MHC Antigen Expression on Glial Cells

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We have shown that lymphokines, especially gamma-interferon (γ-IFN), induce major histocompatibility complex (MHC) class I antigen expression on oligodendrocytes and astrocytes.[1,2] More recently, we demonstrated that γ-IFN induces MHC class II antigen expression on isolated macrophage-microgia.[3] MHC class II antigen expression on astrocytes is reportedly inducible by γ-IFN[4] or viral infection.[5] In the previous study, we found that infection of the central nervous system with MHV-A59, a neurotropic coronavirus, induces class I, but not class II, MHC antigen expression on oligodendrocytes and astrocytes.[6] We sometimes found Ia antigen expression on γ-IFN-treated astrocytes by indirect immunofluorescence; however, this finding could not be confirmed by radioimmunoassay.

In this study, we examined more precisely the expression of MHC antigen on glial cells by indirect immunofluorescence (IF), radioimmunoassay (RIA), and ^{51}Cr release assay. Oligodendrocyte-enriched (Oligo), astrocyte-enriched (Ast) cultures and isolated macrophage-microglia (Mi) were stimulated with γ-IFN (50 U/ml for 2 days). They were then examined for the expression of MHC antigens.

Unstimulated Oligo and Ast did not express either class I (H-2) or class II (Ia) antigen on their surface. γ-IFN induces H-2 antigen expression on both Oligo and Ast. Although Ia antigen was sometimes detected on γ-IFN-treated astrocytes (FIG. 1), most Ast usually remained Ia negative even after γ-IFN treatment.

Radioimmunoassay confirmed the induction of H-2 antigen, but not Ia antigen, on Oligo and Ast (TABLE 1). By ^{51}Cr release assay using the same monoclonal anti-MHC antibodies plus complement, we detected H-2 antigen expression on unstimulated Mi, and both H-2 and Ia antigen on γ-IFN-treated Mi. However, we could not detect Ia antigen on γ-IFN-treated Ast under the same assay conditions (TABLE 2).

This study confirmed the induction of class I MHC antigen expression on Oligo and Ast by three different assays. We could detect Ia antigen on γ-IFN-treated Mi. However, we could not confirm Ia antigen expression on γ-IFN-treated astrocytes by

TABLE 1. MHC Antigen Expression: Radioimmunoassay[a]

AKR	H-2D^{k}K^{k}	I-A^{k}	I-E/C^{k}	MEM	H-2D^{b}K^{b}	I-A^{b}
Oligo	1,264 ± 89[b]	546 ± 102	571 ± 46	653 ± 49	601 ± 74	556 ± 93
Ast	3,437 ± 362[b]	1,086 ± 70	1,026 ± 27	1,182 ± 173	1,127 ± 188	1,252 ± 183

[a]Each culture was treated with 50 U/ml of γ-IFN for 2 days before assay.
[b]$p < 0.001$.

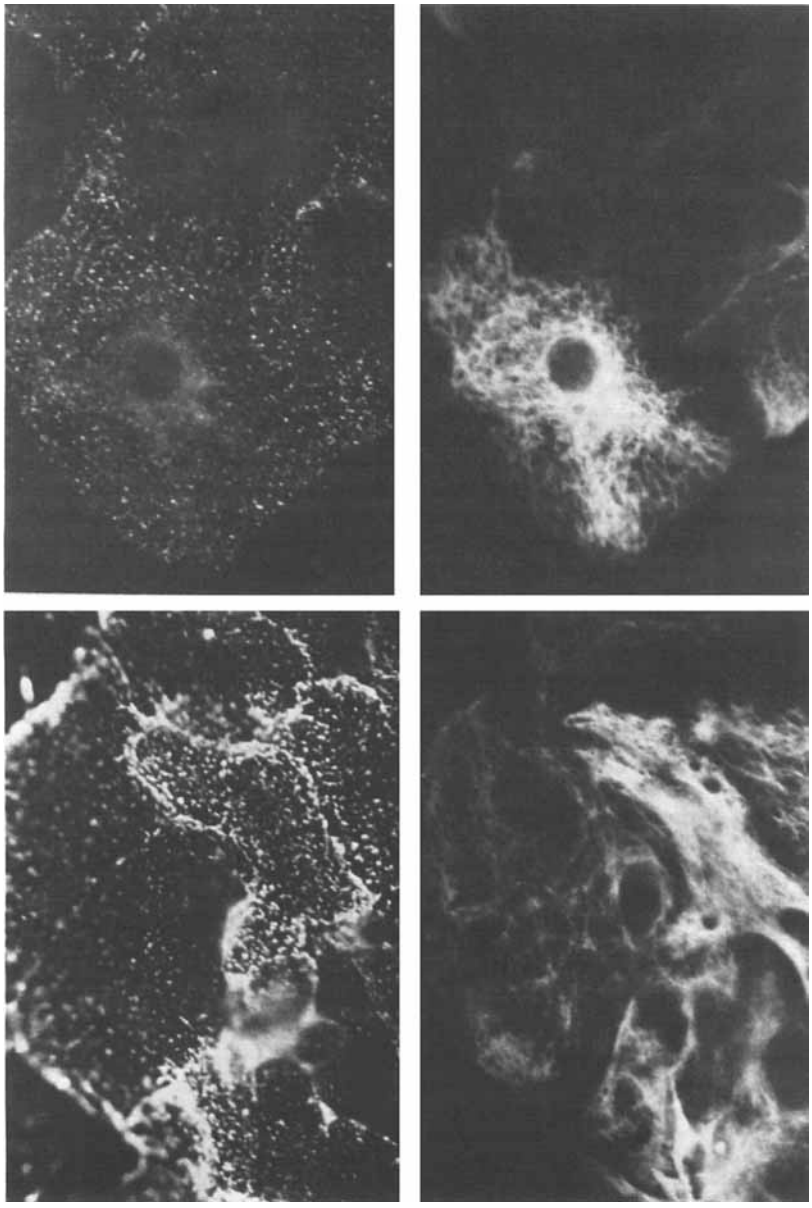

FIGURE 1. Induction of H-2 antigen expression (*left*) and Ia antigen (*right*) on GFAP-positive astrocytes by γ-IFN.

TABLE 2. MHC Antigen Expression: ^{51}Cr Release Assay[a]

		H-2D^{k}K^k	I-A^k	I-E/C^k	MEM	H-2D^{b}K^b	I-A^b
Mi	(−)	31.2 ± 10.9[b]	14.9 ± 1.0	15.5 ± 6.1	13.7 ± 2.5	14.8 ± 2.2	16.8 ± 4.2
	γ-IFN	47.3 ± 5.0[b]	39.5 ± 6.7[b]	28.7 ± 9.0[b]	15.5 ± 4.2	14.5 ± 6.2	16.4 ± 4.2
Ast	(−)	10.3 ± 1.9	12.2 ± 2.8	NT	11.4 ± 2.0	10.0 ± 1.0	10.1 ± 4.9
	γ-IFN	34.4 ± 3.2[b]	12.8 ± 2.2	13.2 ± 3.7	12.4 ± 1.9	11.2 ± 3.3	10.8 ± 0.7

[a]Each value represents mean ± standard deviation of individual % ^{51}Cr release ($n = 9$).
[b]$p < 0.001$.

means of RIA and ^{51}Cr release assay. These observations, along with the fact that Mi have very similar properties as peripheral blood macrophages,[3] suggest a possible immunoregulatory function of Mi as is characteristic of the cells of monocyte lineage.

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