Safety and Immunogenicity of Preexposure Rabies Vaccination in Children Infected with Human Immunodeficiency Virus Type 1

There has been an alarming increase in the number of HIV-infected children worldwide [1]. Dog bites are a serious public health problem in developing countries, and one-fourth of children in Thailand have experienced animal bites [2]. We conducted this study to evaluate the safety and immunogenicity of rabies vaccine in children infected with HIV type 1 (HIV-1).

HDCV (human diploid-cell rabies vaccine, lot 0544, antigen content of 9.3 IU/mL; Institut Merieux, Lyon, France) was given to 13 HIV-1–infected children (study group) and 9 healthy children (control group) as 1 injection of 1 mL into deltoid muscle on days 0, 7, and 28. All subjects were seen on days 0, 7, 14, 21, 28, 60, 90, 180, and 360. Blood was drawn for determination of titers of rabies-neutralizing antibody by the rapid fluorescent focus inhibition test [3] on days 0, 7, 14, 21, 28, 60, 90, 180, and 360. The CD4+ cell count was measured for every subject on day 0 by use of an automated flow cytometer (FACSORT; Becton Dickinson, Cockeysville, MD).

The average age of the study group members was 41.62 months, which is not significantly different from that of the control subjects (47.22 months) (P > .05). The mean percentage of CD4+ cells in the study group was 16.54%, which was significantly lower than that of the control subjects (31.11%) (P < .05). Blood samples were obtained from all children at each visit, except for 1 specimen on day 90 from the HIV-1–infected group and 2 specimens on days 180 and 360 from the control group.

Geometric mean titers (GMTs) of rabies antibody in the HIV-1–infected children were significantly lower than those in the control group on days 14, 21, 28, 60, 90, and 360 (P < .05). After categorizing HIV-1–infected children into groups with <15% CD4+ cells or ≥15% CD4+ cells, we found that GMTs in the former group were significantly lower than those in the latter on days 14, 21, 28, 60, 180, and 360 (P < .05). GMTs of antibody for children in the study group with ≥15% CD4+ cells were significantly lower than for those in the control group on days 28, 60, 90, 180, and 360 (P < .05; figure 1). Four children (30.8%) who had <15% CD4+ cells failed to respond to the vaccine. There was no adverse reaction to the vaccine among all children treated.

HIV-1–infected children have suppressed humoral and cell-mediated immunities, leading to impaired antibody production after vaccination [4]. The World Health Organization Expert Committee on Rabies recommended using a double dose of rabies vaccine, given at different sites, for subjects who are immunocompromised and have been exposed to rabies [5]. No published study testing this empirical recommendation had been published.

We suggest that the titers of neutralizing antibodies in all immunocompromised, rabies-exposed patients be determined on days 14 and 28 after rabies vaccination to ensure adequate response. Further studies are urgently needed to determine the proper means of rabies immunization in immunocompromised, rabies-exposed patients.

References


Figure 1. Geometric mean titers of rabies antibody in the study and control groups.

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