Game theoretical modelling of survival strategies of *Candida albicans* inside macrophages.

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Abstract

The polymorphic fungus Candida albicans can live as an aggressive pathogen that causes a wide variety of diseases in humans. Host resistance against these infections is mediated predominantly by phagocytes, namely neutrophils and macrophages. This report provides two game theoretical models of ingested C. albicans cells in macrophages. Two strategies are available for each pathogenic yeast cell: avoiding lysis transiently (called silencing) or forming hyphae and escaping (called piercing because the macrophage is pierced from inside). In dependence on parameter values, two different outcomes can be derived from the model: when the difference of the costs of the two strategies is low, all fungal cells inside a macrophage will play the piercing strategy, while in the high-cost case, a mixed population of piercing and silencing cells is the only stable solution. Further, the role of the SAP gene family encoding secreted proteinases and the Sap proteins is investigated with the help of known studies and is put in relation to the costs of the strategies, the most important parameter of this model. Our results are in agreement with wet-lab results presented by other groups and the model parameters can be estimated from experimental data.

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