Adaptive Focused Acoustics Processing to Aid Recovery of Fungi from CF Patient Sputum Samples

H.B. Miller, S. Lewis, A. Gluck, S.L. Fisher, S.X. Zhang
The Johns Hopkins Medical Institutions, Baltimore, MD

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Results Summary

Phases I and II describe processes that were necessary to recover fungi from unprocessed sputa. In Phase I, we processed sputa from CF patients with AFA to homogenize and liquefy the mucoid sample, allowing for optimal recovery of fungal elements that are present in the sputum. We employed different AFA processing protocols in Phase I and II to optimally homogenize and liquefy sputum samples. The reported conditions were as follows:

- AFA parameters in Phase I: 180-50, 200°C and 15 sec. These conditions were used to homogenize and liquefy the sputum samples sufficiently to enable the recovery of fungi.
- AFA parameters in Phase II: 150-50, 200°C and 15 sec. These conditions were used to homogenize and liquefy the sputum samples further, allowing for efficient recovery of fungi.

These conditions were determined by optimizing the AFA parameters to achieve the best recovery of fungal elements from the sputum samples. The recovery of fungi from unprocessed sputa was achieved using these optimized conditions.

Discussion

In Phase I and II, we describe the processes that were necessary to recover fungi from unprocessed sputa. In Phase I, we processed sputa from CF patients with AFA to homogenize and liquefy the mucoid sample, allowing for optimal recovery of fungal elements that are present in the sputum. We employed different AFA processing protocols in Phase I and II to optimally homogenize and liquefy sputum samples. The reported conditions were as follows:

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Conclusions

In conclusion, the use of AFA processing protocols to homogenize and liquefy sputum samples has shown promising results in recovering fungi from unprocessed sputa. The optimized AFA parameters described in Phase I and II provide a feasible approach for fungal recovery from CF patient sputa. Further studies are warranted to evaluate the clinical relevance of these findings.

References


Acknowledgements

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Abstract

Cystic Fibrosis (CF) is a genetic disorder that affects over 70,000 people worldwide. It is characterized by chronic infections and inflammation of the lungs, which can lead to progressive lung destruction. The impact of fungal infections on patients with CF is significant and can contribute to increased hospitalization rates and reduced quality of life. The goal of our study was to evaluate the effectiveness of Adaptive Focused Acoustics (AFA) in recovering fungal elements from CF patient sputum samples. We employed different AFA processing protocols in Phase I and II to optimally homogenize and liquefy sputum samples. The reported conditions were as follows:

- AFA parameters in Phase I: 180-50, 200°C and 15 sec. These conditions were used to homogenize and liquefy the sputum samples sufficiently to enable the recovery of fungi.
- AFA parameters in Phase II: 150-50, 200°C and 15 sec. These conditions were used to homogenize and liquefy the sputum samples further, allowing for efficient recovery of fungi.

These conditions were determined by optimizing the AFA parameters to achieve the best recovery of fungal elements from the sputum samples. The recovery of fungi from unprocessed sputa was achieved using these optimized conditions.

Methods

Phase I: Homogenization and Liquefaction

Twenty sputum samples were processed by AFA using a Covaris S220x AFA ultrasonicator (Covaris, Woburn, MA). Each sample was diluted 1:1 with sterile saline and processed in duplicate according to the Covaris S220x AFA ultrasonicator specifications and the AFA parameters for sample homogenization and liquefaction (Figures 1A-V in the supplementary data).

Phase II: Fungal Viability within Sputa

CF patient sputum samples were processed with AFA and plated onto fungal isolation media. Both unprocessed and AFA-processed samples were inoculated onto Sabouraud Dextrose Agar (SAB) plates. After incubation for 72 hours at 35°C, plates were read at 24/72 hours (data not shown). AFA did not prove beneficial to the recovery of normal flora. However, the recovery of fungal elements was significant post-AFA. In Phase II-B, fungal spikes were introduced into pathogen-free sputa pools (only the growth of normal flora was recorded in the JHH Microbiology Lab record). The plates inoculated with the AFA processed aliquot.

Phase III: Application of Process on Sputa from CF Patients

In conclusion, the use of AFA processing protocols to homogenize and liquefy sputum samples has shown promising results in recovering fungi from unprocessed sputa. The optimized AFA parameters described in Phase I and II provide a feasible approach for fungal recovery from CF patient sputa. Further studies are warranted to evaluate the clinical relevance of these findings.

Conclusions

In conclusion, the use of AFA processing protocols to homogenize and liquefy sputum samples has shown promising results in recovering fungi from unprocessed sputa. The optimized AFA parameters described in Phase I and II provide a feasible approach for fungal recovery from CF patient sputa. Further studies are warranted to evaluate the clinical relevance of these findings.

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