Reviewer's report

Title: A new paradigm in respiratory hygiene: modulators of airway secretions to improve cough interaction.

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Reviewer: Bruce Rubin

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General

Zayas and colleagues propose that it may be possible to reduce cross infection caused by airborne pathogens by preventing the aerosolization of airway secretions during cough or sneeze. They provide some data using "mucomodulator drugs" that they refer to as XL B and XL C and they suggest that mucus simulants with greater cross linking have less dispersion on a "target".

This is an outstanding research group and a superb investigator. The premise of this manuscript is very attractive. However, additional information is essential in order to understand what has been proposed.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

[1] The most critical shortcoming of this manuscript is the use of "secret" drugs, to alter the properties of mucus simulants. Although the reason for secrecy is stated to be confidentiality, a patent disclosure form can be completed in little time and would give the authors protection for their intellectual property for a year. Thus they could easily protect this IP with either a disclosure or with a full patent application and confidentiality would not be compromised by publication.

[2] The authors have introduced new terminology and redefined existing terminology. For example, the authors refer to clearability in their cough machine as airway clearance when airway clearance usually refers to an in vivo measurement. They have also coined the new term "mucomodulator" without defining the term. The term modulator usually means to return something toward a state of homeostasis. For example, an immunomodulator reduces hyperimmunity and increases the immune response when there is immunosuppression. Thus, a mucomodulator drug should return abnormal mucus to the properties of normal airway secretions. In this manuscript the authors are suggesting the opposite, i.e. that their mucomodulators will change the properties of normal mucus to make them abnormal and thus less prone to dispersion.

[3] Although the images of a single target dispersion are interesting, the authors should quantify these results and clearly describe the number of experiments involved and how these were done.

[4] I cannot understand how these secret drugs have an effect on mucus simulants. Since the authors are collecting frog mucus, which presumably has properties more similar to human mucus, it is recommended that these studies be repeated using only human sputum or frog mucus rather than mucus simulants if the purpose is to show that these "mucomodulator agents" have an effect on clearability and dispersion.
Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

This is a difficult manuscript to read. The paper is disorganized with Results in the Discussion section, Discussion in the Methods section, and lack of clarity regarding the rationale for doing specific measurements.

Discretionary Revisions (which the author can choose to ignore)

**What next?:** Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

**Level of interest:** An article of importance in its field

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** No

**Declaration of competing interests:**

'I declare that I have no competing interests'