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Tissue and Cell Donation: Recommendations From an International Consensus Forum

Jacinto Sánchez-Ibañez, MD,[1] Christine Humphreys, MSc, CEBT,[2] Mar Lomero, RN, PhD,[3] Manuel Escoto, MPH,[4] Matthew J. Weiss, MD,[4,5,6] Murray Wilson, BCE, MBA,[4] and Marta López-Fraga, MSc, PhD[3]

Background. Organ, tissue, and cell donation and transplantation legislation and policies vary substantially worldwide, as do performance outcomes in various jurisdictions. Our objective was to create expert, consensus guidance that links evidence and ethical concepts to legislative and policy reform for tissue and cell donation and transplantation systems. **Methods.** We identified topic areas and recommendations through consensus, using nominal group technique. The proposed framework was informed by narrative literature reviews and vetted by the project's scientific committee. The framework was presented publicly at a hybrid virtual and in-person meeting in October 2021 in Montréal, Canada, where feedback provided by the broader Forum participants was incorporated into the final manuscript. **Results.** This report has 13 recommendations regarding critical aspects affecting the donation and use of human tissues and cells that need to be addressed internationally to protect donors and recipients. They address measures to foster self-sufficiency, ensure the respect of robust ethical principles, guarantee the quality and safety of tissues and cells for human use, and encourage the development of safe and effective innovative therapeutic options in not-for-profit settings. **Conclusions.** The implementation of these recommendations, in total or in part, by legislators and governments would benefit tissue transplantation programs by ensuring access to safe, effective, and ethical tissue- and cell-based therapies for all patients in need.

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After blood, human tissues and cells are the most frequently used substances of human origin. According to the American Association of Tissue Banks,[1] >2 500 000 tissue transplants are performed annually around the world from 58 000 donors. In 2012, hematopoietic progenitor cell (HPC) transplantation surpassed 1 million.[2] In 2015, 157 449 children were born in Europe after assisted reproductive technology,[3] and 129 681 organs were transplanted in 2020.[4]

Tissue and cell transplants range from life saving treatments to therapies providing enormous quality-of-life improvements. Corneal grafts can restore sight, tendons and ligaments are used to treat sporting injuries or repair degenerative defects, heart valves replace damaged ones and extend life in many patients, and skin is critical for the survival of patients suffering major burns and is used to support the healing of ulcers. Bone is used in orthopedics (general and oncology), sports medicine, and craniofacial/maxillofacial, dental, and neurosurgical procedures. Transplantation of HPC can cure congenital or acquired diseases, including some leukemias, and free recipients from long-term anticoagulation therapy, and donated gametes and embryos can be used for medically assisted reproduction.

This report covers 1 of 7 domains dealt with by the International Donation and Transplantation Legislative and Policy Forum (the Forum). As described in an accompanying publication,[5] the Forum outputs provide cohesive, evidence-informed guidance for those aspiring to implement the best legislative and policy aspects for their organ, tissue, and cell donation and transplantation (OTDT) system. The primary audience for this work includes those responsible for defining and implementing the legislative and regulatory framework of an OTDT system in their jurisdiction.

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[1] *A Coruña Tissue Bank, Cryobiology Unit, A Coruña University Hospital, Spain.*
[2] *Eye Bank of Canada (Ontario Division), Toronto, ON, Canada.*
[3] *Department of Biological Standardisation, OMCL Network & HealthCare (DBO), European Directorate for the Quality of Medicines & HealthCare (EDQM), Council of Europe, Strasbourg, France.*
[4] *Canadian Donation and Transplantation Research Program, Edmonton, AB, Canada.*
[5] *Transplant Québec, Montréal, QC, Canada.*
[6] *Division of Critical Care, Department of Pediatrics, Centre Mère-Enfant Soleil du CHU de Québec, Québec, QC, Canada.*

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Correspondence: Marta López-Fraga, EDQM, Council of Europe, 7 allée Kastner, Strasbourg, France. (marta.fraga@edqm.eu).

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Although many of the issues and requirements in the fields of OTDT are common, certain specificities in the tissue and cell field warrant separate consideration. These include the increasingly novel ways in which tissues and cells are processed and used, the large numbers that can be obtained from a single donor, the possibility to store and process them for long periods of time and transport and distribute them globally, and the market forces that risk having a profound impact on their donation and supply.

