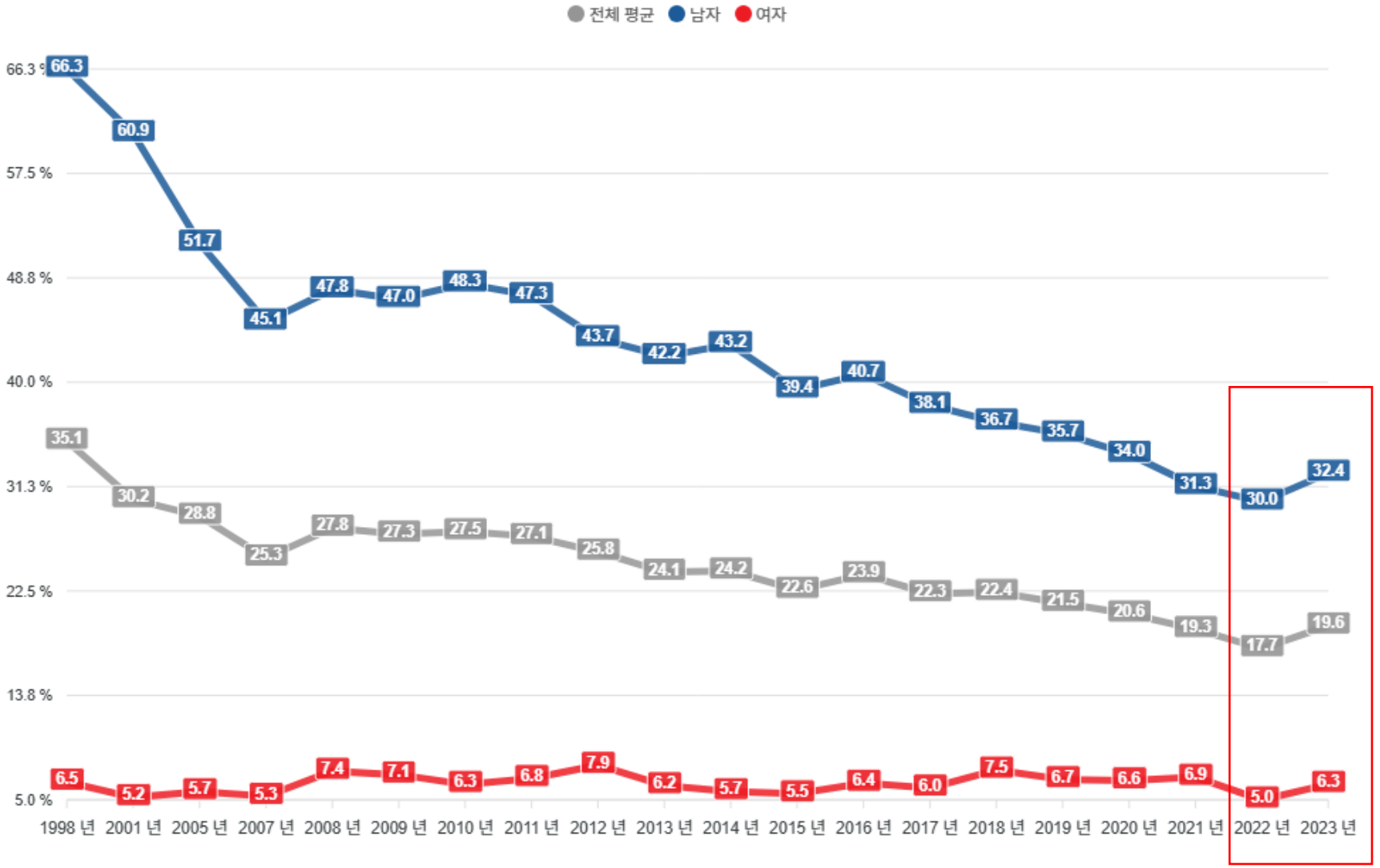
- 2019년 국내 직접흡연으로 인한 사망수는 5만 8천여명(남성 50,942명, 여성 7,094명)
- 남자 전체 사망의 32.3%, 여자 5.3%
- 현재흡연자는 비흡연자보다 흡연으로 인한 사망위험이 남자 1.7배 여자 1.8배
- 직접흡연으로 인한 사회경제적 비용은 12조 1,913억 원





질병관리청. 흡연으로 인한 국내 사망자 수와 사회경제적 비용
조성일 외. (2021). 흡연 폐해 연구기반 구축 및 사회경제적 부담 측정 연구('19-'21, 서울대학교)

현재 흡연율



※ 현재흡연율 : 평생 일반담배(궐련) 5갑(100개비) 이상 피웠고 현재 일반담배(궐련)를 피우는 분율, 19세이상
※ 2005년 추계인구로 연령표준화

국민건강영양조사 https://knhanes.kdca.go.kr/knhanes/main.do

Smoking causes respiratory diseases

COPD	Chronic obstructive pulmonary disease (COPD), resulting in about 8 in 10 COPD-related deaths in the United States.
Asthma	Asthma exacerbation in adults.
TB	Increased risk of tuberculosis disease and mortality.
Respiratory Symptoms	Respiratory symptoms, including **coughing**, wheezing, phlegm, and dyspnea.
Acute Respiratory Illness	Acute respiratory illness, including pneumonia.
Lung Function	Reduced lung function and impaired lung growth in childhood and adolescence.

CDC. Respiratory Care Settings and Smoking Cessation.
https://www.cdc.gov/tobacco/hcp/patient-care-settings/respiratory.html

5.1.1. 흡연력

흡연력(흡연 시작 연령, 흡연량, 흡연 기간)에 대해서 구체적으로 확인해야 한다. 흡연량과 기침의 빈도는 관련이 있으며, 장기간의 흡연은 만성기관지염을 유발하여 객담을 동반한다[1]. 금연은 기침을 비롯한 호흡기 증상을 감소시킨다[2]. 따라서 기침하는 모든 흡연자에게 금연을 적극적으로 권고해야 한다.

대한결핵및호흡기학회. 2020 개정 기침진료지침

국민건강보험 National Health Insurance Service
일산병원 Ilsan Hospital

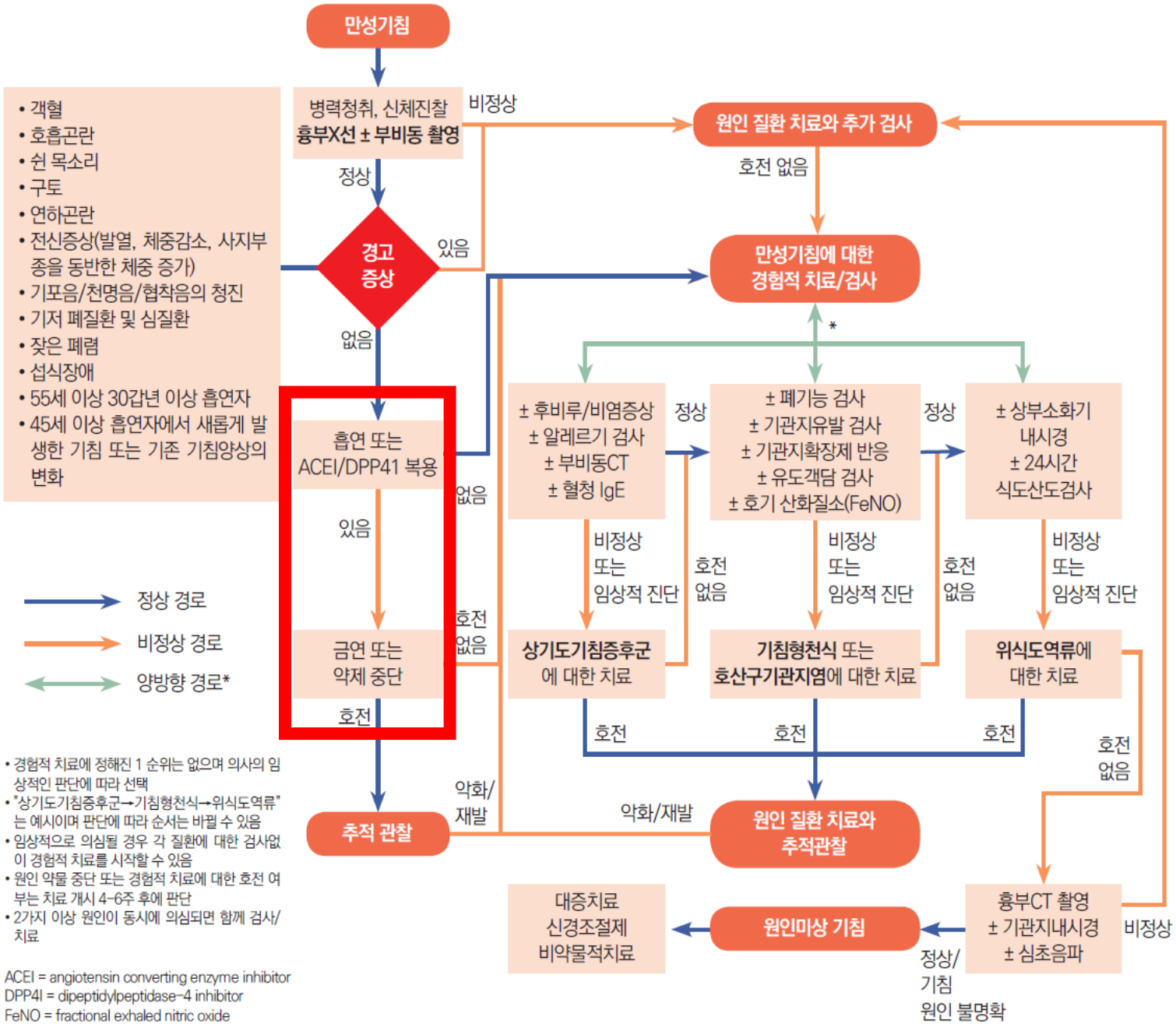
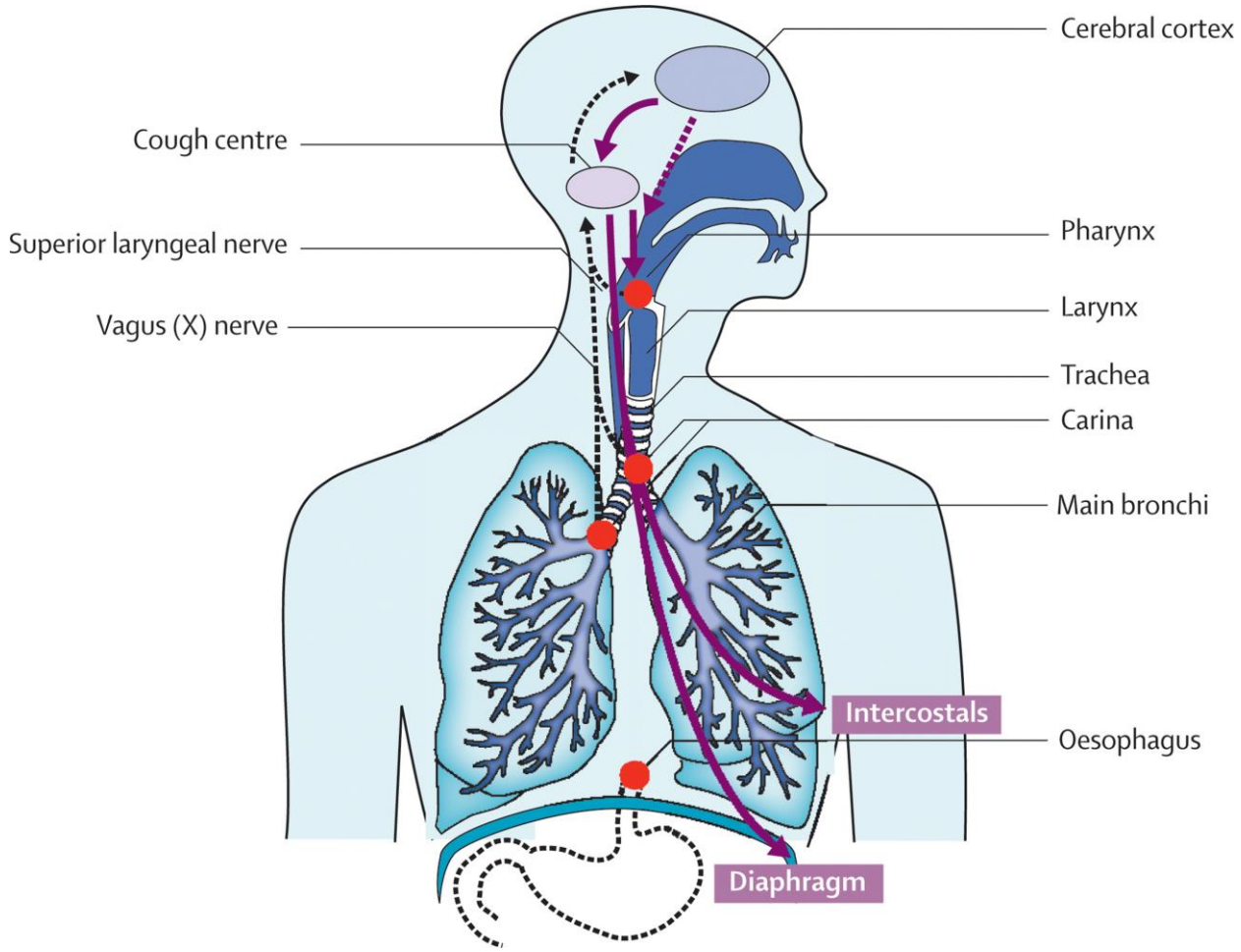


