

FRIEND OR FOE: USING SYSTEMS BIOLOGY TO ELUCIDATE THE INTERACTION BETWEEN FUNGI AND THEIR HOSTS

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Modelling the networks subtending the fruitful coexistence between fungi and their mammalian hosts is becoming increasingly important in the effort to control emerging fungal pathogens. In a “Systems Biology” perspective the microbiota and the host should be seen as an ecosystem, and disease considered as an alteration of the equilibrium. The tasks of recognizing an invading pathogen and activating the host response are accomplished by pattern-recognition receptors, which recognize conserved microbial components called pathogen-associated molecular patterns. Recent evidence suggests that the use of distinct recognition receptors contributes to the disparate patterns of reactivity observed locally in response to challenge with pathogenic and harmless fungi. To contrast fungal infection, augmenting the ability of the immune system to eliminate a pathogen requires a sophisticated understanding of the molecular mechanisms that are involved in pathogen recognition and in the host immune response. The integration of a Systems Biology approach to functional data will offer new interpretive clues to the mechanisms of fungal virulence. This work addresses host-yeast interaction with special focus on the ecology of the yeasts, and the environmental determinants of the expression of potentially pathogenic traits. Knowledge of “friendly” organisms, generally recognized as safe, such as *Saccharomyces cerevisiae*, will significantly improve our ability to understand fungal ecological niches and the selective forces shaping their population structure.