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# **ISBT 128 For Cellular Therapy**

## **An Introduction**

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# 1 Preface

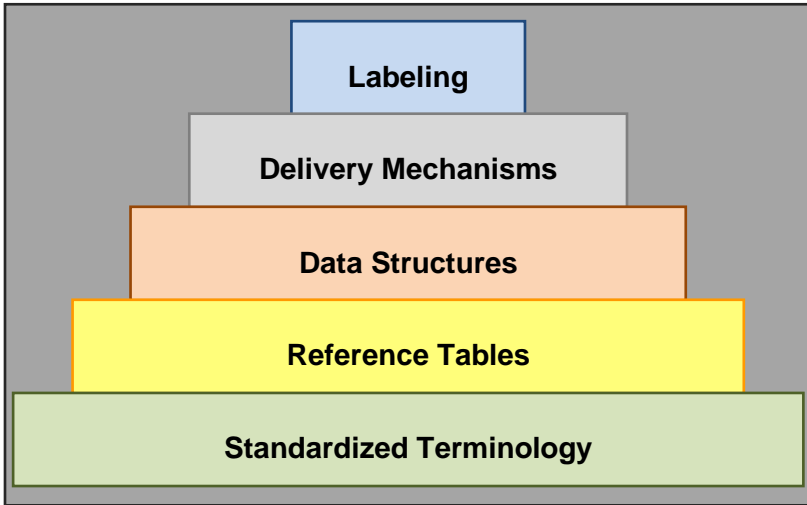
A great deal of important information is presented on the label of a cellular therapy product. The information varies from country to country according to licensing regulations, language differences, and local practice but, in all cases, it is essential that it is recorded accurately, transferred correctly, and that critical items such as the blood groups, expiration date, and product description are clearly understood by medical personnel transfusing or transplanting the product. In addition, robust audit trails must be in place to allow tracing between donor and recipient.

The field of Cellular Therapy (CT) is very much a global one and CT products are regularly transferred across national boundaries. There is a clearly identified need for international agreement on product descriptions and a means of ensuring the unique identification of each donation throughout the world. These fundamental requirements are essential for effective traceability on a global scale. An editorial in the Bulletin of the World Health Organization (WHO) (<https://www.who.int/bulletin/volumes/91/5/12-116988.pdf>) recognized the need for effective traceability of all medical products of human origin (MPHO), including blood, organs, bone marrow, cord blood, corneas, tissues, reproductive cells, and milk, to ensure donor and recipient safety. In addition, the bulletin called for the global adoption of ISBT 128 as the coding system for all MPHO. WHO and ICCBBA have a joint work program to take forward this initiative.

Increasingly, facilities dealing with the collection, processing, and administration of CT products operate sophisticated computer systems to enhance safety and efficiency. Transfer of information between such facilities by electronic means ensures accuracy, but can only be effectively achieved in a global context by use of internationally agreed standards to define the information environment.

## 2 What is the Information Environment?

The information environment comprises a number of layers each of which needs to be in place to ensure that standardization can be achieved.



### Standardized Terminology

At the base lies the standardized terminology ([ISBT 128 Standard Terminology for Medical Products of Human Origin](#)) that will ensure common understanding of terms. Without clarity at this level any further attempt at standardization is lost. However, obtaining agreement on standardized terminology at the necessary level of detail involves careful analysis and robust consensus. A simple example serves to illustrate this. DMSO is used during cryopreservation of a cellular therapy product. However, different concentrations may be used and hydroxyethyl starch may be added. In order to accommodate these variations a range of standardized terminology and associated values are required. Extreme care is needed in order to ensure that internationally agreed standardized terminology is defined at the required level of granularity. This provides confidence in the consistency of both the information being transferred and the quality of the product described. The standardized terminology needs to be accessible to all users of the standard.

## **Reference Tables**

Once the standardized terminology is in place, these can be combined to give the required items of information. Reference tables are built to map each item to a suitable code. Such tables can be large and complex and it is essential that they are managed to ensure that they can be modified to meet the changing needs of clinical practice in a manner that maintains their integrity and avoids ambiguity or redundancy.

Product reference tables in particular need to combine a tightly defined structure with the flexibility to accommodate expansion and change in ways that cannot be anticipated.

Successful management of the standardized terminology and reference tables requires input from both clinical experts in the field and information specialists. The tables themselves need to be published in a manner that allows all users of the standard to access the most up-to-date versions in a timely manner.

## **Data Structures**

Having built reference tables which convert the clearly defined information into codes suitable for electronic transmission, it is necessary to define data structures in which to embed the data. Data structures define the technical characteristics necessary for the interpretation of the information. They specify the context and structure and provide the links to the appropriate reference tables for conversion of codes to meaningful information.

