

# Research at BC Women's: Collecting Umbilical Cord Blood

Information, Applications and Methods

Click the **Next** button to start the tutorial.

# Course Objectives

By participating in this tutorial, the learner will be able to:

- Describe the unique characteristics of cord blood
- Identify therapeutic applications of cord blood
- Identify benefits and advantages of using cord blood in therapeutic applications and research
- Describe the purpose of private and public cord blood banks
- Identify hospital policies on specimen collections for research
- Perform a cord blood collection for a typical research study



This is a voluntary tutorial for your information and education only. It should take approximately 15 to 20 minutes to complete the tutorial.



# What is Cord Blood?

Cord blood refers to the blood found in the newborn's umbilical cord and in the placenta after birth.

Cord blood contains components of normal blood, such as plasma, red blood cells, white blood cells, and platelets.

## However...

Cord blood is also an important source of **hematopoietic stem cells** - multipotent stem cells that can differentiate into any type of blood cell.



*Close-up of newborn baby with umbilical cord attached just after a Caesarian section. Photo by Aubrey Kilian*

## Topic 2: Therapeutic Applications



# Stem Cell Treatments

Stem cells obtained from cord blood have been used in the treatment of more than 70 disorders, including blood-related cancers such as leukemia, and hereditary blood diseases such as Fanconi's anemia.



# Stem Cell Transplants

Umbilical cord blood collection can also provide an option for families in need of a stem cell transplant when a immunologically compatible bone marrow or peripheral stem cell donation is not possible.

## Topic 3: Advantages of Cord Blood



# Benefits and Advantages

Cord Blood:

- Provides an excellent source of stem cells
- Is easily stored and retrieved for future use
- Is well suited to banking for public or private purposes
- Is simple and painless to collect
- Collection poses no risks to mother or baby

For more information, visit

[http://www.nationalcordbloodprogram.org/qa/what\\_are\\_advantages.html](http://www.nationalcordbloodprogram.org/qa/what_are_advantages.html)

# Donor-Recipient Matching

Stem cells obtained from cord blood do not require a perfect donor-recipient match.

Stem cell transplants can be successful with as few as 3 out of 6 HLA\* matches, although a minimum of 4 out of 6 is recommended.

\* HLA stands for *human leukocyte antigen*, a term referring to protein markers found on the body's cell surfaces. The higher the number of matches there are between donor and recipient HLAs, the more alike the tissue types are, and the better the chances of transplant being successful.

# Fewer Transplant Complications

Cord blood has fewer potential complications for the recipient.

There is a lower likelihood of adverse immune reactions such as Graft vs. Host disease, and lower likelihood of viruses such as CMV being present.

For a detailed comparison of cord blood and bone marrow for use in transplants, visit:

<http://www.nationalcordbloodprogram.org/qa/comparison.html>

## Topic 4: Private and Public Cord Blood Banks



# Private Cord Blood Banks

Many families choose to store their child's cord blood in private cord blood banks for potential therapeutic applications.

Families are encouraged to choose either banking or participation in a research study, as it is difficult to accommodate both options with the relatively small sample available. Volumes of at least 50 to 150 mL can typically be collected.

If a family intends to privately bank their cord blood and participate in a research study requiring cord blood collection, **the private cord blood collection is given priority over the research collection.**

An example of a private cord blood bank is [Lifebank](#).

# Public Cord Blood Banks

Families may also choose to donate their cord blood to a public bank, where it is made available to anybody in need.

In Canada, there is currently no national accredited public cord blood bank. There are two regional public cord blood banks where families can donate their cord blood: the [Alberta Public Cord Blood Bank](#), and [Hema-Quebec](#).

## Future Possibilities

There are tremendous possibilities for future therapies involving umbilical stem cells. However, without collection of this vital sample, research cannot take place.

Successful collection of cord blood is the crucial first step.



## Topic 5: Research and Cord Blood Collections



## Research at BC Women's

BC Women's and Children's Hospital and Health Centre is a busy research and academic centre, with a dedicated mission to develop and establish best care and teaching practices for all women and their families.

*Women's*

BC WOMEN'S HOSPITAL  
& HEALTH CENTRE

*An agency of the Provincial  
Health Services Authority*

**Research at BC Women's**



## Cord Blood and Research

Several research groups at BC Women's request cord blood collection as part of their research.

As a member of the Delivery team, your assistance is appreciated in collection of this important sample.

## Research and Ethics

All research studies that take place at BC Women's must undergo a formal review process and receive official approval by the C&W Research Ethics Board before any research-related activities may take place.

Research studies must also receive approval from the Department Manager(s) for each unit where the research will take place.

# Research Participation and Informed Consent

Informed consent is integral to participation in research.

Before a person chooses to participate in a research study, the following events take place:

- Detailed information is provided about the study, the participant's role in the study, and the benefits and drawbacks of participating.
- Adequate time should be provided to allow discussion of their decision with friends and family, and to address any questions the participants may have with research staff.
- A copy of their signed informed consent must be provided as part of the ongoing consent process.

