

## Current Grants Awarded

2022-2027 NIH/NIAID U19 Research Program - Cooperative agreements RFA AI-20-056 - Coccidioidomycosis collaborative research center (U19 Clinical Trial Not Allowed). (PI Keim NAU). Early in vivo expressed antigens and their role in virulence, immune response, and vaccines for coccidioidomycosis. Submitted Feb 2021. NOA August 22, 2022. Role: Co-I Core Director and Research Project Leader. \$7.5 million total costs.

2021-2025 Reagent's Grant from TRIF fund (PI:Keim NAU). Getting to the Source of Arizona's Valley Fever Problem: A Tri-University Collaboration to Map and Characterize the Pathogen Where it Grows. Role: Co-I \$3,000,000 direct.

2022-2027 NIH/NIAID U19 Research Program - Cooperative agreements RFA AI-20-056 - Coccidioidomycosis collaborative research center (U19 Clinical Trial Not Allowed). (MPI Dadakar UCD and Sil UCSF) Molecules and pathways at the Coccidioides host-pathogen interface. Role: Co-I Core director. \$1,200,000 total budget estimate.

McHardy IH, Barker B, Thompson GR. Review of Clinical and Laboratory Diagnostics for Coccidioidomycosis. *Journal of Clinical Microbiology*. 0(0):e01581-22. doi: doi:10.1128/jcm.01581-22. Accepted.

## PUBLICATIONS

Kollath DRPD, Morales MMU+, Itogawa ANRT\*, Mullaney D, Lee NR, Barker BM. Combating the Dust Devil: Utilizing Naturally Occurring Soil Microbes in Arizona to Inhibit the Growth of Coccidioides spp., the Causative Agent of Valley Fever. *J Fungi*. 2023; 9(3):345. <https://doi.org/10.3390/jof9030345>

Higgins Keppler EA, Van Dyke MCC PD\*+, Mead HLG\*, Lake DF, Magee DM, Barker BM, Bean HD. Volatile Metabolites in Lavage Fluid Are Correlated with Cytokine Production in a Valley Fever Murine Model. *J Fungi (Basel)*. 2023 Jan 14;9(1). doi: 10.3390/jof9010115. PubMed PMID: 36675936; PubMed Central PMCID: PMC9864585.

Dubin CA, Voorhies M, Sil A, Teixeira MM PD+, Barker BM, Brem RB. Genome Organization and Copy-Number Variation Reveal Clues to Virulence Evolution in Coccidioides posadasii. *J Fungi (Basel)*. 2022 Nov 22;8(12). doi: 10.3390/jof8121235. PubMed PMID: 36547568; PubMed Central PMCID: PMC9782707.

Mead HLG\*, Kollath DRG, de Melo Teixeira M PD+, Roe CC, Plude C, Nandurkar N, Donoho C, O'Connor BL, Terriquez J, Keim P, Barker BM. Coccidioidomycosis in Northern Arizona: An Investigation of the Host, Pathogen, and Environment Using a Disease Triangle Approach. 2022. mSphere. 2022 Oct 26;7(5):e0035222. doi: 10.1128/msphere.00352-22. Epub 2022 Aug 16. PubMed PMID: 35972134; PubMed Central PMCID: PMC9599602.

Kollath DRG, Mihaljevic J, Barker BM. 2022. PM10 and other Climatic Variable are Important Predictors of the Seasonal Variability of Coccidioidomycosis in Arizona. Microbiology Spectrum. Apr 27;10(2):e0148321. doi: 10.1128/spectrum.01483-21. Epub 2022 Mar 23. PMID: 35319247; PMCID: PMC9045372

McHardy I, Reagan KL, Sebastian JF, Barker B, Bays DJ, Dandekar S, Cohen SH, Jennings KE, Sykes J, Thompson GR III. 2022 Sex Differences in the Susceptibility to Coccidioidomycosis. Open Fo-rum Infectious Diseases. Feb 16;9(3):ofab543. doi: 10.1093/ofid/ofab543. eCollections 2022 Mar. PMID: 35252466; PMCID: PMC8890500

Teixeira MdMPD, Stajich JE, Sahl JW, Thompson GR, Brem RB, Dubin CA, Mead HLG\*, Blackmon AVUG+, Keim P, Barker BM. A chromosomal-level reference genome of the widely utilized *Coccidioides posadasii* laboratory strain "Silveira". 2022. G3 (Bethesda) Feb 7:jkac031. doi: 10.1093/g3journal/jkac031. Epub ahead of print. PMID: 35137016.

