



Ontario Newborn Screening Program
Children's Hospital of Eastern Ontario
Department of Genetics
401 Smyth, Ottawa Ont. K1H 8L1

BULLETIN #27 – April 16, 2008

Unsatisfactory Samples – Educational Resource

The Ontario Newborn Screening Program has noted a recent increase in the number of samples we receive that are unsatisfactory for testing.

To assist submitting institutions in obtaining satisfactory newborn screening samples we have developing the following Educational Resource. The attached document provides examples of satisfactory and unsatisfactory blood spots received by the Ontario Newborn Screening Program.

This Educational Resource is also posted on our website:
www.newbornscreening.on.ca.

Again, thank you for your cooperation and assistance in making the Ontario Newborn Screening Program the most effective and efficient that it can be.

Additional information about the Ontario Newborn Screening Program can be found at:
www.newbornscreening.on.ca

These bulletins are being circulated to keep you abreast of changes to the Ontario Newborn Screening program. Please share this information with any relevant personnel in your hospital / clinic. If there is someone who would like to be added to this list, contact:
Shelley Kennedy or Sari Zelenietz, Genetic Counsellors
(613) 738-3222, option #1; NewbornScreening@cheo.on.ca

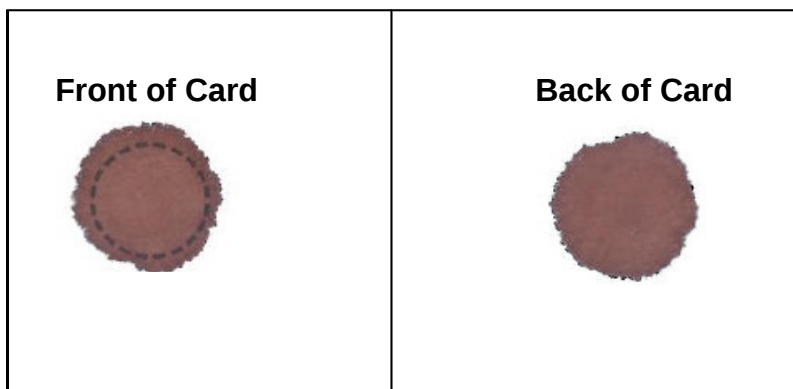


Blood Spot Collection

Satisfactory Newborn Blood Spots

The goal: to submit a newborn screening card with five circles completely saturated with blood that is satisfactory for testing.

The blood must fully soak through to the back of the filter paper. No areas of white should be visible on the front or back of the circle.



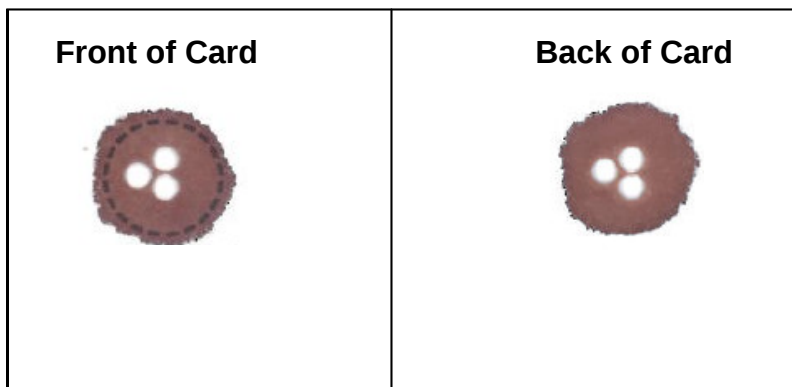
It is estimated that 75 uL - 100 uL of blood is required to fill one circle on the filter paper.

The newborn screening test calculations assume that the blood is evenly distributed within the circle and completely saturates both sides of the filter paper.

A properly collected sample is crucial to accomplish the purpose of newborn screening: to identify babies at risk.



3.2 mm holes are punched from the blood spots for testing in the Ontario Newborn Screening lab.



The Impact of Unsatisfactory Blood Spot Samples

The newborn screening program will refuse to analyze a specimen if its analysis might yield unreliable, misleading or clinically inaccurate results.