Legislations and policies surrounding tissue and cell donation and transplantation vary enormously from country to country. This article does not intend to provide guidance about the type of legal framework that should be used to regulate these substances of human origin or to be prescriptive about implementation details but identifies key expert recommendations addressed to governments, healthcare professionals, and stakeholders within the field of tissues and cells that could provide a general framework to assure fair, ethical, and safe access to these substances for citizens worldwide. Because of their unique characteristics, blood and blood components are out of the scope of this work.

MATERIALS AND METHODS

Funding, Ethics, and Conflict of Interest Management

The majority of Forum funding was from the Provincial Government of Québec, with additional in-kind or cash funding from nonprofit research and professional organizations (listed here) and Canadian Blood Services. No funding was received from for-profit entities. The recommendation generation process did not involve any new research, and ethics approval was not required or sought. All participants completed potential conflict of interest forms, which were screened by 2 members of the planning committee. Any declaration of a past or present relationship with a for-profit entity was reviewed by this committee. No relevant conflicts were discovered. Professional participants received no financial reimbursement for their participation beyond travel allowances for those who attended the Forum in person. Patient, family, and donor (PFD) participants were reimbursed according to established practices.[6]

Knowledge Gaps and Limitations

Unlike the field of organ transplantation, there is a lack of basic activity information on the number of tissue donors, grafts procured and implanted, and recipients and patients on waiting lists. Because of the wide range of indications and processing methods for each type of tissue and cell, it is difficult to find published studies to contribute to the body of evidence.

Furthermore, although some tissues and cells are used practically unaltered from the condition they were removed from the donor, others are processed into products almost unrecognizable as bodily material. Some of these processing steps are performed by entities that work for profit, and in some instances, the resulting therapies move to regulatory frameworks other than those governing transplantation. Therefore, the line delineating what constitutes as the commercialization of substances of human origin, and the interpretation of the principle of the prohibition of financial gain with respect to the human body and its parts, particularly in the context of novel therapies involving these substances, is blurry and a matter of great controversy.[7]

Recommendation Generation

The Forum was initiated by staff from Transplant Québec and cohosted by the Canadian Donation and Transplantation Program with partners including Canadian Blood Services, the Canadian Society of Transplantation, The Transplantation Society, and the International Society of Organ Donation and Procurement. PFD partners were involved at every stage of the planning of this event. The recommendation generation process is described in detail in the Introduction and Methodology manuscript.[5]

The authors of this domain included experts in the field from Europe and North America and patient partners. We identified topic areas and recommendations through consensus, using nominal group technique (NGT). The domain lead received training on NGT with a focus on creating group consensus while allowing diverse opinions to be expressed.

Three meetings were held between March and June 2021 to generate and prioritize topics for further exploration. In June, the domain's framework and topics were presented to the Forum members, which included 61 participants from 13 countries.[5] Participants provided live and written feedback. Each author performed narrative reviews on prioritized topics to build an evidence-based justification for each recommendation.

Recommendations were finalized in October and submitted to the Forum's Scientific Committee for review and feedback. The recommendations were presented at the Forum's hybrid in-person/virtual event in Montréal, Canada, on October 14 and 15, 2021, where global stakeholders, including experts in donation and transplantation, government representatives and policymakers, health professionals, and PFD partners, gave further feedback on them.

RECOMMENDATIONS

The recommendations in this domain cover 4 main areas (self-sufficiency of supply, ethics, quality and safety, and innovation), according to their objectives are as follows.

A. Ensuring national self-sufficiency in tissue and, where relevant, cells for human application

> **Recommendation 1:**
>
> ***We recommend that governments and policymakers aim to achieve national/regional self-sufficiency in the supply of tissues and, where relevant, cells of human origin. To do this, they should develop appropriate legislative and regulatory frameworks, allocate resources to carry out policy in an effective manner, and regulate exports and imports to ensure that the needs of the patients are met and to avoid market-driven flows of tissues and cells.***

Sustainability and security of systems providing tissue products for transplant require a systematic and long-term perspective. Policy development and planning require a coordinated and integrated approach to develop self-sufficient national and local donation and transplantation systems.[8]

Governments must consider and plan for costs associated with establishing legislation, governance mechanisms, staff

training and infrastructure, and the development of ongoing donor awareness programs.[9] Economies and efficiencies of scale in recovery, processing, and distribution of tissues can also be achieved through national collaboration.

