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## A Special Report: Bone Marrow Transplants Using Volunteer Donors— Recommendations and Requirements for a Standardized Practice Throughout the World—1994 Update

By John M. Goldman for the WMDA Executive Committee

**A primary function of the World Marrow Donor Association is to establish general guidelines covering collaboration between international donor registries and practice in regard to bone marrow transplants (BMTs) in which the donor and recipient reside in different countries. To this end, a special report proposing specific recommendations and requirements was published in 1992. This paper amplifies the previ-**

**ous publication and gives special attention to accreditation of national "hubs" (defined as coordinating centers for each country) and donor, harvest, and transplant centers, details of the marrow harvest procedure, use of peripheral blood (PB) stem cells for allografting, and use of PB lymphoid cells for treatment of leukemia relapsing after BMT.**

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**T**HE OBJECTIVES of the World Marrow Donor Association (WMDA) include the definition and standardization of ethical, technical, medical, and financial aspects of transplants involving volunteer donors in one country who give marrow for unrelated patients in another country.<sup>1</sup> In 1992, the Executive Committee of the WMDA published recommendations and guidelines for a standardized practice throughout the world to govern such international bone marrow transplants (BMTs).<sup>2</sup> Much further experience with the use of unrelated donor transplants has been gained since 1992 and new guidelines have been developed, notably on accreditation, on the use of donors on a second occasion for the same patient and on the use of peripheral blood stem cells (PBSCs) for allografting. This report reiterates some of the points made in the 1992 publication and updates it where necessary. Other recommended criteria for the performance of BM transplants in the United States have been published previously.<sup>3</sup>

### ACCREDITATION

#### Scope of Accreditation

WMDA will undertake to identify and accredit a series of national hubs for the general purpose of ensuring uniform standards for international transplants. The national hubs will in turn supervise accreditation of donor, harvest, and transplant centers in the respective countries. (A hub is defined in the WMDA constitution<sup>1</sup> as a national organization whose responsibility is to process requests for donors originating from within the country or emanating from abroad and to coordinate activities of donor, harvest, and transplant centers in the respective country.)

#### Accreditation of National Hubs

The Executive Committee of the WMDA will assume responsibility for establishing the criteria that must be met by individual hubs to obtain accreditation. Such criteria will

be designed to promote efficient exchange of search information, tissue typing, and matching data and harvested marrow between national hubs while protecting the safety of donors and the confidentiality of donor and recipients. The Executive Committee will establish an accreditation subcommittee to implement a system for review and approval of national hubs. The WMDA will maintain a list of accredited national hubs and a list of individual centers accredited by national hubs in each country. Such lists will be maintained in close liaison with the various regional agencies. The regional agency for Europe is the European Group for Bone Marrow Transplantation (EBMT), and regional agencies for America, Asia, and Australia have been or will be established.

*Consideration of complaints.* The WMDA Accreditation Committee will establish a system for handling complaints that may arise in relation to the operating policies and/or procedures of national hubs, or in response to a particular incident occurring at an individual center accredited by one of the national hubs. The WMDA Accreditation Committee will consider the complaint and determine whether it is justified. Claims that are deemed to be justified will be submitted formally to the director of the relevant hub, who will be requested to address the issues. If the complaint is justified, the WMDA will monitor the efficacy of steps taken to correct or redress the problem.

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*From the Executive Committee of the World Marrow Donor Association, Leiden, The Netherlands.*

*Submitted June 2, 1994; accepted July 7, 1994.*

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**Withdrawal of accreditation.** In extreme circumstances, the WMDA Accreditation Committee may recommend to the Executive Committee that accreditation be withdrawn from a national hub or local center. In such circumstances, a WMDA officer will write to all relevant parties indicating that accreditation has been withdrawn and specifying the reasons for such action. The letter will specify that, thereafter, the designated hub or center should not be involved in international transplants until accreditation has been restored.