Participation in research is entirely voluntary, and a participant may decide at any time to withdraw from a study without any impact to the quality and level of care they will receive.

# Exceptions: Cord Blood Collections for Emergency Studies

**Some research studies may involve emergency interventions** (for example, the imminent delivery of a premature infant).

In these circumstances, a research group may receive ethical approval for a **two-part consent process**, where **only verbal consent from the patient is required from delivery staff prior to sample collection**.

A detailed discussion with a research study staff person takes place at a later time. Informed written consent may then be obtained at this time.

If the patient declines to participate in the study, any collected samples and other study-related information are destroyed/discarded.

# BC Women's Policy on Research and Private Cord Blood Collections

**The care, health, and wellbeing of the pregnant woman and her infant will always take priority over any collections that are not medically indicated (i.e. research, private banking).**

BC Women's does not guarantee that it will be always be technically feasible to collect the baby's umbilical cord blood at the time of delivery.

BC Women's staff will collect cord blood samples for private purposes during elective and emergency Caesarean births unless medically contraindicated.

## Topic 6: How to Collect Cord Blood



# Umbilical Cord Blood Collection

There are 2 basic methods for collecting cord blood:

1. Some research studies may request collection of cord blood *after* the baby is born, but *before* delivery of the placenta. This is referred to as **in utero collection**, and is usually performed by a physician or a midwife for private cord blood banking, and occasionally for research studies.
2. The second method takes place *after* the placenta is delivered and the umbilical cord is clamped, and is referred to as **ex utero collection**. This method can take place in a separate area and can be performed by nursing and/or research staff. The *ex utero* method is demonstrated here.

## Before Collection: Basic Requirements

You will need:

- Gloves (at least 2 sets)
- Absorbent blue pads
- Cord blood collection kit
- Sharps container (not shown)
- Garbage bag (not shown)



# Double Gloving

**Double glove prior to obtaining your sample.**

The placenta and cord will be bloody. Once you have collected the cord blood sample, you will remove and discard the outer pair of gloves.

This will leave you wearing a clean set of gloves for labeling/handling the vacutainer tubes and cleaning your work area.



# Sharps Disposal and Universal Safety Precautions

Set up a garbage bag near your work area to receive discarded materials.

Set up a sharps container on or near your work area prior to starting collection.

The placenta and cord are very slippery. Exercise caution and be careful not to push the needle completely through the umbilical cord and into your hands/fingers holding the cord on the other side.



Universal precautions should always be followed for any collections involving biological specimens.

The contents of the clamped cord and placenta are under pressure, and blood spurt/spray may occur. You may prefer to wear goggles during collection, although current guidelines do not require them.

## Before the Collection: Setting Up

Remove and arrange the collection equipment from the study kit.

A typical study kit will provide:

- Needle plus syringe, or
- Butterfly needle plus adaptor\*
- Cord clamps
- Vacutainers (blood tubes)\* and/or cord blood collection bags

[\* *recommended/preferred*]

There should always be a requisition included with the kit providing instructions for:

- Contacting research staff
- Collection and storage orders
- Processing and/or shipping



## Before the Collection: Setting Up (continued)

Lay out the vacutainer tubes in the order in which they are to be collected.

Although every effort is made to ensure that tubes are labelled prior to collection, this may not always happen. If not, please label the tubes as per study kit instructions.

Open sealed/sterile needle packages, and attach butterfly to yellow adaptor (or if using needle and syringe, attach needle to syringe). Keep needle sheathed until immediately prior to collection.



Ready to Go!



## Collection is from the Umbilical Cord with or without Attached Placenta

The umbilical cord should be clamped at each end if separated from the placenta. This may be done by the physician at birth. The cord is delicate, and if damaged, it may not be possible to collect the sample.

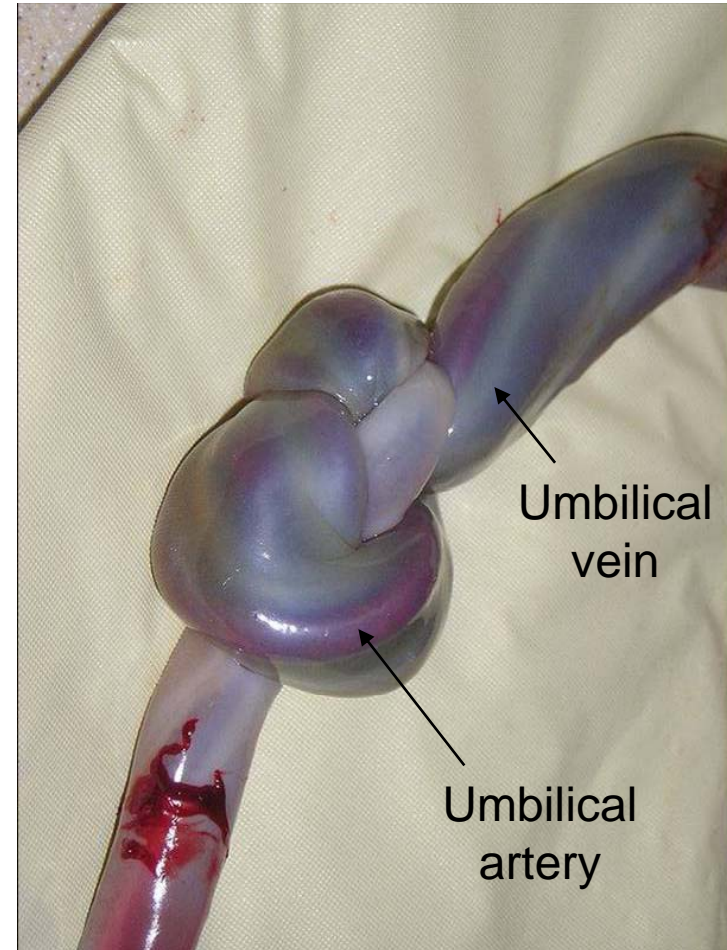
Alternately, the cord may still be attached to the placenta and will be clamped only at the cut distal end. This is more common.