Governments and health authorities should evaluate the advantages and disadvantages of permitting the importation of tissues and avoid activities that negatively affect national and local self-sufficiency.[10] Importation should be a temporary strategy executed in conjunction with, not as a substitute for, developing tissue banking programs.[11] Although imported tissue can be essential for addressing shortages, creating an adequate domestic supply offers greater security against fluctuations in global tissue supply. Governments and health authorities should implement policies encouraging the preferential use of tissues and cells sourced locally or nationally, except where international cooperation is needed to ensure highly matched transplants (eg, HPC). Countries with developing tissue banking and transplantation programs need to enhance public programs, improving access to transplantation for the entire population.

Where self-sufficiency for certain tissues and cells is not a feasible long-term solution (eg, because of the size or characteristics of the country), international collaborations based on solidarity or reciprocity may be sought to attain regional self-sufficiency.[10]

Although exportation may be key in addressing global tissue and cell shortages, it is also a source of revenue for commercial processors and industry partners in the exporting country. Often those for-profit entities interface with nonprofit processors in the importing country, creating an imbalance of incentives. The importation of tissues and cells also diverts resources from developing self-sufficient tissue donation systems in the importing country and can make countries reliant on imported tissues.[12] Therefore, the provision of exported tissue by countries with a surplus should be conditional on the existence of a regional or national plan to develop the infrastructure and resources needed to provide long-term services.

Recommendation 2:

We recommend that governments, policymakers, and donation and transplantation services regularly collect activity data related to the availability and use of tissues and cells of human origin to evaluate demand and supply, ideally using harmonized and common datasets.

Governments need to understand production and demand volumes for each tissue and cell type to ensure fair, timely, and equitable access to safe transplantation services. In addition to meeting their jurisdiction's needs, data collection allows for continuous system improvements, including appropriate funding levels to support donation and transplant activities. Understanding system capacity and demand information is essential to avoid overreliance on third parties and to prepare for risk scenarios that may impact supply.[13,14]

Governments and health authorities should develop mechanisms for collecting data on imported and exported tissues to permit the tracking of tissue types, volumes, and locations to help understand the level of dependency on imported tissues and progress on self-sufficiency.[15]

A harmonized and common dataset to record the activity data needed by the many relevant stakeholders in the field for different objectives (transparency, biovigilance, service planning, accurate comparisons between jurisdictions participating in import/export exchanges, research, etc) would facilitate benchmarking and minimize the burden on reporting bodies, such as tissue banks, collection centers, and clinical sites. Recent efforts in Europe have led to an agreement on a minimum dataset to meet these goals.[16]

B. Ensuring robust ethical principles

Recommendation 3:

We recommend that free, informed, and specific consent is the central part of any donation process. Donated tissues and cells should not be used in a manner that was not explicitly acknowledged and accepted by the person providing consent—including their use for nontherapeutic purposes, for research, and/or for profit.

Human tissues and cells can only be obtained from a person's body, hence the ethical principles that should remain the cornerstone governing their use. Tissues and cells may be recovered from living or deceased persons, and the material may be used almost immediately or stored for long periods. It may also be used following minimal manipulations or be heavily processed. Because of this diversity of circumstances, it is essential to clearly define the limits of consent. National authorities are responsible for determining the process of obtaining and recording consent for cell, tissue, and organ donation in light of international ethical standards.[17–19]

Living donors must make a free choice, without any undue influence or coercion, and must be given appropriate information beforehand on the intended use and nature of the intervention, as well as its consequences and risks, in a complete and comprehensible fashion.[8] They should be legally competent and capable of weighing the information, and they may freely withdraw consent at any time.

Tissues must not be removed from the body of a deceased person unless consent or authorization has been obtained. Whether "explicit" or "presumed," the consent model depends on each country's social, medical, and cultural traditions. Regardless, removal must not be performed if the deceased person had expressed any opposition to posthumous removal of bodily material. Furthermore, for tissue donation, which entails slightly less challenging time constraints than organ donation, it is always recommended to seek the approval of the legally designated surrogate decision-maker (eg, next of kin) to protect public trust and support for donation programs.