Data structures need to be clear and unambiguous and must take into account any constraints imposed by the anticipated delivery mechanisms. For example, data structures that will be used in linear bar codes are limited in the number of characters they can contain.

## **Delivery Mechanisms**

The delivery mechanism is the means of delivering the electronic information. Probably the most well-known delivery mechanism is the linear bar code that has been used in blood transfusion practice for many years. There are in fact several types of linear bar codes including the old fashioned Codabar system that was only capable of encoding

numeric information, and Code 128, a bar code standard widely used in coding standards such as GS1 and ISBT 128.

Higher capacity delivery systems are available using 2-dimensional or reduced space symbology bar codes. These codes can carry much more information in each symbol. More recently the use of radio frequency identification (RFID) chips that can carry encoded information is being developed for medical products of human origin.

It is important to recognize that a range of delivery systems can sit at this level of the hierarchy. The standardized terminology, reference tables, and data structures of the information standard can be delivered as easily in a linear bar code as they can in an RFID tag. The standards themselves need to be adaptable in order to make best use of new delivery mechanisms as they are developed.

## **Labeling**

The final element in the coding system is the associated labeling. Although there will be other labeling requirements that fall outside the coding system, an effective coding system needs to consider the physical association between the information and the product. Whether incorporated into a bar code or an electronic tag, there needs to be a mechanism that will ensure correct physical assignment of information to the product, and confidence in the association between electronically stored information and eye-readable printed information. This latter requirement must not be overlooked in the enthusiasm to embrace remotely rewritable tags.

## **The Information Environment**

Together these elements form the Information Environment. For such a system to be, and to remain effective, it must be carefully designed and managed. There must be an ongoing dialogue between clinical users, scientists, information specialists, and equipment and software vendors to ensure that the standard continues to support rapidly developing clinical practice.



### **3 The ISBT 128 Standard**

The ISBT 128 Standard provides the specification for many of the elements of the information environment required in transfusion and transplantation. It defines the lower three levels of the model: the standardized terminology, reference tables, and data structures. Minimum requirements are also defined for delivery mechanisms and labeling. By complying with ISBT 128, collection and processing facilities can provide electronically readable information that can be read by any other compliant system.

ISBT 128 specifies:

- a donation numbering system that ensures globally unique identification;
- the information to be transferred, using internationally agreed reference tables;
- an international product reference database;
- the data structures in which this information is placed;
- a bar coding system for transfer of the information on the product label;
- a standard layout for the product label;
- a standard reference for use in electronic messaging.

The standard, originally designed for use in blood transfusion, has gained international acceptance and is now in widespread use.

Following meetings between FACT, JACIE, and ICCBBA, an agreement was reached to support the use of ISBT 128 for coding and labeling CT products, and this decision has been endorsed by the Boards of major cellular therapy professional organizations.

A plan for full implementation of ISBT 128 is also required by AABB. The most current version of the standard terminology is maintained on the ICCBBA website at [www.isbt128.org](http://www.isbt128.org).

While the description of a product in the Product Description Codes Database is standardized, the text that appears on the actual label of a product is under national control. This allows for differences in languages and regulatory requirements.

## 4 Unique Donation Identification Number (DIN)

ISBT 128 provides for unique identification of any donation worldwide. It does this by using a 13-character DIN built up from three elements: the first identifying the facility that assigned the DIN (e.g., the collection facility, registry, etc.), the second the year in which the DIN was assigned, and the third a sequence number controlled and maintained by the facility that assigned the DIN.

For example:

**S0020 16 001021** 

where:

**S0020** identifies the collection facility (in this case Karolinska University Hospital, Stockholm, Sweden);

**16** identifies the collection year as 2016;

**001021** is the sequence number of the collection assigned by the collection facility.

The two digits printed vertically allow individual bar codes in a number set to be discretely identified, hence providing an option to add process control.

An additional character is enclosed in a box at the end of the identifier. This is a checksum character used when a number is entered into a computer system through the keyboard to verify the accuracy of the keyboard entry.

Facility codes are assigned by ICCBBA, who maintain a database of all registered facilities that can be found on their website ([www.isbt128.org](http://www.isbt128.org)). A lookup program allows the look up of individual facility codes. ICCBBA licensed facilities and vendors are able to download a full listing of all registered facilities.

## 5 Product Descriptions

ISBT 128 provides a comprehensive and highly flexible system for describing products and assigning product codes. The foundation of this system is a standard terminology which is constructed by international consensus to ensure global consistency in use and understanding. The standard terminology is maintained on the ICCBBA website and is publicly available. Cellular therapy terminology and coding is managed by ICCBBA and the international Cellular Therapy Coding and Labeling Advisory Group (CTCLAG).

