2026 California Thoracic Society Annual Educational Conference

& Chronic Obstructive Pulmonary Disease Symposium

Thursday March 12, 2026-Sunday March 15, 2026

Earn up to 19 CME/CEU/MOC Credits

Jointly Provided by AKH Inc., Advancing Knowledge in Healthcare and the California Thoracic Society

PORTOLA HOTEL & SPA
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Thursday March 12, 2026 (6 CME/CEU/MOC Credits)
COPD Symposium
Friday March 13, 2026 (6.5 CME/CEU/MOC Credits):
Advances in Interventional Pulmonary, Remote Monitoring in Pulmonary and Sleep Medicine, Approach to Symptom Management in Chronic Lung Disease and Critical Care
Saturday March 14, 2026 (6.5 CME/CEU/MOC Credits)
Sepsis and Shock, Extracorporeal Membrane Oxygenation, Inpatient Pulmonary Complications of Cancer Care
Sunday March 15, 2026
Fellow and Resident Track Symposium

California Thoracic Society
ATS Chapter Serving California and Arizona

AKH INC.
ADVANCING KNOWLEDGE IN HEALTHCARE

California Thoracic Society
Annual Conference
March 12-15, 2026
Portola Hotel and Spa, Monterey, CA

Friday March 13, 2026

Advances in Interventional Pulmonary

8:00 am – 8:10 am: Welcome and Introduction

8:10 am – 8:55 am: Keynote Address – Evolution of Bronchoscopy in Diagnosing Lung Nodules

- **Christine Argento, MD (Johns Hopkins) -** This speaker will discuss the recent advances in bronchoscopy from radial EBUS, to electromagnetic navigation, to robot technologies, and how advancement has improved lung nodule diagnosis.

8:55 am – 9:20 am: Implications of the new TNM9 staging for lung cancer

- **Colleen Channick, MD (UC Los Angeles) -** This speaker will discuss the new TNM staging system, how staging is currently performed, and how to approach staging in the patient with suspected lung cancer.

9:20 am – 9:45 am: Management of Central Airway Obstruction

- **Raed Alalawi, MD (Arizona-Phoenix)-** This speaker will discuss how interventional pulmonary practitioners can manage and treat central airway obstruction.

9:45 am – 10:10 am: The Changing Landscape of Pleural Disease Management

- **Joon Chang, MD (Stanford) -** This speaker will discuss advances in management of pleural disease by the interventional pulmonologist including when to use an intrapleural catheter, and when to use

10:10 am – 10:20 am: Question and Answer

10:20 am – 10:50 am: Break

Remote Monitoring in Lung Disease and Sleep Medicine

10:50 am – 11:15 am: Developing a home spirometry program

- **Steven Hays, MD (UC San Francisco) -** This speaker will discuss how to approach the development of a home spirometry program to monitor lung disease, how to use digital health technologies to integrate results into the EHR.

11:15 am – 11:40 am: Home Non-Invasive Ventilator Monitoring

- **Christal Hawkins, RRT (UC San Diego) -** This speaker will review how to monitor home non-invasive ventilators for compliance and for adequate control of sleep disordered breathing.

11:40 am – 11:55 am: Pro: Virtual Pulmonary Rehabilitation is Ready for Prime Time

- **Aimee Kizziar, RRT (UC Davis) -** This speaker will argue in favor of virtual pulmonary rehabilitation programs.

11:55 am – 12:10 pm: Con: Virtual Pulmonary Rehabilitation is not ready for Prime Time

- **Julia Rigler, BA. RRT (UC San Francisco) -** This speaker will argue against virtual pulmonary rehabilitation programs.

12:10 pm – 12:20 pm: Question and Answer

12:20 pm – 1:00 pm: Awards Ceremony

1:00 pm – 2:00 pm: Lunch

Hands On Session:

2:00 pm – 3:00 pm: Robotic Bronchoscopy **Raed Alalawi, MD (Arizona-Phoenix) & Joon Chang, MD (Stanford)** Cough Monitoring **Lauren Eggert, MD (UCSF)**; Endobronchial Ultrasound **Pranjal Patel, MD (Stanford)**; Home NIV **Krystle Leung, MD (Stanford)**

3:00 pm – 3:20 pm: Break

Approach to Symptom Management in the Pulmonary Patient

3:20 pm – 3:45 pm: Addressing the Unmet Needs of Refractory Chronic Cough

- **Krishna Sundar, MD FCCP FAASM ATSF (UC Davis) -** This speaker will discuss the etiology behind refractory chronic cough and the treatment approaches for management

3:45 pm – 4:10 pm: Frailty in Pulmonary and Critical Care Medicine

- **Jonathan Singer, MD MPH (UC San Francisco) -** This speaker will discuss the concept of frailty and how it impacts health in patients with lung disease. The speaker will also discuss how frailty can change as lung disease is treated.

4:10 pm – 4:35 pm: Palliative Care for the Patient with Chronic Lung Disease

- **Grace Amadi, MD (UC Davis) -** This speaker will discuss how palliative care teams can benefit patients with chronic various lung disease including ILD, COPD, and pulmonary hypertension.

4:35 pm – 5:00 pm: Palliative Care for the Patient with Critical Illness

- **B. Corbett Walsh, MD, MBE (UC Los Angeles) -** This speaker will discuss how palliative care teams can benefit the inpatient with advancing lung disease, the importance of advance care planning, and palliative care in the intensive care unit.

5:00 pm – 5:10 pm: Question and Answer

5:30 pm – 7:00 pm: Women in Pulmonary, Critical Care, and Sleep Medicine (NON-CME) – Food and beverages will be served

Dr. Sundar received his medical degree from Delhi University followed by residency in Internal Medicine at St. Luke's Roosevelt Hospital, Columbia University, New York. He then did his fellowship in Pulmonary, Critical Care and Sleep Medicine at University of Utah. Subsequently he worked with Intermountain Health Care and then at University of Utah where he led the Sleep program and created a multidisciplinary chronic clinic in conjunction with Speech Pathology and ENT. He moved to UC Davis more than a year ago as Professor in the Pulmonary Division and recently started a chronic cough clinic in Sacramento. His main research interests have been in chronic cough and chronic hypoxia in relation to sleep apnea.

Addressing the Unmet Needs of Refractory Chronic Cough

Krishna M. Sundar, MD, ATSF
Professor of Medicine, Division of Pulmonary, Critical Care & Sleep Medicine
Department of Medicine, UC Davis
Sacramento, CA

Disclosures:
Consultant, GSK Pharma for Cough Therapeutics
Advisory Board, Trevi Therapeutics

ATS American Thoracic Society. | The France Foundation

Provided by the
American Thoracic Society
in collaboration with The
France Foundation

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The France Foundation

ATS American Thoracic Society

Learning Objectives

1. Summarize the steps in the diagnostic evaluation and overall patient work up to identify refractory chronic cough (RCC)
2. Identify the underlying neurologic mechanisms that contribute to cough hypersensitivity and their basis as treatment targets for RCC
3. Assess how ongoing developments in clinical research may help address current limitations in the management of RCC

Which of the following statements about chronic cough and refractory chronic cough is true?