Finn DR, Maldonado J, de Martini F, Yu J, Penton CR, Fontenele RS, Schmidlin K, Kraberger S, Varsani A, Gile GH, Barker B, Kollath DRG, Muenich RL, Herckes P, Fraser M, Garcia-Pichel F. Agricultural practices drive biological loads, seasonal patterns and potential pathogens in the aerobiome of a mixed-land-use dryland. Science of The Total Environment. 2021:149239. doi.org/10.1016/j.scitotenv.2021.149239

Barker BM, Cuomo CA, Govender NP. Editorial: Genomic Characterization of Emerging Human Fungal Pathogens. Front Genet. 2021;12:674765. Epub 2021/04/13. doi: 10.3389/fgene.2021.674765. PubMed PMID: 33841515; PMCID: PMC8027301.

Higgins Keppler EA, Mead HLG\*, Barker BM, Bean HD. Life Cycle Dominates the Volatilome Character of Dimorphic Fungus *Coccidioides* spp. mSphere. 2021;6(2). Epub 2021/04/16. doi: 10.1128/mSphere.00040-21. PubMed PMID: 33853870.

de Melo Teixeira M, Lang BF, Matute DR, Stajich JE, Barker BM. The mitochondrial genomes of the human pathogens *Coccidioides immitis* and *Coccidioides posadasii*. *G3 Genes| Genomes| Genetics*. 2021. Volume 11, Issue 7, July 2021, jkab132, <https://doi.org/10.1093/g3journal/jkab132>

Mead, H.L.G\*, P.S. HammVS\*, I.N. Shaffer, M. de Melo TeixeiraPD+, C. Wendel, N.P. Wiederhold, G.R. Thompson, R. Muñiz-Salazar, L.R. Castañón Olivares, P. Keim, C. Plude, J. Terriquez, J.N. Galgiani, M.J. Orbach, B.M. Barker. 2020. Differential thermotolerance adaptation between species of *Coccidioides*. *J Fungi (Basel)*. 2020;6(4). Epub 2020/12/18. doi: 10.3390/jof6040366. PubMed PMID: 33327629; PMCID: PMC7765126.

Mead, H. L. G\*, Van Dyke, M. PD\*+, Barker, B. M. 2020. Proper Care and Feeding of *Coccidioides*: A Labor-atorian's Guide to Cultivating the Dimorphic Stages of *C. immitis* and *C. posadasii*. *Current Protocols in Microbiology*, 58(1), e113. <https://doi.org/10.1002/cpmc.113>. PubMed PMID: 32894648.

Mead, H.L. G\*, C.C. Roe, E.A. Higgins Kepler, M.C. Caballero Van Dyke PD\*+, K.L. Laux G\*, A.L. Funke, K.J. Miller G\*, H.D. Bean, J.W. Sahl, B.M. Barker. 2020. Defining critical genes during spherule re-modeling and endospore development in the fungal pathogen, *Coccidioides posadasii*. *Frontiers in Genetics*. May 15;11:483. doi: 10.3389/fgene.2020.00483. eCollection 2020. PubMed PMID: 32499817; PubMed Central PMCID: PMC7243461

Kollath, D.R., M.M. TeixeiraPD+, A. Funke, K.J. MillerU,G\*, B.M. Barker. 2020. Investigating the role of animal burrows on the ecology and distribution of *Coccidioides* spp. in Arizona soils. *Mycopathologia* 185(1):145-159. doi: 10.1007/s11046-019-00391-2. Epub 2019 Oct 4. PubMed PMID: 31586286; PubMed Central PMCID: PMC7050328.

Teixeira, M.M. PD+, P. Alvarado, C. Roe, G.R. Thompson, J. Patane, J.W. Sahl, P. Keim, J.N. Galgiani, A.P. Litvintseva, D.R. Matute, B.M. Barker. 2019. Population structure and genetic diversity among iso-lates of *Coccidioides posadasii* in Venezuela and surrounding regions. *mBio*.2019 Nov 26;10(6). doi: 10.1128/mBio.01976-19. PubMed PMID: 31772050; PubMed Central PMCID: PMC6879716.

