Presence of Neutralizing Antibody to Canine Distemper Virus in Sera of Patients with Subacute Sclerosing Panencephalitis

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Received February 12, 1973

Summary

Sera collected from three patients with subacute sclerosing panencephalitis (SSPE) at various stages of the disease were demonstrated to contain remarkably high levels of neutralizing antibody to canine distemper virus in proportion to the well known high antibody titers against measles virus. In contrast, neutralizing antibody to canine distemper virus was detected only at low titer in sera of convalescents from natural measles, or of measles with or without atypical measles symptom following vaccination, as well as in sera of children vaccinated with live or killed measles vaccine. Anti-measles sera prepared in various experimental animals also contained neutralizing antibody to canine distemper virus only at low titer.

The significance of these findings is discussed in relevance to the possible involvement of canine distemper virus in the pathogenesis of SSPE.

1. Introduction

The etiologic agent of subacute sclerosing panencephalitis (SSPE) is elucidated as measles virus (MV) or measles-related virus from results of virus isolations in patient’s brains and serologic examinations (4, 14). However, the serologic identification of the SSPE agent is not completely established. Possibility of participation of virus of zoonotic origin is also suggested from epidemiologic studies (2). Since canine distemper virus (CDV) is closely related to MV (6), antibody titer to CDV in the sera of SSPE patients will give some informations on the antigen analysis of the SSPE agent.

In the present study, sera of SSPE patients were examined for neutralizing antibodies both to MV and CDV. For comparison, sera of patients after natural measles, or measles following vaccination with or without atypical measles symptoms, as well as sera from vaccinated children, or experimentally immunized animals were examined in a similar way.
2. Materials and Methods

Virus neutralization test was conducted in tubes of Vero cell cultures using the TYCSA strain of MV and the Vero cell-adapted Lederle strain of CDV as challenge viruses. Details of the procedure were described previously (18). Antibody titers were expressed as reciprocals of the serum dilution which protected 50 per cent of the cultures from viral cytopathic effect.

The sera of three SSPE patients were obtained from Drs. T. Togashi, Hokkaido University, T. Sato, Niigata University and M. Inui, Toranomon Hospital, respectively. The first case (M) was diagnosed as SSPE by histological and electron microscopical findings with biopsied brain as well as by clinical symptoms (19). The second case (H) was also diagnosed as SSPE by clinical symptoms, and the MV-related virus was isolated from the brain (17). The third case (K) was diagnosed as SSPE by clinical and serological examinations. This case was found accidentally accompanied with infection of an angiostoma, Angiostrongyulus cantonensis (7).

3. Results

As shown in Table 1, the three SSPE patients had high levels of neutralizing antibodies both to MV and CDV in their sera collected at various stages, antibody titers to CDV being more than one-tenth of those to MV. The ratio of antibody titers for CDV/MV ranged between 0.13 and 0.32. In contrast, neutralizing antibody to CDV was demonstrated only at low levels in sera of both patients recovered from natural measles, patients showing atypical measles symptoms, patients of natural measles following the combined vaccinations with killed (K) and live (L) measles vaccines, and in vaccinated children by KKL or L program. The ratios of antibody titers (CDV/MV) in these groups ranged between 0.002 and 0.01.

Anti-MV sera prepared in monkeys, guinea pigs and rabbits by various immunization schedules with MV exhibited very low antibody titer to CDV, while the two anti-CDV sera prepared in dogs showed high antibody titer to homologous CDV and very low titer to heterologous MV.

Thus, the ratio of neutralizing antibodies (CDV/MV) was approximately 50 times higher in cases of SSPE than that in natural measles infection and in vaccinated children. It is worthy to note the low antibody titers to CDV in two cases of atypical measles in which the antibody titers to MV were as high as those in the SSPE cases. Therefore, the high level of antibodies to MV in the sera of SSPE patients may not be responsible for the high cross-reacting antibodies to CDV.