Beyond Cough: Exploration of Complex Respiratory Responses to Citric Acid and Capsaicin in Guinea Pig Models

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Background: Citric acid and capsaicin are commonly used tussive agents in cough research due to their consistent effects on both animals and humans. However, their influence extends beyond cough provocation, affecting various respiratory parameters.

Objective: This study aimed to explore the broader respiratory responses to citric acid and capsaicin exposure in conventional (CON) and specific pathogen-free (SPF) guinea pigs using whole-body plethysmography.

Methods: Male and female guinea pigs were exposed to aerosols of saline, citric acid (0.4M), and capsaicin (25μM). Respiratory parameters, including cough count, inspiratory and expiratory times, respiratory rate, tidal volume, enhanced pause, and mid-expiratory flow, were recorded and analysed.

Results: Both citric acid and capsaicin induced significant upper and lower airway responses in guinea pigs, with notable differences between CON and SPF animals. Citric acid elicited a stronger upper airway response than capsaicin, especially in CON animals. Intrapulmonary airway obstruction was more pronounced in CON animals, evidenced by changes in expiratory time, enhanced pause, and mid-expiratory flow.

Conclusion: Citric acid and capsaicin trigger complex respiratory effects beyond cough, underscoring the importance of considering broader respiratory responses in translational cough research to better align animal model findings with human outcomes.

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