Van Dyke, M.C.C.PD\*+, G.R. Thompson, J.N. Galgiani, B.M. Barker. 2019. The rise of *Coccidioides*: Forces against the dust devil unleashed. *Frontiers in Immunology*. Sep 11;10:2188. eCollection 2019. doi: 10.3389/fimmu.2019.02188. PMID 31572393 PMCID: PMC6749157

Damasceno, L.S., M.deM. TeixeiraPD, B.M. Barker , M.A. Almeida , M.M. Muniz , C.V. Pizzini , J.R.L. Mesquita , G. Rodríguez-Arellanes , J.A. Ramírez , T. Vite-Garín , T.doM. Jesus Silva Leitão , M.L.

Taylor , R. Almeida-Paes. 2019. Histoplasmosis in HIV patients: Novel clinical *Histoplasma capsulatum* genotypes and dual infection by different genotypes. *Scientific Reports*. Aug 13;9(1):11789. doi: 10.1038/s41598-019-48111-6. PMID: 31409874. PMCID: PMC6692370

Teixeira, M.M. PD+, B.M. Barker, J.E. Stajich. 2019. Improved reference genome sequence of *Coccidioides immitis* strain WA\_211, Isolated in Washington state. *Microbial Resource Announcements*. 8 (33) e00149-19; doi: 10.1128/MRA.00149-19. PMID: 31416856 PMCID: PMC6696631

MeadG, H.L., A.V. BlackmonU, A.J. Vogler, B.M. Barker. 2019. Heat Inactivation of *Coccidioides posadasii* and *C. immitis* for Use in Lower Biosafety Containment. *Applied Biosafety*. June; 24(3): 123-128. <https://doi.org/10.1177/1535676019856525>

Van Dyke, M.C.C.PD+\*, M.M. TeixeiraPD+, B.M. Barker. 2019. Fantastic Yeasts and Where to Find Them: The Hidden Diversity of Dimorphic Fungal Pathogens. *Current Opinion in Microbiology*. Invited Review. Epub ahead of print. June 7; 52:55-63. doi: 10.1016/j.mib.2019.05.002. PMID: 31181385.

KollathG, D.R., K.J. MillerU\*, B.M. Barker. The mysterious desert dwellers: *Coccidioides immitis* and *Coccidioides posadasii*, causative fungal agents of coccidioidomycosis. 2019. Invited review. *Virulence* 10(1): 222-233. PMID: 30898028 PMCID: PMC6527015

Barker, B.M., S. Rajan, M.M. TeixeiraPD, M. Sewnarine, C. Roe, D.M. Engelthaler, J.N. Galgiani. 2019. Coccidioidal meningitis in New York traced to Texas by fungal genomic analysis. *Clinical Infectious Diseases*. ciz052, <https://doi.org/10.1093/cid/ciz052>. PMID: 30715178

Maxwell, C.S., K. Mattox, D.A. Turrissini, M.M. TeixeiraPD+, B.M. Barker, and D.R. Matute. 2019. Gene exchange between two divergent species of the fungal human pathogen, *Coccidioides*. *Evolution*.73(1): 42-58. doi 10.1111/evo.13643. PMID 30414183

Taylor, J.W., B.M., Barker. 2019. The endozoan small-mammal-reservoir hypothesis and the life cycle of *Coccidioides* species. *Medical Mycology*. 57(S1): S16-20. <https://doi.org/10.1093/mmy/myy039> PMID: 30690603 PMCID: PMC6702415

Barker, B.M., A. Litvintseva, M. Riquelme, L. Vargas-Garcia. 2019. The ecology and genomics of *Coccidioides*. *Medical Mycology*. 57(S1): S21-29. <https://doi.org/10.1093/mmy/myy051> PMID: 30690605 PMCID: PMC6347077

MeadG\*, H.L., M.deM. TeixeiraPD, J.N. Galgiani, B.M. Barker. 2019. Characterizing spherule morphogenesis of multiple strains of both species of *Coccidioides* in an in vitro system. *Medical Mycology*. 57(4) 478-488. PMID:30053114

Alvarado, P., M.deM. TeixeiraPD+, L. Andrews, A. Fernandez, G. Santander, A.L. DoyleRT\*, M. Perez, F. Yegres and B.M. Barker. 2018. Detection of *Coccidioides posadasii* from xerophytic environments in Venezuela reveals risk of naturally acquired coccidioidomycosis infections. *Emerging Microbes and Infections*. 7 e46. doi:10.1038/s41426-018-0049-6. PMID: 29593263.