#### *Accreditation of Centers*

National hubs will consider the following organizations for accreditation:

**Donor centers.** The donor center is the organization responsible for recruiting, counseling, and tissue typing prospective donors on the understanding that the patient may reside in another country. The donor center maintains a register or data base, which may be searched as appropriate. The donor center is usually responsible for supervising matching tests and for making arrangements for the marrow harvest procedure and for conveyance of marrow from the harvest center to the transplant center.

**Harvest centers (also known as collection centers).** The harvest center is the hospital at which the marrow collection actually takes place.

**Transplant centers.** The transplant center is the hospital at which a patient is offered a transplant with marrow from an unrelated donor identified in another country.

#### **Criteria for Accreditation of Transplant Centers**

Transplant centers should have performed at least 10 allogeneic BM transplants in each of the 2 years preceding the request for accreditation and will be expected to maintain this level of clinical activity. The centers should agree to maintain membership of and to report clinical data covering all allogeneic transplants on a regular basis to an appropriate agency, such as the EBMT, the National Marrow Donor Program (NMDP), International Bone Marrow Transplant Registry, or another internationally recognized body. (Regular publication of clinical data in peer-reviewed journals may be accepted as an alternative to regular reports to one or other of the agencies specified above.) They should also agree in principle to accept a site visit comprised of members designated by the Accreditation Committee of WMDA, should this be deemed necessary.

#### **Criteria for Accreditation of BM Harvest Centers**

Harvest centers should be under the direction of a designated medical director and should have a defined harvest team with appropriate experience. The centers should have performed at least 10 BM harvest procedures, either autologous or allogeneic, in each of the 2 years preceding the request for accreditation and will be expected to maintain this level of clinical activity. They should agree to maintain membership of and to report details of consecutive harvest procedures regularly to an appropriate agency, such as EBMT, NMDP, or another internationally recognized body.

Harvest centers should agree in principle to accept a site visit comprised of members designated by the Accreditation Committee of WMDA, should this be deemed necessary.

#### **Criteria for the Accreditation of Donor Centers**

The donor center must be an established institution at a fixed physical site and must have demonstrated experience in recruiting blood, apheresis, or BM donors and in management activities including education, counseling, confidentiality issues, and medical screening. The center must have a qualified medical director who should ideally have an interest in BM transplantation and transplantation immunology. The center also must have a designated coordinator and adequate staffing levels proportionate to the size of the active donor register.

The donor center must have access to the following accredited facilities: (1) an HLA typing laboratory that should be accredited to the standard of American Society for Histocompatibility and Immunogenetics or the European Foundation for Immunogenetics; (2) a laboratory for infectious-disease markers and other biochemical tests required for assessment of BM donors; (3) a blood-grouping laboratory; (4) a blood bank for collection of autologous blood; (5) a hospital or clinic to perform a predonation physical examination. It must be able to perform specialized tests such as chest x-rays, electrocardiograms, and possibly BM aspiration, etc; (6) one or more accredited harvest centers (see above).

Donor recruitment must ensure that donors receive adequate information either by means of an informative brochure or by personal contact with trained personnel, such that the donor can provide fully informed consent. Preferably, this should be documented in a signed consent form. Donor recruitment must proceed on the basis that donors will be available to donate to a patient anywhere in the world, without discrimination based on any attribute of the patient, provided only that the request originates from an accredited transplant center. Recruitment should not be geared to identification of a donor for any specific patient.

The director of the donor center must ensure that donor information is maintained in a confidential manner and that all staff with access to this information understand the importance of confidentiality. Hard copy must be stored so as to be accessible to authorized personnel only. The maintenance of data on computer must comply with the prevailing laws governing data protection.

The donor center must be willing to merge its donor data with an existing national registry (ie, national hub) on a regular basis. For this purpose, donors should not be identified by name. The donor center must regularly maintain its file to maximize the possibility that individual donors will be eligible and available when required. Donors who cannot be traced must be removed from the register.

