

Capsaicin Utilization for Cough-Response Elicitation (CURE): Variability in Healthy Persons – A Pilot Study



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Introduction

Cough reflex testing is essential for detecting airway protection deficits in dysphagia. Application under tidal breathing conditions is not yet standardized with respect to:

- materials and methods of application
- dose-response specification
- individual impact factors

To develop a tidal-breathing capsaicin challenge and establish a doseresponse normative data base for clinical application.

Research Questions

Dose-Response Specification:

Is there an association between increasing capsaicin doses and

- **Latency** from first tidal breath to first cough?
- 2. Number of cough responses?
- Urge-to-cough?

Impact Factors:

Do individual factors have an impact on cough sensitivity

- a. Gender
- Smoking habits
- Spicy-food consumption
- d. Spicy food tolerance

Results

1. Dose–Response Specification:

1. Latency to first cough: No significant dose effect

Cox proportional hazards $\to HR = 0.93$; 95% CI 0.69–1.26; p = 0.63

2. Cough count: No significant dose effect

Negative-binomial GLMM \rightarrow IRR = 0.87 per dose step; p = 0.27

3. Urge-to-cough: No significant dose effect

Linear mixed model $\rightarrow \theta = -2.55$; p = 0.40

2. Impact Factors:

- a. Gender => <u>no group differences</u> in
 - 1. Latency (U=493.5, z=-.238, p=.812)
 - 2. Coughs (U=492, z=-.259, p=.796)
 - 3. Urge-to-cough (U=473.5, z=-.465, p=.642)
- Smoking habits => <u>no group differences</u> in
 - **1.** Latency (U=704, z=-.672, p=.501)
 - 2. Coughs (U= 678.5, z= -.851, p= .395)
 - 3. Urge-to-cough (U=650.5, z=-1.16, p=.246)
- c. Spicy food consumption => <u>no group differences</u> in
 - **1. Latency** (χ^2 [2]= 1.82, p= .394)
 - 2. Coughs ($\chi^2[2]$ = .789, p= .674)
 - 3. Urge-to-cough (χ^2 [2]= .571., p= .752)
- d. Spicy food tolerance => <u>no association</u> with

a. Latency (r_s = -.063, p= .579)

- **b.** Coughs (r_s = -.085, p= .455)
- c. Urge-to-cough r_s = -.061, p= .592)

Methods & Materials

Participants:

20 healthy adults (24-45 yrs, M=27.7, SD=4.43), no neurological, respiratory or GI disease

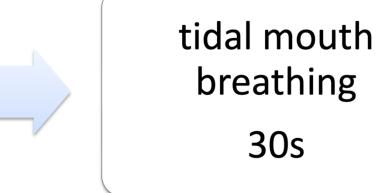
- a. Gender: male = 16, female = 4
- Smoking: no = 12, yes = 8
- Spicy food consumption: daily = 9, weekly = 7, monthly = 4
- Spicy food tolerance (1-10): 3-8 (M= 6.2 , SD= 1.4)

Capsaicin Challenge:

- 0.64 mg/drop extract (500k SHU)
- Incremental doses of 1–4 drops mixed into 200 mL carbonated water (\sim 10.5–41.9 μ M).



solution mixed < 10s





washout after each dose 1 min

Data Collection:

- Latency (s) to first cough (video-timed, 60 fps)
- Cough count (first 15s post-inhalation)
- **Urge-to-cough** (0–100 Visual Analogue Scale VAS)

Interesting Observations

Significant associations:

- More coughs \Leftrightarrow higher urge-to-cough (r_s = .73, p< .001)
- Older participants \Leftrightarrow lower latency to first cough (r_s = -.18 , p= .045)
- Smokers \Leftrightarrow fewer coughs (M=0.9; SD=1.2; 0-3) and lower urge-to**cough** (M=26; SD=26.6; 0-98) than non-smokers (coughs: M=1.23; *SD*= 1.3; 0-4, urge-to-cough: *M*= 42; *SD*= 36; 0-100).

Discussion & Future Directions

- Surprisingly, we found no clear dose-response relationship in a tidal breathing Capsaicin Challenge => Higher capsaicin doses did not significantly alter latency, cough frequency, or urge-to-cough.
- No significant effect of gender, smoking habits and spicy-food consumption or tolerance. Occasional smokers trended toward fewer coughs and lower urge-to-cough
- Positive association between number of cough responses and subjective urge-to-cough => confirms general internal validity of the tidal breathing method

Limitations:

- > larger and more homogeneous sample size needed
- modification of the test procedure: dropper dosing may lack precision compared to nebulizer methods; aerosolization by carbonated water might increase response variability