PRIMATOLOGY

Blood Picture and Interferon Status of Monkeys Infected by Simian Latent Viruses

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The blood picture and interferon status of rhesus macaques infected with one or two simian latent viruses do not differ from those of clinically healthy seronegative monkeys.

Key Words: *blood values; interferon status; simian latent viruses*

Like humans, monkeys are carriers of RNA-containing (simian T-lymphotropic retrovirus; STLV-1) and DNA-containing latent viruses (cytomegalovirus, CMV; Epstein–Barr-like simian herpesvirus, EBV). Virus persistence without cytopathic replication in host cells is characteristic of chronic viral infection; this results in the formation of latent states undetectable by immunological surveillance [10,11].

The monkey is a well-known model for reproduction of the most significant human diseases. However, the knowledge of the functioning of monkey physiological systems is essential for interpretation of the results of experiments on these animals. The data on the monkey hematology, hormonal [2] and IFN status [5], higher nervous activity [7], and other physiological systems have been amply studied.

We studied the blood picture and IFN status of monkeys infected by latent viruses [1,8].

MATERIALS AND METHODS

Blood specimens from 29 rhesus macaques of both genders aged 4-8 years were studied. The animals were divided into 3 groups. Group 1 (n=14) included clinically healthy seronegative monkeys without antibodies to latent simian viruses. Group 2 (n=7) were monkeys with antibodies to latent simian virus (STLV-1). Group 3 (n=8) were monkeys with antibodies to 2 latent simian viruses (CMV, EBV).

Interferon was isolated and titered by a previously described method [2,4] in our modification adapted for studies on monkeys [3,5,9]. The capacity of simian lymphocytes to respond by IFN reaction *in vitro* to an adequate inductor was evaluated as the IFN status and included measurements of IFN-α and IFN-γ, spontaneous production of IFN, and its presence in the serum (circulating IFN).

The specific antibodies to latent simian viruses were detected by EIA by the standard methods according to the instructions using commercial kits (Vector-Best and Bioservice). Specific antibodies to STLV-1 and CMV were detected with recombinant antigens (Vector-Best and Bioservice) from commercial kits. Specific antibodies to simian EBV were screened using kits from Diagnostic Test Systems. The results of EIA were recorded by Uniplan spectrophotometer by measuring optical density (OD) at λ=450 nm. The measurements were carried out no later than 10-15 min after the reaction arrest. The results of analysis were considered positive, if the OD in a well was equal or

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TABLE 1. IFN Status and Hematological Values of Laboratory Primates (*M*±*m*)

Parameter		Group 1	Group 2	Group 3
Mean values of IFN status, U/ml	IFN-α	98.3±36.5	114.3±42.8	100.0±52.4
	IFN-γ	45.7±16.4	59.4±34.2	42.3±19.0
	IFN, spontaneous production	4±0	4±0	4±0
	circulating IFN	4±0	4±0	4±0
Mean hematological values	erythrocytes, $\times10^{12}$/liter	4.46±1.00	5.4±0.5	5.53±0.40
	leukocytes, $\times10^{9}$/liter	6.14±1.50	6.1±1.5	5.7±1.3
	hemoglobin, g/liter	116.21±11.00	112.1±7.6	1150±4.6
	platelets, $\times10^{9}$/liter	215.0±41.8	239.9±28.8	244±15
	erythrocyte sedimentation rate, mm/h	2.1±1.0	1.8±1.1	2.5±1.6
	basophils	2.14±1.40	3.0±1.7	3.5±2.7
	eosinophils	3.0±1.8	3.0±1.7	2.5±1.6
	stab	1±0	1.4±0.5	1±0
	segmented	43.1±12.1	58±7	57.8±2.1
	monocytes	4.0±3.1	3.9±2.2	4.0±3.2
	lymphocytes	33.9±8.0	37.3±8.0	37.0±7.5

surpassed the critical OD (OD_{crit}) calculated by the formula:

$$OD_{crit}=OD_{M}(\text{negative sera})+0.1,$$

where OD_{M}(negative sera) was the mean OD of negative sera and 0.1 was the coefficient estimated by the manufacturer.

Hematological analysis was carried out by the common method after Nikolaev.

The significance of differences in the values was evaluated by Student's *t* test.

RESULTS

All parameters of IFN status were similar in monkeys of 3 groups (Table 1). These data indicate that latent infection with DNA viruses (CMV, EBV) and RNA virus (STLV-1) causes no changes in the IFN status, which virtually does not differ from that of seronegative monkeys. Lymphocytes of infected and seronegative monkeys are incapable of spontaneous production of cytokines *in vitro*, the absence of IFN in the serum attests to noncytopathic replication of the virus. Blood picture of infected and seronegative monkeys is similar and indicates the absence of pathological processes in these animals.

Our results characterize STLV-1, CMV, and EBV-like virus as viruses with low replicative activity and hence, low expression of specific antigens, which explains their latent status in the host.

Hence, latent simian virus infection is inessential for the blood picture and IFN status of monkeys, which suggests regarding these animals as clinically healthy and fit for simulation of human diseases.

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