그림 4. 만성기침의 진단적 접근

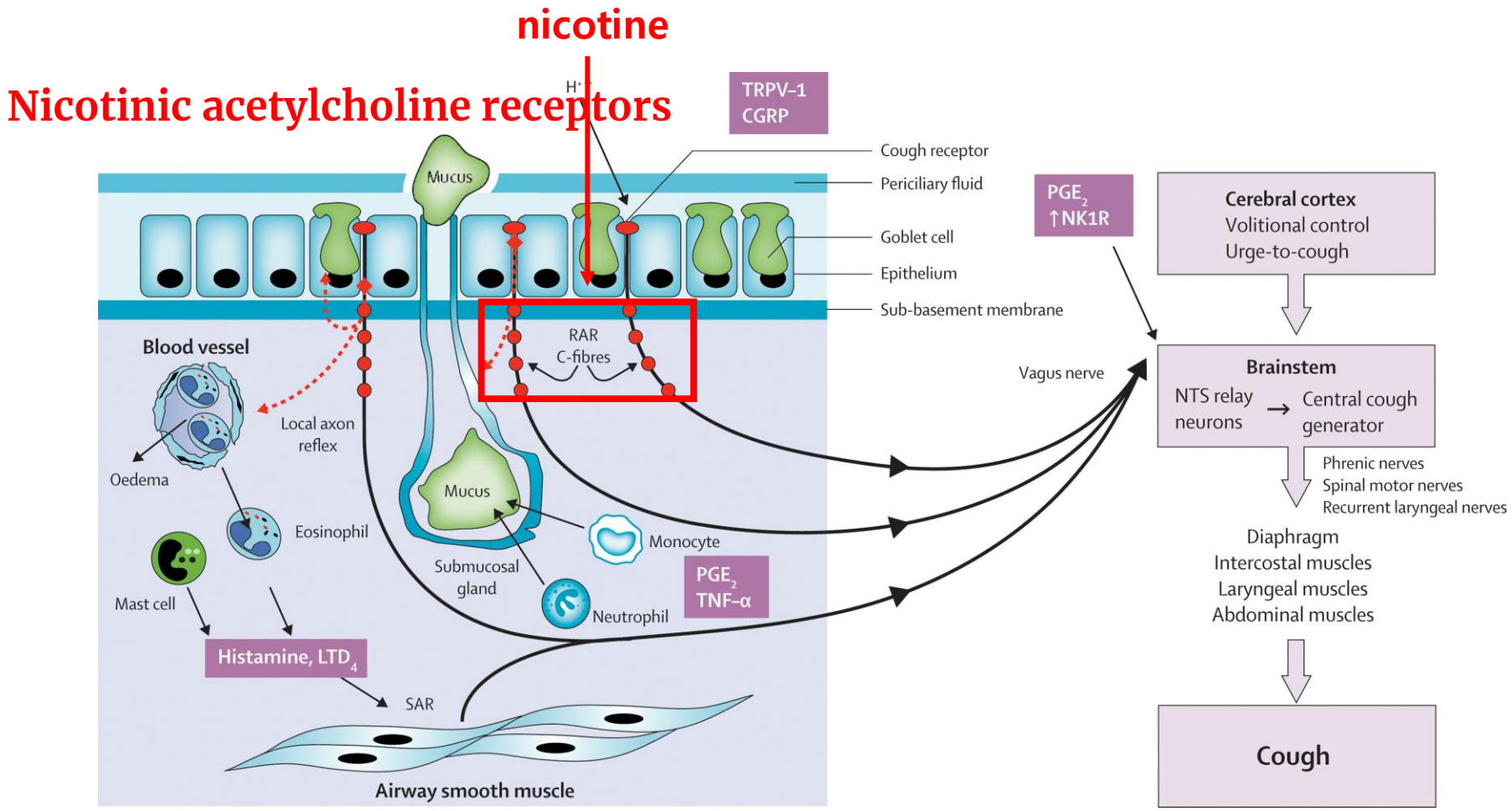
대한결핵및호흡기학회. 2020 개정 기침진료지침

Anatomy of cough pathways



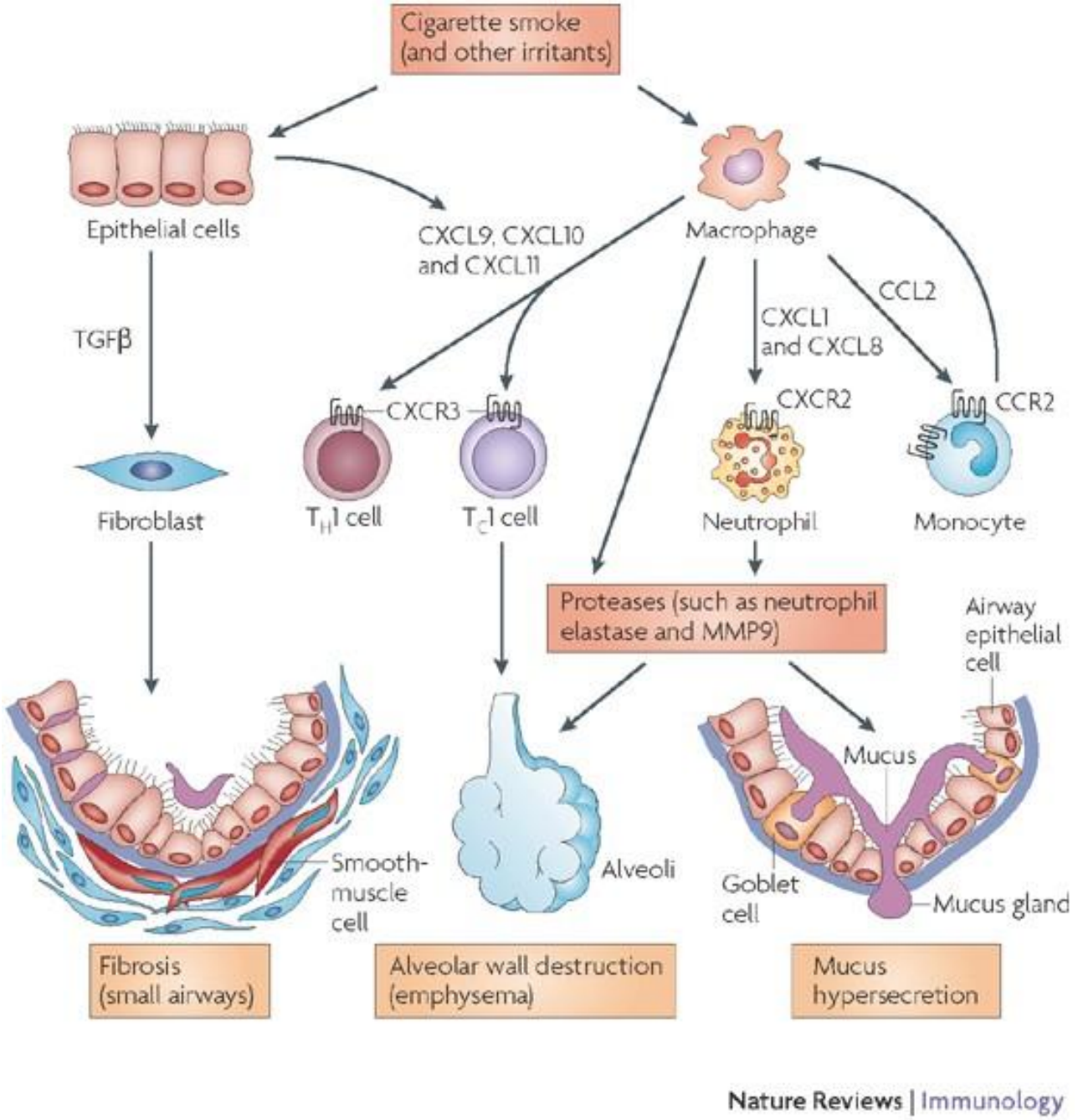
Kian Fan Chung et al. Lancet. 2008 Apr 19;371(9621):1364-74.

Cigarette Smoke on Cough: Role of Nicotine



Kian Fan Chung et al. Lancet. 2008 Apr 19;371(9621):1364-74.
Lu-Yuan Lee et al. Lung. 2010 Jan:188 Suppl 1:S23-7.

국민건강보험 National Health Insurance Service
일산병원 Ilsan Hospital



Peter J Barnes. Nat Rev Immunol. 2008 Mar;8(3):183-92.

1. Smoking and chronic cough

2. Smoking and cough sensitivity

3. Electronic cigarette and cough

Current smoking → Cough

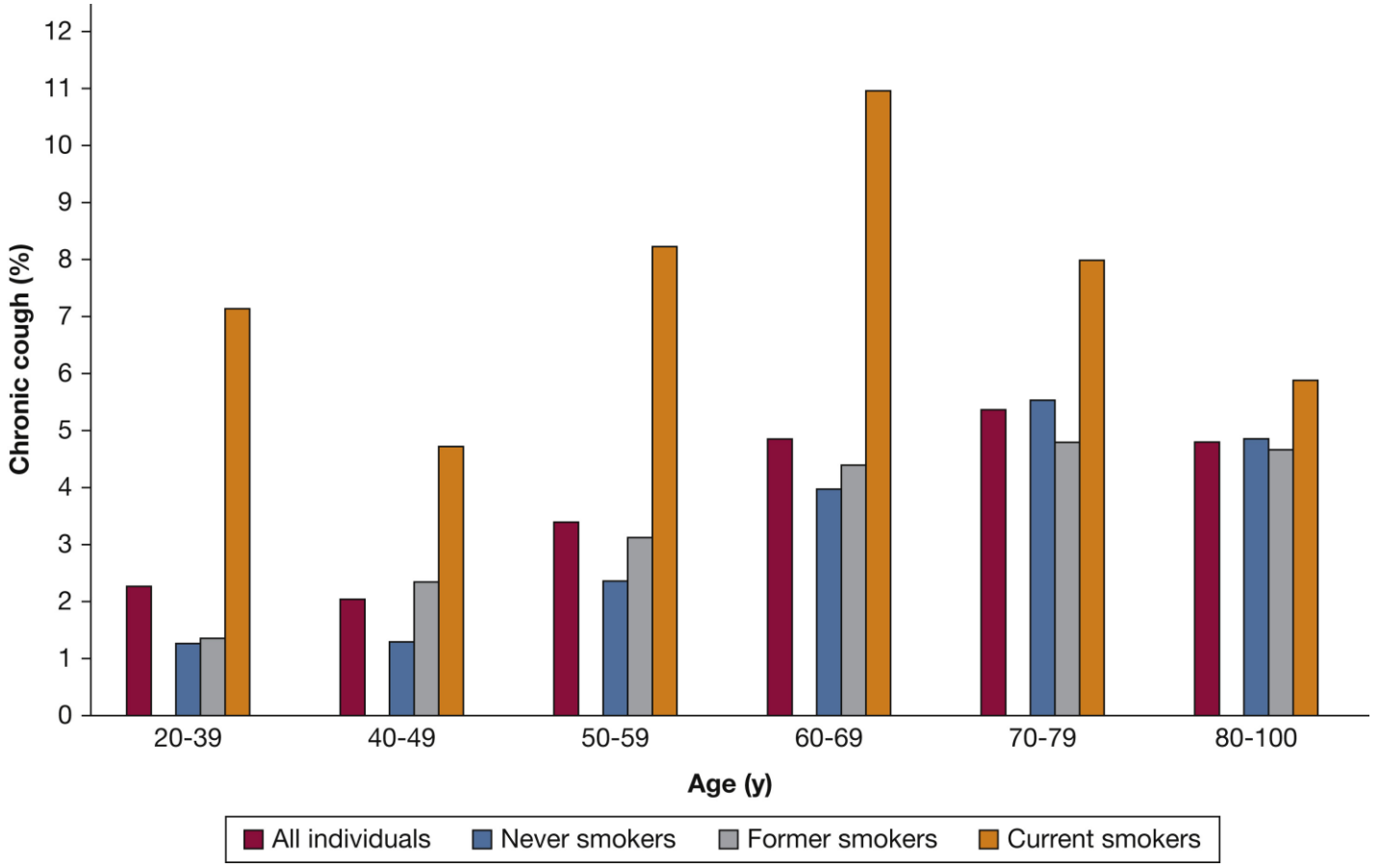
Table 3—*Prevalence of Physician-Diagnosed Chronic Bronchitis and Respiratory Symptoms in Men and Women by Smoking Habits in Norrbotten and Lapland

Variables	Nonsmokers		Ex-smokers		Smokers		p Value for Difference by Smoking
	Men	Women	Men	Women	Men	Women	
Physician-diagnosed chronic bronchitis							
Norrbotten	2.2	2.9	4.8	4.0	5.2	6.3	< 0.001
Lapland	2.4	2.3	5.5	4.4	3.0	3.5	< 0.001
Chronic productive cough							
Norrbotten	6.2	6.5	7.3	6.3	11.4	8.7	< 0.001
Lapland	8.2	8.3	12.5	10.2	14.8	14.8	< 0.001
Sputum production							
Norrbotten	15.3	16.8	18.9	16.3	27.3	24.7	< 0.001
Lapland	18.3	19.6	25.5	27.3	32.7	33.8	< 0.001
Wheezing last 12 mo							
Norrbotten	13.7	15.1	18.1	16.6	25.2	29.8	< 0.001
Lapland	12.9	13.5	19.0	15.6	28.1	28.3	< 0.001
Dyspnea grade 2							
Norrbotten	4.5	7.7	6.7	12.8	10.3	11.7	< 0.001
Lapland	8.1	17.2	18.5	20.4	12.7	18.2	< 0.001

*Data are presented as % unless otherwise indicated.

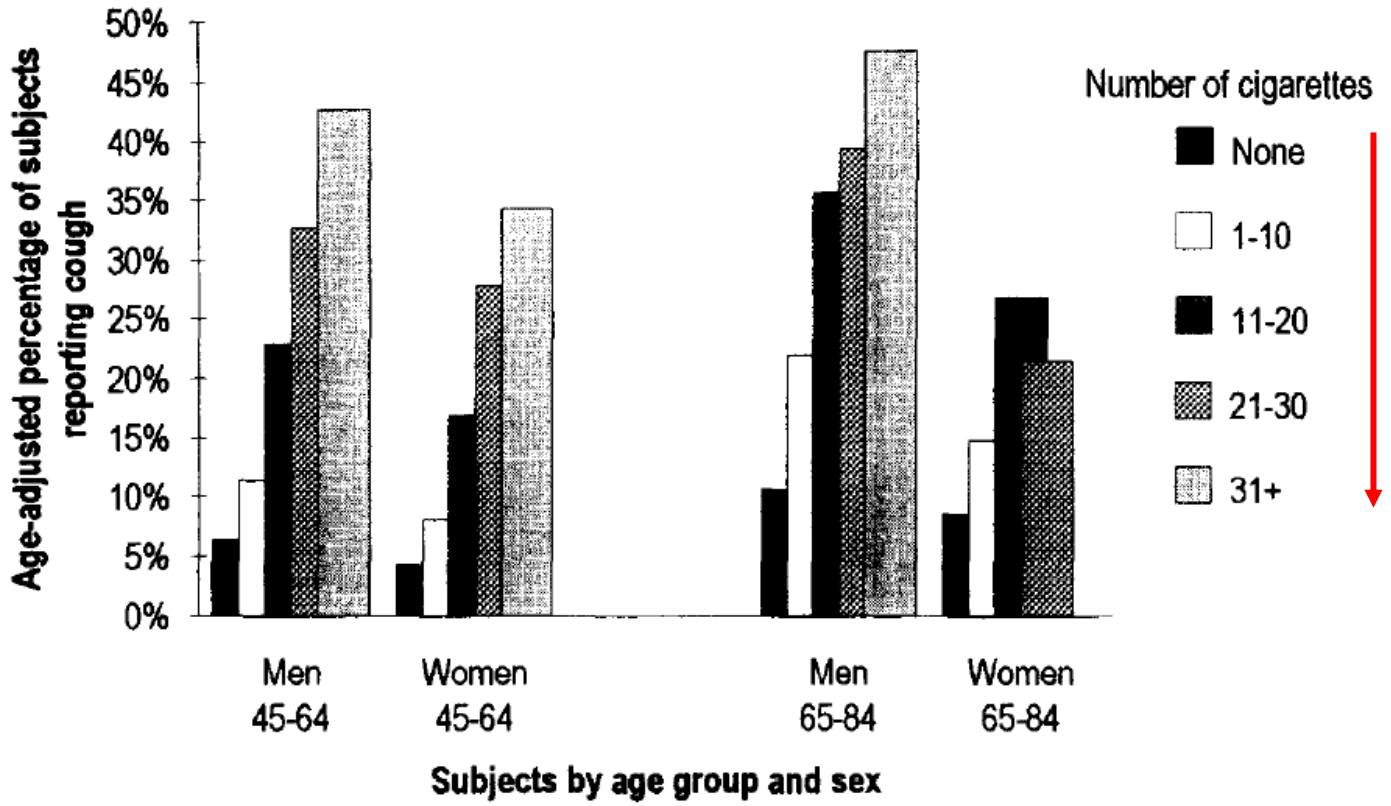
M Lindström et al. Chest. 2001 Mar;119(3):852-61.

Chronic cough: current smoker > never or former



Yunus Çolak et al. Chest. 2017 Sep;152(3):563-573

Smoking ↑ → Cough ↑



K M Freund et al. Ann Epidemiol. 1993 Jul;3(4):417-24.

Smoking ↑ → Cough ↑

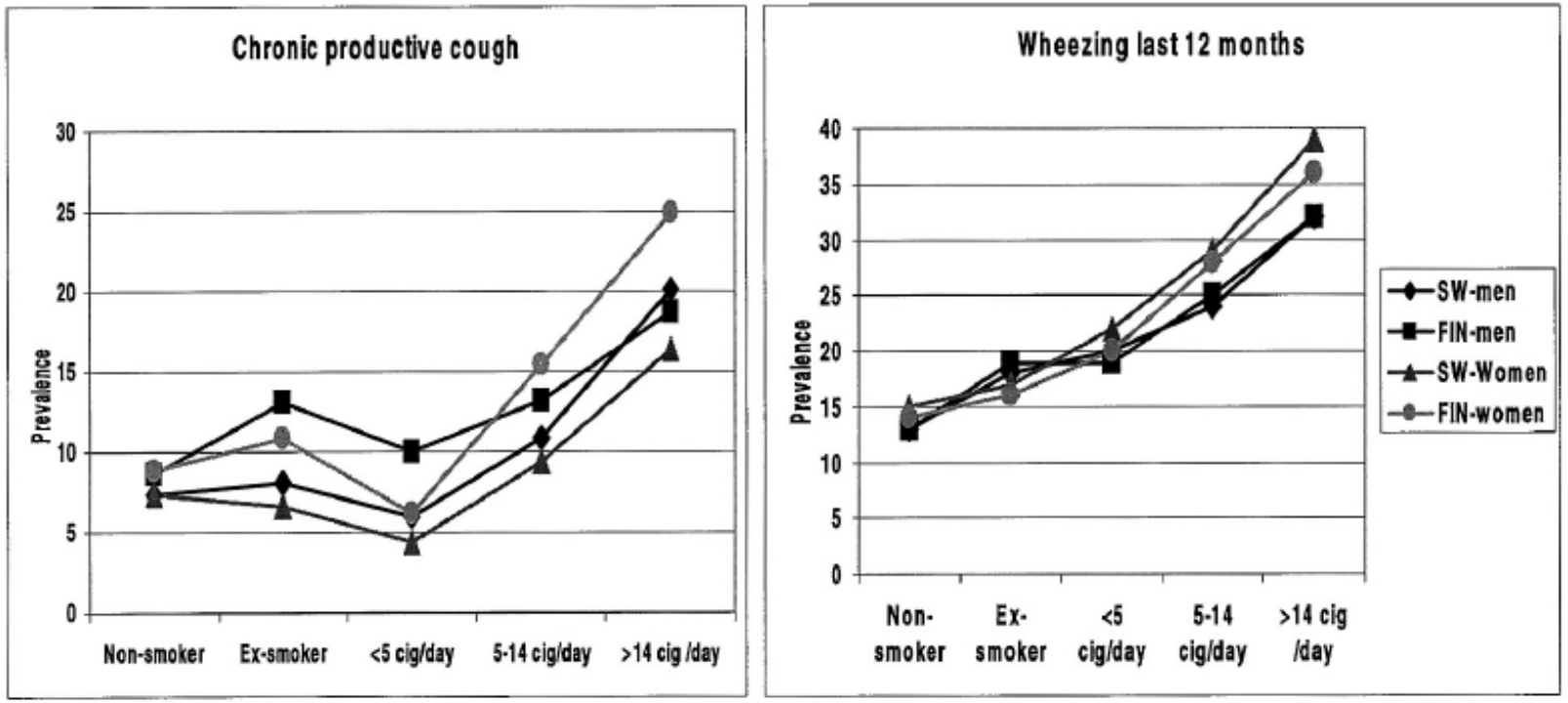


FIGURE 2. The prevalence (in percentage) of chronic productive cough and wheezing during the last 12 months, respectively, in different smoking categories among men and women in Northern Sweden (SW) and Northern Finland (FIN). cig = cigarettes.

M Lindström et al. Chest. 2001 Mar;119(3):852-61.

Passive smoking on Cough

TABLE 2. Prevalence of and adjusted ORs for respiratory symptoms in relation to SHS and number of years exposed to SHS at baseline

	SHS in 1997–1998					Duration of exposure in 1997–1998 (years)							
	No		Yes			0		≤2			>2			
Symptoms	%	OR	%	OR	95% CI	%	OR	%	OR	95% CI	%	OR	95% CI	Test for trend *p*
Frequent cold	14.4	1	24.8	1.89	1.66–2.15[a]	14.4	1	20.8	1.74	1.42–2.12[a]	27.9	2.08	1.80–2.40[a]	<0.001
Frequent cough and phlegm	4.8	1	10.6	1.65	1.35–2.02[a]	4.8	1	6.1	1.18	0.84–1.66	13.0	1.87	1.51–2.32[a]	<0.001
Frequent throat problem	12.1	1	23.4	1.88	1.63–2.15[a]	12.1	1	14.9	1.35	1.07–1.70[b]	28.4	2.21	1.90–2.57[a]	<0.001
Any respiratory symptoms[c]	21.7	1	37.0	1.96	1.75–2.20[a]	21.7	1	27.5	1.55	1.29–1.86[a]	42.9	2.29	2.01–2.60[a]	<0.001
Rhinitis	8.0	1	7.0	0.87	0.71–1.05	8.0	1	7.1	0.86	0.64–1.17	6.8	0.84	0.67–1.06	0.12

ORs adjusted for age, sex, education attainment, and occupational exposures (chemicals, chemical gases, and dust).
SHS = secondhand smoke, OR = odds ratio, CI = confidence interval.
[a] $p < 0.001$.
[b] $p < 0.05$.
[c] Any respiratory symptoms, excluding rhinitis.

