

RESEARCH ARTICLE

# Low-level Laser Therapy to the Mouse Femur Enhances the Fungicidal Response of Neutrophils against *Paracoccidioides brasiliensis*

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**Citation:** Burger E, Mendes ACSC, Bani GMAC, Brigagão MRPL, Santos GB, Malaquias LCC, et al. (2015) Low-level Laser Therapy to the Mouse Femur Enhances the Fungicidal Response of Neutrophils against *Paracoccidioides brasiliensis*. PLoS Negl Trop Dis 9(2): e0003541. doi:10.1371/journal.pntd.0003541

**Editor:** Joseph M. Vinetz, University of California San Diego School of Medicine, UNITED STATES

**Received:** October 31, 2014

**Accepted:** January 14, 2015

**Published:** February 12, 2015

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**Data Availability Statement:** All relevant data are within the paper and its Supporting Information files.

**Funding:** This study was supported by grants: Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq - [www.cnpq.br](http://www.cnpq.br)) 486135/2012-8 and 304827/2012-6; and Fundação de Amparo à Pesquisa do Estado de Minas Gerais (FAPEMIG - [www.fapemig.br](http://www.fapemig.br)) CBB-PPM-00119-14. MRH was supported by National Institute of Health (US NIH - [www.nih.gov](http://www.nih.gov)) grant R01AI050875. FFS was supported by Coordenação de Aperfeiçoamento de

## Abstract

Neutrophils (PMN) play a central role in host defense against the neglected fungal infection paracoccidioidomycosis (PCM), which is caused by the dimorphic fungus *Paracoccidioides brasiliensis* (*Pb*). PCM is of major importance, especially in Latin America, and its treatment relies on the use of antifungal drugs. However, the course of treatment is lengthy, leading to side effects and even development of fungal resistance. The goal of the study was to use low-level laser therapy (LLLT) to stimulate PMN to fight *Pb in vivo*. Swiss mice with subcutaneous air pouches were inoculated with a virulent strain of *Pb* or fungal cell wall components (Zymosan), and then received LLLT (780 nm; 50 mW; 12.5 J/cm<sup>2</sup>; 30 seconds per point, giving a total energy of 0.5 J per point) on alternate days at two points on each hind leg. The aim was to reach the bone marrow in the femur with light. Non-irradiated animals were used as controls. The number and viability of the PMN that migrated to the inoculation site was assessed, as well as their ability to synthesize proteins, produce reactive oxygen species (ROS) and their fungicidal activity. The highly pure PMN populations obtained after 10 days of infection were also subsequently cultured in the presence of *Pb* for trials of protein production, evaluation of mitochondrial activity, ROS production and quantification of viable fungi growth. PMN from mice that received LLLT were more active metabolically, had higher fungicidal activity against *Pb in vivo* and also *in vitro*. The kinetics of neutrophil