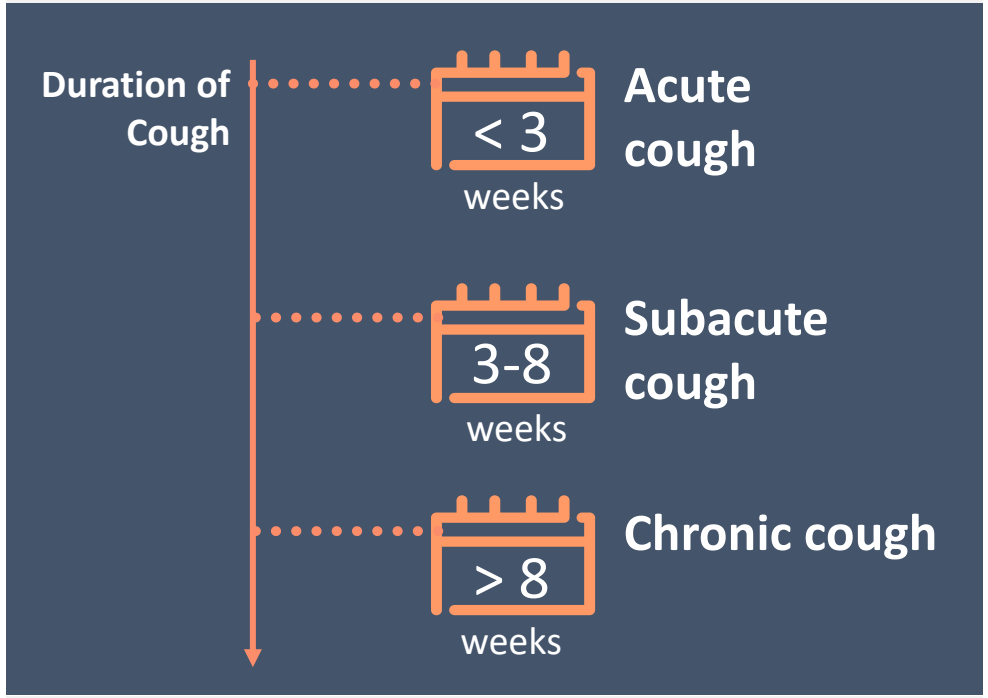
Which research trend is most likely to improve management of refractory chronic cough (RCC)?

What Is Chronic Cough?

- Classifying cough by **duration** can help diagnose patients and guide treatment decision-making[1]
- Current definition of CC is based **on duration (> 8 weeks):**
  - Does not characterize the intensity or impact of CC on health
  - Does not indicate diagnosis or phenotype

CC, as measured, is the result of multiple different etiologies when using the duration criterion.

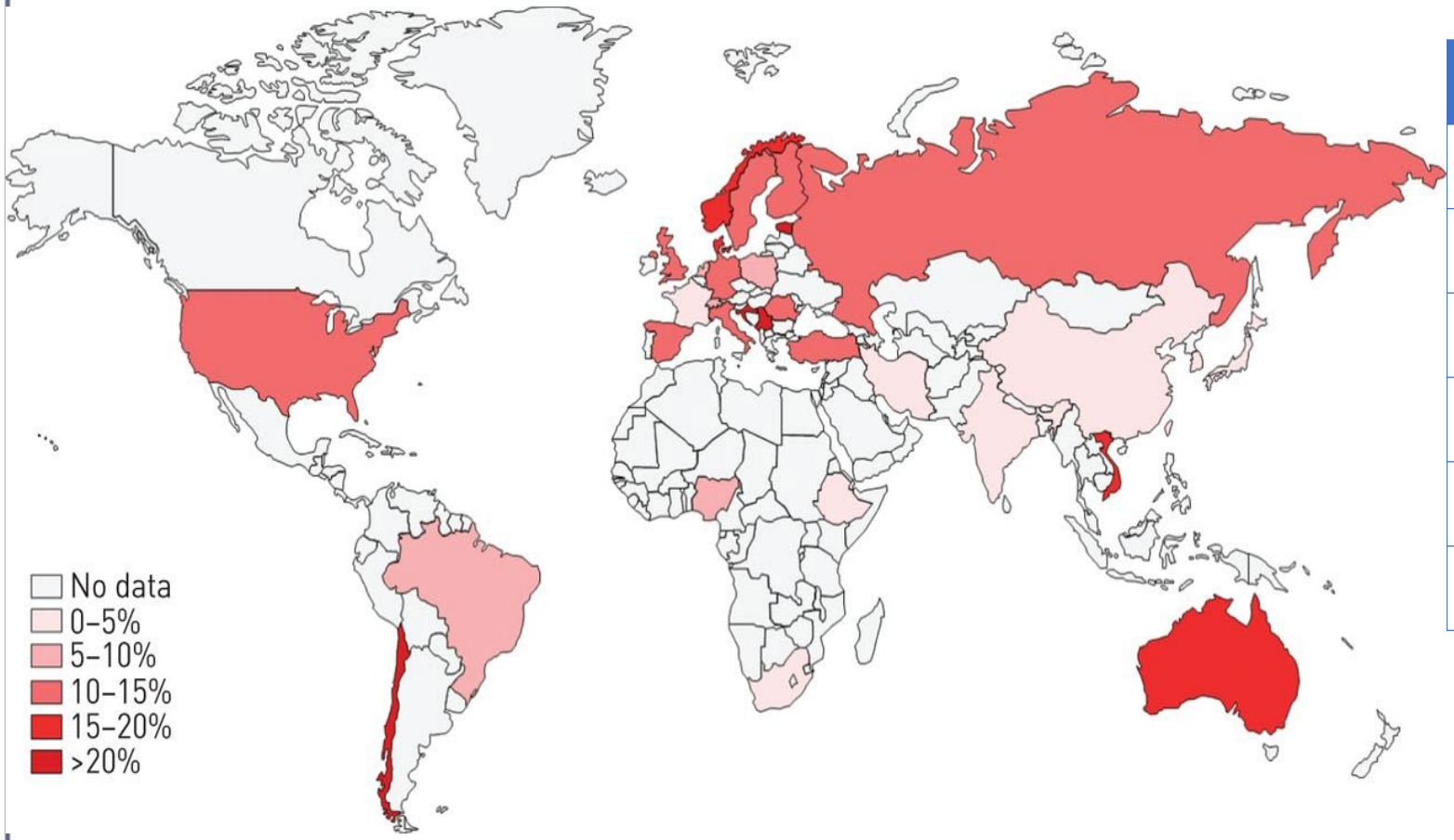
CHEST Classification of Cough as a Symptom in Adults[1]



Note: the definition of chronic cough varies globally, with some studies using 3 months as the cut-off criterion

1. Irwin RS, et al. *Chest*. 2018;153(1):196-209; 2. Morice AH, et al. *Eur Respir J*. 2020;55(1):1901136; 3. Visca D, et al. *Eur J Intern Med*. 2020;81:15-21.

Global Impact of Chronic Cough



Region	Prevalence
Overall	9.6% (95% CI 7.6%-11.7%)
Oceania	18.1% (95% CI 9.8%-27.2%)
Europe	12.7% (95% CI 10.4%-15.2%)
America	11.0% (95% CI 7.8%-14.4%)
Asia	4.4% (95% CI 1.8%-7.4%)
Africa	2.3% (95% CI 0%-6.7%)

Definitions of cough in 90 studies: Cough ≥ 3 consecutive months on most days of the year or for 2 successive years or 8-week cut-off duration.

Global prevalence of 9.6%, comparable to asthma or COPD

Meltzer EO, et al. *J Allergy Clin Immunol Pract*. 2021;9(11):4037-4044.e2; Song WJ, et al. *Eur Respir J.* 2015;45(5):1479-1481..

Initial Assessment of Chronic Cough

Clinical History

- Cough duration and characteristics
- Cough triggers
- Family history
- Risk factors (eg, smoking, use of ACE inhibitors, occupational exposure)
- Red flags that indicate a life-threatening cause for cough

Routine Evaluations

- Physical examination
- Chest radiography
- Pulmonary function test

Cough-Specific Measures

- Cough severity assessment
  - Numerical questionnaire
  - Visual analog scale

Red Flags

- Hemoptysis
- Smoker aged > 45 years with a new cough, change in cough, or voice disturbance
- Adults aged 55-80 years who have a 30 pack-year smoking history and currently smoke or who have quit within the past 15 years
- Prominent dyspnea, particularly at rest or at night
- Hoarseness
- Systemic symptoms (eg, fever, weight loss, peripheral edema)
- Dysphagia
- Vomiting
- Recurrent pneumonia
- Abnormal respiratory exam and/or abnormal chest radiograph coinciding with duration of cough

CHEST Guidelines and Expert Panel Report

ACE = Angiotensin-Converting Enzyme

Irwin RS, et al. *Chest*. 2018;153(1):196-209; Morice AH, et al. *Eur Respir J*. 2020;55(1):1901136; Chung KF, et al. *Nat Rev Dis Primers*. 2022;8(1):45.