Sai Yin Ho et al. Ann Epidemiol. 2007 Feb;17(2):126-31

Passive smoking on Cough

Table 2. – Adjusted odds ratios (ORs) for different respiratory symptoms by daily exposure time to environmental tobacco smoke (ETS) outside of the home

Symptoms	ETS outside home			
	<1 h	1–5 h	>5 h	p-value*
Long-standing cough	1.25 (1.07–1.45)	1.40 (1.16–1.71)	1.61 (1.27–2.03)	<0.001
Increased sputum production	1.32 (1.14–1.52)	1.56 (1.29–1.87)	1.52 (1.21–1.91)	<0.001
Chronic productive cough	1.32 (1.01–1.72)	2.00 (1.47–2.74)	1.81 (1.25–2.62)	<0.001
Wheeze	1.25 (0.99–1.59)	2.12 (1.61–2.78)	2.67 (1.98–3.61)	<0.001
Wheezing in last 12 months	1.15 (0.97–1.37)	1.41 (1.13–1.76)	1.85 (1.43–2.39)	<0.001
Woken up with tightness in chest	1.11 (0.92–1.35)	1.37 (1.08–1.73)	1.64 (1.25–2.15)	<0.001
Dyspnoea grade 2	1.02 (0.80–1,30)	1.75 (1.32–2.31)	1.65 (1.20–2.27)	<0.001
Physician-diagnosed asthma	0.85 (0.54–1.34)	1.21 (0.71–2.07)	1.79 (1.02–3.16)	0.098
Physician-diagnosed chronic bronchitis or emphysema	1.24 (1.01–1.53)	1.16 (0.88–1.53)	1.54 (1.13–3.00)	0.006

All data presented as OR (95% confidence interval) unless otherwise stated. The ORs were adjusted for age, sex, heredity for asthma or bronchitis/emphysema, community, and ETS exposure at home and were calculated using subjects reporting almost no ETS exposure outside of the home as a reference category; *: linear dose/response relationship.

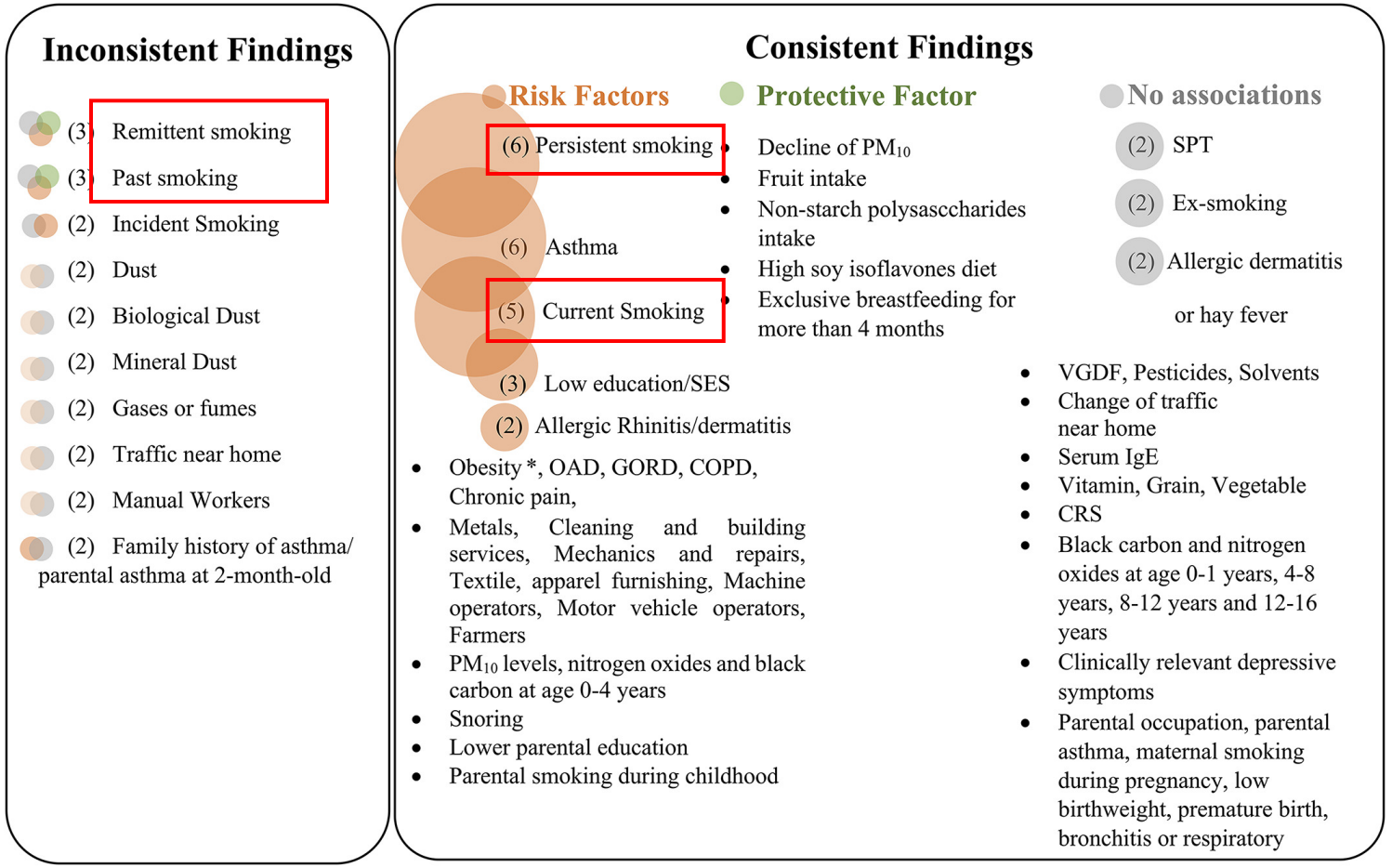
M L Larsson et al. Eur Respir J. 2003 Apr;21(4):672-6.

Ranking of Risk Factors for Chronic Cough

Ranking by OR				Ranking by PAR	
Risk Factor	**OR (95% CI)**	***P* Value[a]**	**Prevalence, %**	**Risk Factor**	**PAR[b], %**
Bronchiectasis	5.4 (2.5-12)	< .001	<1	**Smoking**	**20**
Asthma	2.5 (1.9-3.2)	< .001	7	Low income	19
Occupational exposure to dust/fumes	2.0 (1.6-2.6)	< .001	7	Abdominal obesity[c]	18
Airflow limitation[d]	1.8 (1.5-2.2)	< .001	21	Airflow limitation[d]	14
Gastroesophageal reflux disease	1.8 (1.4-2.3)	< .001	9	Low vegetable intake	10
Upper airway cough syndrome	1.8 (1.3-2.5)	.001	4	Asthma	9
Low income	1.5 (1.2-1.8)	< .001	47	Occupational exposure to dust/fumes	7
Smoking	1.5 (1.2-1.8)	< .001	54	Gastroesophageal reflux disease	7
Low vegetable intake	1.5 (1.2-1.7)	< .001	26	Upper airway cough syndrome	3
Abdominal obesity[c]	1.4 (1.2-1.7)	< .001	53	Bronchiectasis	1
Female sex	1.2 (0.97-1.4)	.10	55	Female sex	(8)

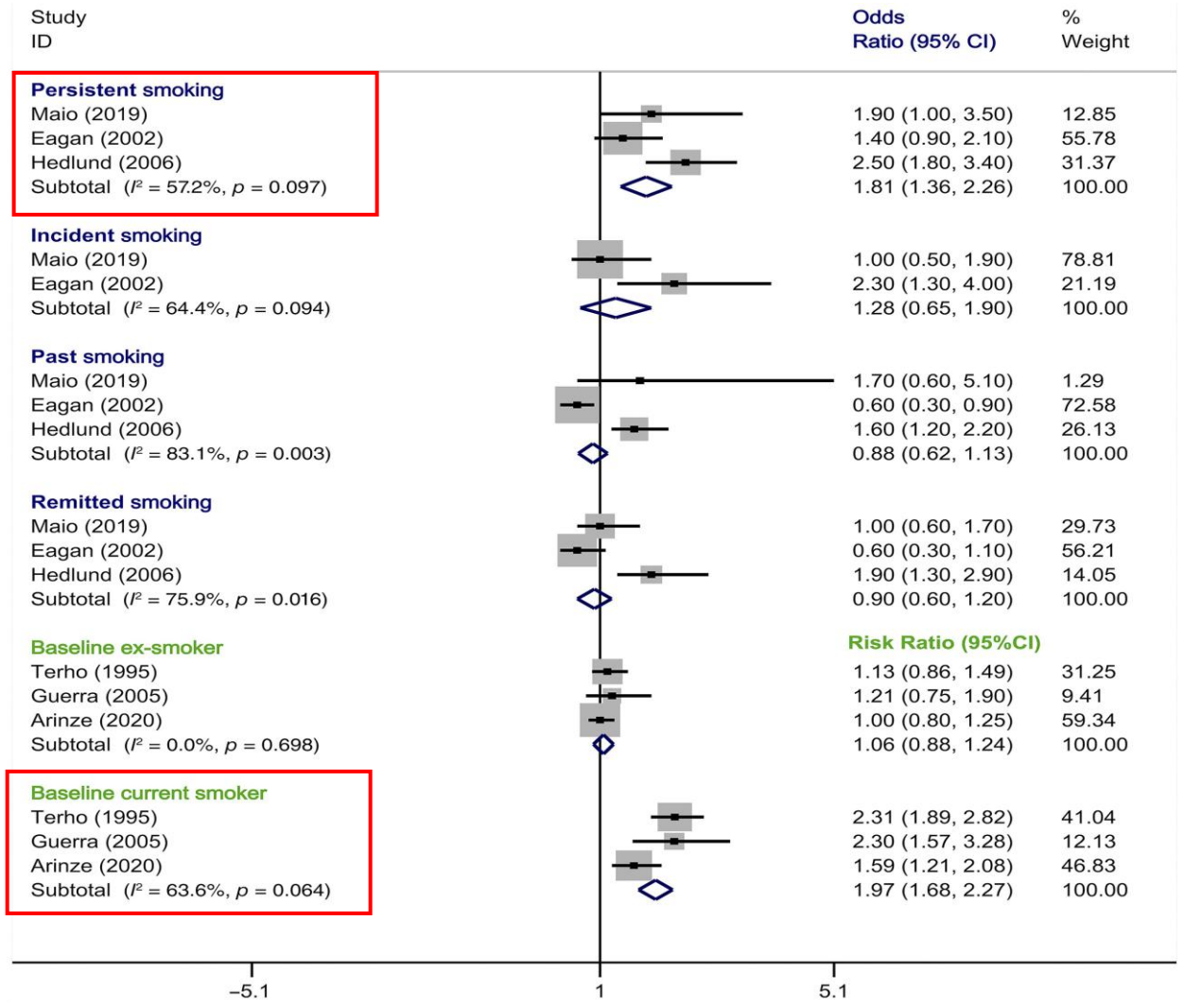
Yunus Çolak et al. Chest. 2017 Sep;152(3):563-573

Risk factors for chronic cough



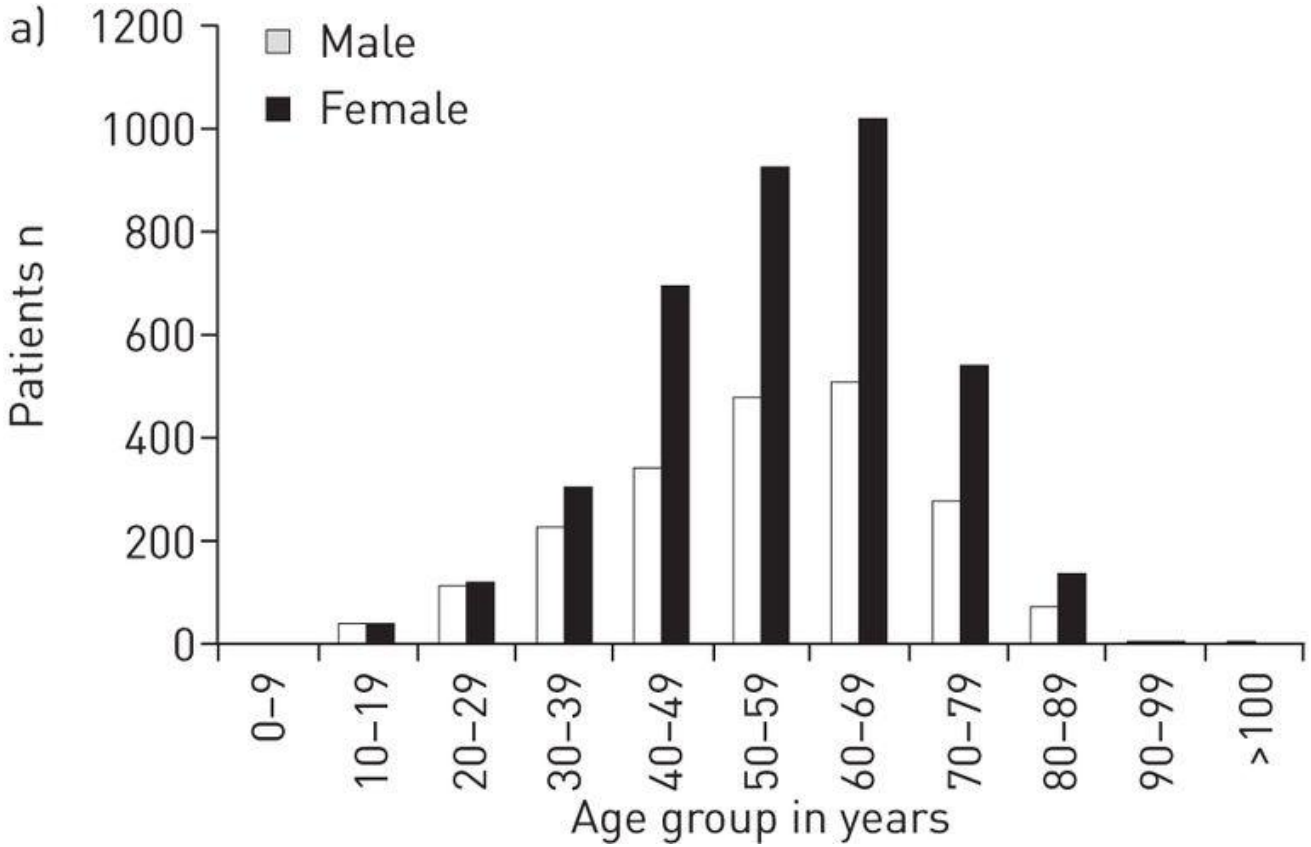
Jingwen Zhang et al. Respirology. 2022 Jan;27(1):36-47.

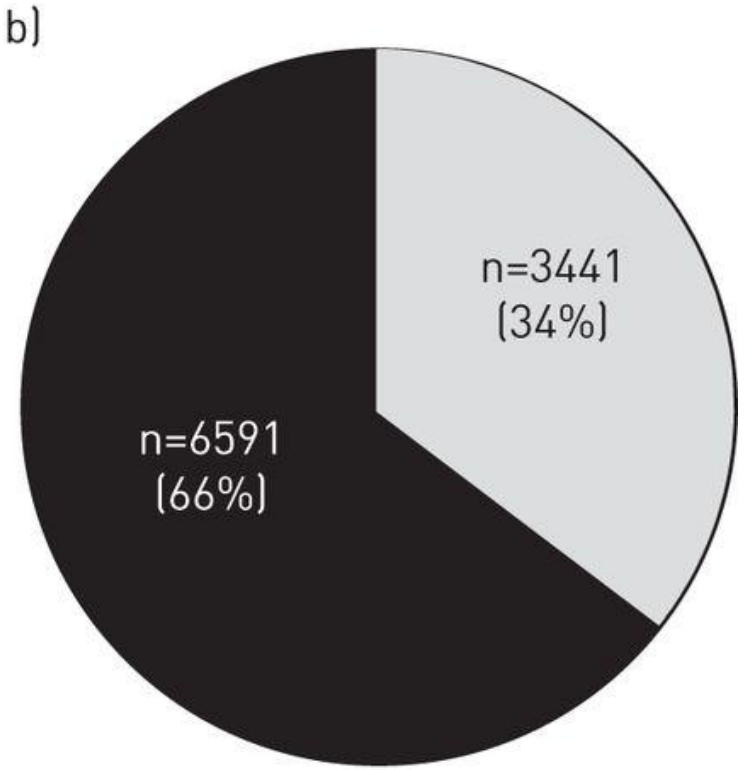
Associations between smoking and chronic cough



Jingwen Zhang et al. Respirology. 2022 Jan;27(1):36-47.

Presentation with chronic cough





Eur Respir J. 2014 Nov;44(5):1149-55

Cough in Elderly

	Frequent cough		Chronic persistent cough		Nocturnal cough	
	Adjusted OR (95% CI)*	*p* value	Adjusted OR (95% CI)†	*p* value	Adjusted OR (95% CI)*	*p* value
Age (years)	0.95 (0.91–0.98)	0.003	0.94 (0.90–0.99)	0.026	0.90 (0.85–0.94)	<0.001
BMI (kg/m²)	0.94 (0.86–1.03)	0.171	0.91 (0.80–1.03)	0.144	1.06 (0.96–1.17)	0.288
Male gender	0.39 (0.19–0.81)	0.011	0.44 (0.16–1.22)	0.113	0.39 (0.16–0.95)	0.037
Ex-smoker	1.32 (0.55–3.15)	0.537	1.42 (0.44–4.56)	0.557	1.45 (0.53–3.98)	0.469
Current smoker	4.22 (1.91–9.39)	<0.001	4.10 (1.37–12.3)	0.012	1.37 (0.43–4.35)	0.589
Asthma	2.89 (0.99–8.42)	0.052	5.94 (1.80–19.6)	0.003	5.70 (1.95–16.7)	0.001
Allergic rhinitis	2.51 (0.93–6.77)	0.068	5.29 (1.60–17.5)	0.006	2.71 (0.91–8.07)	0.074
HbA1C ≥ 8%	10.0 (3.68–27.2)	<0.001	11.0 (2.56–47.6)	0.001	5.10 (1.58–16.5)	0.006
Constipation	2.64 (1.33–5.23)	0.005	6.84 (2.87–16.3)	<0.001	2.74 (1.18–6.37)	0.020
Gastritis			1.69 (0.65–4.42)	0.284		

Woo-Jung Song et al. PLoS One. 2013 Oct 21;8(10):e78081.

