Arenaviruses are responsible for a number of different human diseases that can cause significant morbidity and mortality. The *Arenaviridae* family is divided in two different groups, the Old World and New World arenaviruses. The Old World arenaviruses include Lassa and lymphocytic choriomeningitis virus (LCMV) while the New World arenaviruses include the South American hemorrhagic fever viruses (Junin, Guanarito, Sabia, and Machupo). This study examined cell viability, virus production, and apoptosis in vaccine and attenuated strains of arenaviruses. Monkey kidney cells were infected at a MOI of 1 with either a virulent (Junin Romero, Guanarito, Lassa) or attenuated (Junin Candid#1, Pichinde, Mopeia) strains of arenaviruses in a biological safety level (BSL)-4 laboratory. Cytopathic effects, cell viability, phosphatidylserine translocation, and virus production were measured daily. Values were compared to mock infected cells by running a two-way ANOVA (Bonferroni’s post-hoc test analysis). Cytopathic effects were more prominent in cells infected with attenuated strains of arenaviruses compared to mock infected cells. Attenuated arenavirus strains experienced significantly reduced cell viability in infected cells compared to mock infected cells. Phosphatidylserine translocation, an early indicator of apoptosis, increased in attenuated strains when compared to uninfected cells. Despite similar virus production, virulent arenaviruses showed little cytopathic effects and phosphatidylserine translocation compared to attenuated strains. Results from this study suggest that increased amounts of cell death and phosphatidylserine flipping signal the immune system with infection by the vaccine strains of arenavirus for immune clearance. Virulent arenaviruses, which can cause significant mortality in humans, replicate in cells without as much cell death occurring and therefore can go unrecognized by the immune system.