Unsatisfactory blood samples place an unnecessary burden on:

- o the infant
- o the infant's parents
- o the submitting facility
- o the newborn screening program

Unsatisfactory blood samples can cause:

- o A potential delay in the detection and treatment of an affected infant



Common types of unsatisfactory blood spots:

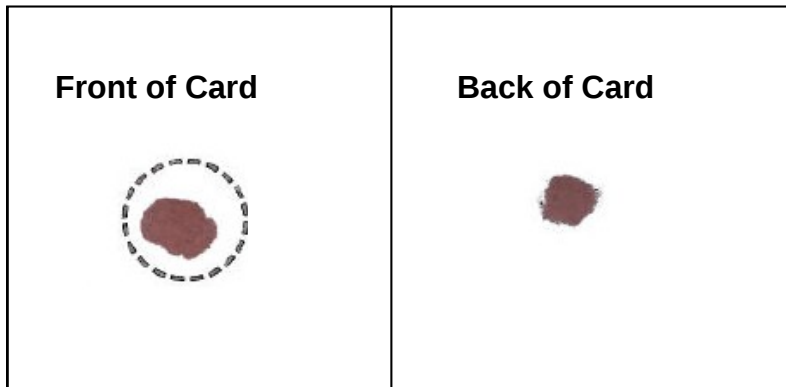
1. Quantity of Blood Insufficient (QNS)
2. Supersaturated
3. Clotted or Layered
4. Scratched or Abraded
5. Wet and/or Discoloured
6. Serum Rings

The following are examples of unsatisfactory newborn blood spots received by the Ontario Newborn Screening Program.



Quantity of Blood Insufficient

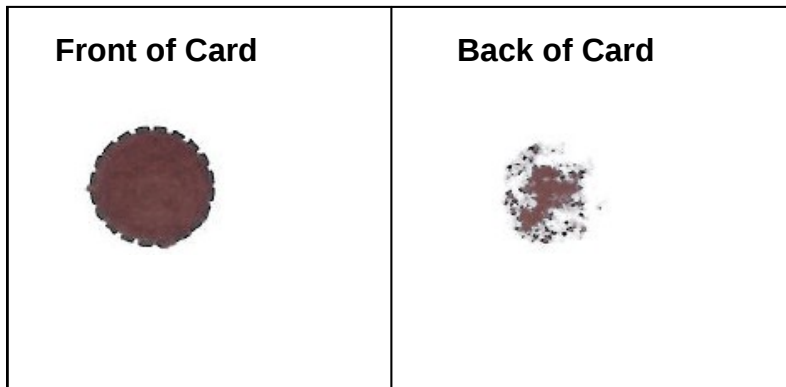
Type 1 – Circles not sufficiently filled



Although the blood has soaked through to the back of the card, the amount of blood is not sufficient for testing.

Quantity of Blood Insufficient

Type 2 – The sample appears sufficient from the front, but is insufficient when viewed from the back.



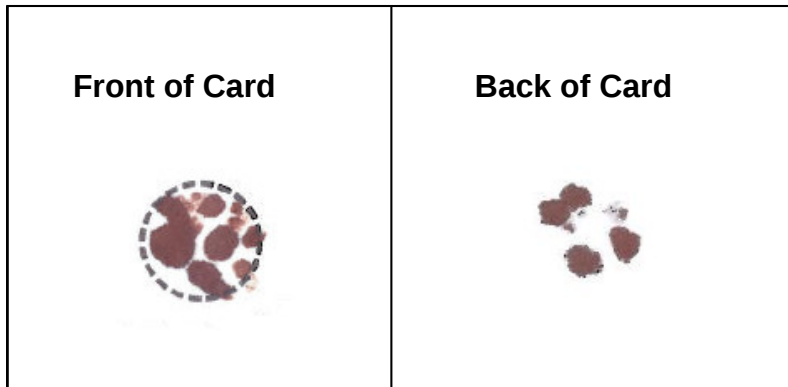
This is one of the most common causes of unsatisfactory samples the Ontario Newborn Screening Program encounters.

Please ensure blood has fully soaked through to the back of the filter paper.

Please do NOT directly apply blood to the back of the filter paper.

Quantity of Blood Insufficient

Type 3a – Circles not sufficiently filled (patchy application)



Insufficient blood flow was obtained to fill the circle.

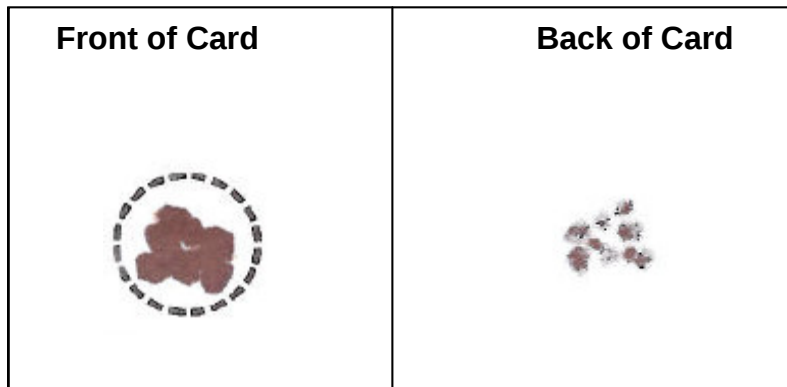
Warming the newborn's heel can help increase blood flow.