New products are defined by combining pieces of information from the standardized terminology in a way that unambiguously describes the product. This process is made easier by the use of the concepts of component class, core conditions, and attributes.

This unique product description is assigned a Product Code that becomes incorporated into the ISBT 128 Product Description Code Database, ensuring that the product will be accurately identified in any country in the world that is using ISBT 128.

New entries into the Product Description Code Database can be readily accommodated allowing the system to expand to meet a growing range of products without losing the overall structure of the coding system.

The following example is taken from the database:

Component Class:	HPC, CORD BLOOD
Core Conditions:	NS (anticoagulant not specified) XX (variable volume) <=-150C (storage condition)
Attributes:	10% DMSO Other Additives:Yes Cryopreserved

Product Description Code: S1150

While the description of a product in the Product Description Code Database is standardized, the text that appears on the actual label of a

product is under national control. This allows for differences in languages and regulatory requirements.

## **6 Other Data Structures**

In addition to the donation identifier and product codes, many other pieces of important information needs to be provided with a CT donation. Through its wide range of data structures, ISBT 128 provides significant information including, but not limited to:

- ABO and RhD Blood Groups;
- Collection Date and Time;
- Expiration Date and Time;
- Collection Container Catalog and Lot Number;
- Donor Identification Number;
- Patient Date of Birth;
- Patient Identification Number;
- Flexible Date and Time (supporting encoding of local time, or UTC)

## 7 Delivery Mechanisms

The delivery mechanism is the means by which the information is represented in a machine-readable manner. The most common such mechanism is the linear bar code. ISBT 128 has traditionally been based on the linear bar code using Code 128 symbology. However, a two-dimensional Data Matrix symbol can be used on cellular therapy labels and is preferable to maximize space on a partial label. A single Data Matrix symbol can carry the same information as encoded in multiple linear bar codes. With very small containers, label size is severely restricted and in these situations a more efficient two-dimensional Data Matrix symbol can be used.

### Comparative Size of Code 128 and Data Matrix Symbols

Data Matrix



Code 128



Donation ID Number



ABO/RhD



Product Code



Expiration Date/Time



Collection Date/Time

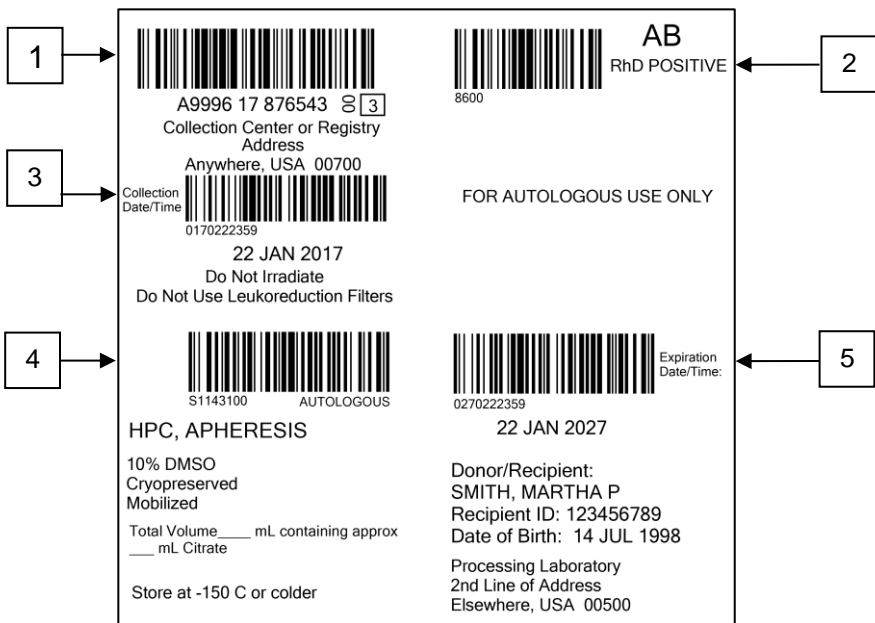
The Data Matrix symbol on the left contains all of the information held in the five Code 128 symbols on the right.

There is much interest in the use of RFID tags. This technology is still developing, but may provide significant benefits in some situations. ISBT 128 Compound Messages are compatible with RFID.

## 8 Product Labeling

In addition to specifying the requirements for the electronic coding of information, ISBT 128 provides a standard labeling format that ensures a consistent layout of the bar codes on product labels. Critical eye-readable information such as blood groups, product description, and expiration date also appears in fixed positions on the label. This reduces the risk of confusion when products from multiple sources are being used.



The ISBT 128-specified label is illustrated below. Additional label examples and further information may be found in the *ISBT 128 Standard Labeling of Cellular Therapy Products*. This document may be found on the ICCBBA website ([www.isbt128.org](http://www.isbt128.org)).