Medical and societal mistrust is one reason people are reluctant to donate bodily material.[20] Concerns include the terms of consent being abused (by using the donated material in a manner not explicitly agreed), the fact that additional material may be taken without knowledge, or third parties obtaining financial gain from altruistically donated material. Therefore, it is key that public confidence is maintained by standards of good practice and that the limits of consent are clearly established, made explicit, and scrupulously respected.

Recommendation 4:

We recommend that when receiving treatments that involve human tissues and cells, patients be given accurate and balanced information about their origin and the need to report back any complications after the treatment. In the case of innovative/experimental therapies, they should receive all the necessary information so that they can provide informed consent to treatment and have realistic expectations about the results.

Patients receiving any treatment involving human tissues and cells must be given suitable information beforehand on the purpose and nature of the procedure, its consequences and risks, the human origin of the material to be received, and the alternatives to the intervention. This applies to procedures that obviously involve human tissues or cells, such as corneal or HPC transplants, and the use of products almost unrecognizable as bodily material, such as skin or bone powder incorporated into sprays or gels used in craniofacial/maxillofacial/dental surgery.

The use of human tissues and cells is not exempt from risks, and this should be communicated to recipients. Some patients may not require long-term follow-up care; therefore, they must be informed of the need to report any posttreatment complications because this information may be relevant for other recipients of material from the same donor. With medically assisted reproduction, especially using nonpartner gametes or embryos, the need to communicate unexpected issues applies not only to the recipient but also to the offspring throughout their lifetime. Therefore, families should be informed about the types of reportable complications, which may include genetically transmissible diseases.

There is a spectrum of treatments that may be considered innovative or experimental, from those that have never been used in humans to those routinely used but not authorized for the condition in question. Patients' decisions about such treatments may be influenced by their medical situation, their values, advice from their treatment teams, marketing activities of companies/establishments offering the treatments, and other financial considerations. Therefore, regulations should require that patients are fully informed about the risks of innovative/experimental treatments and therapeutic alternatives based on robust clinical evidence from sources free of commercial bias, as well as about the authorization status of such treatments.

Recommendation 5:

We recommend that the principle of voluntary unpaid donation have a central role in the donation process of any type of tissue or cell. Compensation to donors should cover only justifiable expenses and loss of income and should not act as a direct or indirect inducement.

Discussions around how best to increase the supply of human tissues often focus on donor motivation, specifically, how individuals may best be encouraged to donate different forms of bodily material. Nevertheless, the prohibition of financial gain concerning the human body and its parts from living or deceased donors, and by extension, the need to ensure voluntary and unpaid donation, must remain at the center of considerations regarding the donation or use of human tissues and cells.[17,18,21]

Removal of barriers to donation must not render a decision nonaltruistic. Acceptable financial exchanges could include compensation of living donors for lost earnings or where damage results from the removal of tissues and cells from a living person. These financial interventions should aim at achieving financial neutrality for the donors or their families. Other "non-altruist-focused interventions" targeted at potential donors with no altruistic motivation to help others by donating their bodily material and who, therefore, if they are to donate, need to be provided with different reasons to do so (eg, in the form of payments or incentives beyond the reimbursement of expenses) must be strictly prohibited.

Similarly, advertising a need for tissues or cells with a view to offering or seeking financial gain or comparable advantage for the donor, or their next of kin where the donor is deceased, must be prohibited. Promotional activities may be acceptable if the measures involved are "altruist-focused," such as general donation promotion campaigns and the recognition of altruistic donations.[21]

Recommendation 6:

We recommend that governments and policymakers put in place measures and interventions to avoid the commodification of altruistically donated tissues and cells, which would not only breach the fundamental ethical principle that the human body, or its parts, should not give rise to financial gain or equivalent advantage but also endanger patient access to therapies.

