



CALIFORNIA STATE SCIENCE FAIR 2011 PROJECT SUMMARY

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Project Title Role of Septins in the Uptake of the Fungus <i>Candida albicans</i> by Host Cells	
Abstract Objectives/Goals The fungus <i>Candida albicans</i> normally grows as a harmless commensal on the skin and mucous membranes. In hospitalized patients, <i>C. albicans</i> causes a severe bloodborne infection associated with greater than 40% mortality. Investigating septin function during the invasion of the fungus <i>C. albicans</i> into endothelial cells may provide insight into how microbial pathogens hijack endocytosis mechanisms to invade these cells. The objectives of this experiment are to determine if septins affect N-cadherin accumulation and if septin depletion decreases <i>C. albicans</i> uptake. Learning more about the basic science of cell membrane dynamics will help in the development of anti-infective drugs to combat candidiasis. Methods/Materials Human umbilical vein endothelial cells were infected with <i>C. albicans</i> cells. Septins and actin microfilaments were stained by AlexaFluor immunofluorescence procedures and imaged by confocal microscopy. To establish the role of septin 7 during <i>C. albicans</i> uptake, endothelial cells were transfected with siRNA against septin 7, infected with <i>C. albicans</i> , fixed, stained with anti-septin 7 and anti-N-cadherin (a known <i>C. albicans</i> cell receptor) antibodies, and then imaged by confocal microscopy. In addition, the endocytosis of <i>C. albicans</i> by the transfected cells was quantified via a differential fluorescence assay. Results By confocal microscopy, septin 7 co-localized with the actin filaments that also coalesced around the organisms. Confocal microscopy revealed a 72% reduction in septin 7 accumulation around <i>C. albicans</i> in endothelial cells that were transfected with the septin 7 siRNA compared to the control siRNA. Confocal microscopy also revealed a 66% reduction in N-cadherin accumulation around <i>C. albicans</i> in these septin-depleted cells. Septin 7 knockdown by siRNA resulted in a 47±18% decrease in the number of <i>C. albicans</i> cells that were endocytosed by the endothelial cells. Conclusions/Discussion Septin 7 is necessary for <i>C. albicans</i> to induce its own endocytosis by endothelial cells. The link between septins and vital cell receptors such as N-cadherin explains why septins are so important for host cells to take up microbial pathogens. Endothelial cell receptors for <i>C. albicans</i> cannot function properly without the presence of septins in this host cell.	
Summary Statement This study focuses on discovering the intracellular processes which facilitate endocytosis of the fungus <i>Candida albicans</i> in order to decrease the mortality rate of the disease it causes.	
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