Cough in young adults: aged 20–44 years

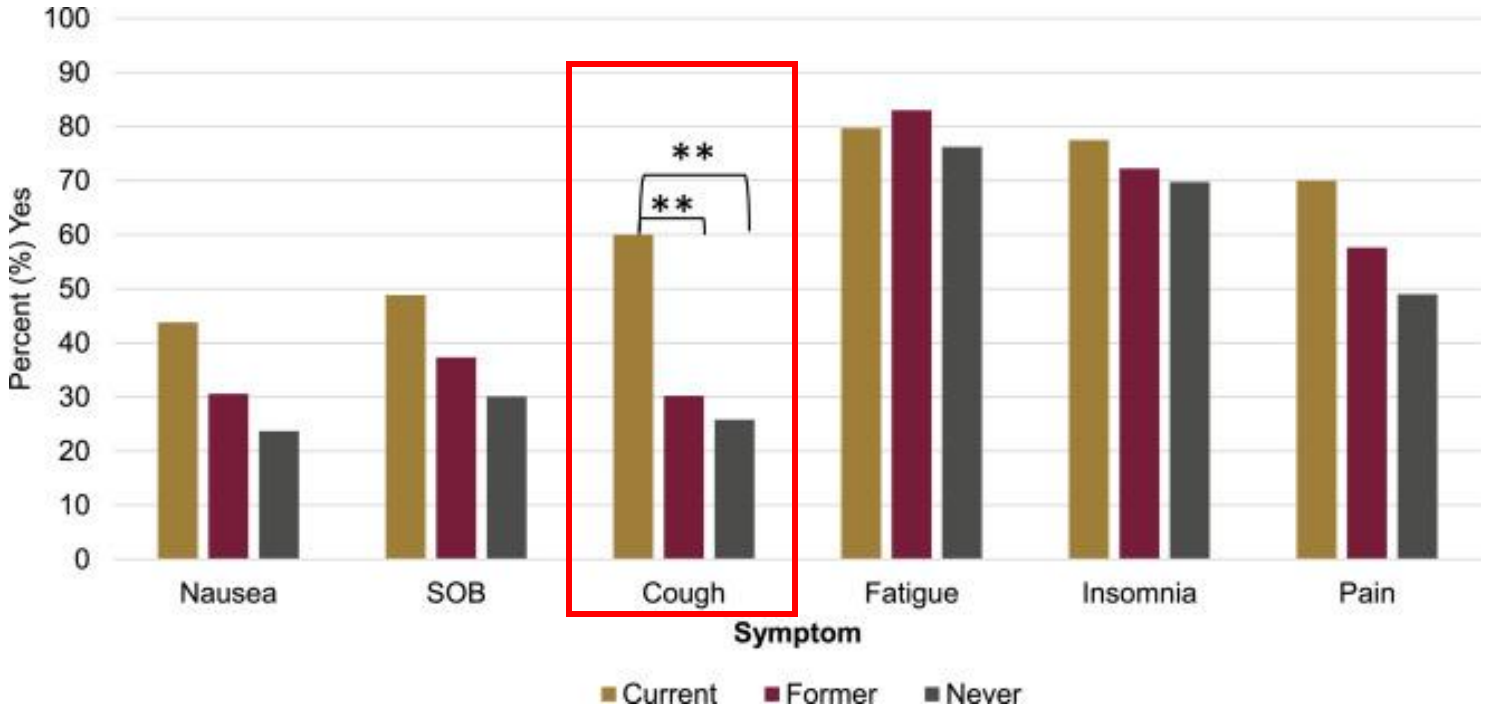
Table 4 Association (measured with odds ratio[a]) between smoking and respiratory symptoms adjusted [b] by other variables

	Asthma-related symptoms		Chronic bronchitis		Minor respiratory symptoms		Chronic cough	
Passive smoker	0.87	(056–(1.36)	0.89	(0.25–3.09)	1.54	(0.93–2.54)	1.37	(0.67–2.80)
Ex(smoker	0.96	(0.58–1.59)	1.80	(0.50–6.48)	1.89	(1.09–3.28)*	1.46	(0.65–3.26)
Smoker 1(9 cig./day	1.02	(0.60–1.73)	2.75	(0.81–9.29)	2.09	(1.19–3.65)*	2.87	(1.36–6.05)*
Smoker 10(20 cig./day	1.56	(0.99–2.45)	10.01	(3.44–29.15)*	3.71	(2.26–6.11)*	5.54	(2.83–10.86)*
Smoker > 20 cig./day	4.20	(2.21–7.98)*	47.20	(14.64–152.20)*	9.95	(5.11–19.37)*	8.37	(3.55–19.72)*

a: Odds ratios and CI of 95%, the reference group being subjects without any symptom and the reference category, those exposed to smoking habit.
b: Adjusted according to geographical area, total IgE, age, sex and FEV_1.
*$p < 0.05$. Compared again non smoker.

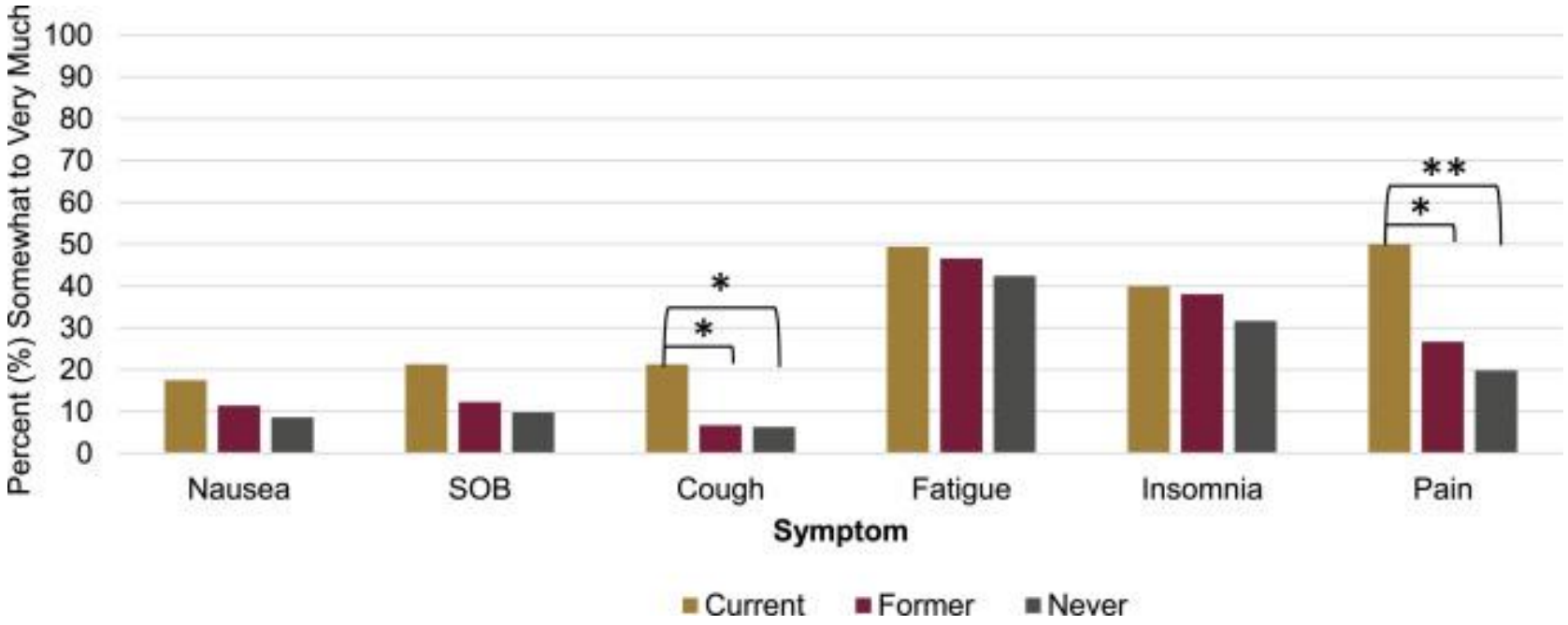
Isabel Urrutia et al. Eur J Public Health. 2005 Apr;15(2):160-5.

Symptom presence by smoking status



J Pain Symptom Manage. 2025 Apr;69(4):370-384.

Symptom severity by smoking status



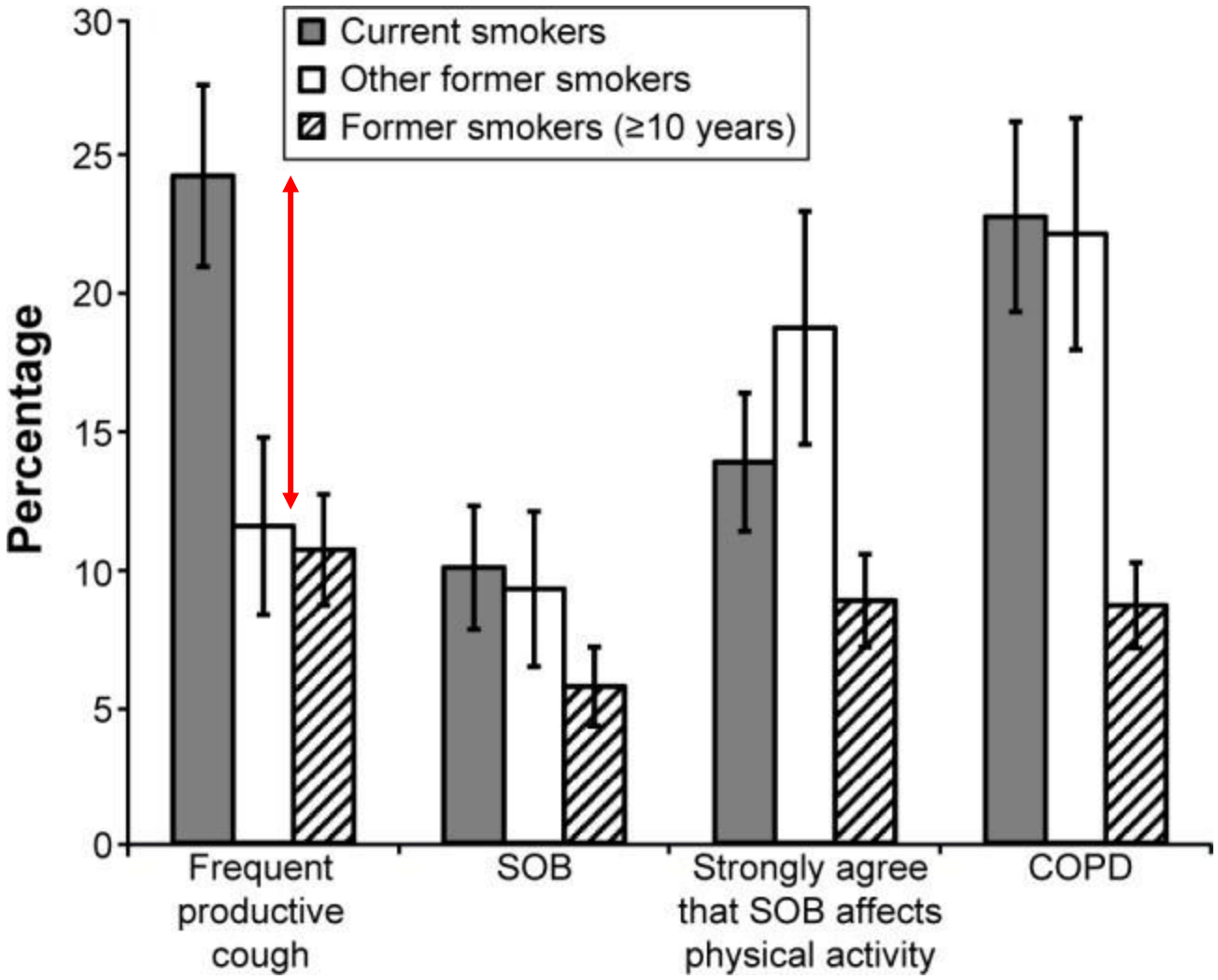
J Pain Symptom Manage. 2025 Apr;69(4):370-384.

Respiratory symptoms by smoking status

Table 4. REPORTED PREVALENCES OF RESPIRATORY SYMPTOMS* IN PERCENT (95% CONFIDENCE INTERVAL) BY SMOKING STATUS			
	Never-Smokers (*n = 4,229*)	Former Smokers (*n = 2,175*)	Current Smokers (*n = 3,232*)
Chronic cough	3.3 (2.8–3.8)	3.0 (2.3–3.7)	9.2 (8.2–10.2)
Chronic phlegm	4.9 (4.2–5.5)	5.5 (4.5–6.5)	11.2 (10.1–12.3)
Chronic cough or phlegm	7.0 (6.2–7.8)	7.5 (6.3–8.6)	16.7 (15.4–18.0)
Wheezing without colds	4.8 (4.2–5.4)	6.6 (5.5–7.6)	12.2 (11.1–13.3)
Breathlessness during the day	5.6 (4.9–6.3)	7.2 (6.1–8.3)	6.0 (5.2–6.8)
Breathlessness at night	5.2 (4.6–5.9)	5.7 (4.7–6.7)	4.3 (3.6–5.0)
Breathlessness, day or night	8.3 (7.5–9.2)	10.7 (9.4–12.0)	8.5 (7.6–9.5)
Current asthma	3.2 (2.7–3.7)	3.7 (2.9–4.5)	1.9 (1.4–2.4)
Dyspnea on exertion	23.5 (22.2–24.8)	23.5 (21.7–25.3)	31.5 (29.9–33.1)
Chest tightness	13.4 (12.4–14.5)	16.1 (14.5–17.6)	14.4 (13.2–15.6)

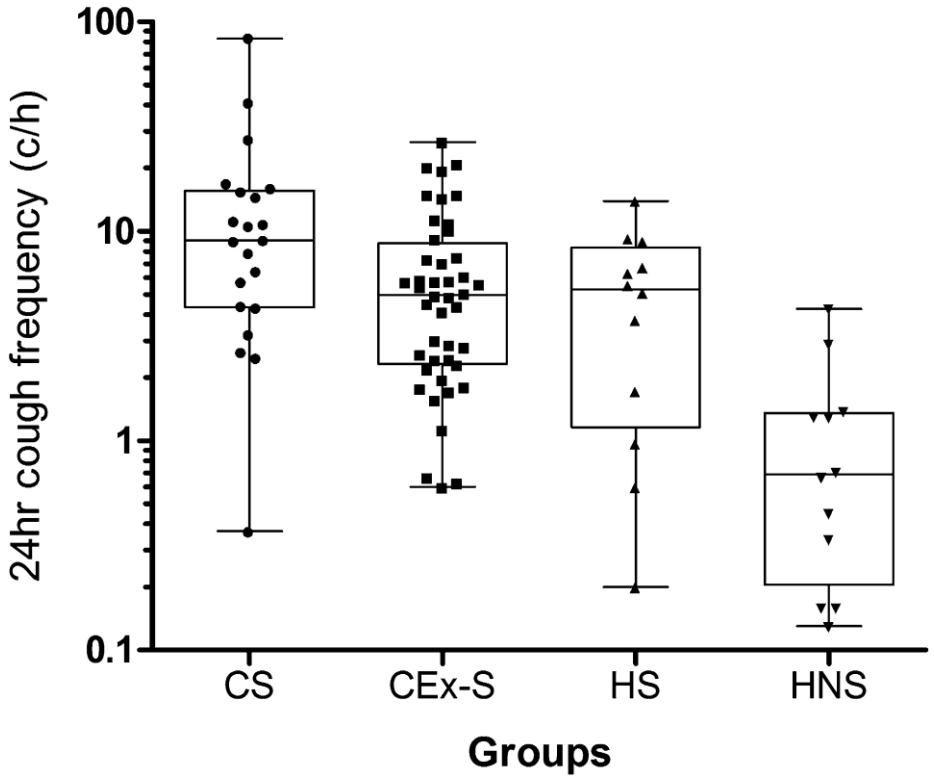
E Zemp et al. Am J Respir Crit Care Med. 1999 Apr;159(4 Pt 1):1257-66.

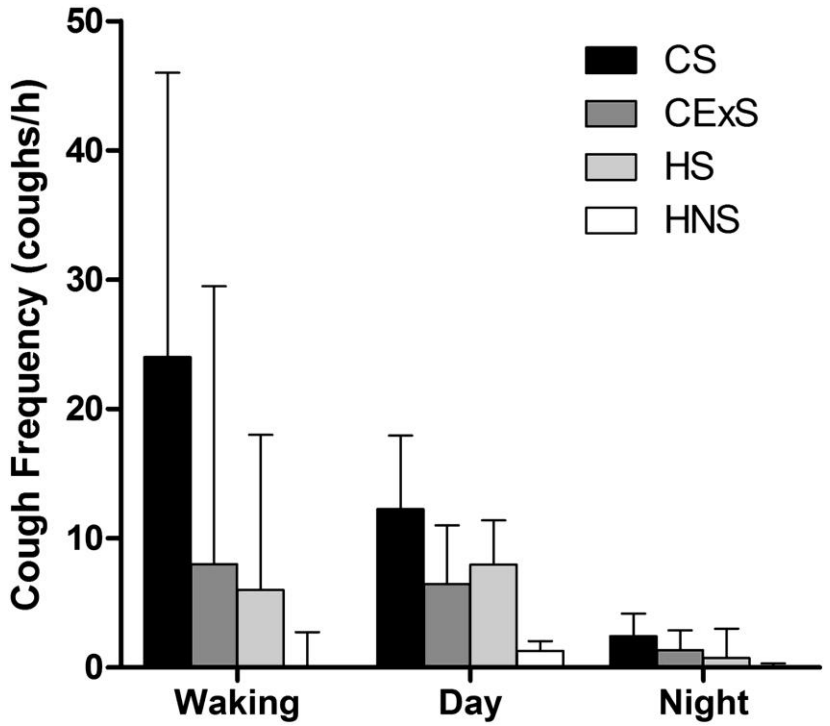
Respiratory symptoms by smoking status



Yong Liu et allnt J Chron Obstruct Pulmon Dis. 2015 Jul 21:10:1409-16.