Since the 1980s, the demand for human tissues has increased dramatically. In addition to the field of advanced therapies, which generated tissue-engineered products and cell-based therapies, pharmaceutical companies started requiring access to human tissues and cells for research and product testing.[22] Inevitably, this created a market in which procurement organizations, tissue banks, and numerous brokers and distributors could charge "reasonable fees" for their services, with far-reaching consequences for the allocation of human tissues and cells, the access to treatment by patients, and the sustainability of public health systems funding them. The term "reasonable fee" has never been clearly defined, and this loophole can be exploited to turn altruistic donations into profits.[23-27] The resulting tension between the altruistic principles of donation and the industry's profit motivations is particularly noticeable and dangerous when tissues and cells are processed or used in ways governed by a different regulatory field, such as medicines or medical devices, in which financial profits are not only allowed but expected.

There is a risk that the interests of industry, with its extensive capacity for lobbying and the ensuing political desire to promote the growth of biotechnology markets and jobs, could take precedence over the interests of patients and research. All aspects of commodification of altruistically donated tissues and cells should be carefully and transparently considered with a view to guaranteeing respect for fundamental ethical principles, safeguarding public trust, ensuring fairness and equity in patient access to treatment, and supporting the sustainability of national healthcare systems, which are ultimately responsible for funding such therapies. The Council of Europe has recently evaluated the risk of commodification of substances of human origin and set out a series of recommendations in

this regard.[7] The choice of regulatory frameworks governing the use of therapies involving tissues and cells may have far-reaching consequences and should be carefully considered balancing evidence-based risks and potential benefits.

Recommendation 7:

We recommend that governments and policymakers put in place measures and interventions to ensure that clinical criteria and ethical principles guide the allocation of tissues and cells. Financial considerations (such as distribution to the highest bidder) should not be weighted in the allocation process.

Needs for human tissues and cells often exceed availability. Decisions on distributing these limited resources, particularly given their human origin and altruistic donation, raise important practical and ethical questions. Except in direct donations (eg, for HPC or, in permissive jurisdictions, gametes), tissues and cells must be allocated based on transparent, objective, equitable, and duly justified clinical criteria that conform with internationally accepted ethical standards.[19]

This also applies to advanced therapies derived from human tissues and cells, in which there is a real risk that unjustified pricing schemes may restrict access to therapies derived from altruistically donated bodily material to only those patients able to pay for them.

Recommendation 8:

We recommend that governments, policymakers, and healthcare professionals put in place appropriate measures and safeguards to ensure the utmost protection of living tissue or cell donors.

Some tissues and cells, such as HPC, gametes, or amniotic membranes, can only be donated by living persons. HPC transplantation is one of the most widely used forms of cell therapy, and HPC is one of the most exchanged biological materials for transplantation. Their application for treating different hematological diseases has increased extensively in the past half-century.[28,29] Many low- and middle-income countries are now establishing autologous and allogeneic HPC transplantation programs. All HPC donors are living donors, and in many cases, unrelated donors are identified across national borders; exceptionally, minors can become related donors. Most donors are exposed to some risk in donation, such as the need to undergo mobilization of HPC with growth factors (eg, peripheral blood stem cell donation) or general anesthesia for bone marrow donation. There is variability in the oversight criteria applied to this form of donation, and the Council of Europe has shown that eligibility criteria for related donors are less stringent and established than those for unrelated donors in most member states.[30]

The demand for gamete donors has also increased exponentially in recent years.[31] Gamete donors may donate numerous times during their life. In women, the donation intervention involves ovarian stimulation through medication and an ovarian puncture procedure, both of which entail risks. The introduction of financial incentives for donation renders certain social groups (and especially women) particularly susceptible to disparities based on social and economic status.[32,33]

Therefore, the development of living donation programs requires robust legislative and operational measures to safeguard donors' health and individual rights and freedoms. In particular, adequate medical and psychosocial selection criteria, proper informed consent, a limit on the number of times a donor can donate based on robust clinical data, a guarantee of follow-up care, and appropriate follow-up of the donor's health status in the short- and long-term.

C. Ensuring quality and safety of tissues and cells for human use

Recommendation 9:

We recommend that governments and policymakers take all necessary measures to protect donors and recipients by ensuring the application of internationally accepted quality and safety standards for the donation, preparation, and clinical application of tissues and cells that consider evidence-based best practices.