Evaluation of the "Big 3"

Upper Airway Cough Syndrome (UACS) secondary to sino-nasal diseases

Consider:

- Sinus imaging
- Nasopharyngoscopy
- Allergy evaluation or empiric treatment

Asthma and Nonasthmatic Eosinophilic Bronchitis (NAEB)

Ideally evaluate:

- Spirometry
- Bronchodilator reversibility
- Bronchoprovocation challenge
- Sputum eosinophilia
- Fraction exhaled nitric oxide (FENO)
- Allergy evaluation or empiric treatment

Gastroesophageal Reflux Disease (GERD)

Physiologic testing for refractory patients. Initial treatment to include:

- Acid suppression with medications
- Lifestyle changes to reduce reflux

Irwin RS, Madison JM. *N Engl J Med.* 2025;392(12):1203-1214; Gibson P, et al. *Chest.* 2016;149(1):27-44.

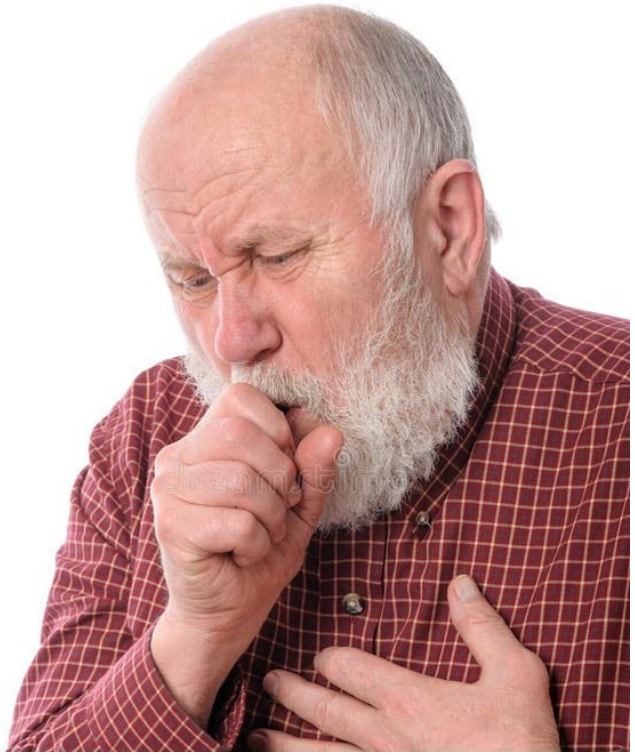
Understanding the Relationship of GERD, UACS, and Airway Problems to Chronic Cough

- Many patients with GERD/UACS/CVA do not cough
- No specific markers that distinguish those with cough and those without cough – particularly investigations outlined
- Empiricism in therapy
  - Multiple rounds of therapy for same problem
  - Unclear plan for investigative work-up, often dependent on the treating practitioner

Refractory Chronic Cough (RCC)

- A chronic cough lasting **more than 8 weeks** that persists despite appropriate treatment of common underlying causes
  - Diagnosis of exclusion

- Often associated with **cough hypersensitivity syndrome**, characterized by heightened neural responses to stimuli or TRIGGERS



Irwin RS, Madison JM. *N Engl J Med.* 2025;392(12):1203-1214.

Impact of Chronic Cough[1]

- Approximately 11% of the US general adult population is estimated to suffer from chronic cough[2]
  - Based on a systematic review and meta-analysis of peer-reviewed journals published between 1980 and 2013[2]

Average duration of cough (n = 560)

8.6 years ±10.5 years[3]

1. Satia I, et al. *Clin Med*. 2016;16(Suppl 6):s92-s97; 2. Song WJ, et al. *Eur Respir J*. 2015;45(5):1479-1481; 3. Zeiger RS, et al. *J Allergy Clin Immunol Pract*. 2021; 9: 1624-1637.e10.

Patient Burden of Refractory Chronic Cough[1,2]

Clinical

- Urinary incontinence
- Dizziness and headaches
- Sleep disruption
- Exhaustion
- Potential exacerbation of underlying diseases

Social

- Conversation/speech interruption
- Avoidance of activities
- Disruption of family, friends, and coworkers

Psychological

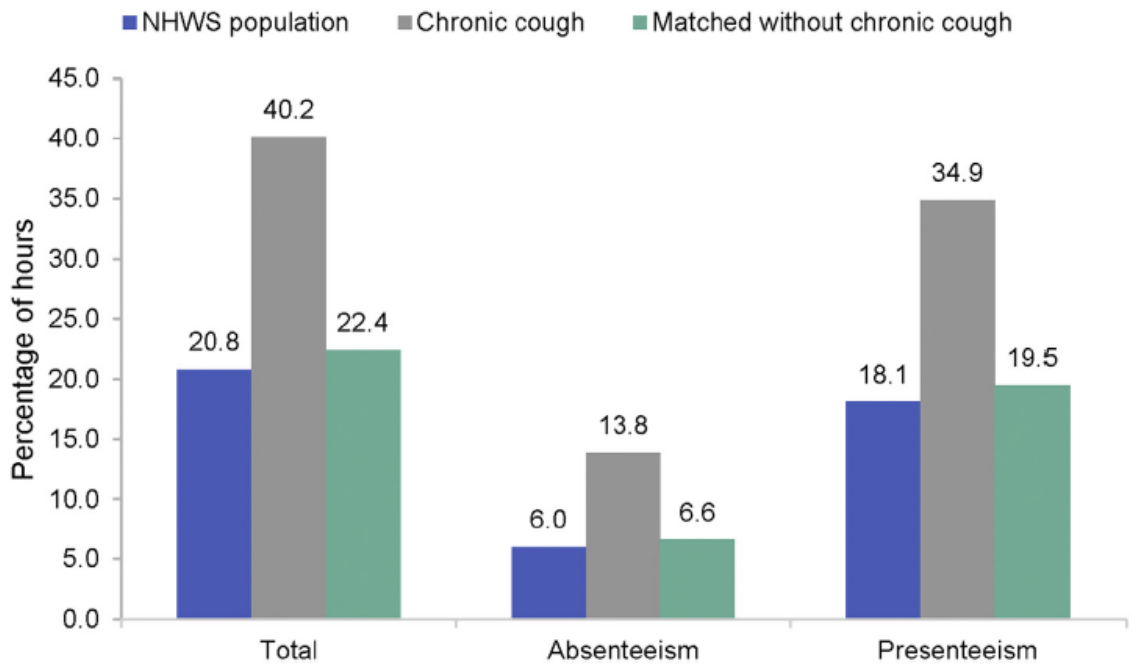
- Depression
- Anxiety
- Self-consciousness and embarrassment
- Concerns about serious underlying condition

Economic

- Impaired productivity
- More emergency department visits and hospitalizations

1. Irwin RS, et al. *Chest*. 2020;158(5):2058-2073; 2. Meltzer EO, et al. *J Allergy Clin Immunol Pract*. 2021;9(11):4037-4044.e2

Economic Burden of Chronic Cough



Impacts health care costs (increased physician visits, diagnostic testing, medication use) and results in lost productivity and work absenteeism[1]

Chronic cough is associated with high health care resource utilization (HCRU) due to challenges in diagnosis and treatment and is anticipated to have a substantial economic impact.[2]

Work productivity among employed respondents over the past week. P<.001 for all comparisons of chronic cough vs matched controls. Propensity score matched to chronic cough sample on age, gender, and modified Charlson Comorbidity Index.

1. Meltzer EO, et al. *J Allergy Clin Immunol Pract.* 2021;9(11):4037-4044.e2; 2. Bali V, et al. *BMC Pulm Med.* 2023;23(1):416.

