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Phagocytic clearance of fungal pathogens, and microorganisms more generally, may be considered to consist of four distinct stages: (i) migration of phagocytes to the site where pathogens are located; (ii) recognition of pathogen-associated molecular patterns (PAMPs) through pattern recognition receptors (PRRs); (iii) engulfment of microorganisms bound to the phagocyte cell membrane, and (iv) processing of engulfed cells within maturing phagosomes and digestion of the ingested particle. Studies that assess phagocytosis in its entirety are informative but are limited in that they do not normally break the process down into migration, engulfment and phagosome maturation, which may be affected differentially. Furthermore, such studies assess uptake as a single event, rather than as a continuous dynamic process. We have recently developed advanced live-cell imaging technologies, and have combined these with genetic functional analysis of both pathogen and host cells to create a cross-disciplinary platform for the analysis of innate immune cell function and fungal pathogenesis. These studies have revealed novel aspects of phagocytosis that could only be observed using systematic temporal analysis of the molecular and cellular interactions between human phagocytes and fungal pathogens and infectious microorganisms more generally. For example, we have begun to define the following: (a) the components of the cell surface required for each stage of the process of recognition, engulfment and killing of fungal cells; (b) how surface geometry influences the efficiency of macrophage uptake and killing of yeast and hyphal cells; and how engulfment leads to alteration of the cell cycle and behavior of macrophages. In contrast to single time point snapshots, live-cell video microscopy enables a wide variety of host cells and pathogens to be studied as continuous sequences over lengthy time periods, providing spatial and temporal information on a broad range of dynamic processes, including cell migration, replication and vesicular trafficking. Here we describe in detail how to prepare host and fungal cells, and to conduct the video microscopy experiments. These methods can provide a user-guide for future studies with other phagocytes and microorganisms.