Bowers, J.R., K.L. PariseRT\*, E. Kelley, D. Lemmer, J.M. Schupp, E.M. Driebe, D.M. Englethaler, P. Keim and B.M. Barker. 2018. Direct detection of *Coccidioides* from Arizona soils using CocciEnv, a highly sensitive and specific real-time PCR assay. *Medical Mycology*. doi.org/10.1093/mmy/myy007. PMID 29534236.

Barker, B.M. 2017. The changing epidemiology and diagnosis of Valley Fever. *Clinical Microbiology Newsletter*. 39(20) 159-164. <https://doi.org/10.1016/j.clinmicnews.2017.09.007>.

Thompson, III G.R, B.M. Barker, N. P. Weiderholdt. 2017. Large Scale evaluation of in vitro Amphotericin B, Triazole and Echinocandin activity against *Coccidioides* species from United States institutions. *Antimicrobial Agents and Chemotherapy*. 61(4) pii: e02634-16. PMID 28096163.

Chow, N.A., D. W. Griffin, B.M. Barker, A.P. Litvintseva. 2016. Molecular detection of airborne *Coccidioides* in Tucson, Arizona. *Medical Mycology*. 54(6): 584-92. PMID 27143633.

Englethaler, D.M., C.C. Roe, C.M. Hepp, M.deM. TeixeiraPD+, E.M. Driebe, J.M. Schupp, L. Gade, V. Waddell, K. Komatsu, E. Arathoon, H. Longemann, G.R. Thomson, T. Chiller, B.M. Barker, P. Keim, A.P. Litvintseva. 2016. Local population structure and patterns of Western Hemisphere dispersal for *Coccidioides* spp., the fungal cause of Valley Fever. *MBio*. 26;7(2). pii: e00550-16. PMID 27118594.

Teixeira, M.deMPD+, B.M. Barker. Use of population genetics to assess the ecology, evolution, and population structure of *Coccidioides*. 2016. *Emerging Infectious Diseases*. 22(6):1022-30. PMID 27191589..

Shubitz, L.F., H.T. Trinh, J.N. Galgiani, M.L. Lewis, A.W. Fothergill, N.P. Wiederhold, B.M. Barker, E.R.G. LewisPD+, A.L. DoyleRT\*, W.J. Hoekstra, R.J. Schotzinger, and E.P. Garvey. 2015. Evaluation of VT-1161 for treatment of coccidioidomycosis in murine infection models. *Antimicrobial Agents and Chemotherapy*. 59(12): 7249-54. PMID 26369964.

Vogler, A.J., R. Nottingham, K.L. ParisRT\*, P. Keim, B.M. Barker. 2015. Effective Disinfectants for *Coccidioides immitis* and *C. posadasii*. *Applied BioSafety Journal*. 20(3): 154-158. PMID: 26900366.

Lewis, E. R. G.PD+, V. R. David, A. L. DoyleRT, K. Rajabi, J. A. Kiefer, P. Pirrotte, and B. M. Barker. 2015. Differences in host innate response among isolates of *Coccidioides* in a murine model of pulmonary coccidioidomycosis. *Eukaryotic Cell*. 14(10):1043-53. doi: 10.1128/EC.00122-15. PMID 26275879.

Rosen S., B. Barker, B. Larsen, I. Poojary. 2015. Medical image of the week: fungus ball. *Southwest Journal of Pulmonary Critical Care*. 10(4):182-3. doi: <http://dx.doi.org/10.13175/swjpsc025-15>

Lewis, E.R.G.PD+, J.R. Bowers, B.M. Barker. 2015. Dust Devil: The Life and Times of the Fungus That Causes Valley Fever. PLoS Pearls invited review. *PLoS Pathogens*. 11(5): e1004762. doi: 10.1371/journal.ppat.1004762. PMID: 25973899.