Diagnostic Criteria for RCC

- Diagnosis of exclusion
- **Cough lasting > 8 weeks**
- No identifiable cause (rule out asthma, GERD, upper airway cough syndrome)
- Normal or nondiagnostic findings
  - Normal chest X-ray
  - Normal pulmonary function tests
  - Laryngoscopy and bronchoscopy normal
- Failure to respond to therapy targeted at common causes

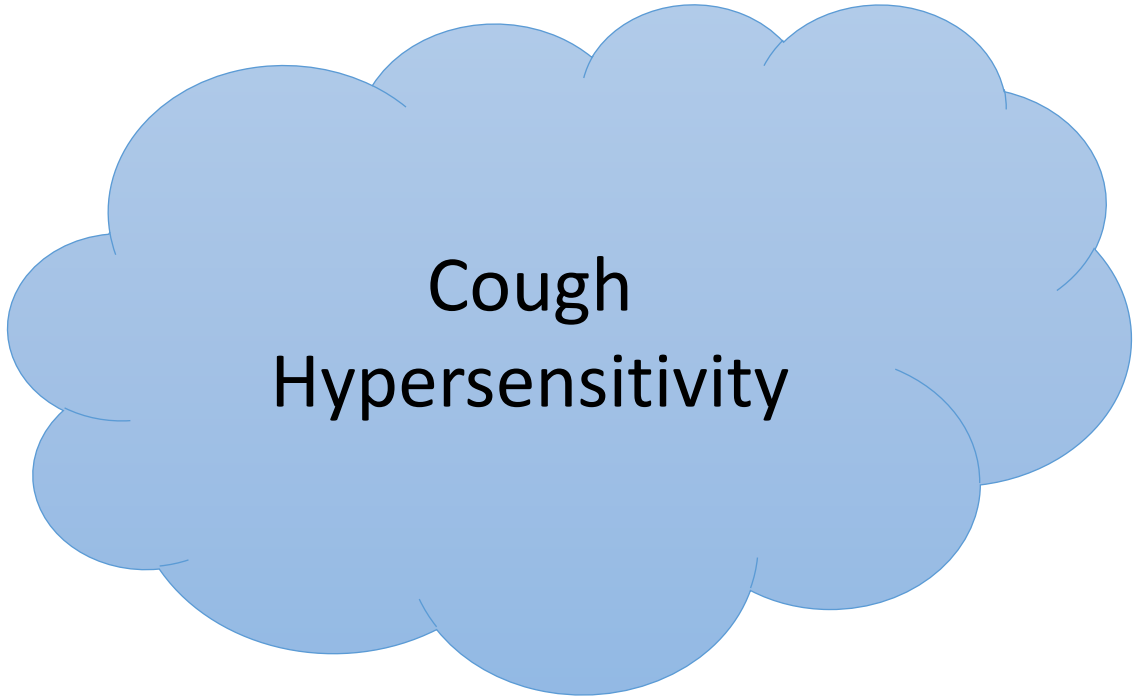
Irwin RS, Madison JM. *N Engl J Med.* 2025;392(12):1203-1214.