Transplant centers should be kept advised of the availability status of requested donors. The donor center has overall responsibility for the care and safety of the donor both before and after the donation. It must ensure that informed consent is obtained for all procedures. The donor center must ensure that appropriate general liability insurance cover is in force. The donor center must offer counseling sessions to all donors

selected to donate. The donor center must allocate a private area for such counseling sessions. The donor center must ensure that the services of a donor advocate are available if required. The donor center must ensure that the clinical results of transplants using the donors that it provides are monitored by an appropriate body.

#### CRITERIA FOR CONSIDERING A PATIENT FOR AN UNRELATED DONOR TRANSPLANT

##### Indications for Initiating a Search

A search may be initiated when: (1) a patient's disease fulfills criteria listed below; (2) a patient is not older than 55 years; (3) he/she is aware of the risks of the procedure; (4) a patient is accepted onto the waiting list of the designated transplant center (see above); and (5) the financial responsibility for the search and transplant is clearly established.

##### Disease Categories

Patients may be judged eligible for a volunteer donor protocol under either of two categories: (1) for transplant by an accredited transplant team in accordance with a clinical research program that has been submitted to the Institutional Review Board (or Research Ethics Committee); or (2) for transplant by an accredited transplant team for an indication that is generally accepted on the basis of data published by other centers.

##### Diagnosis

**Malignant diseases.** The following malignant diseases may be treated under category 1 or 2 (above): acute lymphoblastic leukemia (ALL), complete remission, high risk; acute myeloid leukemia (AML), complete remission, high risk features; chronic myelogenous leukemia (CML), chronic phase; myelodysplastic syndrome, poor risk refractory anemia (RA) or RA with ring sideroblasts; lymphoma; and myeloma.

The following malignant diseases may be treated only under category 1 (above): AML in relapse; CML in advanced phases; and refractory anemia with excess blasts (RAEB) or RAEB in transformation (RAEB-t).

Those patients with the following malignant diseases are not generally acceptable for BMT: AML or ALL in refractory relapse; CML in refractory BT; RAEB/RAEB-t resistant to chemotherapy; and myeloma or lymphoma resistant to chemotherapy.

**Nonmalignant diseases.** The following nonmalignant diseases may be treated under category 1 or 2 (above): very severe aplastic anemia (SAA) at diagnosis or up to 3 months after antilymphocyte globulin and cyclosporin A without response; inborn errors/immunodeficiencies; severe combined immune deficiency; combined immunodeficiency; leukocyte adhesion deficiency; Wiskott-Aldrich syndrome; Chediak-Higashi syndrome; familial erythrophagocytotic lymphohistiocytosis; Fanconi anemia and other congenital marrow failures; mucopolysaccharidosis I (Hurler disease); mucopolysaccharidosis VI (Maroteaux-Lamy syndrome); Gaucher's disease; and osteopetrosis. The following nonmalignant diseases may be treated only under category 1

(above): less severe SAA; thalassemia; and sickle cell disease.

#### HISTOCOMPATIBILITY, DONOR SELECTION, AND INFECTIOUS-DISEASE MARKERS

##### Histocompatibility

It is recommended that donor and patient be identical and be phenotypically matched for HLA-A, -B, and -DR, including splits if possible. The typing on the patient should be repeated at least once to confirm the original findings. If a serologically identical unrelated donor is not available, individual BM transplant teams may wish to use an unrelated donor mismatched at a single class I locus or within the class II region. It is not recommended that volunteer donors be used where there is more than one major antigenic disparity. The following additional tests should be considered in the choice of donor: polymerase chain reaction (PCR)/oligo-probes; PCR/restriction fragment-length polymorphism; HLA-DP typing; cytotoxic T-lymphocyte precursor frequency (if possible); and DNA cross-matching for HLA-DR using heteroduplex technology.

Storage of DNA and cells from both donor and patients is highly desirable. The cells should include viable lymphocytes suitable for establishment of cell lines. Full typing of the patient's family should be performed if possible with a view to identifying the haplotypes and confirming their patient's phenotype. The typing of the prospective donor and patient must be repeated at the transplant center at an early stage.

