

## Susceptibility of Bovine Rotavirus to Interferon

### Brief Report

By

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### Summary

Using the plaque assay or the CPE test (cytopathogenic effect), we investigated the action of human, simian (rhesus), bovine and murine interferons on bovine *rotavirus* adapted to grow on established Rhesus monkey kidney cell line (MA 104) or Georgia Bovine Kidney cell line (GBK). Except for the murine interferon we used, which had no antiviral effect at all, the different interferons tested were clearly active.

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Three strains of bovine *rotavirus* were used: a canadian strain PQ (kindly furnished by Dr. M. E. Bégin, St-Hyacinthe, Québec) and strains S14 and S77 isolated in our laboratory. They were grown on MA 104 and GBK cells (1). Vesicular Stomatitis Virus (VSV), originally obtained from Dr. Youngner (Pittsburgh), was produced in L<sub>929</sub> cells.

Human fibroblast interferon (Hu IFN $\beta$ ) was induced in FS<sub>4</sub> cells of human foreskin fibroblasts by-poly inosinate-polycytidylate (poly I:C) as described by VILČEK and HAVELL (8) and partially purified by ammonium sulfate precipitation and chromatography on Biogel PI 50 and CM Sephadex as described by KNIGHT (3). The specific activity of the preparation used throughout this work was  $1 \times 10^6$  international units per mg of protein.

Mouse fibroblast interferon (Mu IFN $\beta$ ) was induced in L<sub>929</sub> cells by NDV virus (Newcastle Disease Virus, Koumaroff strain). The purification of this interferon was achieved according to the method described by PAUCKER and STANCEK (6). Its final specific activity was  $1 \times 10^6$  international units per mg of protein.

Simian interferon (Rhesus IFN) was induced in MA 104 cells by infecting them with NDV (Koumaroff strain). The crude interferon, treated at pH 2 for at least

five days, was used without further purification, after neutralization and clarification by centrifugation.

For the production of bovine interferon (Bov IFN), GBK cells were induced with NDV (Koumaroff strain) and treated as the simian interferon.

The action of interferons on *rotavirus* was first tested on MA104 cells using the plaque assay described by MATSUNO *et al.* (5) and DAGENAIS *et al.* (2). The cells were established in an antiviral state by incubation with IFN at 37° C overnight before inoculation with the bovine *rotavirus*. Then, the inhibitions by interferons of the cytopathogenic effect provoked either by VSV or by *rotavirus* were compared by the classical method using MA104 and GBK cells.

According to our results, human, simian and bovine interferons are active on bovine *rotavirus* grown in established Rhesus monkey kidney or Georgia bovine kidney cell lines, whereas one partially purified murine interferon is not active at all. Compared with VSV, bovine *rotavirus* does not appear to be less susceptible to bovine interferon as it was reported by La Bonnardière and coworkers (4). The choice of the experimental system is therefore important to ascribe the efficiency of interferon against bovine *rotavirus* in defined conditions. As the data obtained with the three strains of *rotavirus* are similar, Table 1 gives the comparison of the susceptibility to interferon of VSV and one strain of *rotavirus*.

The antiviral activity was destroyed by a pretreatment with trypsin and correlated well with the induction of 2'5' oligoadenylate synthetase (7). This indicates that interferon is the active factor involved in the antiviral effect.

Our preliminary results show that human fibroblast interferon (Hu IFN  $\beta$ ) has an important heterologous antiviral effect in GBK cells infected with bovine *rotavirus*. It is therefore worthwhile to test the *in vivo* effect of human fibroblast interferon (Hu IFN  $\beta$ ) on neonatal calf diarrhoea provoked by *rotavirus*.

Table 1. Activity of different interferons on MA104 and GBK cells on bovine rotavirus (S77) and VSV multiplications

Cell line	Virus	Interferon		
		Hu IFN	Rhesus IFN	Bov IFN
MA 104	VSV	1.00	1.00	1.00
GBK	VSV	1.17	11.7	0.68
MA 104	Rota. S 77	1.39	1.39	3.76

Figures represent the relative titer of the different interferons in the different systems used, compared to the titer obtained in MA104 cells using VSV as challenge virus. The mean of two independent determinations are used to establish the comparison. End-points of titration are read as 50 per cent protection against CPE with a technique involving 0.5 log<sub>10</sub> dilution steps. Reproducible data have been obtained using dilutions of interferon preparations titrating between 10<sup>2</sup> and 10<sup>4</sup> laboratory units/ml

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