235

Broad Spectrum Antiviral Activity of Mangrove Plants

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Extracts of bark, fruit, hypocotyl, leaf and stilt root from Bruguiera cylindrica (L.) Blume, Ceriops decandra (Griff.) Ding Hou. and Rhizophora mucronata Lam. were tested in vitro for antiviral activity against four RNA viruses viz., Newcastle disease, Encephalomyocarditis, Semliki forest, and Human immuno-deficiency viruses and two DNA virus viz., Vaccinia and Hepatitis B virus. A broad spectrum antiviral activity was exhibited in leaf of B. cylindrica and bark of R. mucronata. Bark and stilt root of R. mucronata showed the highest antiviral activity by giving 100% protection against EMCV and NDV respectively. Bark of R. mucronata had a high selectivity index (SI) of 17.59 and 15.41 against SFV and EMCV respectively. Leaf of C. decandra exhibited the anti-HIV activity with a high SI of 16.11. The herbal medicine from marine environment for the possible development of antiviral drugs has been discussed. Further studies on isolation of bioactive compounds are at progress.

236

Antiviral Activity of Glutathione: *in vitro* Inhibition of RNA and DNA Virus Replication.

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Glutathione (GSH) is a cysteine-containing tripeptide (γ-glutamyl-cysteinyl-glycine) which provides cells with their reducing equivalents and functions as a major cellular antioxidant. Recently, a growing body of evidence has pointed to an involvement of GSH in the human immunodeficiency virus (HIV) infection both *in vitro* and *in vivo*. The inhibition of HIV activation has been related to influence of GSH on cytokine-mediated activation of NFkB, the nuclear factor that increases HIV transcription and replication. On the other hand, there is no evidence for any direct antiviral action exerted by GSH. We have investigated the *in vitro* effect of exogenous GSH on RNA (Sendai) and DNA (Herpes Simplex) virus replication. Our results indicate that addition of reduced GSH, after the infection period, inhibited Sendai virus production in AGMK cells. This effect was dose-dependent, it did not adversely affect cellular metabolism, and it was associated to an increase of the GSH intracellular levels. The antiviral effect was related to decrease and inactivation of the hemagglutinin-neuraminidase (HN) Sendai virus glycoprotein. The same inhibitory effect was observed on HSV-I production in VERO cells. Our results clearly indicate a direct action of GSH on viral replication. In particular, they suggest that the viral envelope proteins which are involved in several aspects of viral infection, are the major target for GSH antiviral activity.