##### Donor Selection

It is a cardinal principle of BM transplantation that the donor should be anonymous (with the reservation outlined below) and unpaid. Donors should also be 18 to 55 years old.

**Counseling.** Donor should be counseled on three separate occasions: (1) when recruited to the register; (2) when selected for further tests; and (3) when definitely selected as donor. Counseling at point 1 may require only distribution of relevant literature; counseling at points 2 and 3 should involve discussion with a trained professional who will, in addition, provide further literature that the donor may take home to read at leisure.

Counseling should aim to cover the following topics: (1) emphasis on anonymity for donor and patient; (2) requirement for further blood samples before donation; (3) requirement for virological testing, especially human immunodeficiency virus (HIV) and HBsAg; (4) risks of anesthesia and harvest procedure; (5) loss of time from normal activities; (6) location of harvest procedure, ie, proximity to donor's home; (7) requirement for collection of autologous blood unit; (8) possibility of need for allogeneic unit and associated risks; (9) donor's right to withdraw and consequences for the patient if this right is exercised after the transplant protocol has started; (10) patient's need for BMT and chance of success expressed in general terms; (11) possibility of second donation for the same patient (the fact that the donor is under no obligation to donate on a second occasion needs to be

stressed); and (12) details of compensation for loss of income and details of insurance cover effected.

**Health.** The donor should be examined by a physician not involved with the transplant procedure who should inter alia assess the patient's risk for undergoing general anesthesia. The following are absolute reasons for exclusion from donation: HIV seropositivity; human T-cell lymphotropic virus type 1 (HTLV-1) seropositivity; and pregnancy.

**Infectious-disease markers.** Infectious-disease markers should be assessed at three stages in relation to the actual donation. Requirements are essentially the same as for a sibling transplant. These three stages are: (1) at time of donor recruitment—as for blood donation, eg, optionally hepatitis B, hepatitis C, HIV, cytomegalovirus; (2) before selection decision—as for blood donation; (3) within 30 days before harvest—as for blood donation.

Infectious-disease markers for consideration are the following: syphilis; hepatitis B surface antigen; HIV antigen; and antibodies to HIV, hepatitis B core antigen, hepatitis C, HTLV-1, herpes simplex virus, cytomegalovirus, varicella-zoster virus, and Epstein-Barr virus (EBV).

#### MARROW COLLECTION, PROCESSING, LABELING, AND TRANSPORTATION

##### Marrow Collection

**Location of harvest procedure.** The marrow collection should be performed at an accredited marrow collection center, ideally near the donor's normal residence (see Criteria for Accreditation).

**Communications.** Donor and recipient weight should be communicated to the harvest center in advance of the medical examination. A senior member of the harvest team should communicate with the recipient transplant center if the donor is disproportionately small or there are other factors that might influence the success of the marrow collection.

**Anesthesia.** General anesthesia is recommended, but spinal or epidural anesthesia is acceptable if the donor and medical team agree. The duration of the general anesthetic should not exceed 2 hours.

**Site of aspiration and collection.** Marrow should be aspirated from the posterior and (if required) anterior iliac crests. The sternum should be avoided if possible, but may be used if the donor has agreed in advance. Marrow will ideally be collected using a closed system.

**Cell counts.** The harvest center must provide cell counts for each bag of marrow and the total number of cells collected. The target should be to collect no less than  $2.0 \times 10^8$  cells/kg patient weight nucleated cells (uncorrected numbers).

**Volume.** The harvest team should aim to aspirate a total volume of 1,000 to 1,200 mL. In exceptional circumstances, this figure may be increased to 1,500 mL at the specific request of the harvest center. It should on no account be less than 500 mL (unless the recipient is a child). The volume of marrow harvested should be written on the bag (using the conversion factor 1 mL = 1.06 g).