# Identifying the Umbilical Vein

Identify the umbilical artery and the umbilical vein. The smaller round vessel is the umbilical artery. The umbilical vein is the larger, flattened vessel.

For research purposes, the sample is usually drawn from the umbilical vein.



# Venipuncture and Collecting the Cord Blood



When you have received the umbilical cord (or placenta), position cord (or placenta) on the blue absorbent pad. Choose a needle insertion site close to the clamp, and wipe area clean with gauze.

Identify the umbilical vein and insert the butterfly needle (or needle) into the umbilical vein, with the bevel facing up.



Insert blood tubes into the yellow adaptor, and obtain blood sample. For proper insertion, carefully centre tube in the adaptor.

NOTE: do not pull stoppers off the vacutainers to fill tube. This will break the vacuum seal and render the tubes useless.

## Collecting from the Placenta

Cord blood for research can also be collected from the placenta.

If clotting occurs, **leave the needle in place**, and **using a new needle**, attempt another collection further up on the umbilical cord. The needle prevents blood from seeping out of the initial puncture site.

Invert vacutainer tubes gently 2 to 3 times to ensure mixing.

Please contact research staff for pick-up, or place sample in dirty utility fridge, or send sample to hospital lab as per the instructions provided in the collection kit. Instructions may also be indicated on the physician's orders relating to research collections.



## Other Sample Collections and Clean Up

Some research studies may request collection of the placenta as well.

Please follow the instructions provided in the collection kit, or the physician's orders relating to research collections.

Otherwise, please dispose of placenta as per hospital policy (bagged and put in hospital biomedical waste, or to pathology if indicated).

Needles should be disposed of in the sharps container. Other garbage can go in the garbage bag.



# Summary

In this tutorial you have learned:

- Components of Cord Blood
- Therapeutic Applications
- Advantages of Cord Blood
- Private and Public Cord Blood Banking
- Cord Blood Collections for Research
- How to Perform a Cord Blood Collection for Research



# Congratulations!

You have successfully completed the BC Women's tutorial on cord blood collections for research. You should now have a better understanding of cord blood as an invaluable therapeutic treatment and research tool.

You also now know the BC Women's Hospital policies regarding cord blood collections for both research and private and public cord blood banking, as well as some basic information on participating in research and informed consent practices.

You know how to perform a cord blood collection for a typical research study. There are many research studies taking place at BC Women's, and there are many different variations in collection methods and requirements. There should always be clear instructions included with any research kit, as well as contact information for research staff. You can always contact research staff if you have questions about a specific collection.

Thank you for supporting Research at BC Women's.

## Further Information

For Further Information on Research at BC Women's Hospital:

**Visit** [www.bcwomens.ca/Research](http://www.bcwomens.ca/Research)

**Email** [research@cw.bc.ca](mailto:research@cw.bc.ca)

**Contact** the Women's Health Research Institute at 604-875-3459

# For More Information on Cord Blood

## Unit Research Resources

Research and Contact information binders

Kit requisitions/instructions

Physician's Orders in patient chart

## Research at BC Women's

[BC Women's Website](#)

[Women's Health Research Institute](#)

[Child & Family Research Institute](#)

## Public Cord Blood Banks

[Alberta Public Cord Blood Bank](#)

[Hema-Quebec](#)

## Acute Perinatal Research

Contact the Acute Perinatal Research Coordinator

Email: [research@cw.bc.ca](mailto:research@cw.bc.ca)

Phone: 604-875-3459

## Credits

Many thanks to Maureen Mooney for her assistance and advisement in the creation of this tutorial.

Many thanks to the CHILD (Canadian Healthy Infant Longitudinal Development) Study team for providing photographs of collection procedures.

On behalf of all research groups conducting studies at BC Women's Hospital, many thanks to all our health care providers for their continued support and assistance in promoting Research at BC Women's Hospital.