



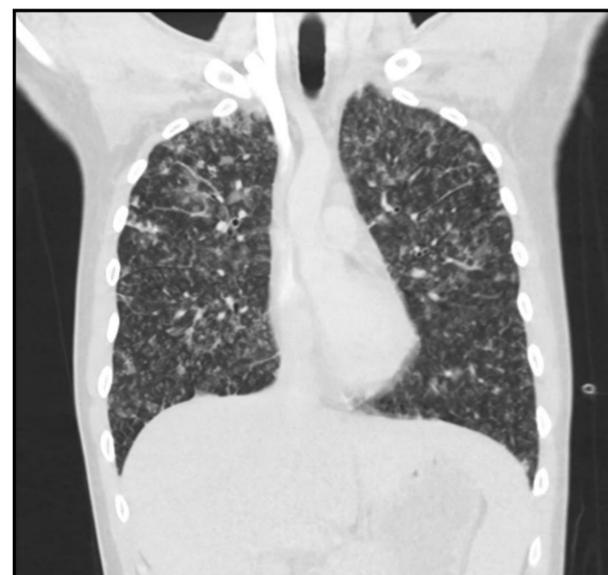
# Hypersensitivity Pneumonitis Diagnosed with Broad-Range PCR Testing after Exposure to *Battarrea* Mushroom Spores

Laura Selby, DO<sup>1</sup>, Justin Jacobs OMS III<sup>2</sup>, Adam C. Brady, MD<sup>1</sup>

1. Samaritan Health Services, Corvallis, Oregon 2. Western University of Health Sciences College of Osteopathic Medicine of the Pacific Northwest, Lebanon, Oregon

## BACKGROUND

- *Battarrea* mushrooms are long-stemmed fungi with a characteristic cap that belong to the Agaricaceae family. When disturbed by physical contact, they can release numerous conidia into the air.
- Lycoperdonosis is a rare illness caused by the inhalation of large numbers of conidia from certain puffball mushrooms (namely *Lycoperdon*) that can cause hypersensitivity pneumonitis and mimic pulmonary infection.
- Inhalation of *Battarrea* conidia has not been described in the literature to cause illness in humans.
- We present a case of lycoperdonosis due to *Battarrea*, diagnosed with broad-range PCR testing.



## CLINICAL CASE

- A 23-year-old homeless male with a history of inhalational methamphetamine use presented to an emergency department in western Oregon with a two-week history of dry cough, pleuritic chest pain and progressive dyspnea.
- Symptoms began several hours after eating a mushroom which he describes as being “dusty” and having a “long stalk.”
- At presentation he was noted to be febrile with leukocytosis and imaging was consistent with bilateral ground glass infiltrates.
- Despite antibiotic therapy, he developed worsening hypoxemia requiring NIPPV.
- Blood and sputum cultures were negative. Bronchoscopy was performed and lavage cultures were negative for AFB, fungi, and bacteria.

## CLINICAL CASE (CONT.)

- Cytology from BAL fluid did not reveal fungal elements or spores and showed ciliated bronchial epithelial cells, pigmented macrophages, and neutrophil-predominant inflammation.
- Broad Range PCR from BAL fluid detected *Battarrea* spp. DNA. No other pathogens were detected.
- After treatment with corticosteroids, symptoms rapidly improved and he was discharged but lost to follow up.
- PCR Methods: *Battarrea* species DNA was detected from 28S and ITS regions at the University of Washington. Fungal PCR at this laboratory employs three PCR targets in 28S and ITS1 and ITS2 and all primers were previously published in the literature with some optimization in the lab. The 28S amplicon is 500-700 bps while ITS1 and ITS2 are 200-400 bps depending on the fungal species. The analytical sensitivities are: 28S 1000 genomes per PCR reaction; ITS1 and ITS2-100 genomes per PCR reaction.

## DISCUSSION

- Human lycoperdonosis is a rare disease that is characterized by nausea, shortness of breath, and tachycardia.
- Common chest imaging findings include bilateral pulmonary infiltrates.
- Diagnosis has traditionally been made through visualization of spores in respiratory specimens.
- Corticosteroids are thought to be the most effective therapy and there is no definitive role for systemic antifungal agents.
- To our knowledge this is the first reported case of lycoperdonosis diagnosed by broad range PCR in humans.

## CONCLUSION

- Broad range PCR from respiratory specimens should be considered in those with a history of long stemmed puffball mushroom exposure and clinical signs of hypersensitivity pneumonitis.

## REFERENCES & ACKNOWLEDGEMENTS

- Munson, E., Panko, D. and Fink, J. (1997). Lycoperdonosis: Report of two cases and discussion of the disease. *Clinical Microbiology Newsletter*, 19(3), pp.17-21.
- 3. Jeffries P, McLain L. Synonymy between *Battarrea phalloides* and *B. stevenii* - ENRR625 part 1 [Internet]. Natural England - Access to Evidence. English Nature; 2005 [cited 2019JUL14]. Available from: <http://publications.naturalengland.org.uk/publication/108005>
- Kuo M. *Battarrea phalloides* [Internet]. *Battarrea phalloides* (MushroomExpert.Com). MushroomExpert.com; 2011 [cited 2019JUL14]. Available from: [https://www.mushroomexpert.com/battarrea\\_phalloides.html](https://www.mushroomexpert.com/battarrea_phalloides.html)
- Alenghat T, Pillitteri CA, Bemis DA, Kellett-Gregory L, Jackson KV, Kania SA, et al. Lycoperdonosis in two dogs. [Internet]. *Journal of veterinary diagnostic investigation* : official publication of the American Association of Veterinary Laboratory Diagnosticians, Inc. U.S. National Library of Medicine; 2010 [cited 2018Oct22]. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/21088194>
- King TE. Hypersensitivity pneumonitis (extrinsic allergic alveolitis): Treatment, prognosis, and prevention [Internet]. UpToDate. Wolters Kluwer; 2018 [cited 2019Jul16].
- DNA extraction, PCR amplification and DNA sequencing was performed in the Department of Laboratory Medicine at the University of Washington.
- Mushroom photograph used under Creative Commons License, from Andrew Heath (Quercus) at [https://mushroomobserver.org/image/show\\_image/674714?obs=256860&q=xKeW](https://mushroomobserver.org/image/show_image/674714?obs=256860&q=xKeW)