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Gold nanoparticle conjugated RSV peptides inhibit virus replication

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Respiratory syncytial virus (RSV) belongs to the Paramyxoviridae family of Pneumoviruses which causes bronchiolitis in infants. Recent studies involving synthetic peptides have shown that peptides derived from the fusion protein of paramyxoviruses can bind to the F protein of RSV and block the necessary conformational changes needed during the infection. Gold nanoparticles have been used due to their efficient intracellular delivery and functionalization capacity. In the present study, two synthetic anti-RSV peptides were used to functionalization gold nanoparticles. The gold nanoparticles, peptides and the peptide-functionalized gold nanoparticles (fGNPs) were assessed for cytotoxicity to the HEp-2 cells in vitro using the MTT assay. The fGNPs were then used to evaluate their ability to inhibit RSV infection in various stages of infection including the pre-infection, viral binding stage and the post infection with RSV. The viral inhibition was assessed using the plaque reduction assay, immunofluorescence microscopy, qPCR and western blot. The MTT assay revealed that the gold nanoparticles, the peptides and the fGNPs were all non-cytotoxic to the HEp-2 cells at the highest concentrations i.e. 5nM, 50μM and 5nM respectively. The plaques assay as well as qPCR showed reduction in viral replication in vitro. The preliminary in vitro studies indicated that fGNPs were effective in inhibiting RSV replication. Animal experiments are being carried out to assess the in vivo effectiveness of fGNPs.

Biography

Shree R. Singh serves as Professor of microbiology and Director of Center for NanoBiotechnology at Alabama State University. He has been involved with vaccine development and immune system response against novel recombinant and protein vaccines for about 20 years. Dr. Singh has helped secure federal funding of over $20 million while at ASU. His recent research involves field of nanobiotechnology which uses novel nanomaterials to develop anti-viral molecules and develop nanosensors for detection of microorganisms. Dr. Singh has authored over 40 original research articles and several book chapters. Dr. Singh has made over 140 scientific presentations at scientific meetings and delivered many seminars in the US and other countries.

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