**Anticoagulant.** For the donor, several centers use heparin (preservative free) given intravenously with the premedi-

cation (100 U/kg, max 5,000 U). This approach may be used at a given transplant center, but it must be agreed by the donor. The marrow should be anticoagulated with ACD-A (1 in 5) or equivalent unless heparin is requested by the transplant center. If the harvest center routinely uses heparin, they may use heparin for a volunteer donor harvest provided that the marrow transit time is not expected to exceed 12 hours. Whatever anticoagulant is used, it is the responsibility of the harvest center to ensure that their general policy is known and that each bag of marrow is labeled appropriately.

**Autologous blood transfusion.** The harvest center should aim to collect one or more units of autologous blood for transfusion to the donor during or after the harvest procedure. Every effort should be made to avoid the use of allogeneic blood; if its use is essential, it should be irradiated (>20 Gy).

##### Marrow Processing

**Filtration.** Marrow should be filtered in accordance with the harvest center's routine practice, unless otherwise stipulated. The collection should employ a closed system incorporating the filter.

**Labeling.** The marrow should be labeled clearly with the donor's unique reference number (but not the name) and the unique reference number (but not the name) of the intended recipient, together with the name and address of the recipient transplant center, plus the donor ABO and Rhesus group. The nature of the anticoagulant used should be stated clearly.

**Further marrow manipulation.** Any further manipulation of the marrow will ordinarily be performed at the transplant center.

##### Transportation of Marrow

**Courier.** The designated courier should be a nurse, medical laboratory technician, doctor, or other person of comparable training or comparable level of responsibility. He/she should not be related to donor or patient and must have no other obligations until after the marrow is delivered.

**Travel arrangements.** The courier must keep the marrow in hand or in sight at all times. He/she must be prepared to communicate with the transplant center if any change occurs in travel arrangements and he/she must be prepared to improvise new travel arrangements if necessary. He/she should carry at least one major credit card. If necessary, airline agents should be informed of the urgency of the marrow delivery.

**Travel documents.** The courier should carry documents confirming the nature of the material, its destination and the fact that it is HIV negative.

**Irradiation.** The marrow should not be subjected to irradiation in any airport security system.

**Temperature.** The marrow should be carried at room temperature (unless otherwise requested by the transplant center) in a specially designed rigid container duly labeled. Transportation at 4°C may be optimal for long distances (ie, greater than 12 hours ex-vivo). The marrow cells must on no account be cooled below 4°C; neither dry ice nor liquid nitrogen should be used.

## Marrow Cryopreservation

The transplant center should specify the optimal amount and the minimum amount of marrow they require. The collected marrow should be transfused to the patient when it is received at the transplant center. Clinicians at the transplant center should not request additional marrow from the donor with the intention of cryopreserving a portion thereof.

If it is known that a given donor will not be available at the time when the marrow transplant is scheduled, it may in certain circumstances be permissible for harvested marrow to be cryopreserved at the harvest center or at the transplant center. This can only be undertaken with the approval of the donor and the medical director of the donor center. It should on no account be undertaken if there is any appreciable possibility that the transplant may not actually take place.

## USE OF PBSCs

### PBSCs in Place or in Addition to Marrow

Under certain circumstances there may be advantages in using PBSCs instead of BM for allogeneic transplantation. Currently, the indications include inability or unwillingness for a donor to donate marrow or the treatment of marrow engraftment failure. However, this is a new and rapidly developing area and as such, the use of allogeneic PBSC transplants may (or may not) replace use of marrow stem cells for many purposes. The use of hemopoietic growth factors, including granulocyte colony-stimulating factor (G-CSF) and granulocyte-macrophage colony-stimulating factor, to mobilize blood stem cells for allogeneic use must be approved by the Research Ethics Committee and/or Institutional Review Board at the donor or transplant center.

*Donor screening.* The same criteria for donor selection and screening procedures should apply for donors being considered for allogeneic PBSC transplantation as for BM transplantation. In addition, the prospective blood stem cell donor must have adequate venous access. Informed consent should take account of all aspects of the procedure including the administration of G-CSF and the leukapheresis procedure.

