infection, the VZV becomes latent in the dorsal root or cranial nerve ganglia.[1,2] Upon reactivation, the virus migrates along neural pathways to the skin and causes localized herpes zoster or shingles.[1] Activated T lymphocytes are permissive at a low frequency of VZV infection,[2] which suggests that during primary infection, lymphocyte activation, which alters cell surface antigens, could potentiate viremia.[2,3] Vonsover et al.[4] demonstrated detectable VZV in lymphocytes in patients with active varicella by hybridization with a specific VZV probe. Hayward and Herberger[5] demonstrated that in vitro lymphocyte proliferative responses to VZV by lymphocytes in adults are mainly by CD4 + T cells and that this subset can directly lyse VZV-infected cells with HLA-DR surface antigens. These findings clearly show that VZV infection causes lymphocyte activation.

Peripheral blood mononuclear cells (PBMNC) spontaneously elaborate low, often undetectable levels of immune activation antigens (mainly T-cell antigens, cytokines, cytokines receptors, and adhesion molecules). However, the activation of PBMNC in virus infections, autoimmunity, and cancer leads to the accumulation of significantly higher levels of immune activation antigens.[6,7] Their measurement in the serum, therefore, is of considerable clinical value for monitoring patients with virus infection,[8-13] immune-mediated diseases,[15-20] and cancer.[21-23] However, little is known about sCD4, sCD8, and sCD25 profiles in adult patients with generalized varicella as well as localized zoster infections. In the current study, we determined serum profiles of sCD4, sCD8, and sCD25 in patients with primary and recurrent VZV infection.

MATERIALS AND METHODS

Subjects

Subjects with VZV infections were recruited by the Dermatology Clinic at the Medical Center of National Taiwan University and Taipei Medical University, Taiwan. Diagnosis of varicella was based on the following criteria: the appearance of characteristic papulovesicular lesions accompanied by fever and/or other appropriate symptoms and isolation of virus from vesicular fluid or lesion swabs. Zoster infections were diagnosed in patients who presented with vesicular lesions in a classical dermatomal distribution. All subjects were free of cancer, autoimmunity, or immunodeficiency disease at the time they visited the clinic.

Age-matched uninfected control subjects were selected from the local community. All study subjects gave their written informed consent for participation in the study, which was approved by the Clinical Research Ethics Committee of National Taiwan University and Taipei Medical University. Blood samples (10 ml) were drawn by venipuncture. Serum was collected by centrifugation at 2000 rpm and stored frozen at -70 °C until used. Samples were stored for less than 2 months.

ELISA for sCD4, sCD8, and sCD25

Serum concentrations of sCD4, sCD8, and sCD25 were determined by enzyme-linked immunosorbent assays (ELISA). The ELISA kits were purchased from commercial sources: sCD4 and sCD8 kits from T Cell Diagnostics, Woburn, MA, USA; and the sCD25 kit from BioSource, Camarillo, CA, USA. The lowest detectable concentrations of sCD4 and sCD8 were 25 and 50 U/ml, respectively. The sensitivity of the sCD25 assay was 125 to 8000 pg/ml. The intra- and interassay coefficients of variation for sCD4 were lower than 5% and 9%; for sCD8, they were lower than 10% and 10%; and for sCD25, they were lower than 6% and 9%, respectively. All assays were conducted without knowledge of the patient's clinical course. All blood samples were measured by duplicate wells done in the same run.

EIA Detection of VZV IgM and IgG Antibodies

According to the manufacturer's instructions, the plasma levels of the IgM and IgG antibodies to VZV were measured in duplicate using a commercial Enzygnost enzyme immunoassay (EIA) kit purchased from Behring, Marburg, Germany.

Statistical Analysis

Statistical analyses were done using Student's *t*-test to examine differences between patients with varicella and zoster, and normal controls. The level of signifi-