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Review Article

Action of Acyclovir in Plants

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INTRODUCTION

In medical field when we think of parasites it reminds us of the microorganism which not only nourishes itself but also disturbs basic architecture of its host. Best example of it is 'Virus'. When we consider viral chemotherapy it works by interfering with replication of viruses, it would be interfering with host cell metabolism and some or the other step. However, to surprise it seems to affect plant cellular metabolism also. This case highlights one of such new concept.

CASE

A 25-year old woman nursing her 3-month old child, was suffering from vesicular lesions over her right axilla extending to breast which were unilateral and painless. She was diagnosed as a case of herpes zoster for which she had been prescribed Tab. Acyclovir 200 mg 5 times daily for 5 days. Being lactating simultaneously she was on Tab. Calcium 500 mg BD and Tab. Ferrous sulfate 200 mg OD. She was exclusively breast-feeding her 3-month-old child. As she had a lesion over areola and axillary region, to avoid contact infection to the child physician advised her not to breast feed her child with right breast. He also advised her to discard the milk from right breast using breast pump. The feeding by the left breast was continued.

In India as it is inauspicious to discard the breast milk in wash basin, the mother discarded the milk in the soil surrounding the 'Tulsi' (Ocimum Sanctum linn) plant and this was practiced regularly for four days 6-8 times a day.

It was observed by the family members that surprisingly some blackish dots appears on the leaves which spread over the entire leaf in four days time, all the leaves then fell down. When this dried plant was removed and new plant was planted in the same soil, it again dried and died.

COMMENT

Acyclovir (ACV) is an antiviral drug used in treatment of herpes simplex virus, herpes zoster virus and cytomegalovirus. ACV is the deoxyguanosin analog.^{1,2} It gets converted to its active form acyclovir monophosphate by enzyme thymidine kinase (TK) present in herpes simplex virus. It further gets converted to Acyclovir triphosphate and inhibits viral DNA polymerase. It also gets incorporated in viral DNA and inhibit its lengthening as it lack three hydroxyl group.

Since TK in human is many time less sensitive than in virus so it is less likely to interfere with human cell metabolism.

ACV distributes in vesicular fluid, aqueous humor, Cerebro spinal fluid Acyclovir is excreted in nonmetabolised form by glomerular filtration and tubular secretion.³ It is concentrated in breast milk of the range 0.6 to 4.1 times corresponding plasma levels⁴ This concentration would potentially expose the nursing infant to a dose of ACV upto 0.3 mg/kg/day.⁵ ACV should be administered to a nursing mother with caution and only when indicated.

It appears from our observation that, the breast milk, which was discarded near the plant, contained sufficient amount of acyclovir to be absorbed by plant roots. TK was detected in a study on plant genome carried out using rice clone⁶ This study provides evidence that rice sequence encodes a functional TK protein. This report is first report of TK gene from plant. So acyclovir, taken up by the plants was converted into active forms viz. ACV mono, di and triphosphates. It can be postulated that ACV interfere with DNA synthesis in plants in the same manner as it does with viral DNA [DNA polymerase inhibition, chain termination] This inhibition of DNA synthesis along with other possible reasons that could have proved toxic to plant, thus killing it.

INFERENCE

Hence, we can possibly conclude that ACV can act on the plant cell in much the same way as it acts on viruses. This could be possible due to the presence of sensitive TK in the plant cytoplasm. It can also be stated that *Ocimum Sanctum* linn contains a functional TK. This finding can have implications in both botany and medical science.

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