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Thinning Mucus of Cystic Fibrosis Sufferers

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Introduction

Patients with cystic fibrosis have lung tissue riddled with *Pseudomonas aeruginosa*, a bacteria that produce mucus-like biofilms [1]. This biofilm is too thick for patients to cough out, and thus cystic fibrosis patients cannot breathe easily. The School of Dental Medicine has been studying a mouthwash known as delmopinol and its possibility to provide an alternate treatment for patients with cystic fibrosis. The way that the mouthwash works in the oral cavity is that it acts as a physical barrier between the tooth and bacteria [2]. This could potentially do the same in the lung tissue, and the mouthwash could potentially coagulate, or shrink, the mucus that the bacteria produces, allowing the patients to cough it up and clear their airways.

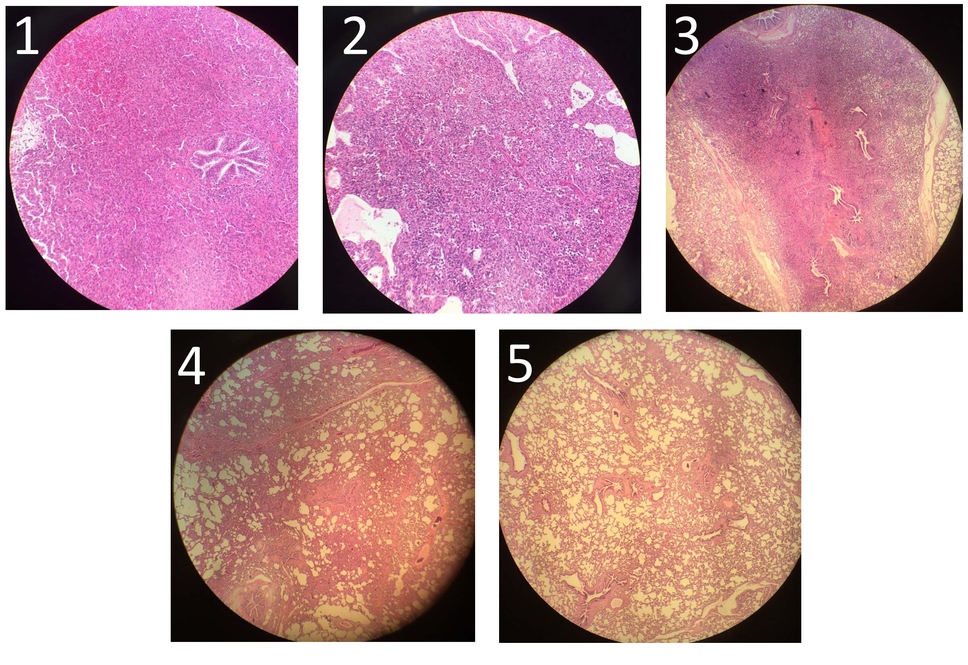
Materials and Methods

To conduct my research I analyzed slides of pig lung tissues that received varying degrees of treatment. There were both infected pigs and healthy pigs, and each group either received a saline solution, a delmopinol solution, or no solution aspirated into their lungs. I inspected the resulting slides under the microscope. I was looking to compare the differences between the experiment groups to see if the delmopinol is a safe treatment method.

Hypothesis

The delmopinol is a safe way to shrink the mucus in the lungs of patients.

Results



Results

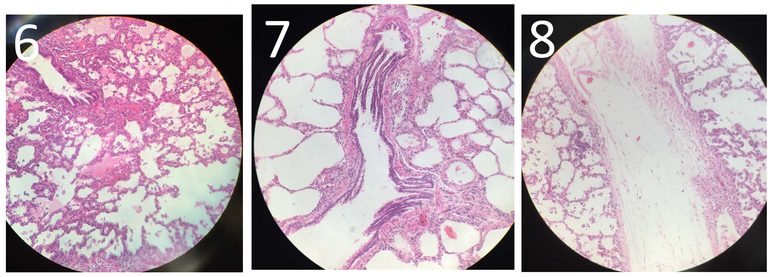


Figure1: Delmo Treated Sick Pig- This pig has a high density of blood clots and granulomas, potentially from an immune response.
Figure2: Control Treated Sick Pig- Similar to the delmopinol-treated pig, this pig also had a high density of blood clots and granulomas.
Figure3: Untreated Sick Pig- This pig also had a high density of granulomas from an inflammatory response.
Figure4: Control Treated Healthy Pig- The healthy pigs seemed to have more open spaces because there seemed to be fewer granulomas and blood clots.
Figure5: Delmo Treated Healthy Pig- Again, similar to the control-treated healthy pig, the healthy pig treated with delmopinol had open spaces and a lower density of particles compared to the sick pigs.
Figure6: Control Sick Pig- The alveolus of the pig appear to be very thickened.
Figure7: Control Healthy Pig- The alveolus of this pig are clear and thin.
Figure8: Delmo Treated Sick Pig- The alveolus of this pig appears to be more cleared than that of the sick, control treated pig

Conclusion

From looking at my findings, it seems that the delmopinol does not do any additional harm to the lung tissue. I believe that the granulomas are an indicator of an inflammatory response and a bad reaction in the lungs. The high density of granulomas cited in the sick pigs seems to be from their infection and not as a result of aspirating the liquid into the lungs, since the healthy pigs did not have nearly as many granulomas or high density areas of inflammatory response. Going forward, it would be helpful to see what an untreated healthy pig lung would look like to know if it is safe to aspirate liquid into the lungs and that a form of pneumonia would not develop as a result. If that proves the safety of the procedure, the next step would be to begin testing a study similar to this on humans.

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References

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