COPD & smoking → Cough





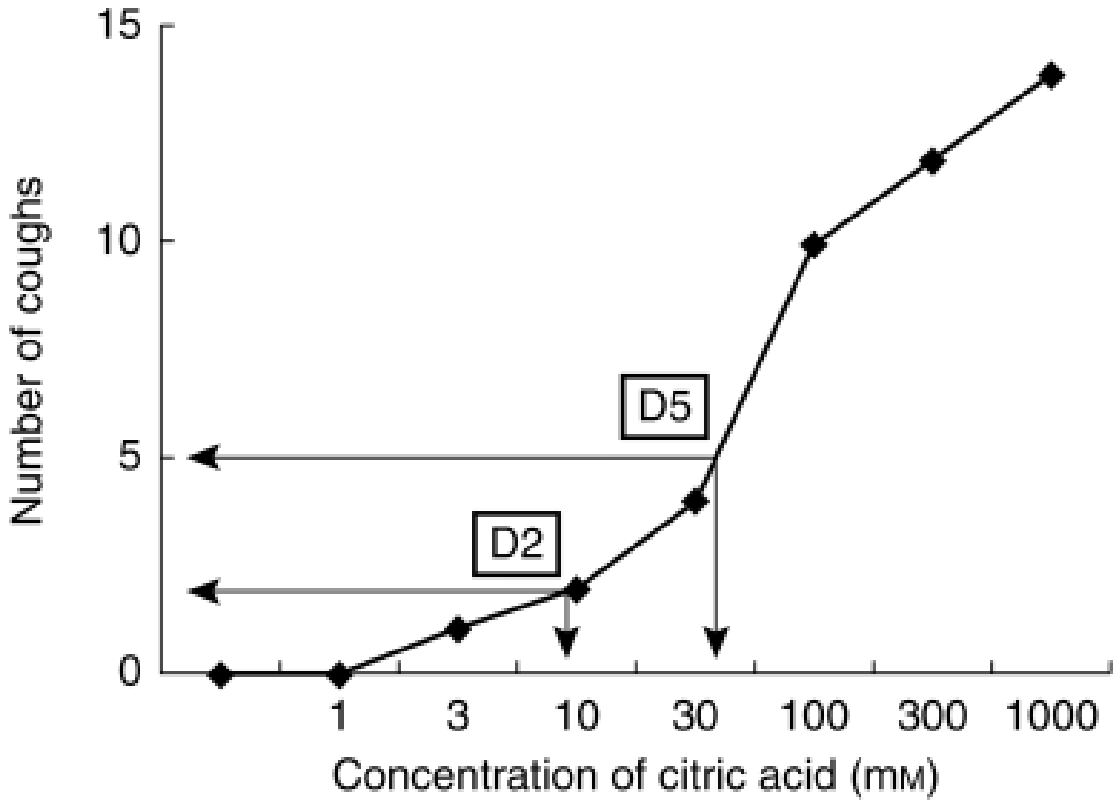
K M Freund et al. Ann Epidemiol. 1993 Jul;3(4):417-24.

1. Smoking and chronic cough

2. Smoking and cough sensitivity

3. Electronic cigarette and cough

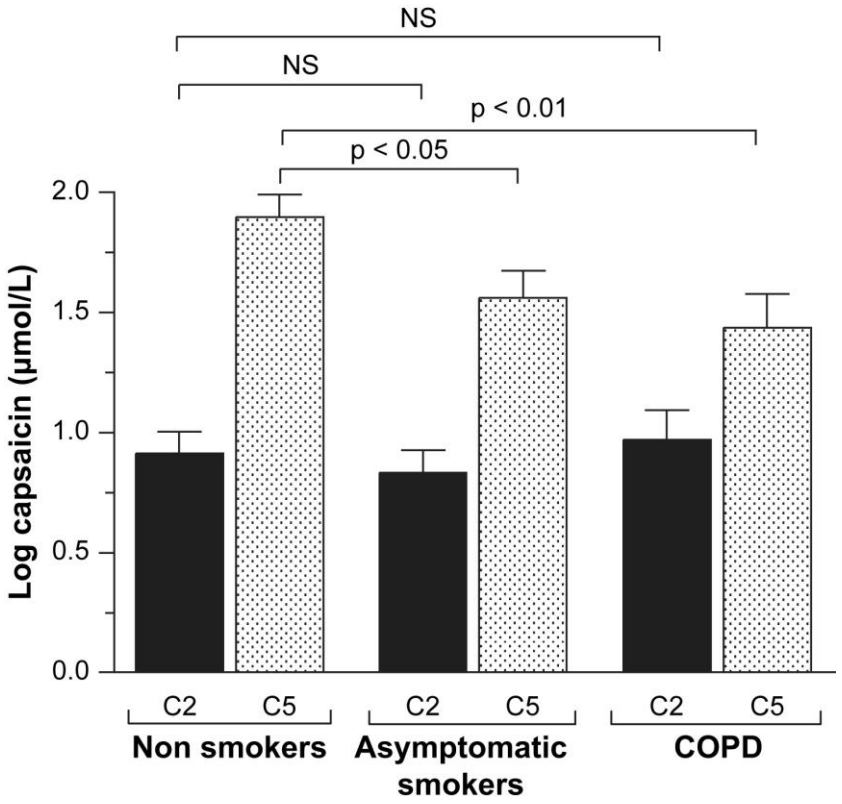
Cough challenge in the assessment of cough reflex

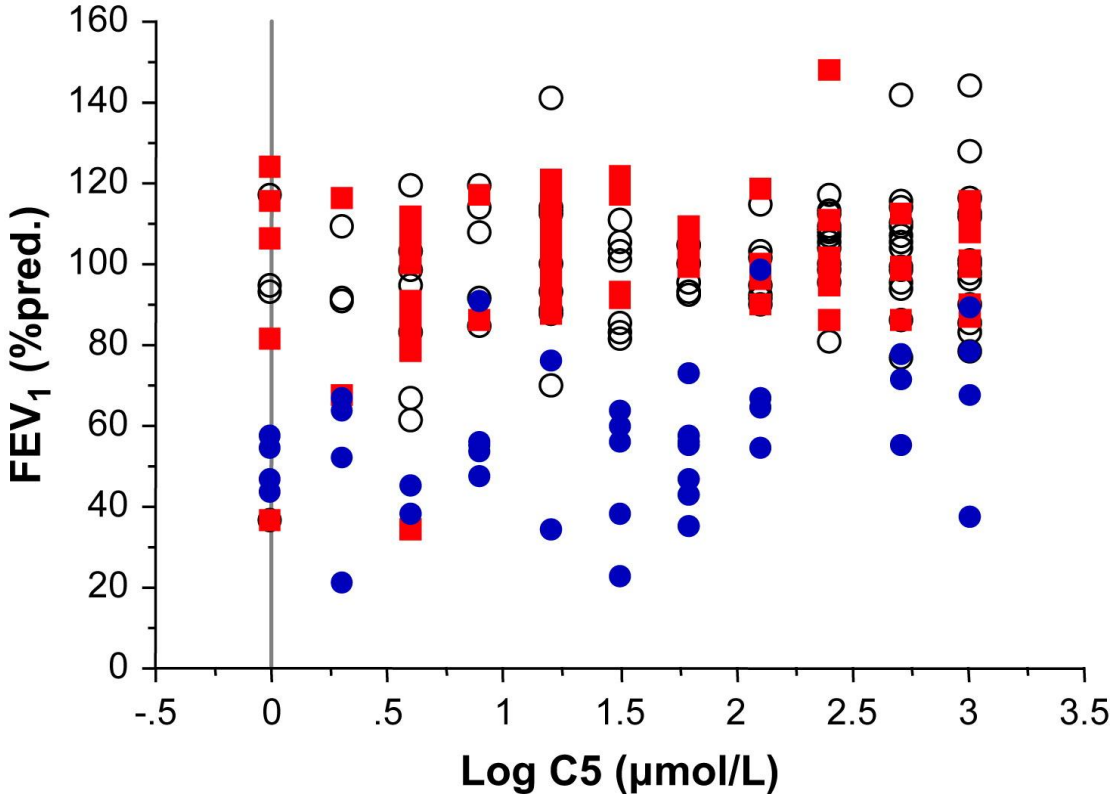


Citric acid or Capsaicin

A H Morice et al. Br J Clin Pharmacol. 2001 Oct;52(4):365-75

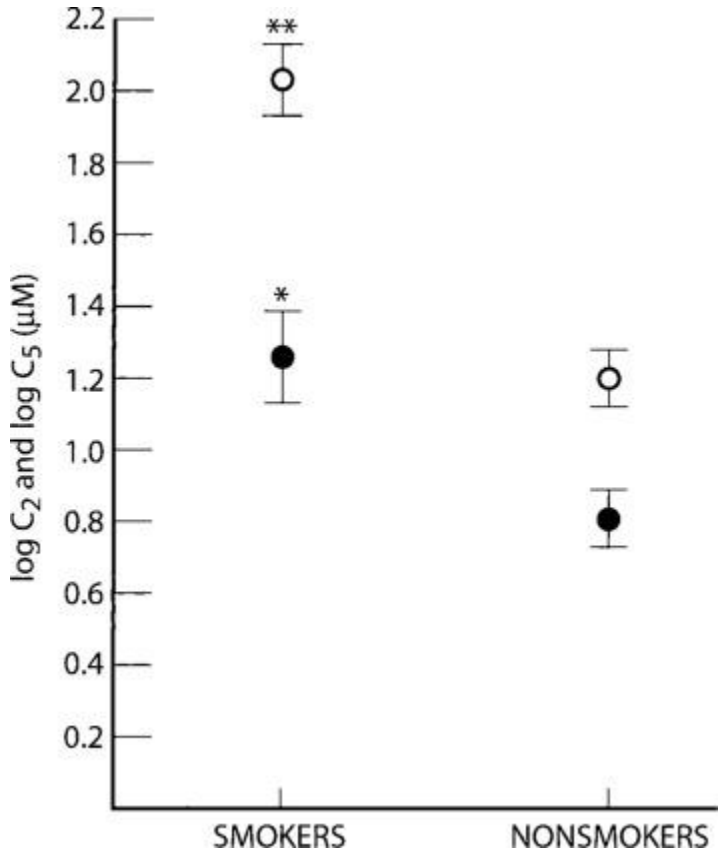
Capsaicin cough sensitivity in smokers with and without airflow obstruction





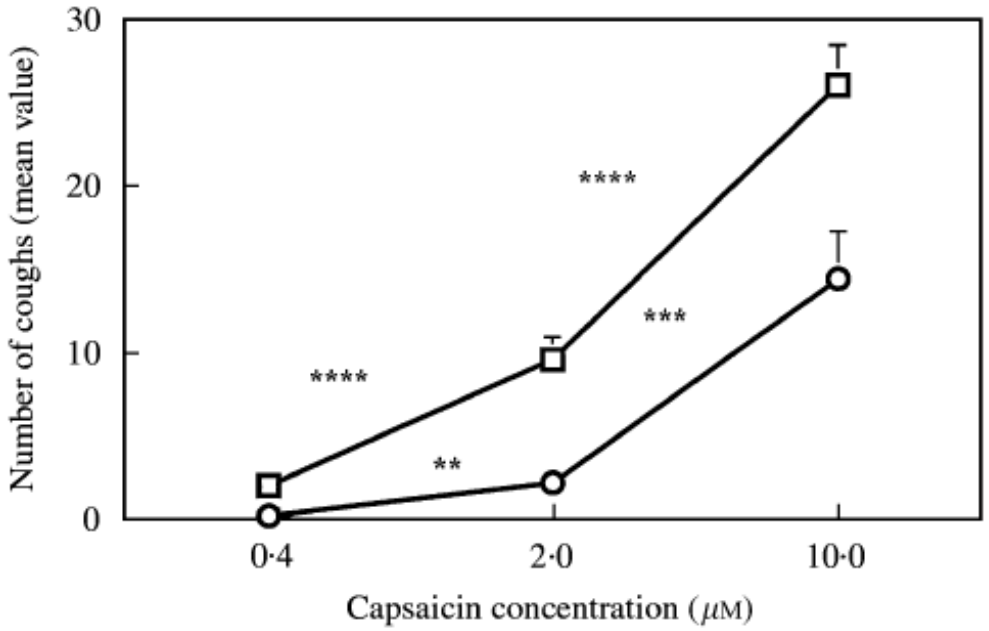
François-Xavier Blanc et al. Respir Med. 2009 May;103(5):786-90.

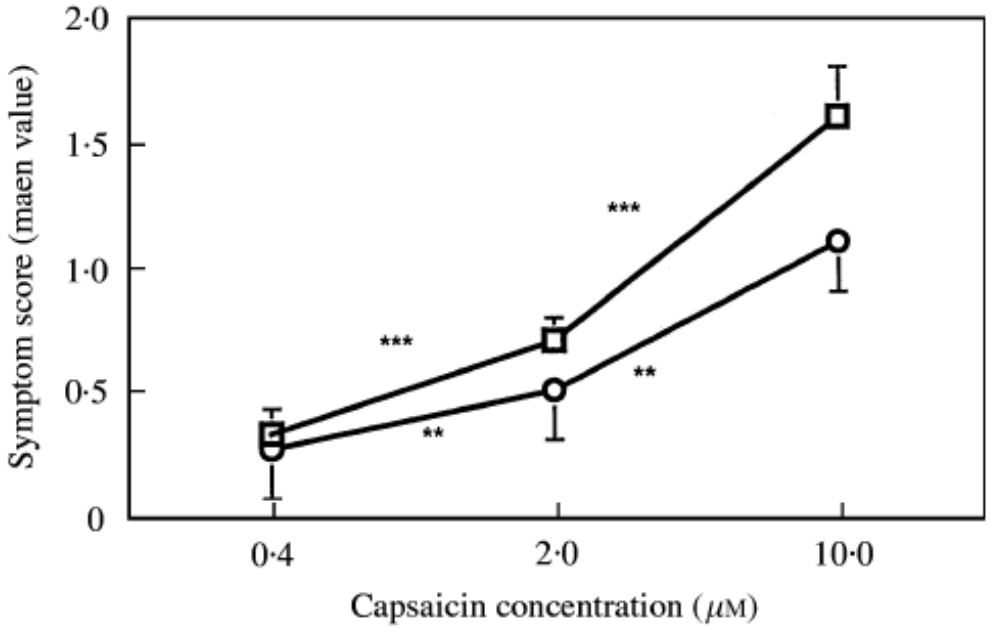
Cigarette smoking and cough reflex sensitivity (Capsaisin)



Chest. 2003 Mar;123(3):685-8.

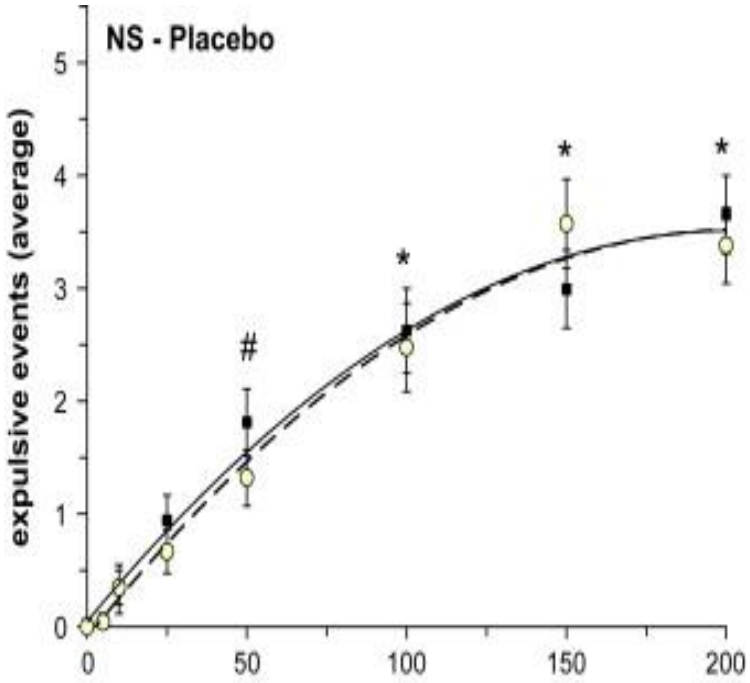
Capsaicin cough sensitivity is decreased in smokers

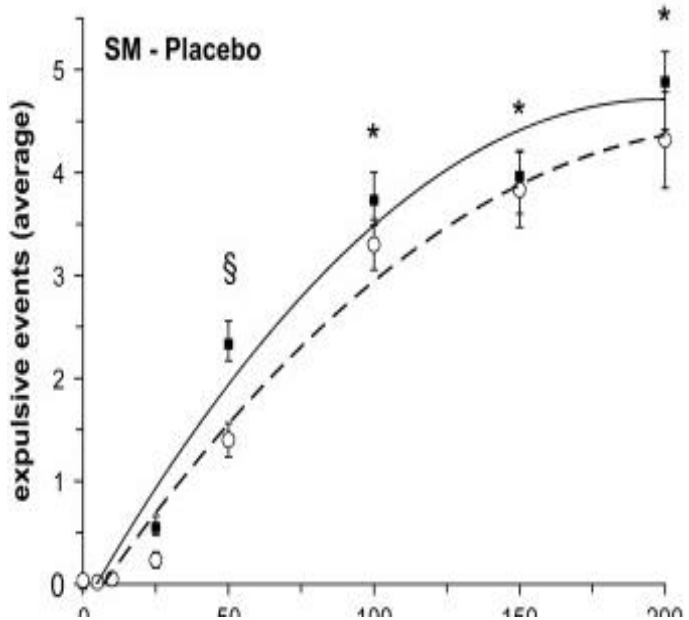


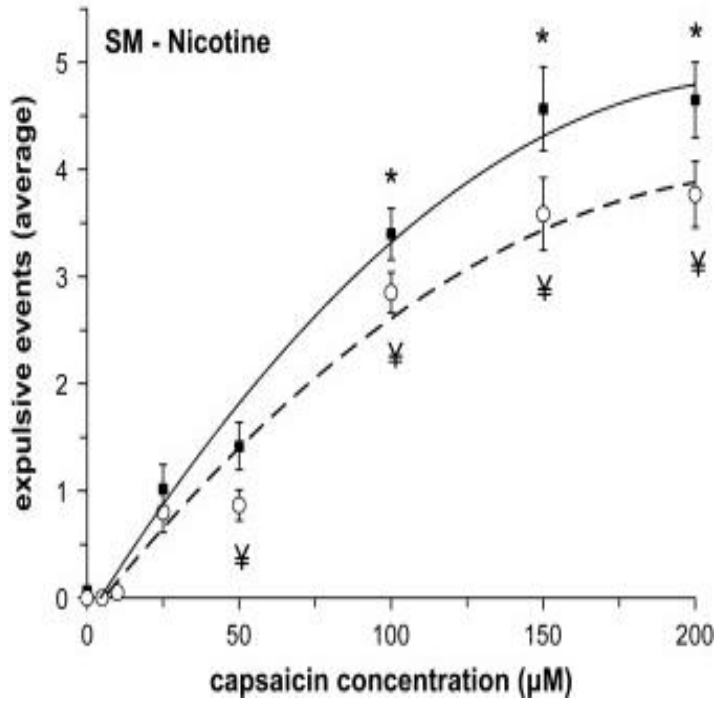


E Millqvist et al. Respir Med. 2001 Jan;95(1):19-21.

