

Investigation of HIV-1 infected and uninfected cells using the optical trapping technique

S. Ombinda-Lemboumba, R. Malabi, M.Y. Lugongolo, S.L. Thobakgale, S. Manoto and P. Mthunzi-Kufa.

ABSTRACT:

Optical trapping has emerged as an essential tool for manipulating single biological material and performing sophisticated spectroscopy analysis on individual cell. The optical trapping technique has been used to grab and immobilize cells from a tightly focused laser beam emitted through a high numerical aperture objective lens. Coupling optical trapping with other technologies is possible and allows stable sample trapping, while also facilitating molecular, chemical and spectroscopic analysis. For this reason, we are exploring laser trapping combined with laser spectroscopy as a potential non-invasive method of interrogating individual cells with a high degree of specificity in terms of information generated. Thus, for the delivery of as much pathological information as possible, we use a home-build optical trapping and spectroscopy system for real time probing human immunodeficiency virus (HIV-1) infected and uninfected single cells. Briefly, our experimental rig comprises an infrared continuous wave laser at 1064 nm with power output of 1.5 W, a 100X high numerical aperture oil-immersion microscope objective used to capture and immobilise individual cell samples as well as an excitation source. Spectroscopy spectral patterns obtained by the 1064 nm laser beam excitation provide information on HIV-1 infected and uninfected cells. We present these preliminary findings which may be valuable for the development of an HIV-1 point of care detection system.