- 1 Donation Identification Number
- 2 ABO/RhD
- 3 Collection Date/Time
- 4 Product Code
- 5 Expiration Date/Time



Labels have also been designed for smaller containers, such as cryopreservation container labels. The example shown below uses a Data Matrix 2-D bar code in the upper left corner to record the Donation Identification Number, Product Code, Expiration Date, Collection Date, Patient Identification Number (Patient ID), and Patient Date of Birth.

 <p>A9999 16 123456 8 Q</p> <p>Product: S1142X00</p> <p><b>HPC, APHERESIS</b></p> <p>6% HES + 5% DMSO  Cryopreserved, Mobilized  ___ ml containing ___ ml Citrate + ___ ml  Heparin (___ units/ml)  Store at -150 C or Colder  Collection Center or Registry  Anywhere, Worldwide  Collection Date: 03 FEB 2016  Expiry Date: 03 FEB 2026 <i>Partial Label</i></p>	 <p>BIOHAZARD  FOR AUTOLOGOUS  USE ONLY</p> <p>Donor/Recipient  PATIENT, JOHN Q:  Recipient ID#: 123456789  Date of Birth: 31 DEC 1984</p> <p>Processing Facility  Anywhere, Worldwide</p>
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## **9 The Role of Technical Advisory Groups**

ICCBBA involves international experts in blood, cellular therapy, tissue, and milk banking in the development and maintenance of the standard. These experts are organized into Technical Advisory Groups (TAGs) that meet regularly (both face-to-face and through conference calls) to further develop and expand the standard ensuring it continues to meet the needs of its users. The vital role of these groups cannot be overemphasized. It is only through the involvement of such expert panels that ICCBBA can be assured it has the knowledge base to anticipate the needs of its users in fields where change is constant. More than 300 experts participate in the ICCBBA TAGs.

For Cellular Therapy, the advisory group is the Cellular Therapy Coding and Labeling Advisory Group (CTCLAG). The group comprises representatives from the following professional organizations: AABB, Asia Pacific Blood and Marrow Transplant (APBMT), American Society for Blood and Marrow Transplantation (ASBMT), American Society for Apheresis (ASFA), European Group for Blood and Marrow Transplantation (EBMT), Foundation for the Accreditation of Cellular Therapy (FACT), ICCBBA, International Society of Blood Transfusion (ISBT), International Society for Cellular Therapy (ISCT), Joint Accreditation Committee of ISCT and EBMT (JACIE), Latin American Blood and Marrow Transplant Society (LABMT), National Marrow Donor Program (NMDP), and the World Marrow Donor Association (WMDA). In addition to these representatives, technical experts and regulatory liaisons also serve on the committee.

CTCLAG reviews requests for new terminology ensuring consistency and consensus in terminology, prepares educational materials, and organizes workshops for ISBT 128 users around the world.

## 10 The Role of ICCBBA

ICCBBA is the not-for-profit standards body responsible for the management, development, and distribution of the ISBT 128 Standard. It maintains a permanent office to manage the registration of facilities, update reference tables and databases, and develop additional functionality. It supports Technical Advisory Groups that include experts from both the transfusion/transplantation community and relevant manufacturers. Fees collected by ICCBBA from registered facilities are used to support these functions.

Through its activities ICCBBA provides the management support essential to sustain standard coding in the complex and rapidly changing field of cellular therapy. In particular it delivers:

- 1) stability – users can be confident in the stability of the standard to satisfy the long time periods over which information has to be retained (e.g. European Commission requirements for data to be stored and traceable for 30 years);
- 2) user focus – the user community are the experts in their field and ICCBBA, through its Technical Advisory Groups, ensures that the information standard meets, rather than dictates, user needs;
- 3) flexibility – as clinical and scientific knowledge grows there is rapid development with changing information needs. ICCBBA ensures that the standard is flexible enough to accommodate those needs;
- 4) responsiveness – in these rapidly developing medical fields ICCBBA ensures that the standard is able to respond to user needs in a timely manner;
- 5) globalization – ISBT 128 is a truly international standard with endorsement worldwide;
- 6) compatibility – standards do not work in isolation but need to interface with equipment, software, and other standards. ICCBBA works with industry and other standards bodies to maximize compatibility.

Blood, cellular therapy, tissue, organ, and banked human milk collection and processing facilities, and manufacturers of equipment or software

that uses ISBT 128, are required to register with ICCBBA and pay a registration and an annual licensing fee. Registered organizations obtain access to all ICCBBA documents and databases.

For further information on ISBT 128, visit the ICCBBA website at [www.isbt128.org](http://www.isbt128.org) or call us at +1 909 793 6516.