LETTER TO THE EDITOR

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Fatty Precipitation in Donor Bone Marrow Caused by Overnight Cold Preservation in a Refrigerator

Imataki O. et al.: Fatty Precipitation of Bone Marrow

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Letter to the Editor,

Japan experiences many typhoons every year. Especially, when there are many opportunities for approaching typhoons from summer to autumn, as in Japan, the risk of delays in bone marrow aspirate transportation increases because public transportation is canceled when typhoons arrive. Regarding the storage of bone marrow aspirate after collection, no domestic or national guideline has been established, and the storage conditions are left to the policies of each transplant facilities. However, in view of cell viability, the physicians at many stem cell transplantation centers consider it desirable to store bone marrow aspirate at 4°C if it is to be preserved overnight or longer[1]. Although the standard practice for bone marrow aspirate storage is at 4°C, we experienced an exceptional case of solidified bone marrow aspirate after 24 hours of storage at 4°C.

In the present case, male bone marrow aspirate was collected in another institute on 23 August 20xx, and was to be transported to our institute for a 65-year-old female recipient. Transportation of the bone marrow aspirate was scheduled to the same day as the collection, but was canceled due to the approach of Typhoon (Cimaron). It was then transported by a commercial transporter (Nippon Express, Japan) on 24 August 20xx, i.e. the next day after collection, after being stored overnight storage at 4°C (39.2°F) at the

collection center. The donor was a 45-year-old man, the amount of bone marrow aspirate collected was 1200 mL, and the total absolute number of all nucleated cells (ANC) was 2.29×10^{10} (3.08×10^{8} /kg body weight).

On the day of transportation, 24 August 20xx, the bone marrow aspirate arrived at our institute at 12.00 am (noon). The total number of ANC on arrival at our hospital had decreased to 1.26×10^{10} (1.70×10^{8} /kg body weight), representing a 55% reduction. Removal of erythrocytes and plasma was performed because of major incompatibility between the donor blood type, AB(+), and the patient blood type, B(+). However, the lipid component in the bone marrow aspirate had solidified (Figure 1), which was highly viscous. This made it impossible to inject the bone marrow aspirate into the apheresis bag. Although the lipid component required time to dissolve, the bone marrow aspirate was safely infused with an ANC recovery value of 75.9% and a mononuclear cell recovery value of 69.1% based on post-processing values. We evaluated the cell viability as 97.1% using the 7-amino-actinomycin D staining assay. The triglyceride concentration in the bone marrow aspirate was 304 mg/dL, which was higher than the peripheral blood concentration of 201 mg/dL. The recipient was engrafted with neutrophils on day 21 and with both erythrocytes and platelets on day 30.

If the delivery of bone marrow aspirate is unusually delayed for reasons such as weather disasters, storage at room temperature may be desirable in cases where the bone marrow aspirate contains a lot of fat. Nevertheless, it would be beneficial to emphasize that this is an exceptional case and that standard practice generally supports storage at 4°C.

Key words: Stem cell transplantation, bone marrow transplantation, donor

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Statements:

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Statement of Ethics

This research was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. The study protocol was approved by the institute's committee on human research.

Consent to participate: The donor have given their written informed consent to participate the case study.

Consent for publication: Written informed consent was obtained from the patient for publication of this study.

Availability of data and materials: The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

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Author's contribution: OI and TK managed the patient's case, contributed to the literature search, and wrote the manuscript. OI made substantial contributions to the concept and design of this report. MU was involved in supervision of the manuscript and managed the research. All authors approved the final version of the manuscript.

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Figure 1

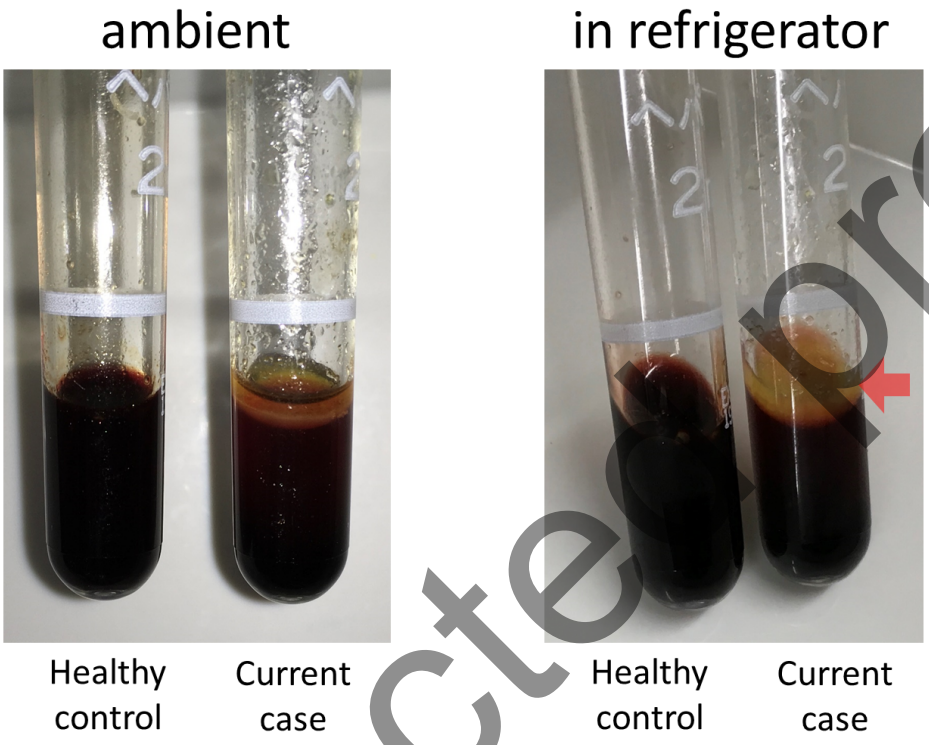

Figure 1 The donor's solidified bone marrow aspirate

The left panel indicated both bone marrow aspirate from donor and healthy control were liquefied at room temperature.

The right panel showed the lipid component of the donor's bone marrow aspirate had been solidified (red arrow) after overnight preservation in refrigerator. The bone marrow aspirate from healthy control was not solidified.