Cough response after nicotine administration

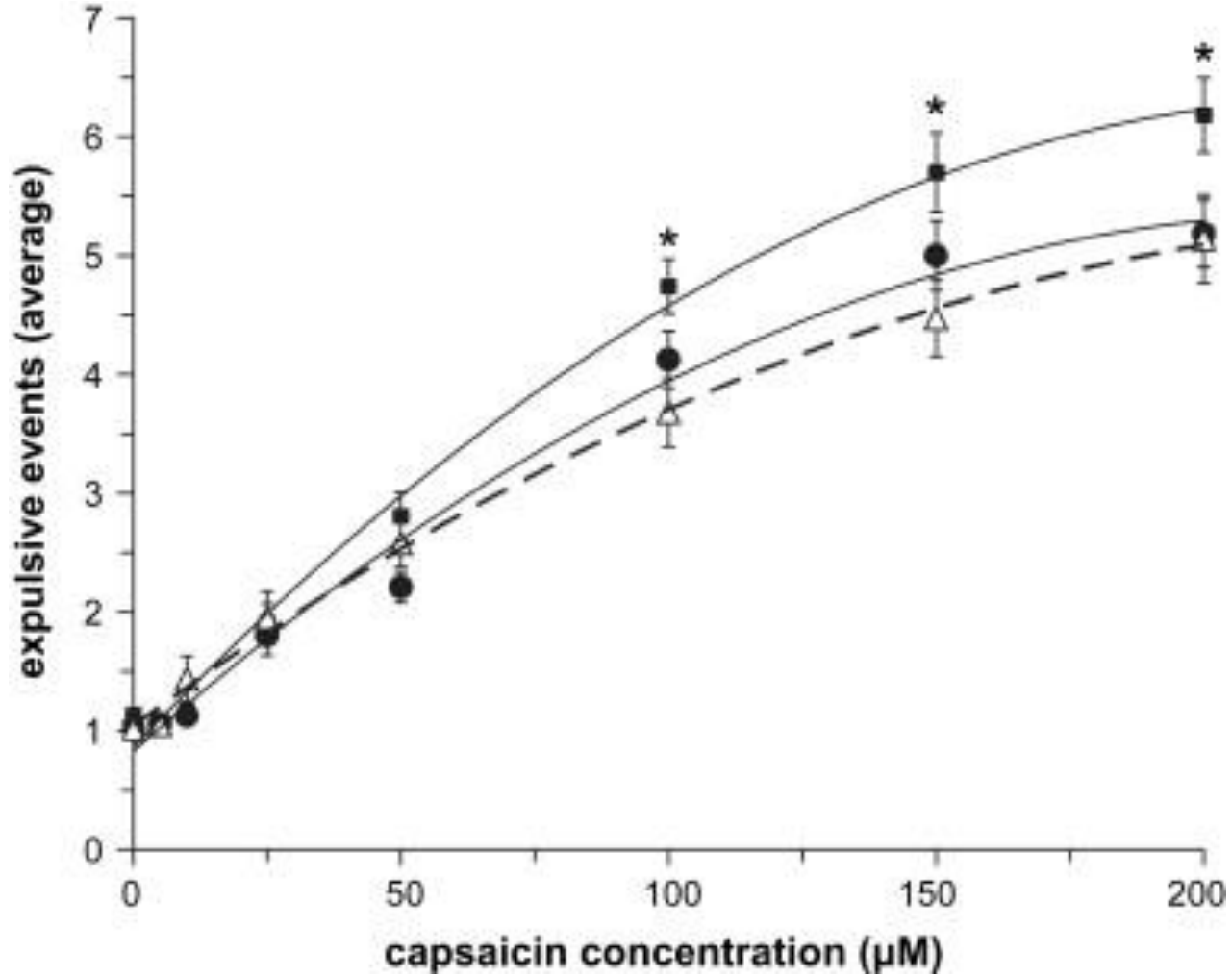






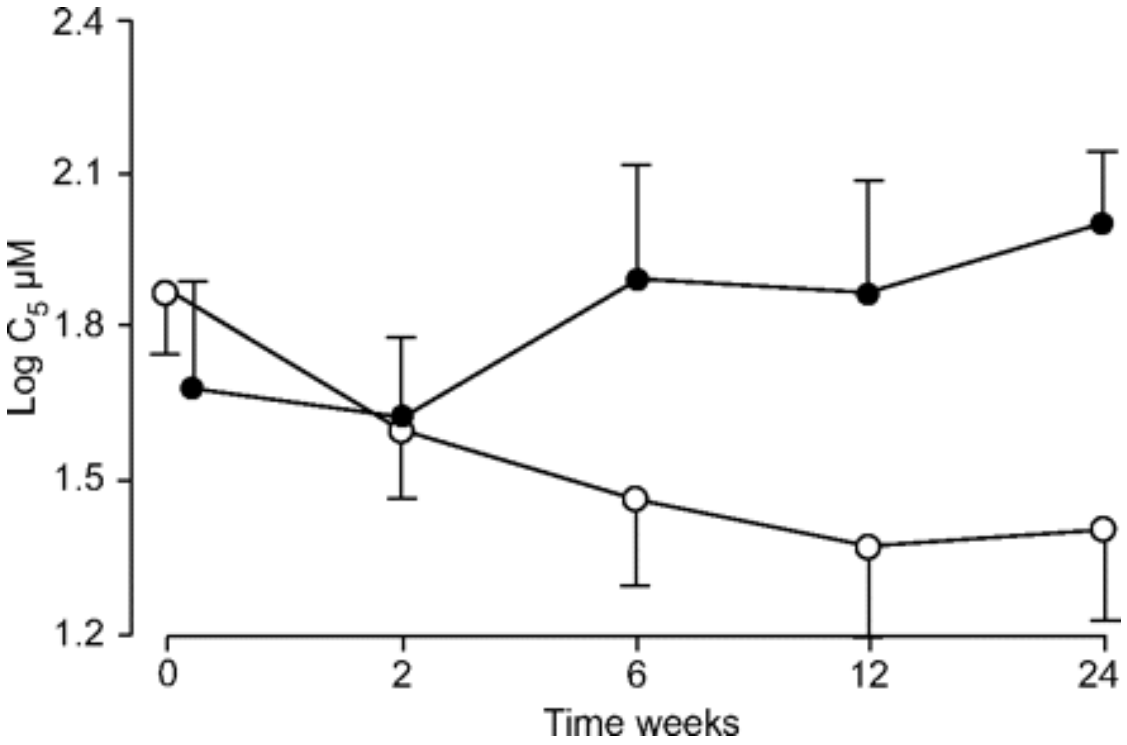
Paul W Davenport et al. Pulm Pharmacol Ther. 2009 Apr;22(2):82-9.

Cough response after withdrew from cigarette smoking for 12 h



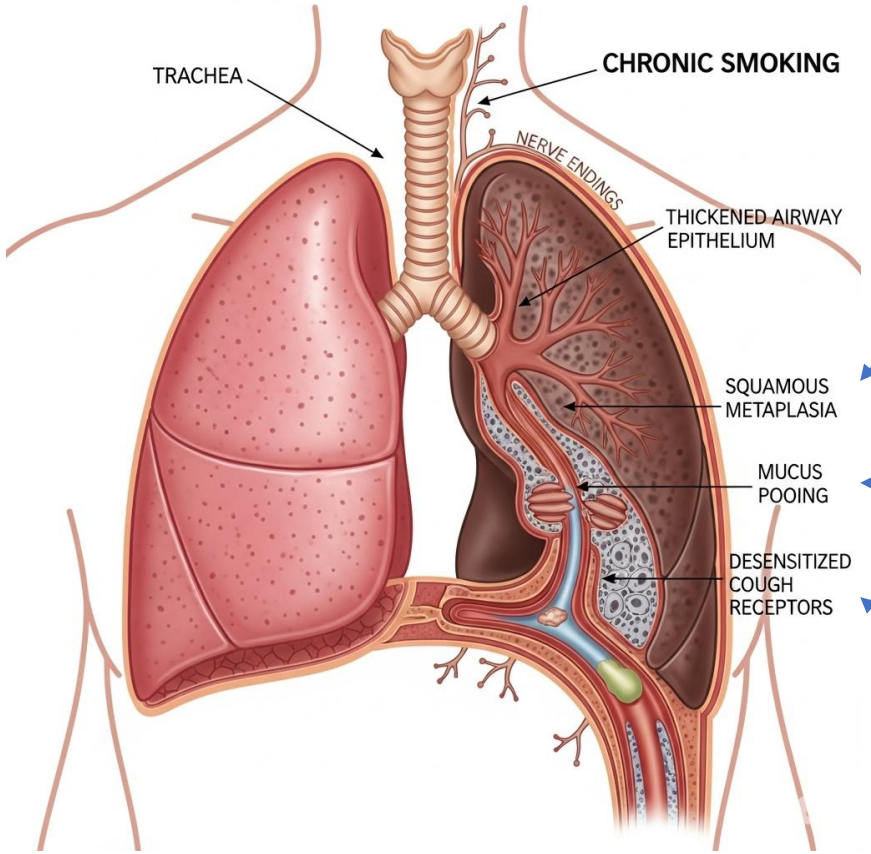
Paul W Davenport et al. Pulm Pharmacol Ther. 2009 Apr;22(2):82-9.

Enhancement of cough reflex sensitivity after cessation of cigarette smoking



P V Dicpinigaitis et al. Eur Respir J. 2006 Oct;28(4):786-90.

Smoking and decreased cough reflex sensitivity



Increased the thickness of airway epithelium and alveolar septa and caused squamous metaplasia in the tracheobronchial tree

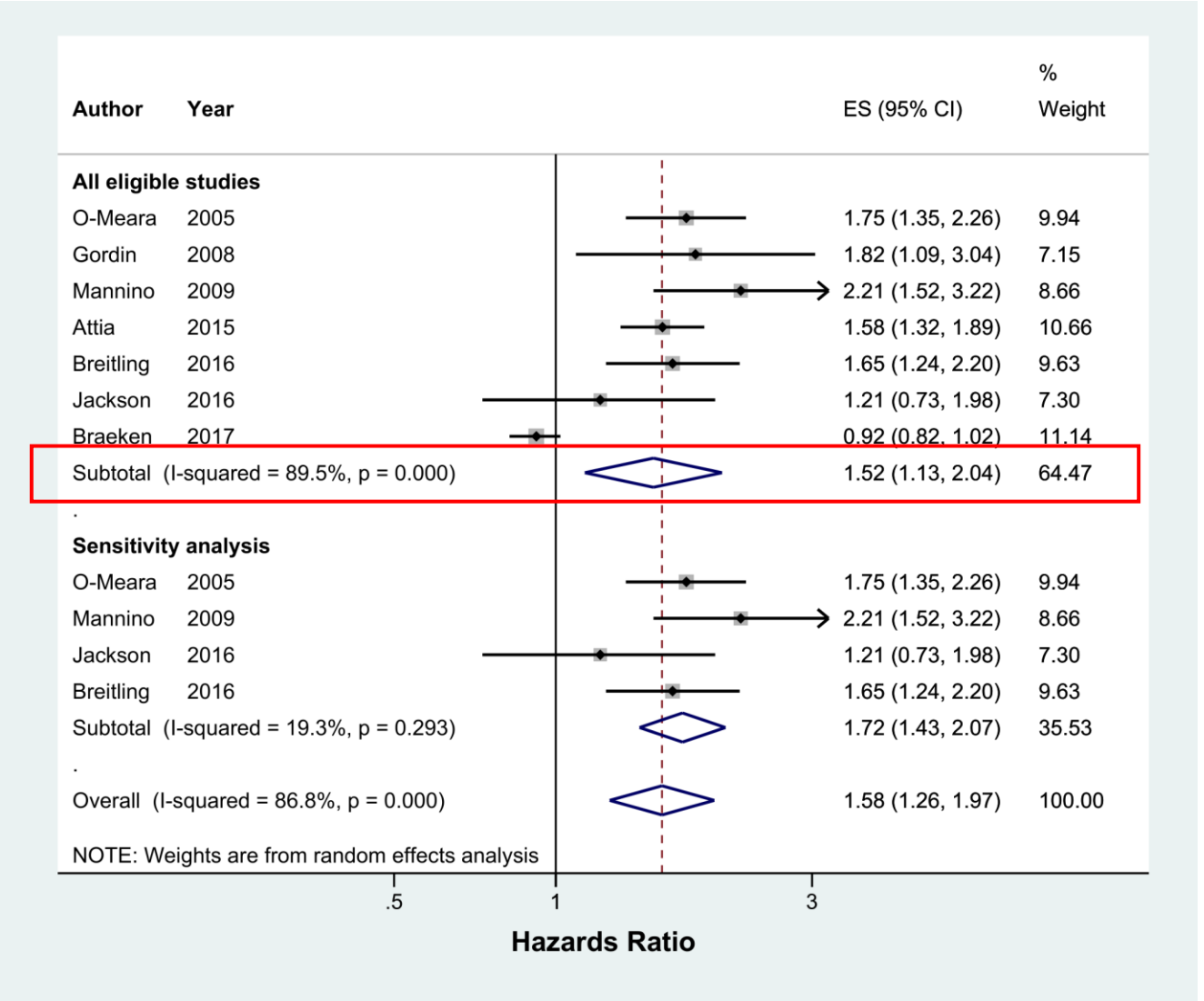
Mucus secretion decreased after smoking cessation

Desensitization afferent cough receptors within the airway epithelium

Smokers may have been selected out by virtue of their constitutively diminished cough reflex sensitivity

Peter V Dicpinigaitis. Chest. 2003 Mar;123(3):685-8
Lu-Yuan Lee Lung. 2010 Jan:188 Suppl 1:S23-7
P V Dicpinigaitis et al. Eur Respir J. 2006 Oct;28(4):786-90.

Smoking and pneumonia



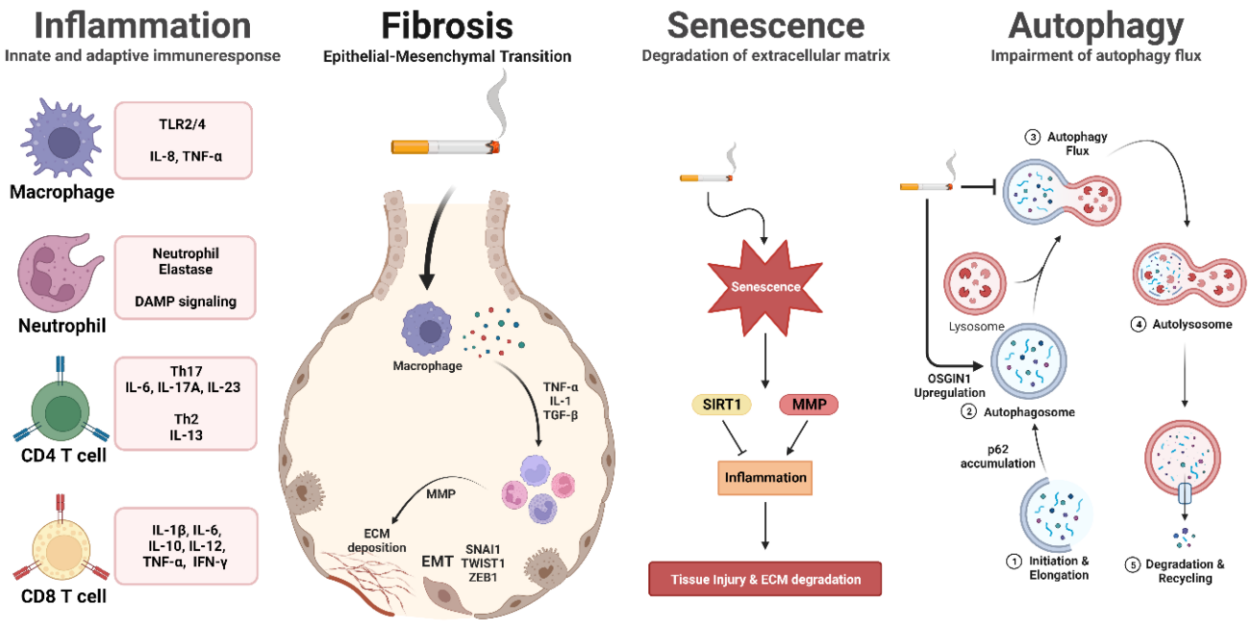
PLoS One. 2019 Jul 18;14(7):e0220204.

