Newborn Bloodspot Screening

State of Maryland
Department of Health and Mental Hygiene
1770 Ashland Avenue
Baltimore, Maryland 21205

Maryland Newborn Screening Laboratory
Phone # 443-681-3900
Maryland Newborn Screening Follow-Up
Phone # 443-681-3916
Fax # 443-681-4500

Newborn Bloodspot Screening: It's not just a "PKU" anymore

- Calling the newborn bloodspot screening a "PKU" is misleading

- PKU is just 1 of over 50 disorders included in the newborn screen.

- NBS screens for certain endocrine disorders; hemoglobin disorders; cystic fibrosis; and disorders breaking down lactose *(sugar in milk-based formulas and in breast milk)*, as well as breaking down fats and proteins.

- Some of these disorders are life-threatening and need immediate intervention.

When is Newborn Bloodspot Screening Performed?

- The State of Maryland has a two tier NBS system.
- Most newborns have a specimen collected in the birth facility after they are at least 24 hours old and have had at least 24 hours of feeding.
- All babies should have a second NBS collected after the baby is 7-10 days of age. This is usually done in the physician's office at the two week check-up.
- ***Please note that NBS specimens from the birth facility are sometimes identified as unsatisfactory specimens. If your office is contacted by Newborn Screening Follow-Up concerning an unsatisfactory specimen at the birth hospital, a repeat NBS needs to be collected as soon as possible.***

The Role of the Pediatric Office

- Check for results of first NBS
- Send routine second screen
- Act on abnormal results promptly and appropriately (with assistance of the follow-up unit)
- Ask for assistance when needed (specialists, ACT sheets)

Delays in Newborn Bloodspot Screening

- Newborn Screening is a life saving practice
- Timing is crucial in newborn bloodspot screening
- The sooner a disorder is identified, the earlier treatment can be started
- Infant outcome depends on newborn screening practices

Specimen Quality

- The Maryland State Newborn Screening Laboratory receives hundreds of specimens each *day* - both from birth hospitals and provider offices.

- Unsatisfactory specimens slow down the process.

- The specimen may be unsatisfactory secondary to missing vital information on the lab slip or blood spots are not acceptable for testing.

Frequently Missing Information

- Birth Date and Collection Date ???
  - Used to determine age of infant at the time of collection
  - Date of collection also determines age of blood at the time of analysis

This information is very important for proper laboratory analysis of the results*

- Mother's Name, Address and Phone Number ???
  - Used to link subsequent specimens to the initial specimen

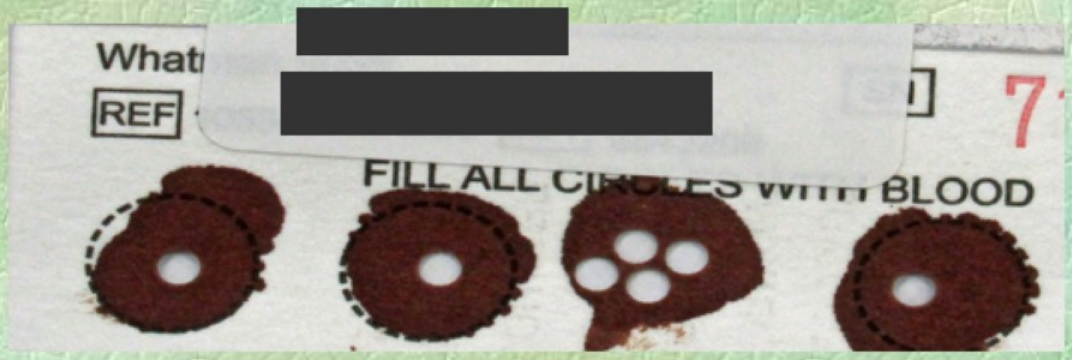
- Submitter's Name ???
  - If an outside lab is collecting the specimen, complete the collection card with your office information prior to the parent taking it to the lab.