Cough Hypersensitivity

Central Role in Refractory Chronic Cough

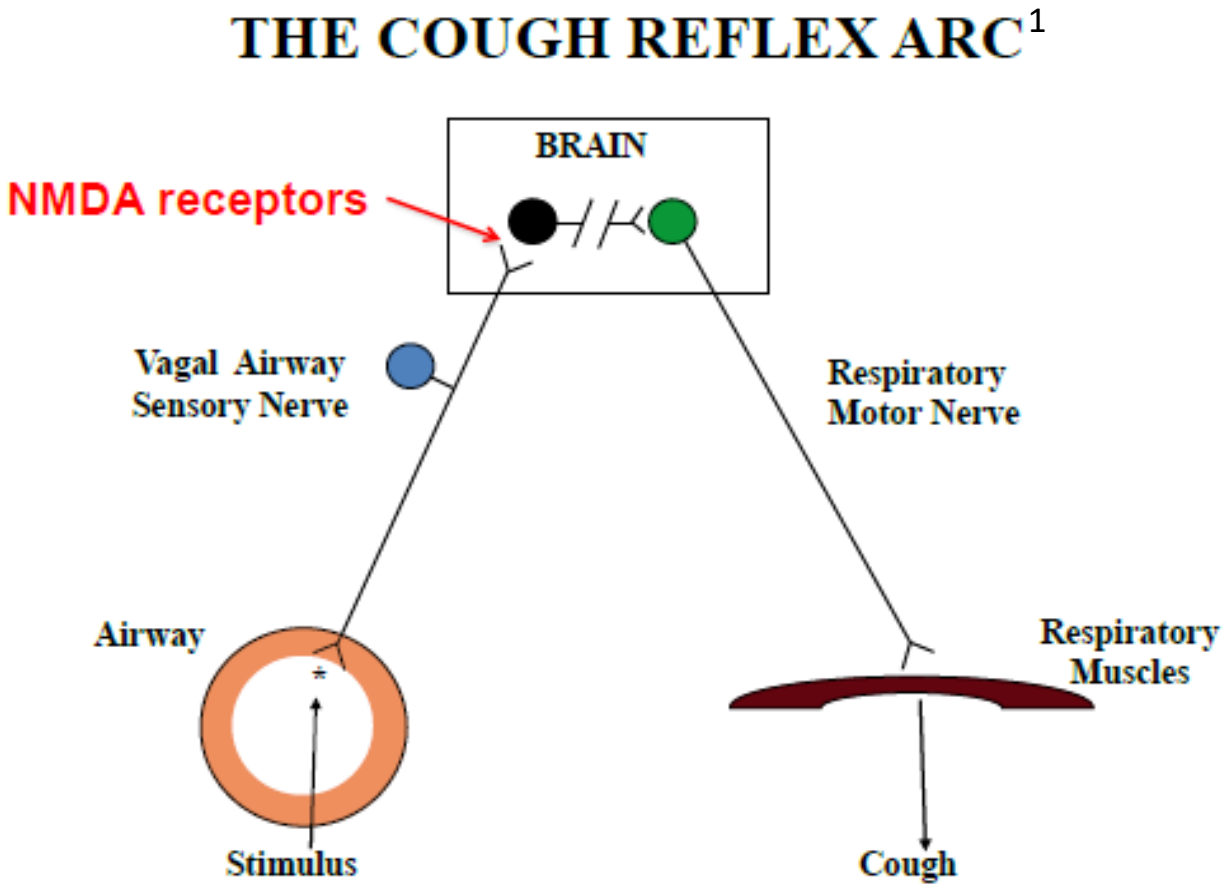
Common Features

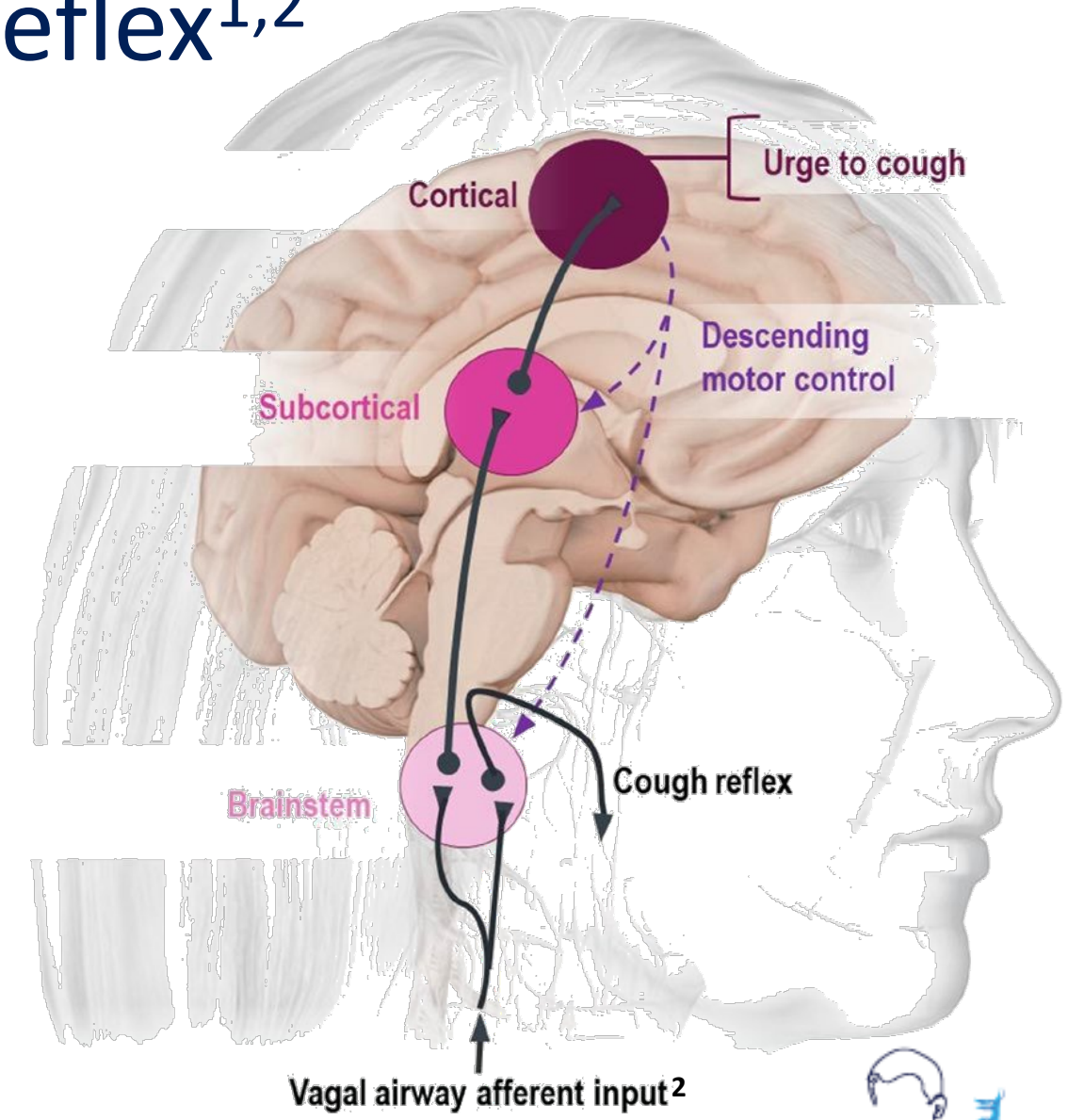
- Exquisite sensitivity to inhaled irritants
- Innocuous stimuli trigger coughing
- Sensations of tickling in the throat
- Urge to cough



Peters AT, et al. *Ann Allergy Asthma Immunol.* 2025;134(6):639-648.

Understanding the Cough Reflex[1,2]

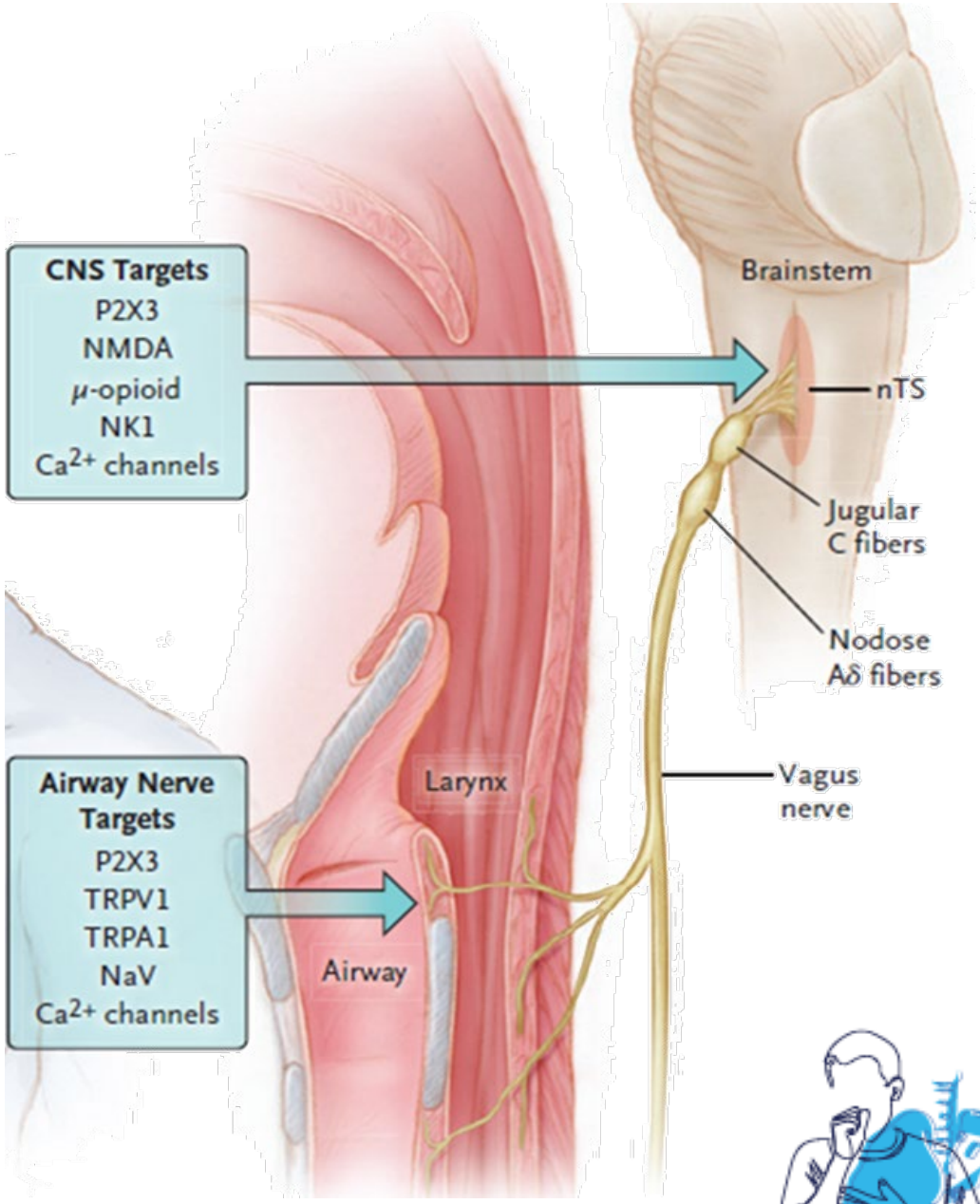




1. Canning B. *Lung.* 2008;186 (Suppl 1):S23-28.
2. Satia I, et al. *Can J Respir Crit Care Sleep Med.* 2021;*5*(6):404–416.