Smoking and pneumonia

- Structural causes
  - Impairs mucociliary clearance
  - Increased pneumococcal adherence
  - Impaired cough reflex

  → increased risk of aspiration in elderly patients

- Altered cellular and humoral immune system



Am J Respir Crit Care Med. 1995;151(3 I):630–4.
Pharmacol Res. 1997;36(6):481–4.
Thorax. 2003 Feb;58(2):152-3.
Sang-Ryul Cha et al. Antioxidants (Basel). 2023 Jun 3;12(6):1210.

Transient increase vs steady decline in cough after smoking cessation

- Cough may transiently increase within the first month after smoking cessation
- Cough actually steadily declined in people who abstained from smoking
- Changes in cough are not a major barrier to quitting

K M Cummings et al. Addict Behav. 1985;10(4):373-81.
David O Warner et al. Nicotine Tob Res. 2007 Nov;9(11):1207-12.
Charlotta Pisinger et al. Clin Respir J. 2008 Jan;2(1):41-6.

1. Smoking and chronic cough

2. Smoking and cough sensitivity

3. Electronic cigarette and cough

E-Cigarettes

- ECs entered the market in 2003 in China.

- E-cigarette: 액상형 (국내 2008년~)
  - ✓니코틴
  - ✓프로필렌글리콜/글리세롤
  - ✓향료

- Heated tobacco: 궐련형 (국내 2017년~)

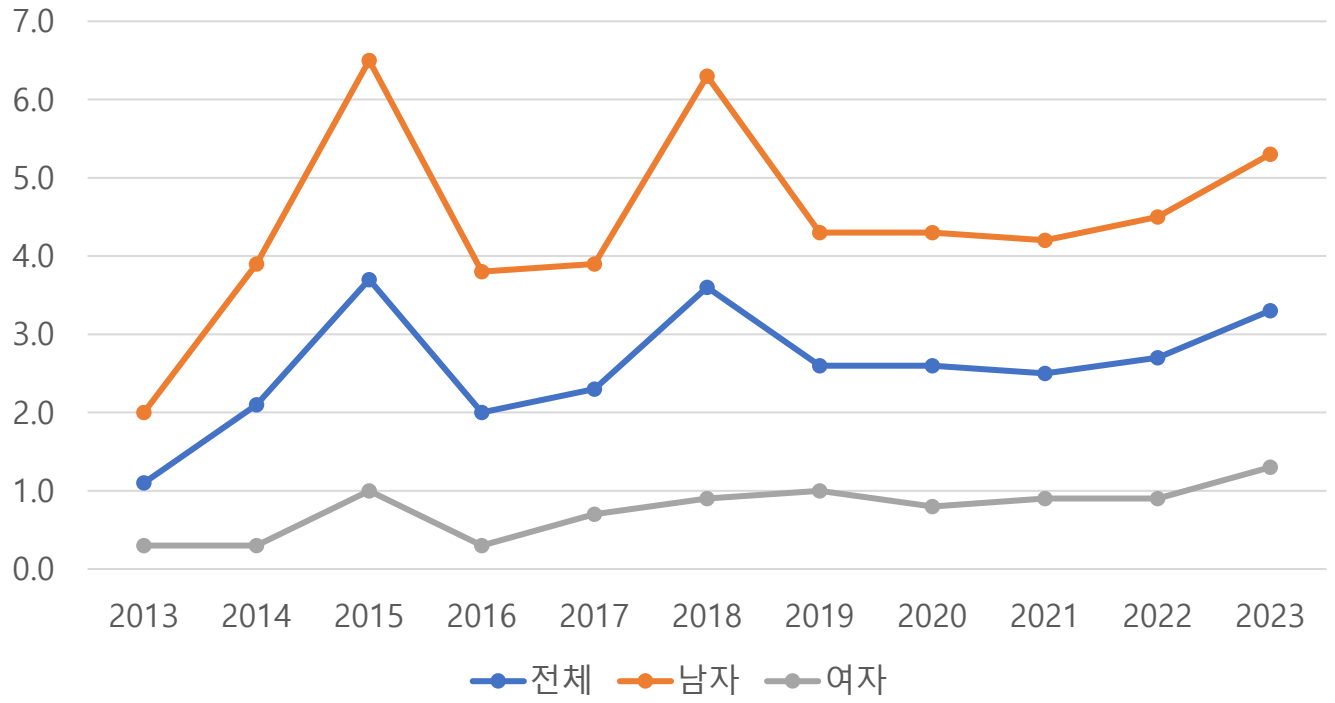
〈그림 전자담배의 종류〉

전자담배(궐련형 3종) 비교

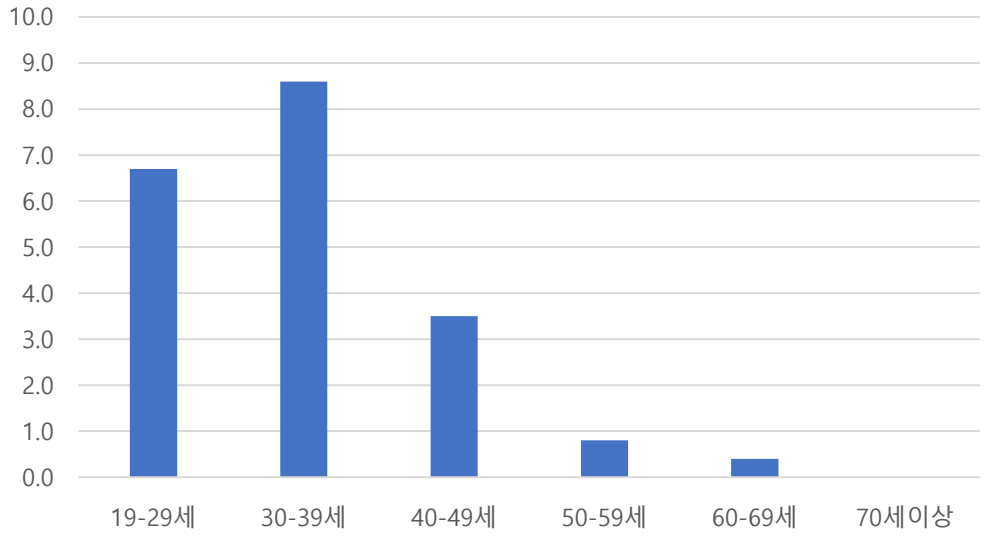
구분			
	한국필립모리스 아이코스	BAT 글로	KT&G 릴
판매가 (할인가)	12만원 (9만7000원)	9만원 (7만원)	9만5천원 (6만8000원)
형태	분리형	일체형	일체형
사용시간	회당 6분 (14모금)	회당3분30초	회당 4분20초
연속사용	불가 (1개비당 4분 충전)	가능 (1회 충전 20개비)	가능 (1회 충전 20개비)
판매처	CU·세븐일레븐 미니스톱·이마트24	CU·세븐일레븐 GS25	GS25

질병관리청. 국가건강정보포털.
https://www.fntimes.com/html/view.php?ud=2017111222082178252123 2f297a_18

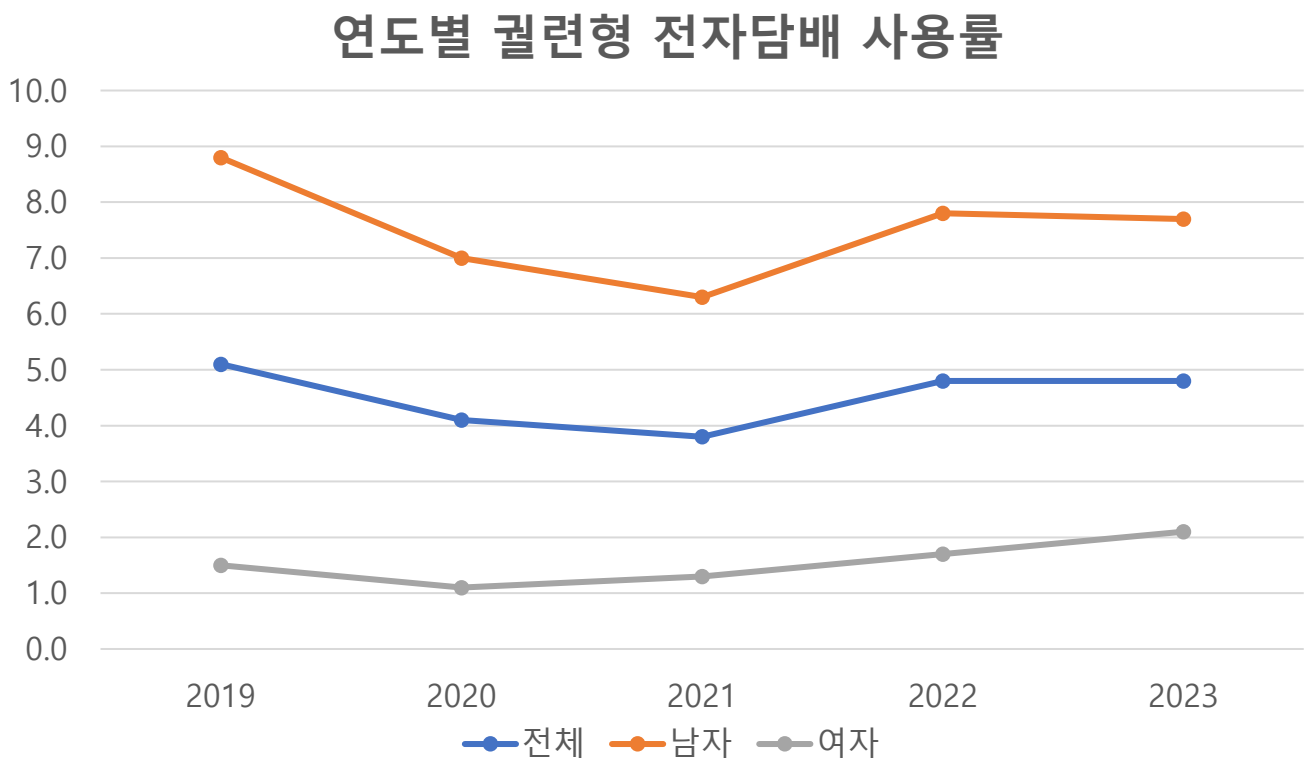
연도별 액상형 전자담배 사용률

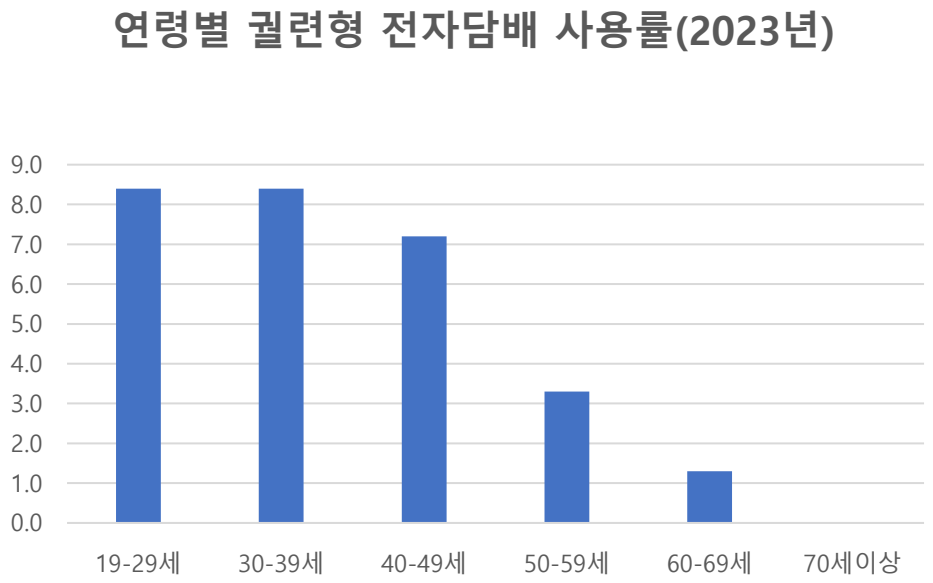


연령별 액상형 전자담배 사용률(2023년)



국가통계포털(https://kosis.kr/index/index.do). 국민건강영양조사.





국가통계포털(https://kosis.kr/index/index.do). 국민건강영양조사.

Electronic Cigarette Use and Chronic Respiratory Symptoms among U.S. Adults

Table 2. Adjusted Prevalence and Prevalence Ratios for Any Respiratory Symptoms with E-Cigarette Use, Stratified by Age Group and Smoking Status

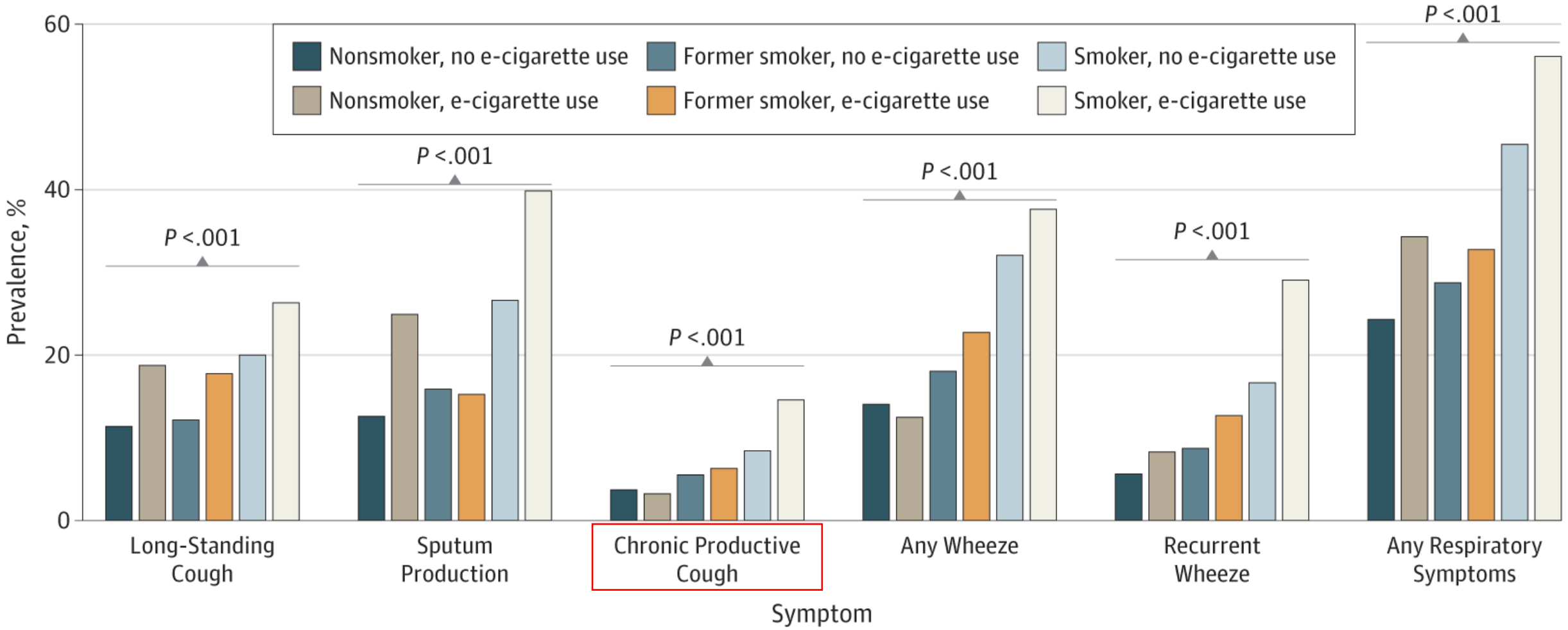
Subgroup	Respondents (*n*)	Adjusted Prevalence of Symptoms* (%)		Adjusted Prevalence Ratio* (95% Confidence Interval)
		E-Cigarette Never-Users	E-Cigarette Users	
Never-smokers				
18–35 yr	16,656	22.1	30.0	1.36 (1.08–1.70)
36–54 yr	16,673	22.6	26.3	1.16 (0.67–2.01)
⩾55 yr	17,570	35.8	35.8	1.00 (0.69–1.46)
Remote-former smokers†				
18–35 yr	1,706	24.5	31.0	1.27 (0.72–2.22)
36–54 yr	4,850	26.5	36.2	1.37 (1.18–1.59)
⩾55 yr	12,033	47.0	51.7	1.10 (0.97–1.25)
Recent-former smokers‡				
18–35 yr	1,053	30.0	26.7	0.89 (0.57–1.40)
36–54 yr	932	33.2	33.3	1.00 (0.70–1.44)
⩾55 yr	775	54.6	50.1	0.92 (0.78–1.08)
Current smokers				
18–35 yr	4,257	45.3	52.5	1.16 (0.99–1.36)
36–54 yr	5,591	52.7	54.4	1.03 (0.91–1.17)
⩾55 yr	4,971	61.0	60.0	0.98 (0.89–1.09)

*Adjusted for sex, obesity, and any diagnosis of coronary heart disease, chronic obstructive pulmonary disease, or asthma. Estimates also apply standard Behavioral Risk Factor Surveillance System weights.
†Quit > 1 year.
‡Quit ⩽ 1 year.

95% CI, 0.26–0.67). Conversely, among young never-smokers, the association of e-cigarette use with chronic respiratory symptoms was primarily driven by a higher prevalence of cough (age 18–34 yr [PR, 1.60; 95% CI, 1.11–2.31]).