*Stem cell harvesting.* Leukaphereses should be performed in an appropriate setting after institutional and blood bank center guidelines concerning the use of blood cell separators. Leukapheresis should be performed with a mechanical blood cell separator using peripheral venous access with the objective of processing a 9- to 12-L lot of whole blood. Central venous access should be avoided. The necessary number of stem cells can probably be collected with one or two leukapheresis procedures in the majority of donors. It would be appropriate to confine allogeneic blood stem cell harvesting to units with an existing autologous stem cell harvesting program.

## INFORMED CONSENT AND DONOR CONFIDENTIALITY

### Donor Consent

The donor should indicate general willingness to donate when he/she joins the panel. The donor should sign an approved form after the final selection has been made. This form should be approved by the local Institutional Review

Board or Ethics Committee. The donor may at the same time be asked to consent to the use of marrow or blood cells for research purposes.

### Donor Confidentiality

Maintenance of donor confidentiality is of paramount importance. In most cases such confidentiality should be maintained for life. Some centers accept the principle that donor and recipient may meet 6 months or more after a successful transplant provided both individuals have independently expressed a desire to do so.

## SECOND DONATION OF MARROW OR BLOOD CELLS FOR THE SAME PATIENT

A donor who has donated marrow in the past may on occasion be requested to repeat the donation for the same patient as a consequence of graft failure or relapse. The donation may take one of three forms: marrow stem cells, PBSCs, or PB mononuclear cells (PBMCs). The use of PBSCs is covered in part in the section above.

### A Second Donation of Marrow Cells

The donor should be warned in advance of the original donation that there is a small possibility that he/she may be asked to donate again for the same patient. He/she should be asked soon after the first donation if he/she would be prepared to donate again. The donor should be informed as to the timing of possible second transplants. He/she should be asked to notify the donor center of any extended travel or change of address. Staff at the transplant center should consider collecting remission or chronic phase stem cells from the blood or marrow to permit an autologous rescue, but this may be unnecessary if the risk of graft failure is thought to be low. If the need for a second transplant for marrow (or blood) stem cells arises, the transplant center should contact its national hub and request that the need for a second transplant be transmitted rapidly to the national hub (or donor center) in the country of residence of the donor. The donor must on no account be contacted directly.

A senior staff member from the transplant center will prepare the case for a second donation in writing and submit it to the medical director of the hub. The document should include, as a minimum, details of (1) the patient's diagnosis, (2) the first transplant, (3) the patient's current clinical status, (4) the reasons for requesting a second donation, and (5) the clinician's estimate of the clinical outcome. On receipt of the request, the hub medical director will circulate the details to members of a review panel. This panel will operate under the direction of the medical director of the national hub and include representatives of the donor center and national registry. The members of the panel will decide if the donor can be approached. The decision will take into account the clinical state of the patient, the likelihood that a second transplant will be successful, the condition of the donor, and other factors.

The review panel will endeavor to give its judgment within 48 hours of receiving the request. It will not normally reconsider the same request within a 7-day period. If the

request is approved, the donor center is responsible for approaching the donor for a second marrow (or PB leukocyte) donation. Before the consent, the donor must be given a general explanation of the indications for and results of second marrow transplantation (or PBMC) donation, the procedure for the second marrow (or PBMC) donation, and the associated risks.

The donor must be given ample time to make her/his decision and must be free to ask all questions that he/she desires. The donor must feel free to decline. There must be no undue pressure on the prospective donor.

#### A Second Donation Comprising PB Leukocytes

A transplant center may request that the original marrow donor be asked to donate leukocytes rather than marrow cells for a second transplant procedure as treatment for graft failure. Moreover, leukocytes or (perhaps better) mononuclear cells from the PB of the original transplant donor have demonstrated activity in reversing relapse in patients previously allografted for leukemia, and thus, a marrow donor may on occasion be asked to undergo leukapheresis for leukocyte donation for either of these reasons. This request may be made months or years after the original marrow donation.) The request for leukocyte donation should be handled in a manner strictly analogous to the request for a second marrow donation (see Second Donation of Marrow Cells). The transplant center may request that the prospective leukocyte donor agrees to donate marrow on a future occasion if required. This request should then be discussed with the donor, who should not in any way be pressured to agree.