Peripheral and Central Neural Pathway Targets

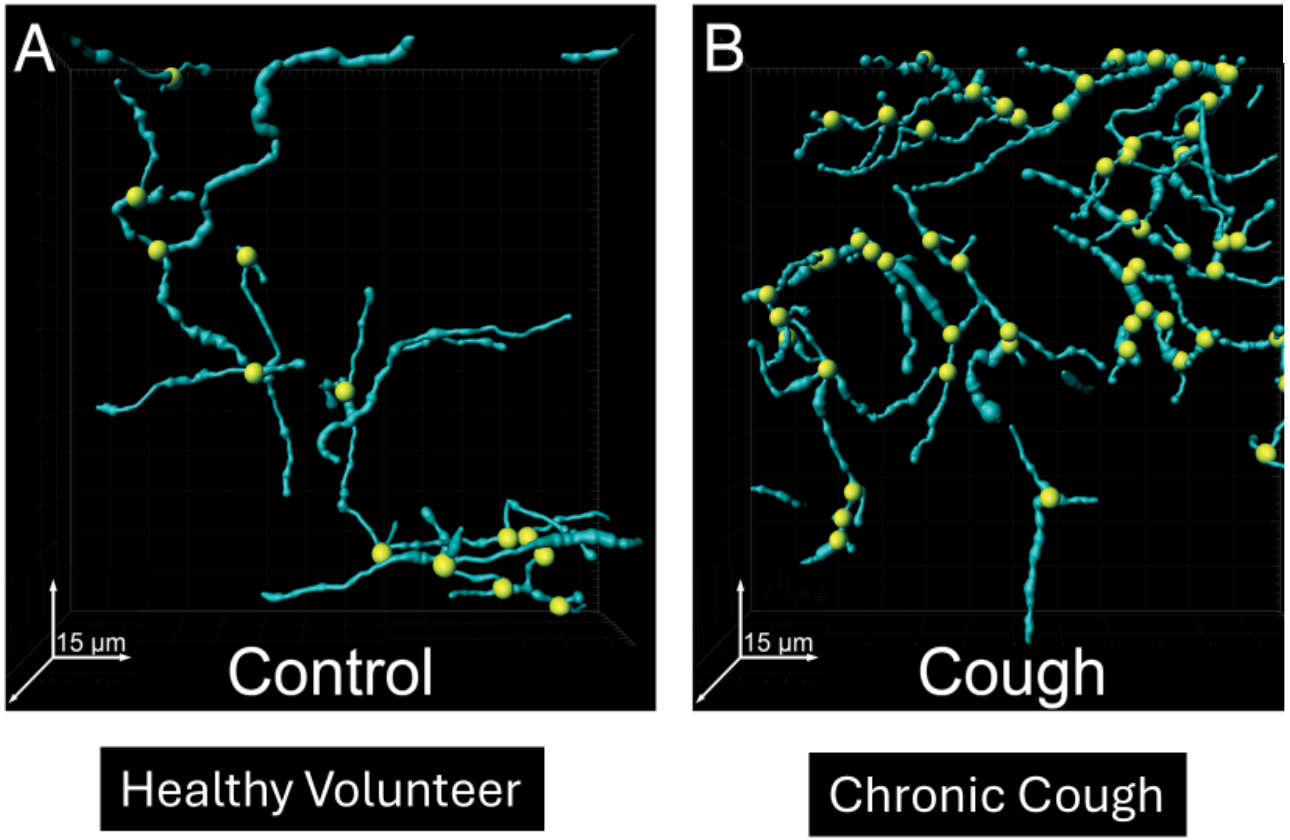
- Vagal afferents transmit stimuli from airways to the nTS and Para V in brain stem
- Neuronal signals to the somatosensory cortex via thalamus, which causes throat irritation, causing the urge to cough
- Leads to cough via activation of spinal motor neurons



nTS = nucleus of solitary tract; aMCC = anterior mid-cingulate cortex; Para V = Paratrigeminal nucleus

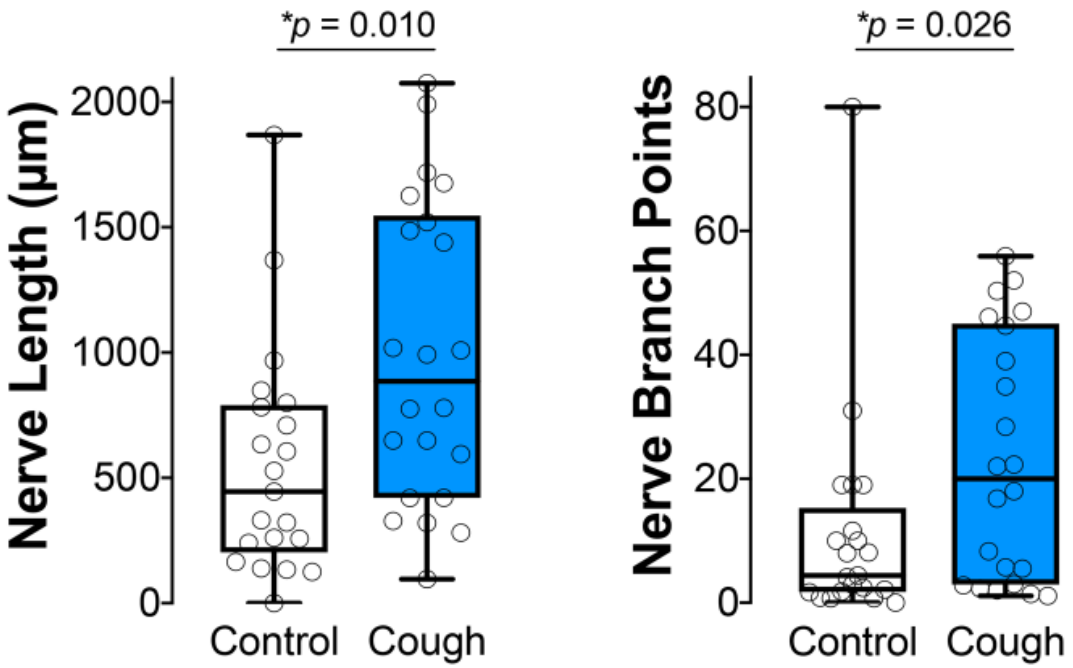
Smith JA, et al. *N Engl J Med*. 2016;375(16):1544-51.

Airway Sensory Nerve Density



Healthy Volunteer

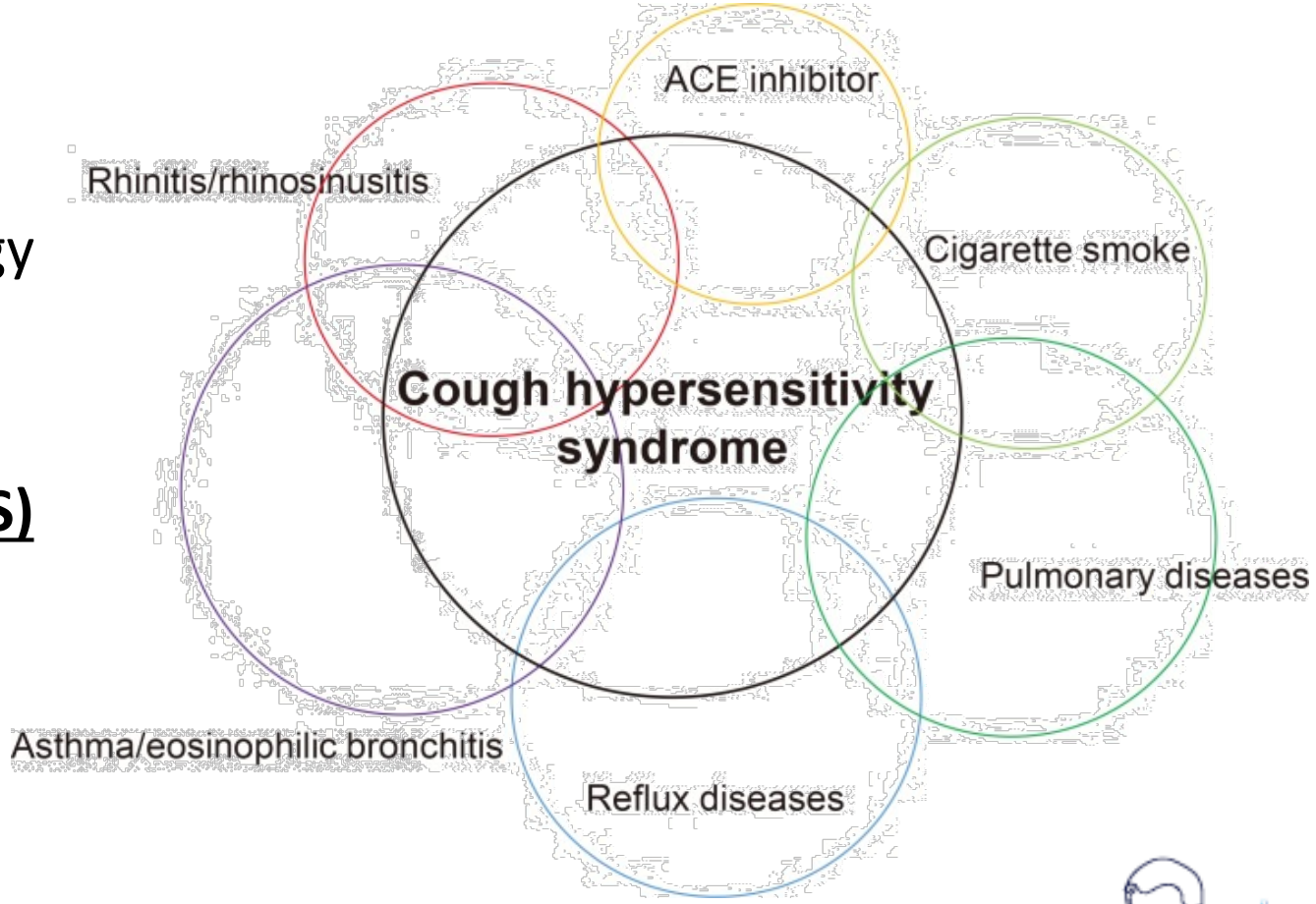
Chronic Cough



Shapiro CO, et al. *Am J Respir Crit Care Med*. 2021;203(3):348-355.

