The first step in isolating umbilical cord [3] blood stem cells [4] occurs right after birth, with the retrieval of cord blood from the placenta [10] and umbilical cord [9]. A special 16-gauge syringe is inserted into the umbilical vein [11] of the placenta [10] and the blood is allowed to drain, by gravity, into a blood-collecting bag; the volume collected is usually less than 170 mL. To prevent clotting of the blood, an anticoagulant such as citrate/phosphate/dextrose/adenine (CPD A) is added to the blood-collecting bag prior to collection of the umbilical cord [3] blood. To avoid contamination by maternal blood and secretions, a specialized support frame with a plastic-lined, absorbent cotton pad is used to suspend the placenta [10]; this also aids in the retrieval process.

Following the retrieval of blood, the volume must be reduced by removing unnecessary components. First, hydroxyethyl starch (HES) is added to the blood-collecting bag to increase the precipitation of erythrocytes (red blood cells). By centrifuging the bag, a plasma rich in leukocytes (white blood cells) is formed and then removed from the precipitated erythrocytes into another bag. The leukocyte-rich plasma is also centrifuged, and the precipitated cells and supernatant (liquid overlying sediment cells) are removed to isolate the leukocytes. These cells are then re-suspended in plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period. After the addition of the DMSO, the bag is deposited in an aluminum canister and placed horizontally in a -80°C freezer. Once the temperature reaches -50°C the unit is stored in the liquid phase of the plasma while on ice over a fifteen minute period.
cells have aggregated to the bottom of the bag, the overlying liquid is removed. This centrifugation step removes the DMSO solution that was added during cryopreservation[13]. The aggregated cells are then slowly suspended in a solution containing albumin and dextran. The final volume should be appropriate for infusion into a patient.

As UBC stem cells[4] grow in clinical importance, so does the awareness of banking them. Both private and public banks advertise the importance of banking cord blood stem cells[4], which has led to an increase in awareness by expecting parents. Cord blood banking has provided an easily accessible source of HSCs that can be used in both treatment and research. In terms of public banking of cord blood, scientists find that by having a large supply of stored samples, it increases the probability of finding matches between unrelated recipients and donors.

Sources


Cord blood banks are institutions designed to store umbilical cord blood (UCB) stem cells. UCB, a source of hematopoietic stem cells (HSCs), has garnered attention from scientific and medical communities since its first successful use in a hematopoietic stem cell transplant (HSCT) in 1988. The umbilical cord is the lifeline by which the growing fetus is nourished by the mother. Once regarded as medical waste, the umbilical cord has become a source of lifesaving treatment. The extraction of HSCs from umbilical cord is non-invasive since the umbilical cord is delivered immediately after the baby exits the womb. The most common application of umbilical cord blood derived stem cells is in unrelated (between donor and host) HSCT. Since these cells are not often needed at the time of delivery, cord blood banks have been established to preserve these cells for future use. In addition to harvesting a supply of cells for treatment, UCB stem cells can be used in research.

Subject

Topic

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