Litvintseva, A.P. N. Marsden-Haug, S. Hurst, H. Hill, L. Gade, E.M. Driebe, C. Ralston, C. Roe, B.M. Barker, M. Goldoft, P. Keim, R. Wohrle, G.R. Thompson III, D.M. Engelthaler, M.E. Brandt, T. Chiller. 2015. Valley Fever: An old disease finding its way to new places: *Coccidioides immitis* found in Washington State from soil associated with recent human infection. *Clinical Infectious Dis*. 60(1):e1-3. PMID: 25165087.

Nguyen, C., B.M. Barker, S. Hoover, D.E. Nix, N.M. Ampel, J.A. Frelinger, M.J. Orbach, J.N. Galgiani. 2013. Recent advances in our understanding of the environmental, epidemiological, immunological, and clinical dimensions of coccidioidomycosis. *Clinical Microbiology Reviews* 26(3): 505-25. PMID: 23824371.

Barker, B.M., J.A. Tabor, L. Shubitz, R. Perrill and M.J. Orbach. 2012. Detection and phylogenetic analysis of *Coccidioides posadasii* in Arizona soil samples. *Fungal Ecology* 5(2): 163-176. <http://www.sciencedirect.com/science/article/pii/S1754504811000961>.

Neafsey, D. E., B. M. Barker (shared first authorship), T. J. Sharpton, J. E. Stajich, D. J. Park, E. Whiston, C. Hung, C. McMahan, J. White, S. Sykes, D. Heiman, S. Young, Q. Zeng, A. Abouelleil, L. Aftuck, D. Bessette, A. Brown, M. Fitzgerald, A. Lui, J. P. Macdonald, M. Preist, M. J. Orbach, J. N. Gal-giani, T. N. Kirkland, G. T. Cole, B. W. Birren, M. R. Henn, J. W. Taylor, S. D. Rounsley. 2010. Population genomic sequencing of *Coccidioides* fungi reveals recent hybridization and transposon control. *Genome Research* 20(7): 938-946. <http://genome.cshlp.org/content/20/7/938> PMID: 20516208

Sheff, K., E. York, E. Driebe, B. Barker, S. Rounsley, V. Waddell, S. Beckstrom-Sternberg, P. Keim and D. Engelthaler. 2010. Development of a rapid, cost-effective TaqMan real-time PCR assay for identification and differentiation of *Coccidioides immitis* and *Coccidioides posadasii*. *Medical Mycology* 48: 466-469. PMID: 20370360

Sharpton, T. J., J. E. Stajich, S. D. Rounsley, M. J. Gardner, J. R. Wortman, V. S. Jordar, R. Maiti, C. D. Ko-dira, D. E. Neafsey, Q. Zeng, C.-Y. Hung, C. McMahan, A. Muszewska, M. Grynberg, M. A. Mandel, E. M. Kellner, B. M. Barker, J. N. Galgiani, M. J. Orbach, T. N. Kirkland, G. T. Cole, M. R. Henn, B. W. Birren, J. W. Taylor. 2009. Comparative genomic analyses of the human fungal pathogens *Coccidioides* and their relatives. *Genome Research* 19: 1722-1731. <http://genome.cshlp.org/content/19/10/1722> PMID: 19717792

Barker, B.M., K. A. Jewell, S. Kroken and M. J. Orbach. 2007. Population biology of *Coccidioides*: Epidemiological implications for disease outbreaks. *Ann. N. Y. Acad. Sci.* 1111: 147-163. <http://www3.interscience.wiley.com/cgi-bin/fulltext/117985902/abstract> PMID: 17344537

Mandel, M.A., B.M. Barker, S. Kroken, S.D. Rounsley and M.J. Orbach. 2007. Genomic and population analyses of the mating type loci in *Coccidioides* reveal evidence for sexual reproduction and gene acquisition. *Eukaryotic Cell* 6: 1189-1199. <http://ec.asm.org/cgi/content/full/6/7/1189> PMID: 17513566