Chronic Cough as a Distinct Clinical Disease

- Historically, cough thought of only as a symptom of a separate pathology
- RCC now considered a distinct pathology characterized by hypersensitivity of the cough reflex
- **Cough Hypersensitivity Syndrome (CHS)** endorsed by European Respiratory Society (ERS)



Chung KF, et al. *Pulm Pharmacol Ther*. 2015;35:76-80; Lee et al., 2021; Morice AH, et al. *Lung*. 2012;190:3–9; Morice AH, et al. *Eur Respir Rev*. 2021;30(162):210127; Song W-J, Morice AH. *Allergy Asthma Immunol Res*. 2017; 9(5):394–402.

Goals of Treating Refractory Chronic Cough

After refractory chronic cough is diagnosed, the goal of treatment changes from identification/treatment of underlying causes to **suppressing the cough reflex**.[1,2]

In the United States, no pharmacotherapies are approved for management of refractory chronic cough.

Guidelines recommend the following treatment strategies:

- Off-label pharmacotherapies[1,2]
- Behavioral cough suppression therapy by a speech-language pathologist[1,2]

Pharmacotherapies commonly used off-label in the US	
Neuromodulators	• Amitriptyline • Gabapentin • Pregabalin
Opioids	• Morphine • Codeine • Hydrocodone

Gabapentin (max dose 1,800 mg) improved cough-related QoL, severity, and frequency (improvements were not sustained after treatment discontinuation)[3]

Amitryptiline in vagal neuropathy[4] – tried in dosing between 10-25 mg at bedtime

Pregabalin shown to improve cough reduction greater than SPT alone[5]

1. Dicpinigaitis, PV. *J Precis Respir Med*. 2023;6(1):10-13; 2. Morice AH, et al. *Eur Respir J*. 2020;55(1):1901136. 3. Ryan NM, et al. *Lancet*. 2012;380(9853):1583-1589 4. Jeyakumar A, et al. *Laryngoscope*. 2006;116(12)2108-2112. 5. Vertigan AE, et al. *Chest*. 2016;149(3):639-648

Nonpharmacologic RCC Treatments

- Nonpharmacologic treatment goals: reduce cough frequency and severity
  - **Speech therapy**
    - Control laryngeal function & reduce cough reflex sensitivity
    - Breathing exercises & vocal hygiene
  - **Behavioral modifications**
    - Cough trigger awareness, controlled breathing exercises, vocal rest
    - Dietary adjustments (avoid acidic/spicy foods)
  - **Cognitive behavioral therapy (CBT) for cough suppression**
    - Manage anxiety-driven triggers, distraction, relaxation
  - **Integrative approach**
    - Multiple therapies and approaches
    - Mindfulness & breathing exercises

Behavioral Cough Suppression Therapy (BCST)

- Only treatment designed to specifically target CHS utilizing principles of neuroplasticity
  - No long-term drug dependency
- Zero side effects
- Quick response – usually 2-4 sessions over 2-8 weeks
- Best efficacy data of any currently available treatment
- Complete resolution of cough in ~50% (remission?)
- Clinically meaningful response in up to 88%

Weinberger SE, et al. *UpToDate.* Updated March 27, 2025. https://www.uptodate.com/contents/evaluation-and-treatment-of-subacute-and-chronic-cough-in-adults.

Emerging RCC Pharmacological Treatments

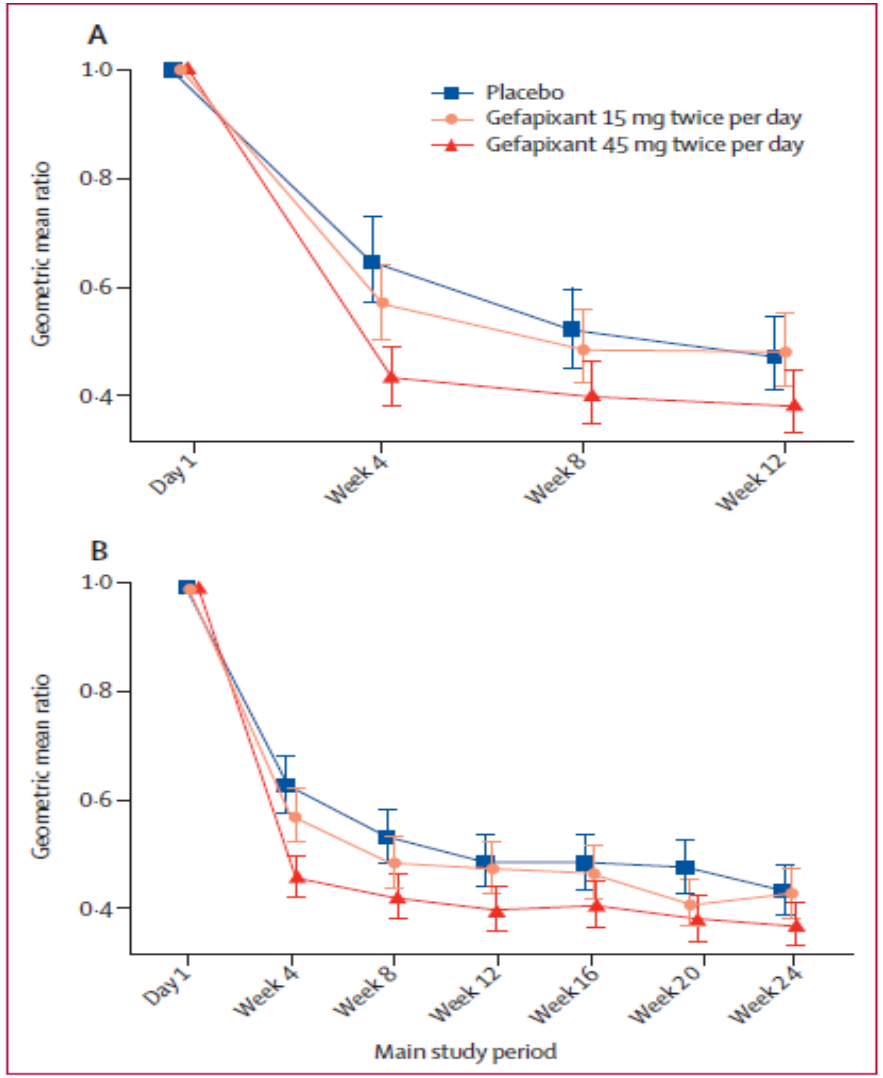
- **P2X3 Receptor Antagonists**
  - Gefapixant (not approved in US)
  - Camlipixant (Phase 3)
- **Neurokinin Receptor Antagonists**
  - Orvepitant (Phase 2)
- **Sodium Channel Blockers**
  - Taplucainium (Phase 2b)
  - XEN-D0501 (Phase 2)
  - GSK2339345 (Phase 1)
- **NMDA Receptor Antagonists**
  - Ifenprodil (Phase 2)
  - Dextromethorphan/Quinidine (Phase 2)
- **TRPM8 Agonists**
  - AX-8 (Phase 2)
- **TRP Channel Modulators**
  - SB-705498 (Phase 2)
  - NAL-NL001 (Preclinical)
  - Mavatrep (Phase 1)
- **Opiod Analgesic/Mixed Agonist-Antagonist**
  - Nalbuphine (Phase 2)
    - Agonist at k-opioid receptors (kappa)
    - Antagonist at μ-opioid receptors (mu)