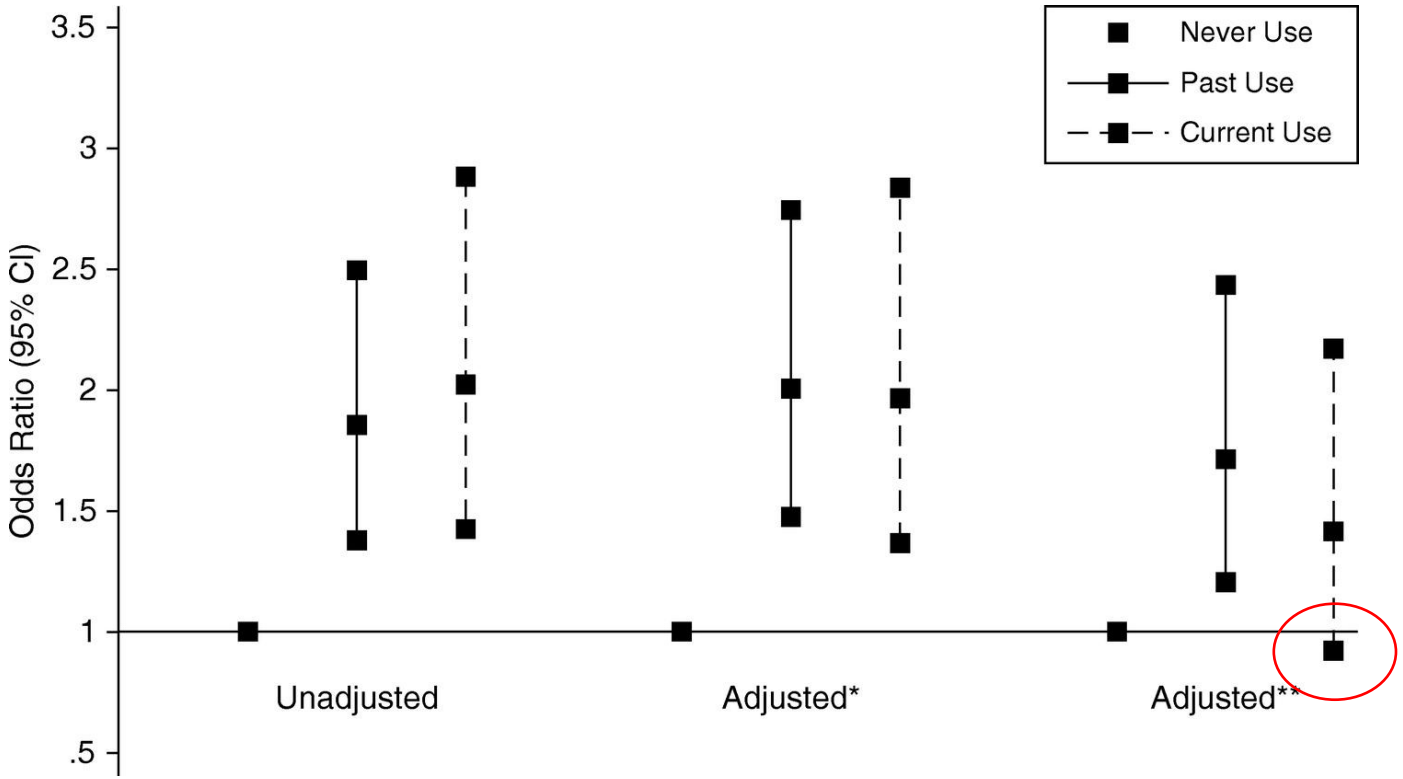
Am J Respir Crit Care Med. 2020 May 1;201(9):1157-1160

Respiratory Symptoms by Smoking Habits and Electronic Cigarette (E-cigarette) Use



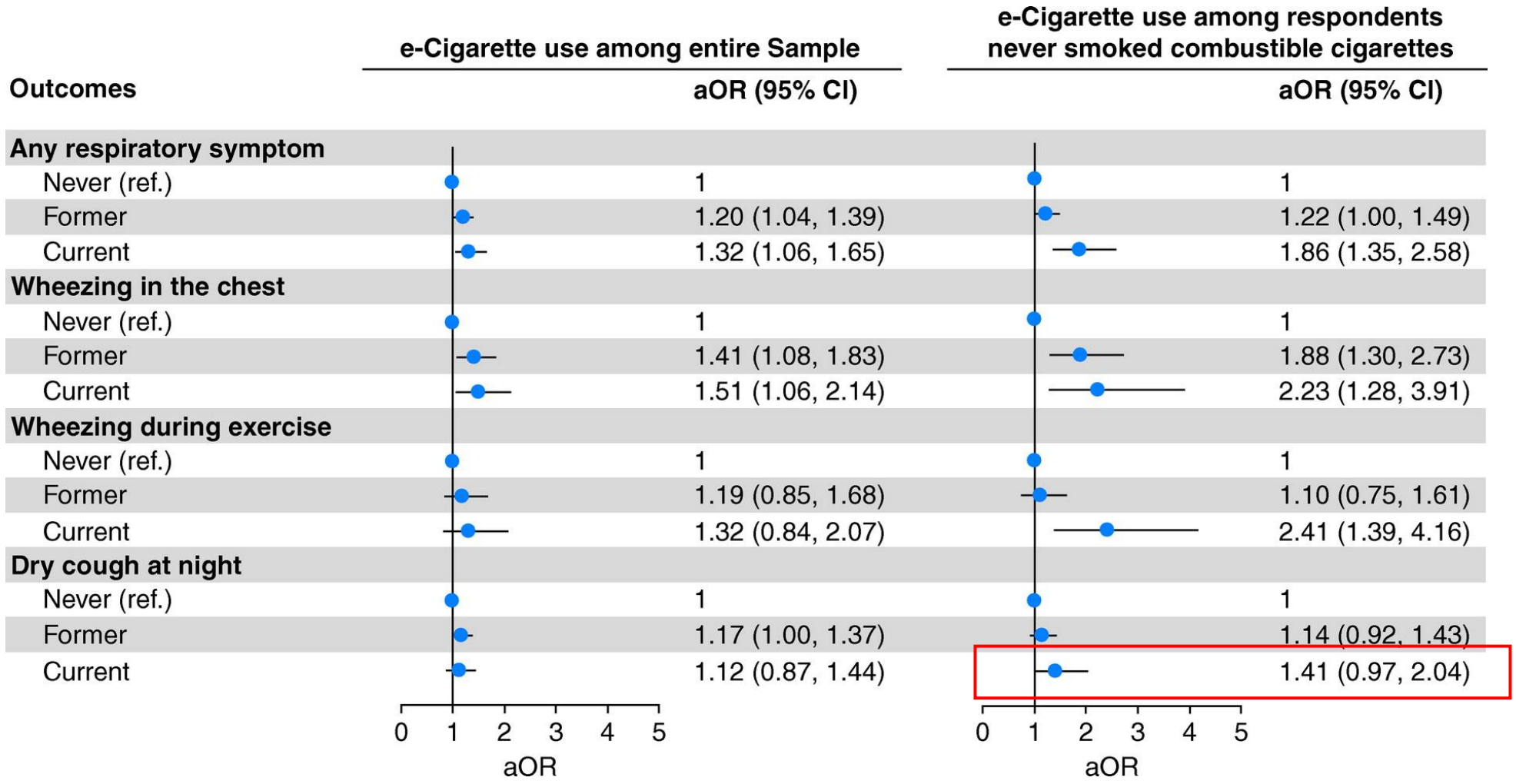
JAMA Netw Open. 2018 Jul 6;1(3):e180789.

Electronic Cigarette Use and Bronchitic Symptoms (cough, congestion, or phlegm)



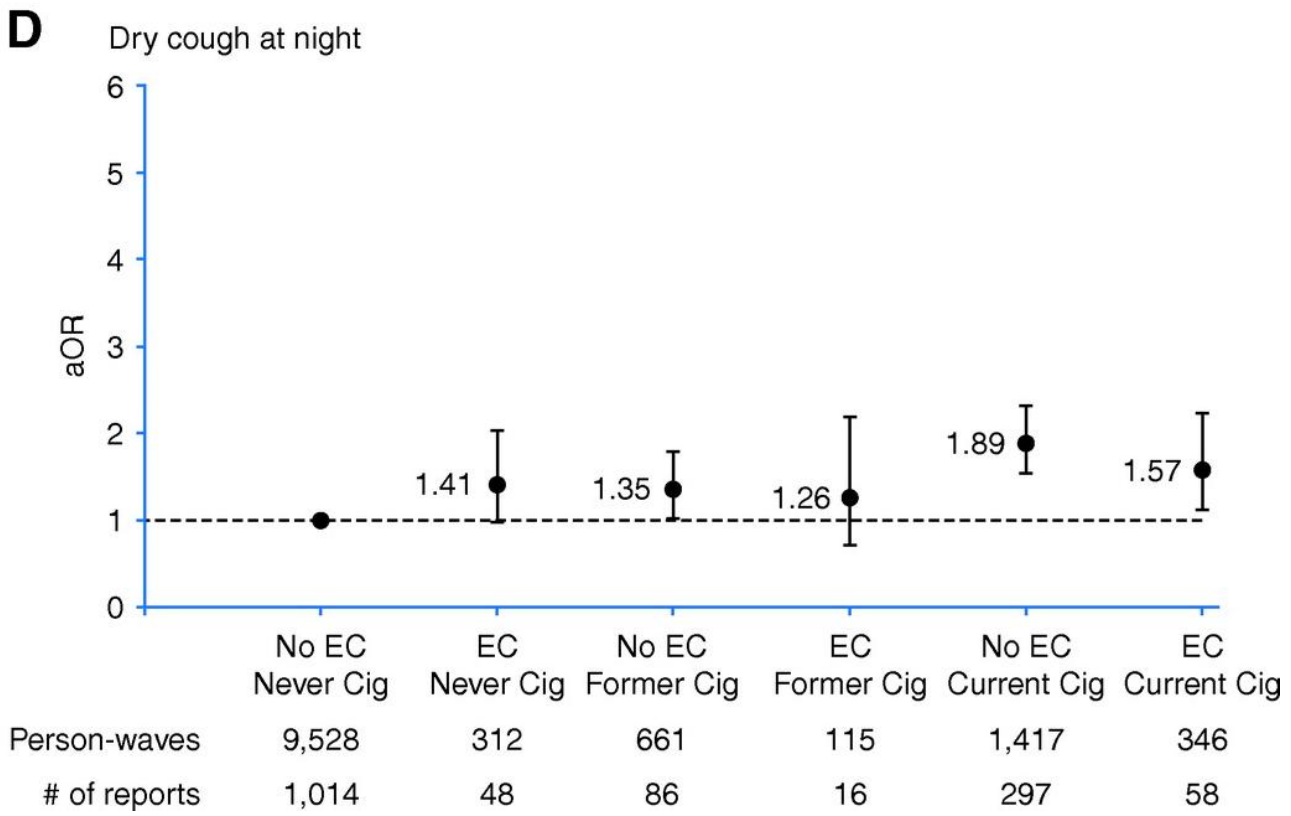
Rob McConnell et al. Am J Respir Crit Care Med. 2017 Apr 15;195(8):1043-1049.

Electronic Cigarette Use with Respiratory Symptom



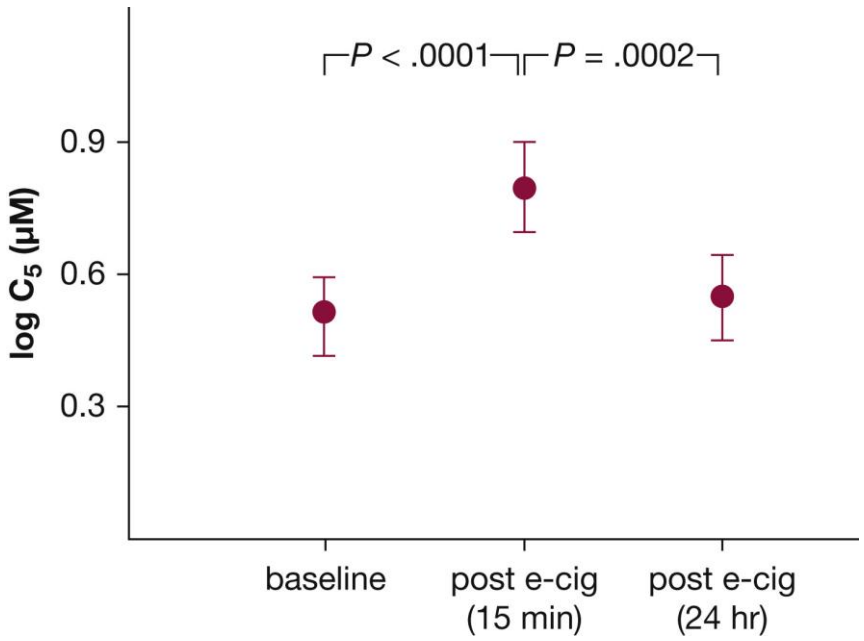
Wubin Xie et al. Am J Respir Crit Care Med. 2022 Jun 1;205(11):1320-1329.

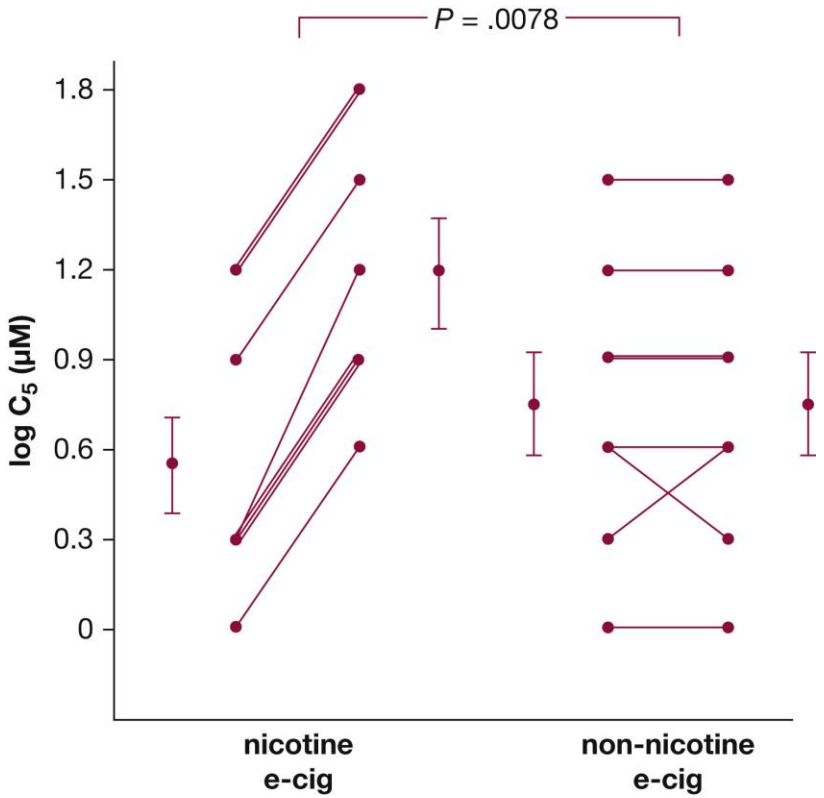
Electronic Cigarette Use and dry cough at night



Wubin Xie et al. Am J Respir Crit Care Med. 2022 Jun 1;205(11):1320-1329.

Effect of E-Cigarette Use on Cough Reflex Sensitivity





Peter V Dicpinigaitis et al. Chest. 2016 Jan;149(1):161-5

E-Cigarettes versus Nicotine-Replacement Therapy for smoking cessation

Table 2. Abstinence Rates at Different Time Points and Smoking Reduction at 52 Weeks.*

Outcome	E-Cigarettes (N=438)	Nicotine Replacement (N=446)	Primary Analysis: Relative Risk (95% CI)†	Sensitivity Analysis: Adjusted Relative Risk (95% CI)
Primary outcome: abstinence at 52 wk — no. (%)	79 (18.0)	44 (9.9)	1.83 (1.30–2.58)	1.75 (1.24–2.46)‡
Secondary outcomes				
Abstinence between wk 26 and wk 52 — no. (%)	93 (21.2)	53 (11.9)	1.79 (1.32–2.44)	1.82 (1.34–2.47)§
Abstinence at 4 wk after target quit date — no. (%)	192 (43.8)	134 (30.0)	1.45 (1.22–1.74)	1.43 (1.20–1.71)¶
Abstinence at 26 wk after target quit date — no. (%)	155 (35.4)	112 (25.1)	1.40 (1.14–1.72)	1.36 (1.15–1.67)‡
Carbon monoxide–validated reduction in smoking of ≥50% in participants without abstinence between wk 26 and wk 52 — no./total no. (%)	44/345 (12.8)	29/393 (7.4)	1.75 (1.12–2.72)	1.73 (1.11–2.69)‖

Peter Hajeket al. N Engl J Med. 2019 Feb 14;380(7):629-637

Cough at 52 weeks after e-cigarettes or nicotine replacement

Table 5. Respiratory Symptoms at Baseline and at 52 Weeks.*

Symptom	E-Cigarettes (N=315)		Nicotine Replacement (N=279)		Relative Risk (95% CI)†
	Baseline	52 Weeks	Baseline	52 Weeks	
	number (percent)				
Shortness of breath	120 (38.1)	66 (21.0)	92 (33.0)	64 (22.9)	0.9 (0.7–1.1)
Wheezing	102 (32.4)	74 (23.5)	86 (30.8)	59 (21.1)	1.1 (0.8–1.4)
Cough	173 (54.9)	97 (30.8)	144 (51.6)	111 (39.8)	0.8 (0.6–0.9)
Phlegm	137 (43.5)	79 (25.1)	121 (43.4)	103 (36.9)	0.7 (0.6–0.9)

* Symptoms were assessed by asking whether participants had the symptom (yes or no).
† Relative risk was calculated by means of logistic regression. Symptoms at 52 weeks were regressed onto trial group, with adjustment for baseline symptoms and trial center.

Peter Hajeket al. N Engl J Med. 2019 Feb 14;380(7):629-637

Summary

- Smoking is a major cause of chronic cough, and coughing is a major symptom caused by smoking. Coughing increases with the amount of smoking, and it improves when quitting smoking.

- Smoking can reduce the cough reflex, and coughing may temporarily increase after quitting smoking, but it will improve over time.

- Electronic cigarette may increase coughing, but it is not yet clear.