Positioning the infant's leg lower than the heart will increase venous pressure.

If blood flow diminishes so that a circle is not completely filled, repeat the sampling technique using a new circle, and if necessary, a new card.

Quantity of Blood Insufficient

Type 3b – Circles not sufficiently filled (capillary tube application)



Given the uniform appearance of the circles of blood, it appears a capillary tube was incorrectly used to apply the blood to this circle.

Dabbing of the capillary tube on the filter paper, or any technique that might scratch, compress or abrade the paper, should NOT be used.

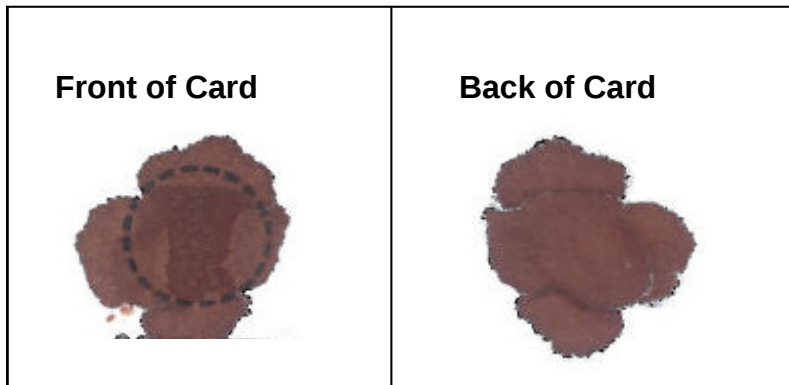
Although not the method of choice, newborn blood spot specimens can be obtained by applying blood collected in heparinized capillary tubes.



Correct procedure for capillary tube application **(please note that the heelstick method is preferred)**:

- A fresh capillary tube should be used for each circle.
- After filling the capillary tube the contents should be immediately applied to the newborn screening card.
- Do NOT allow the capillary tube to touch the filter paper, rather release it in one smooth motion onto the card.

Clotted or Layered Blood Spots



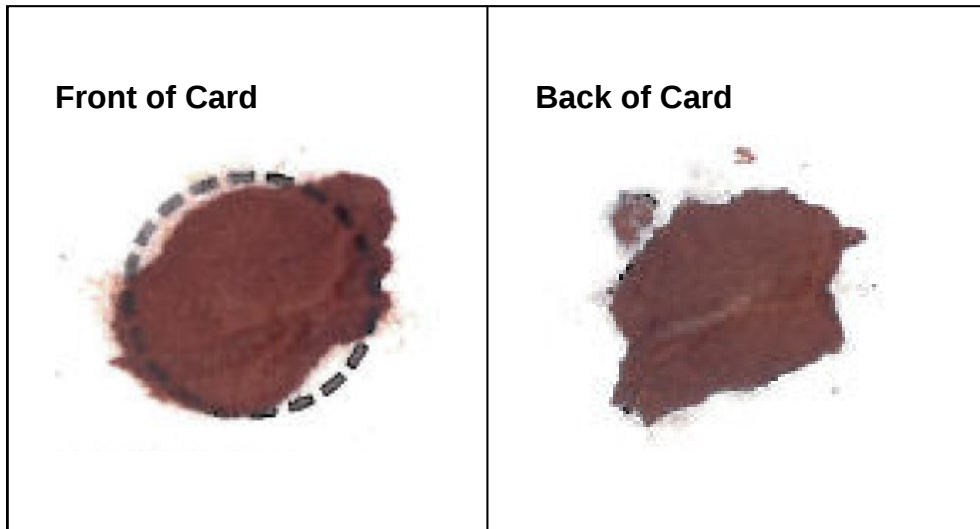
Do NOT repeatedly apply blood to the same circle.

Applying successive drops of blood to already partially dried spots invalidates the specimen.

Blood should be applied to the filter paper in one continuous application.



