The lectins griffithsin, cyanovirin-N and scytovirin inhibit HIV-1 binding to the
DC-SIGN receptor and transfer to CD4+ cells

Kabamba B. Alexandre a, Elin S. Gray a, Hazel Mufhandu b, James B. McMahon c, Ereck Chakauya b
Barry R. O’Keefe c, Rachel Chikwamba b, Lynn Morris a*

a National Institute for Communicable Diseases, Johannesburg, South Africa
b Council for Scientific and Industrial Research, Pretoria, South Africa
c Molecular Targets Laboratory, Center for Cancer Research, NCI-Frederick, MD, USA

ABSTRACT

It is generally believed that during the sexual transmission of HIV-1, the glycan-specific DC-SIGN receptor binds the virus and mediates its transfer to CD4+ cells. The lectins griffithsin (GRFT), cyanovirin-N (CV-N) and scytovirin (SVN) inhibit HIV-1 infection by binding to mannose-rich glycans on gp120. We measured the ability of these lectins to inhibit both the HIV-1 binding to DC-SIGN and the DC-SIGN-mediated HIV-1 infection of CD4+ cells. While GRFT, CV-N and SVN were moderately inhibitory to DC-SIGN binding, they potently inhibited DC-SIGN-transfer of HIV-1. The introduction of the 234 glycosylation site abolished HIV-1 sensitivity to lectin inhibition of binding to DC-SIGN and virus transfer to susceptible cells. However, the addition of the 295 glycosylation site increased the inhibition of transfer. Our data suggest that GRFT, CV-N and SVN can block two important stages of the sexual transmission of HIV-1, DC-SIGN binding and transfer, supporting their further development as microbicides.

* Corresponding author at: National Institute for Communicable Diseases, Johannesburg, Private Bag X4, Sandringham 2131, Johannesburg, South Africa. Fax: +27 11 386 6453.

E-mail address: lynnm@nicd.ac.za (L. Morris).