Rudkin F.M., Bain, J.M., Walls, C., Lewis, L.E., Gow, N.A.R. & Erwig, L.P. (2013). Altered dynamics of *Candida albicans* phagocytosis by macrophages and PMNs when both phagocyte subsets are present, *mBio* 4(6):e00810-13.

An important first line of defense against Candida albicans infections is the killing of fungal cells by professional phagocytes of the innate immune system, such as polymorphonuclear cells (PMNs) and macrophages. In this study, we employed live-cell video microscopy coupled with dynamic image analysis tools to provide insights into the complexity of C. albicans phagocytosis when macrophages and PMNs were incubated with C. albicans alone and when both phagocyte subsets were present. When C. albicans cells were incubated with only one phagocyte subtype, PMNs had a lower overall phagocytic capacity than macrophages, despite engulfing fungal cells at a higher rate once fungal cells were bound to the phagocyte surface. PMNs were more susceptible to C. albicans-mediated killing than macrophages, irrespective of the number of C. albicans cells ingested. In contrast, when both phagocyte subsets were studied in coculture, the two cell types phagocytosed and cleared C. albicans at equal rates and were equally susceptible to killing by the fungus. The increase in macrophage susceptibility to C. albicans-mediated killing was a consequence of macrophages taking up a higher proportion of hyphal cells under these conditions. In the presence of both PMNs and macrophages, C. albicans yeast cells were predominantly cleared by PMNs, which migrated at a greater speed toward fungal cells and engulfed bound cells more rapidly. These observations demonstrate that the phagocytosis of fungal pathogens depends on, and is modified by, the specific phagocyte subsets present at the site of infection.

IMPORTANCE: Extensive work investigating fungal cell phagocytosis by macrophages and PMNs of the innate immune system has been carried out. These studies have been informative but have examined this phenomenon only when one phagocyte subset is present. The current study employed live-cell video microscopy to break down C. albicans phagocytosis into its component parts and examine the effect of a single phagocyte subset, versus a mixed phagocyte population, on these individual stages. Through this approach, we identified that the rate of fungal cell engulfment and rate of phagocyte killing altered significantly when both macrophages and PMNs were incubated in coculture with C. albicans compared to the rate of either phagocyte subset incubated alone with the fungus. This research highlights the significance of studying pathogen-host cell interactions with a combination of phagocytes in order to gain a greater understanding of the interactions that occur between cells of the host immune system in response to fungal invasion.