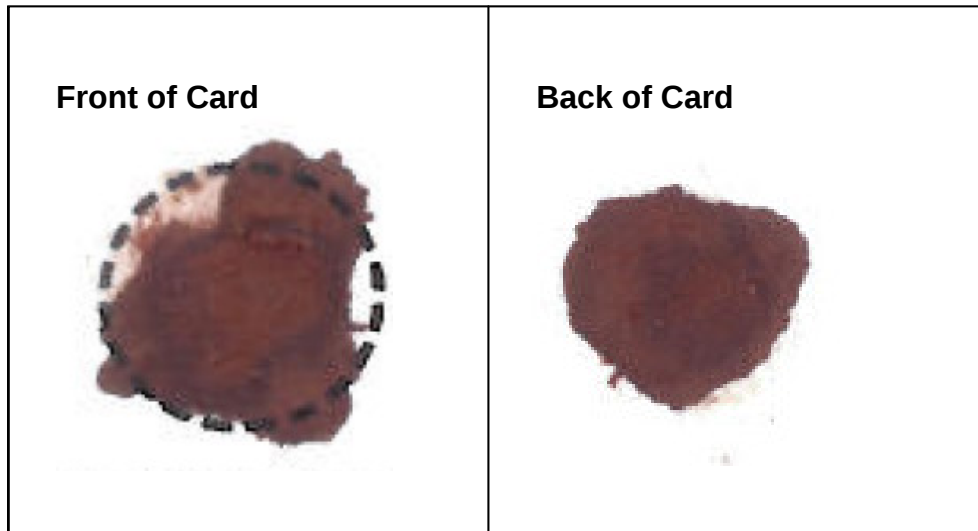
Supersaturated Blood Spots



Too much blood has been applied to the filter paper above causing it to wrinkle.

Supersaturating the paper makes the sample invalid for testing.

Scratched or Abraded Blood Spots



Although difficult to appreciate in this picture, the surface of the filter paper in the above blood spot has been damaged in the middle.

To avoid damaging the filter paper, the paper should not be touched before, during and after collection of blood

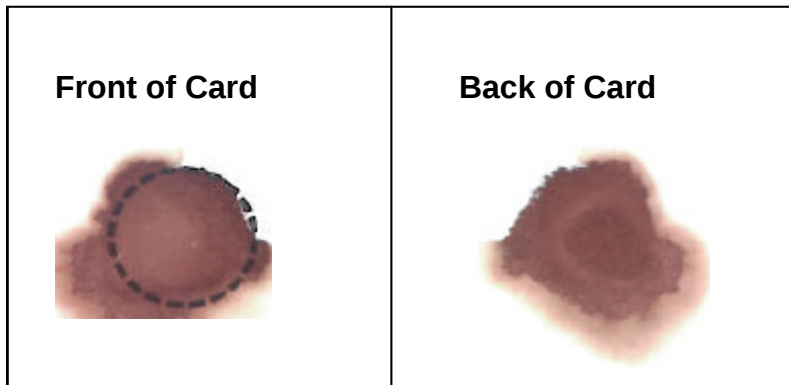
Do NOT press the filter paper against the puncture site on the newborn's heel.

Damage to the blood spots can also occur when the fold-over cover is applied prior to the blood spots being completely dry.

Blood spots should dry horizontally for three hours at room temperature (15 C to 22 C).

Do NOT use heat (eg. a hairdryer) or direct sunlight to dry the blood spots.

Wet and/or Discoloured Blood Spots



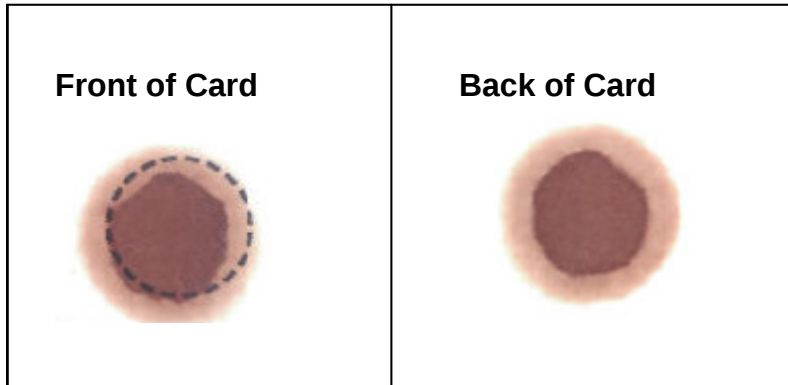
The blood spots must be fully dried before being transported.

Do not allow water, feeding formulas, antiseptic solutions, glove powder, hand lotion or other materials to come into contact with the specimen card before or after use.

To help protect the bloodspots, please use the TYVEK envelopes for shipment to the Ontario Newborn Screening Program.



Serum Rings



Excessive milking or squeezing of the puncture site may result in an excess of tissue fluids in the sample, invalidating it for testing.