Risk of Viral Transmission Via Bone Marrow Progenitor Cells Versus Umbilical Cord Blood Hematopoietic Stem Cells in Bone Marrow Transplantation


ABSTRACT
Hematopoietic stem cell transplantation (HSCT) is the treatment of choice for children and certain adults with malignant and nonmalignant hematologic disease. Since viral infections are the major problem, this study examined those that might potentially be transmitted to HSCT recipients via bone marrow (BM) versus umbilical cord blood (UCB). BM progenitor cells, peripheral blood leukocytes, and plasma samples were collected from 30 allogenic BM donors. Umbilical cord blood hematopoietic stem cells and plasma samples were also collected from 34 UCB donors. Viral DNA extracted and purified from collected specimens was processed using nested polymerase chain reactions (PCR) to detect human parvovirus B19 (HPV B19), human herpesvirus-6 (HHV-6), varicella-zoster virus (VZV), human cytomegalovirus (HCMV), and Epstein-Barr virus (EBV). The prevalences of HCMV DNA in collected BM progenitor cells versus UCB hematopoietic stem cells were 73% versus 23%, respectively. Conversely, HHV-6 DNA was not detected in any collected specimen by simple PCR. Distribution of the other investigated virus DNAs except EBV DNA was similar in specimens collected from both groups. EBV DNA was not determined in UCB hematopoietic stem cells. The results indicate that the risk of viral transmission to BM transplant recipients via UCB hematopoietic stem cells is less than that with BM progenitor cells.

VIRAL INFECTION of allografts is a serious problem in bone marrow transplantation (BMT), for it increases the risks of posttransplant morbidity and mortality.¹ The frequency of latent viral infections tends to increase throughout the adult years, so these samples are at greater risk for virus transmission from donor bone marrow (BM). Current clinical data indicate that umbilical cord blood (UCB) is an important alternative as a source of transplantable hematopoietic stem cells to treat leukemia and other diseases.² The main advantages of UCB over stem cells are the relative ease of procurement, the absence of donor risk, the greatly reduced risk of transmitting infection, and the rapid availability of the sample. The aim of this study was to assess the pattern of viral infections that can be transmitted from BM donors to hematopoietic stem cell transplant (HSCT) recipients compared with the patterns observed in UCB donation.

MATERIALS AND METHODS
Specimens of plasma, peripheral blood leukocytes, and BM progenitor cells were obtained from 30 allogenic BM donors between March 2003 and July 2004. Fourteen individuals were men, 16 were women of overall mean age of 24 years. A physician collected each BM specimen into transport medium. From each of 34 subjects a UCB sample collected using a semiclosed system syringe, was transferred to an EDTA tube. UCB

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