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### Targeted destruction of HIV positive cells

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The rapidly expanding field of nanotechnology has vast potential to radically advance the treatment and prevention of HIV/AIDS. Nanoparticles can provide improved drug delivery, by virtue of their small size, robustness, safety, multimodality or multifunctionality. Since HIV primarily infects CD4<sup>+</sup> cells; we aim to use CD4 as a selectable target to deliver a pro-apoptotic protein to HIV infected cells using nanoparticles as carriers. The aim of this study was to develop a nanotechnology-based death inducing delivery system for the destruction of CD4<sup>+</sup> HIV infected cells through the activation of caspase-3. A modified caspase-3 protein (Mut-3) was engineered, which is cleavable only by HIV-1 protease. Mut-3 can activate apoptosis in the presence of HIV-1 protease, consequently killing HIV positive cells. Mut-3 protein was conjugated to gold nanoparticles together with a CD4<sup>+</sup> targeting peptide. The efficacy of the gold nanoparticles was tested on CHO cells that were genetically engineered to express GFP labelled CD4 and HIV-1 protease. Mut-3 was expressed in bacterial cells and purified. CHO cells that stably over express CD4<sup>+</sup> GFP and HIV-1 protease were selected using Fluorescence Activated Cell Sorting. Dose response cell culture experiments showed that gold nanoparticles without Mut-3 and CD4<sup>+</sup> targeting peptide did not induce cell death in CHO cells, while gold nanoparticles that were conjugated with Mut-3 and the CD4<sup>+</sup> targeting peptide rapidly induced cell death in CHO cells. The results suggest that gold nanoparticles conjugated with Mut-3 and a CD4<sup>+</sup> targeting peptide could potentially induce apoptosis in HIV infected cells

### Biography

Jyoti Sharma has completed her PhD degree in 2010 from Guru Nanak Dev University, Amritsar, India. Since 2010, she has been working as a Postdoctoral fellow in the Department of Biotechnology at University of Western Cape. She has been involved with various research projects: 1. Growth and feeding practices of Punjabi infants (India), 2. "Obesity in Urban Middle Class of Punjab, India, Genetics of Autism (University of Western Cape) 3. Development of Protein Biomarker in Autism (University of Western Cape) 4. Molecular Genetics of Non Ketotic Hyperglycinemia among Vervet Monkeys (Medical Research Council). Her current project is "Development of nanotechnology-based therapeutic approaches to treat HIV". She has published 15 research papers in various reputed journals.

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