Table 1 Reduction in Mengo virus yield in CHO-E16 clone 3-17-12*

	Time (h)	Multiplicity of infection (p.f.u. per cell)† 0.01	0.05	1	10
		log p.f.u. per ml			
Expt 1	12	3.32	2.21	—	—
	24	3.16	2.15	2.79	2.4
	36	4.21	2.88	—	—
Expt 2	12	2.07	2.39	2.23	1.45
	24	2.55	2.23	1.6	1.28
	36	3.18	2.84	1.05	2.0

* Compared to control CHO-DHFR clone 1-8. Log of virus p.f.u. ml^{-1}.
† Multiplicity of infection, p.f.u. per cell, for both cell lines.

Table 2 Virus concentration needed to produce cytopathic effect

Clone	Multiplicity of infection (p.f.u. per cell) Mengo	VSV	HSV-2
CHO-DHFR 1-8	3×10^{-3}	2.5×10^{-4}	125
CHO-E16 3-17-8	15	2.5×10^{-4}	125

Destruction or protection of the monolayers was recorded 24-36 h after infection. The minimal MOI producing 50% destruction is shown for each virus.

tested. The resistance to Mengo virus varied with multiplicity of infection (MOI) but was clear even at 10 plaque-forming units (p.f.u.) per cell, and after single or multiple virus cycles (Table 1). The inhibition of Mengo virus growth in the amplified CHO-E16 clones appears similar to that observed in IFN-treated cells[14].

In a more severe test of the antiviral state, the CHO-E16 cells were protected against the cytopathic effect (CPE) of Mengo virus, in a wide range of virus concentrations, as are IFN-treated cells. In CHO-DHFR clone 1-8 (or other control clones resistant to MTX), Mengo virus produced complete CPE at typically low MOI, whereas a 5,000-fold MOI was needed to produce CPE in CHO-E16 3-17-8 cells (Table 2). But no protection was seen against VSV or HSV-2 in similar experiments (Table 2). Treatment with rHuIFN-β_1 (1,000 U ml^{-1}) protected all cells against the three viruses (data not shown), confirming that the behaviour of CHO-E16 clones is not due to IFN.

Our studies establish directly that elevation of (2′-5′) A synthetase is sufficient by itself, in the absence of IFN, to produce resistance to a picornavirus in CHO cells. This class of virus forms dsRNA intermediates which can activate formation of $ppp(A2'p)_nA$ in infected cells[15,16] triggering degradation of viral RNA, or more likely ribosomes bound to it[2,17], thereby stopping infection. Cell variant studies did not convincingly correlate (2′-5′) A synthetase with picornavirus inhibition[18,19], possibly due to a failure to measure all four enzyme forms[10], or high 2′-phosphodiesterase[20] or low latent RNase in some cells[21]. More IFN-induced proteins could affect picornaviruses (for instance protein kinase[22]), which would obscure the correlation whenever cells were treated with IFN. The absence of virus mutants resistant to IFN indeed suggests multiple IFN effects on each virus. Also, the action of IFN appears to be virus-specific and the (2′-5′) A synthetase is not sufficient to protect CHO cells against VSV, in line with dissociation between IFN effects on different viruses observed in cell variants[19,23]. Growth of CHO cells was not prevented by high levels of enzyme, but this could have been due to selection for growth. It will be interesting to use this direct expression method to study further which IFN activities can be accounted for by the different (2′-5′) A synthetases and by the other IFN-induced proteins.

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Corrigendum

Thermal X-ray emission from supernova 1987A

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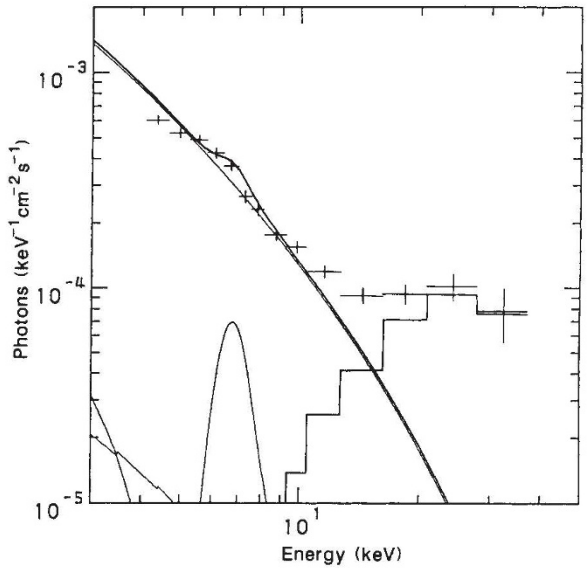
Nature **330**, 235-236 (1987).



THE above figure should replace Fig. 1 in this paper.