If the donor agrees to donate leukocytes, he/she should not be asked to travel to the transplant center. Leukocytes should be collected by means of a mechanical flow blood cell separator at a suitable center as near as possible to the donor's place of residence. The numbers of leukocytes to be collected should be specified by a senior clinician at the transplant center. Between two and five sessions should be performed within 5 to 9 days. Buffy coat should contain 2 to  $4 \times 10^8$ /kg nucleated cells unless otherwise stipulated by a senior clinician as described above.

If the second donation is to comprise only one unit of blood, as may be indicated for the management of EBV-related lymphoma developing in a patient after allografting, the donor center medical director may approve the request on his/her initiative without involvement of the review committee.

#### COMMUNICATIONS BETWEEN DONOR CENTER AND TRANSPLANT CENTER

*Initial search.* The initial search should ideally be from hub to hub. It may exploit the existence of the book *Bone Marrow Donors Worldwide* or the *European Marrow Donor Information System* (supported by a grant from the European Community).

*Transfer of specimens from prospective donors.* Blood specimens will be sent to the transplant center on request.

*Information for donor.* Notwithstanding the desire to maintain anonymity for the donor and confidentiality for the

patient, the transplant center will make arrangements to keep the donor center informed of the progress of the patient on a regular basis. Communication may conveniently be channeled through the respective hubs. If the patient dies, the transplant center will so inform the donor center within a reasonable period of time. The donor center and hub should pass on appropriate information to any donor who has previously expressed a desire to be kept informed of the patient's progress.

#### COSTS AND LEGAL LIABILITIES

*Fee structure.* It is recommended that fees should be assessed in accordance with the following guidelines: initial search, at no cost; DR typing, levied in accordance with local fees; subsequent specialized tests, charged according to local fees; harvest costs and related charges including preharvesting counseling of the donor, medical examination and laboratory tests, autologous unit collection, marrow harvest including hospitalization and anesthesia, insurance (see below), donor expenses and reasonable loss of income, expenses for one accompanying person, and postharvest care should be estimated in advance and communicated to the transplant center. The harvest center will be entitled to charge for services performed if the harvest procedure is canceled after the sequence described above has begun.

*Responsibility for payment.* Hubs will render accounts to hubs. Ultimate responsibility for payment rests with the hub. No hub may approve selection of a donor without implicit approval of all related costs.

*Legal liability.* Life insurance and disability insurance should be obtained for each donor before the harvest procedure.

#### GLOSSARY

*Donor center.* The donor center is the organization that recruits and manages volunteer donors. The donor center is responsible for scheduling the collection of blood specimens and infectious disease testing and for coordinating the marrow harvest. It oversees transportation of marrow from the harvest center to the transplant center.

*Harvest center.* The harvest center is the hospital at which the donor is evaluated for suitability to donate and where the harvest procedure eventually takes place.

*Transplant center.* The transplant center is the hospital at which the patient is treated.

*Hub.* The hub is the national organization responsible for coordinating international searches and international transplants. Each country may have one or more hubs. The hubs may or may not be donor registries. (see *Scope of Accreditation.*)

#### Composition of the World Marrow Donor Association

*Officers and Executive Committee members in 1994.* President: Jon J van Rood; Past President: E Donnell Thomas; General Secretary: John M Goldman; Treasurer: Rudolph Brutoco (before January 1994), Machteld Oudshoorn (January 1994 and after); Administrative Secretary: Pat Coppo;

and Regional Secretaries: Colette Raffoux (Europe), Jill Hows (Europe), Craig Howe (North America), Kerry Atkinson (Australia), and Takeo Juji (Japan). Other Committee members were Pat Beatty (USA), Ben Bradley (UK), Noel Buskard (Canada), Eliane Gluckman (France), Alois Gratwohl (Switzerland), John Hansen (USA), Mary Horowitz (USA), and Philip McGlave (USA).

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throughout the world--1994 update. The WMDA Executive Committee**

JM Goldman

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