This recommendation addresses the need to provide tissue banks, professionals, and stakeholders with strict, comprehensive, and evidence-based international guidelines/standards to ensure the quality and safety of tissues and cells for human application.[34-38] These standards would help tissue banks and healthcare professionals harmonize the evaluation of safety, quality, and efficacy of practices and must be regularly updated according to developments in the field. International standards would prevent the need for policymakers to develop specific requirements for tissues and cells imported from another country.[39]

To ensure quality and safety, and in line with international recommendations, policymakers need to ensure the implementation of comprehensive quality systems[34-36,40] and, crucially, confirm the proper performance of these quality systems in all tissue and cell establishments.[9,41]

Recommendation 10:

We recommend that governments and policymakers take all necessary measures to ensure systems of surveillance and biovigilance for tissues and cells are in place and coordinated with other vigilance systems (organs, pharmaceuticals, medical devices, etc).

The use of human tissues and cells carries a risk of disease transmission and other potential adverse effects in the recipient. These risks can be monitored and controlled. Policymakers must ensure that traceability and biovigilance systems are in place that allow for the detection and investigation of such incidents, the notification to all relevant parties (including donors and recipients, where relevant), and the application of corrective and preventive measures. This would necessarily imply the implementation of traceability systems that would enable us to locate and identify the tissues and cells during any step from procurement, through processing, testing, and storage, to distribution to the recipient or disposal, including the ability to identify the donor and the establishment receiving, processing, or storing the tissue/cells and the ability to

identify the health professionals at the medical facility applying the tissue/cells to the recipient(s). These traceability systems should also guarantee traceability from the donor to the final product when tissue/cells are used as starting material to produce advanced therapies that may be regulated under different regulatory frameworks. Moreover, traceability systems should include the ability to locate and identify all relevant data relating to products and materials coming into contact with the tissues/cells.

Potential adverse effects may also occur in areas closely related to tissues and cells (organ donors, testing kit devices). Ideally, these incidents should be addressed in a centralized biovigilance system, with a global overview of all relevant areas of donation and transplantation. If this is not possible, it is essential to facilitate communication and coordination with other related vigilance systems (ie, organs, pharmaceuticals, or medical device systems).[40,41]

D. Fostering the development of safe and effective innovative therapeutic options in not-for-profit settings

Recommendation 11:

We recommend that regulatory agencies require and evaluate clinical efficacy and safety studies before authorizing any novel therapy for clinical application.

Many critical advances in the history of medicine and surgery were introduced through an unregulated, informal innovation process. However, as numerous consolidated therapies are already available for treating patients, it becomes imperative to evaluate the efficacy of new technologies, processes, and products, as well as new indications for existing tissue- and cell-based treatments.

In the early 2000s, scandals such as the supply of illegally removed human tissues caused a loss of public confidence in tissue systems.[42-44] In response, regulatory agencies have gradually reinforced standards to improve the quality and safety of tissues and cells of human origin intended for transplantation. Many of these standards require clinical data from well-regulated trials before the authorization of treatments with human tissues or cells.[45]

However, organizations must enforce these standards, and governments must ensure adherence to them. An objective evaluation founded on structured clinical studies should be part of the authorization process for new therapies.

There has been a documented increase in the number of clinical trials in this sector, with >1300 active cell therapy trials registered in 2021, an increase of 78% compared with 762 in 2019.[46] However, it is troubling that many clinics and companies continue to provide "regenerative" cell therapies without federal approval in Canada and the United States.[45] These include therapies with little or no scientific evidence of efficacy, such as the use of stem cells for autism, antiaging, cerebral palsy, etc.[47-49] The majority of developed countries have adequate regulations for cell and tissue therapies; however, governments must deploy appropriate resources to enforce these regulations to ensure public safety.[50]

Recommendation 12:

We recommend that the decision to fund innovative therapies should be based on independent and objective cost-effectiveness analyses. The resources (human, financial, and material) of donation and transplantation programs of tissues and cells should be adjusted, taking into account these cost-effectiveness studies.

In addition to the objective evaluation of efficacy studies, a formal cost-effectiveness assessment should be part of the authorization process for new therapies.