P2X3 Receptor Antagonists

Gefapixant

Mechanism of Action: P2X3 receptor antagonist that reduces cough hypersensitivity by inhibiting ATP-mediated signaling in airway sensory nerves

- **Status:** Phase 3 trials → FDA complete response letter (2023) questioned efficacy (vs safety). Merck determining next steps
  - » Approved in Japan, Switzerland, and Europe
- **Clinical Trials:** COUGH-1 & COUGH-2[1,2]
  - » **Key Result**: 45 mg BID reduced 24-hour cough frequency more than placebo
  - » **Side effects**: Taste alteration in 12.7%-68%
    - Nearly 1/3 of patients experienced taste-related adverse events (30% discontinued medication)[1,2]



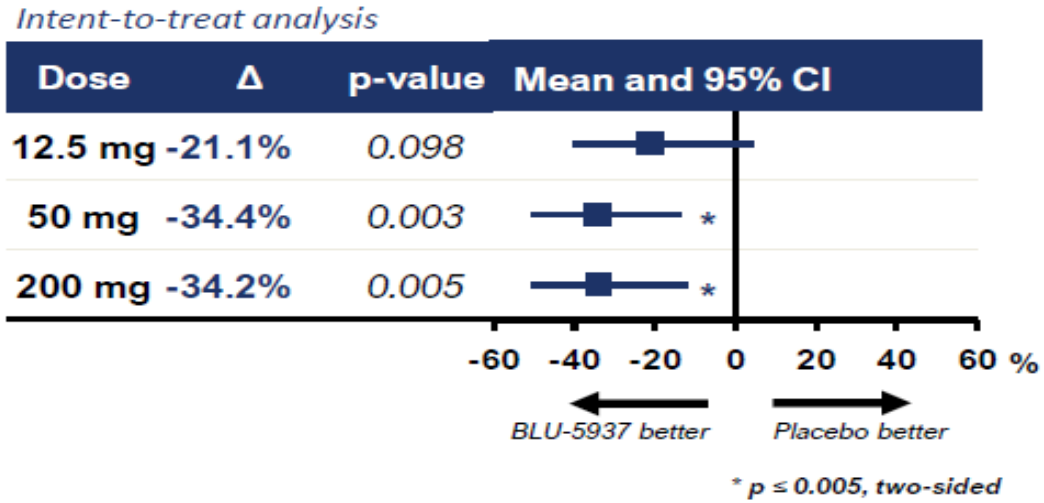
1. Dicpinigaitis PV, et al. *Lung.* 2020;198(5):609-616; 2. McGarvey LP, et al. *Lancet*. 2022;399:909-923.

P2X3 Receptor Antagonists

Camlipixant

Mechanism of Action: Selective P2X3 receptor antagonist with improved tolerability over gefapixant

- **Status:** Phase 3
- **Phase 2b Clinical Trial:** SOOTHE Trial
- **Key Result**: 34% placebo-adjusted reduction in 24-hour cough frequency at 50 mg and 200 mg BID doses (included cough-related QoL with greater improvement in all arms vs placebo)
- **Dose Response:** observed between 12.5 mg and 50 mg BID doses



- Low Taste-Related Adverse Events (< 6.5%)
  - No complete or partial loss of taste at any dose
  - No severe taste-disturbance adverse effects

Smith JA, et al. *Am J Respir Crit Care Med.* 2025;211(4):A2533

Neurokinin (NK) Receptor Antagonists

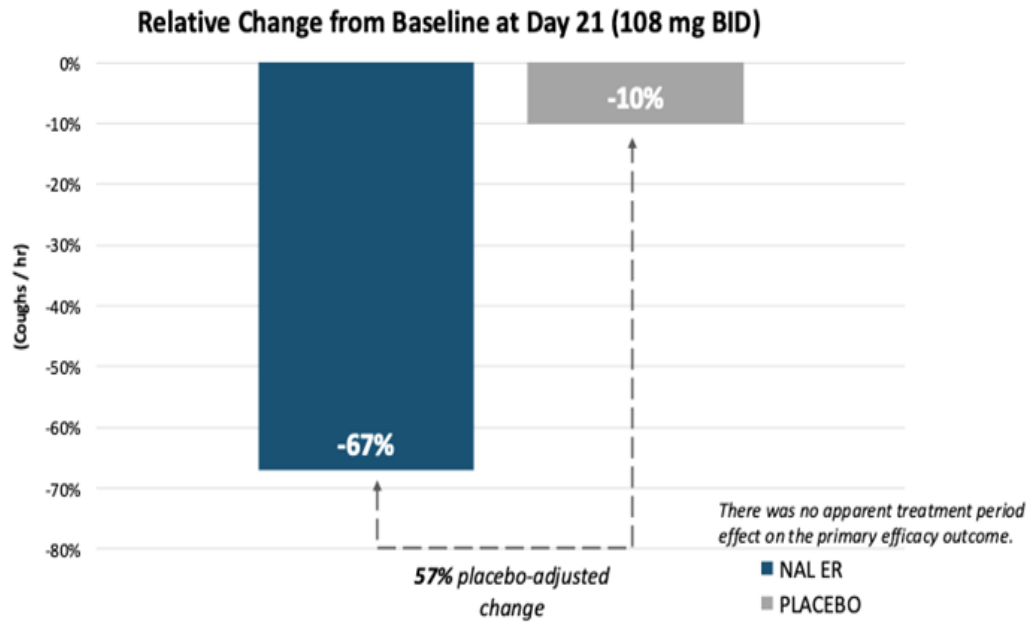
Orvepitant

- **Mechanism of Action:** NK-1 receptor antagonist that modulates neurogenic inflammation and central cough pathways to reduce hypersensitivity
  - **Status:** Phase 2 trials for RCC
  - **Clinical Trials:** VOLCANO-1 (Phase 2a) & VOLCANO-2 (Phase 2b)
    - **Key Result**: 30 mg once daily x 4 weeks resulted in significant reduction in 24-hour cough count and improvements in QoL, patient-reported outcomes.

Nerre Therapeutics. Nerre Therapeutics Announces Positive Findings from Phase 2b Study with Orvepitant in Chronic Cough. Accessed April 3, 2025. https://www.nerretherapeutics.com/nerre-therapeutics-announces-positive-findings-from-phase-2b-study-with-orvepitant-in-chronic-cough

Opioid Analgesic/Mixed Agonist-Antagonist

Nalbuphine ER



- **Crossover Trial Design:** Phase 2a RIVER trial
  - Double-blind, randomized, placebo-controlled, 2-period crossover study
  - 66 participants
- **Criteria:**
  - Diagnosed with RCC for at least 1 year, randomized to subgroups based on pretreatment cough monitor results
    - 10-19 coughs/hour
    - ≥ 20 coughs/hour
- **Primary endpoint:**
  - Relative change from baseline in cough frequency (coughs/hour) vs placebo at day 21
- **AEs:**
  - somnolence, dizziness, headache, hypoaesthesia, lethargy, nephrolithiasis

Trevi Therapeutics. (2025, March 14). *Refractory Chronic Cough Improvement Via NAL ER (RIVER) (NCT05962151)*. ClinicalTrials.gov. https://clinicaltrials.gov/study/NCT05962151

Summary: Take-Home Points

- In adults, a chronic cough is defined as a cough lasting **more than 8 weeks**
- If a chronic cough persists despite appropriate treatment of all potential underlying causes, it is classified as "**refractory chronic cough**" (RCC)
- Currently, there are **no FDA-approved therapies for UCC or RCC**
- RCC can persist for many years and **significantly impacts quality of life**
- RCC is believed to be **associated with cough hypersensitivity syndrome**
- Advancing knowledge of the mechanisms underlying cough hypersensitivity syndrome is driving the development of targeted treatments, **such as P2X3 receptor antagonists**

Which of the following statements about chronic cough and refractory chronic cough is true?

Which research trend is most likely to improve management of refractory chronic cough (RCC)?

Thank You!

Questions/Comments

Complete the evaluation
by scanning the QR code