In many countries, the government bears all or most of the health system's costs. More than 70% of health spending across Organization for Economic Co-operation and Development countries is funded from public sources,[51] and an adequate balance between innovation, cost, and safety is required. Several methods are available to inform healthcare funding decisions, including cost-effectiveness, cost-utility, cost-minimization, and cost-benefit analysis.[52]

When evaluating a specific technology, however, a structured approach must be used to consider sometimes-conflicting evidence. In several studies, researchers have demonstrated the superiority of traditional and new-generation allograft compared with products engineered from nonhuman tissue sources.[53-55] In other cases, it is impossible to conclude the superiority of a new-generation product that is more expensive than traditional therapeutic alternatives,[56] and health systems must ultimately choose whether to approve the new product.

Most countries have established a health technology assessment agency with the required expertise. In England and Wales, the National Institute for Health and Care Excellence appraises the clinical and cost-effectiveness of newly approved therapies and issues recommendations for public coverage in the National Health Service.[57] The Institut national d'excellence en santé et en services sociaux agency plays a similar role in the province of Québec, with the mandate to assess the clinical benefits and costs of therapies or services.[58] The experience and expertise of these groups should be applied to the assessment of the relevance of new therapies derived from human tissues and cells.

Recommendation 13:

We recommend that nonprofit and predominantly publicly funded organizations consider collaborations and partnerships to have access to complementary resources, technologies, and expertise to make the development of innovative processing methods and treatments financially possible and sustainable.

Regulatory agencies have gradually put in place standards to enhance the quality and safety of tissues and cells of human origin intended for transplantation. Often modeled on or strongly inspired by best pharmaceutical manufacturing practices, these standards undergo continual improvement.

As tissues and cells become more than minimally manipulated and treatments involve more sophisticated processes, regulatory requirements become increasingly complex. As a result, compliance costs related to development and production increase, making innovation financially unsustainable

in nonprofit and predominantly publicly funded organizations. It is a common reality for the public sector to face multiple barriers to innovation.[59] Organizations must therefore explore alternatives to the traditional management and development innovative model through public-private collaborations.[60-62]

This could be done by fostering an active exchange of knowledge and collaboration between organizations. Organizations should also prioritize an investment in innovation (incorporating state-of-the-art processes and equipment) as a crucial part of the financial sustainability plan. When defining their development strategy, organizations, including public bodies, must consider all possible options, such as mergers, acquisitions, manufacturing partners, joint ventures, and other strategic partnerships, and alternative sources of financing, such as funds dedicated to innovation, investment partnerships, or philanthropic foundations. However, transparent, public oversight is critical to ensure that public funds are not used to bolster the profits of companies that benefit from the altruistic donation of materials from human sources.

CONCLUSIONS

Several critical aspects affect the donation and use of human tissues and cells and need to be addressed internationally to protect all potential donors and patients. These include the respect of internationally accepted ethical principles, the pursuit of self-sufficiency, and donor and recipient protection.

The recommendations presented in this article resulted from extensive discussions and consensus-seeking among experts in the field of tissues and cells and aim to reflect the basic needs of a functional, effective, and ethical tissue donation and transplantation system. Although the geographical composition of the working group that put forth these recommendations was limited to a group of countries, this subject matter was integrated into and received feedback from organ donation system experts from 13 countries, many of whom affiliated with donation systems that manage both organ and tissue donation simultaneously.[5] Ultimately, it is our hope that future revisions will incorporate expertise from other countries with more diverse tissue transplantation structures.

Although we believe that the incorporation of these recommendations, in total or in part, would benefit most tissue transplantation systems in the world, it will be the role of legislators and governments to implement the measures that will result in the necessary system improvements to ensure the needs of patients are met.

To this end, our knowledge translation strategy will disseminate the Forum's recommendations to legislators, nonexpert stakeholders, and transplant professionals. Through our multipronged strategy, including open-access publications, presentations at scientific conferences, webinars, and the distribution of recommendation summaries, we hope to support stakeholders in developing or reforming their OTDT system. The summaries are formatted to address different stakeholder groups, including fact sheets developed by the CDTRP targeted for stakeholders who have limited baseline knowledge of the OTDT system. The dissemination strategy is further delineated in the accompanying manuscript on the Forum's methods and purpose.[5]

In Memoriam

Mr. Murray Wilson, a patient partner and coauthor of this manuscript, tragically passed away on January 5, 2023. He will be dearly remembered for his sharp intellect, probing questions, and tireless devotion to the cause of organ and tissue donation and transplantation.

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