“Unsatisfactory Specimen”

•If the blood specimen does not give reliable results, it will have to be repeated

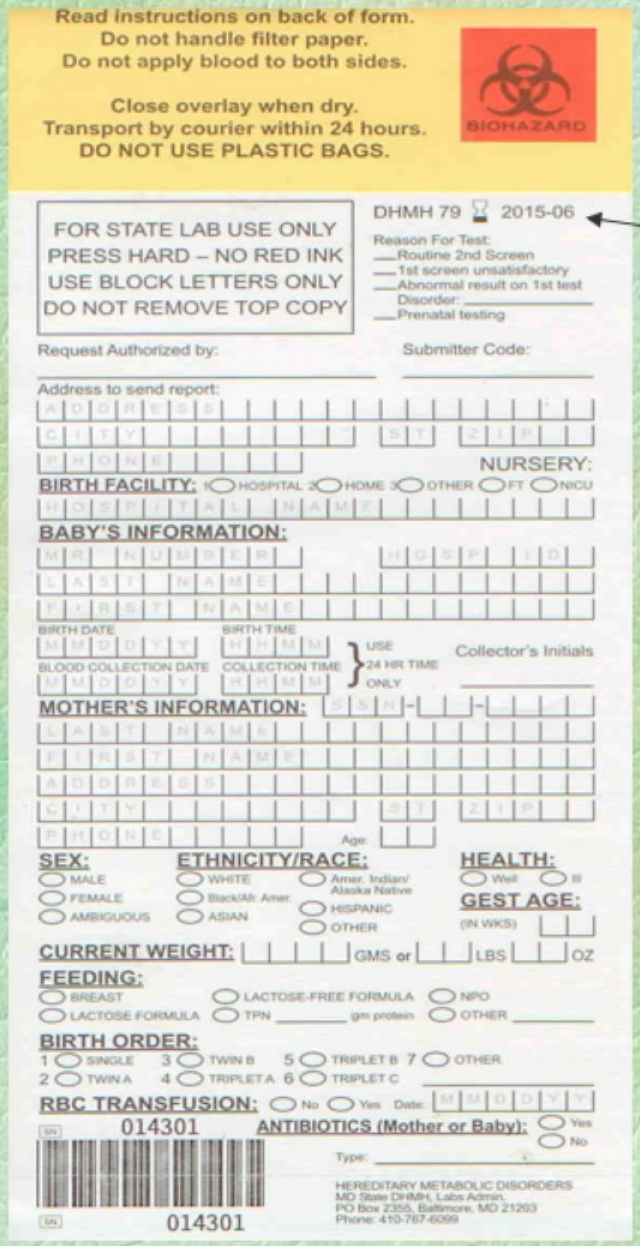
•Getting a repeat specimen can take weeks, putting the newborn baby at risk

•Always check the specimen before sending to make sure it appears acceptable



Collecting a Specimen

Completion of Collection Form


Read instructions on back of form.
Do not handle filter paper.
Do not apply blood to both sides.

Close overlay when dry.
Transport by courier within 24 hours.
DO NOT USE PLASTIC BAGS.

BIOHAZARD

FOR STATE LAB USE ONLY
PRESS HARD – NO RED INK
USE BLOCK LETTERS ONLY
DO NOT REMOVE TOP COPY

DHMH 79 2015-06

Reason For Test:
Routine 2nd Screen
1st screen unsatisfactory
Abnormal result on 1st test
Disorder:
Prenatal testing

Request Authorized by:
Submitter Code:
Address to send report:
NURSERY:
BIRTH FACILITY: HOSPITAL HOME OTHER FT NICU
BABY'S INFORMATION:
BIRTH DATE
BIRTH TIME
USE 24 HR TIME ONLY
Collector's Initials
BLOOD COLLECTION DATE
COLLECTION TIME
MOTHER'S INFORMATION:
Age:
SEX: MALE FEMALE AMBIGUOUS
ETHNICITY/RACE: WHITE Black/Afr. Amer. ASIAN Amer. Indian/ Alaska Native HISPANIC OTHER
HEALTH: Well Ill
GEST AGE: (IN WKS)
CURRENT WEIGHT: GMS or LBS OZ
FEEDING: BREAST LACTOSE FORMULA LACTOSE-FREE FORMULA TPN gm protein NPO OTHER
BIRTH ORDER: 1 SINGLE 2 TWIN A 3 TWIN B 4 TRIPLET A 5 TRIPLET B 6 TRIPLET C 7 OTHER
RBC TRANSFUSION: No Yes Date:
SN 014301
ANTIBIOTICS (Mother or Baby): Yes No
Type:
SN 014301
HEREDITARY METABOLIC DISORDERS
MD State DHMH, Labs Admin.
PO Box 2355, Baltimore, MD 21203
Phone: 410-767-6099

Use DHMH 79 (four spot card) for babies >7 days of age.

Check expiration date prior to collection of blood. If expired, call 410-767-6099 to request new collection cards.

Complete requested information on card prior to collection of blood

Please remember that **all requested information is important** for identification of the baby or for evaluation of the results.

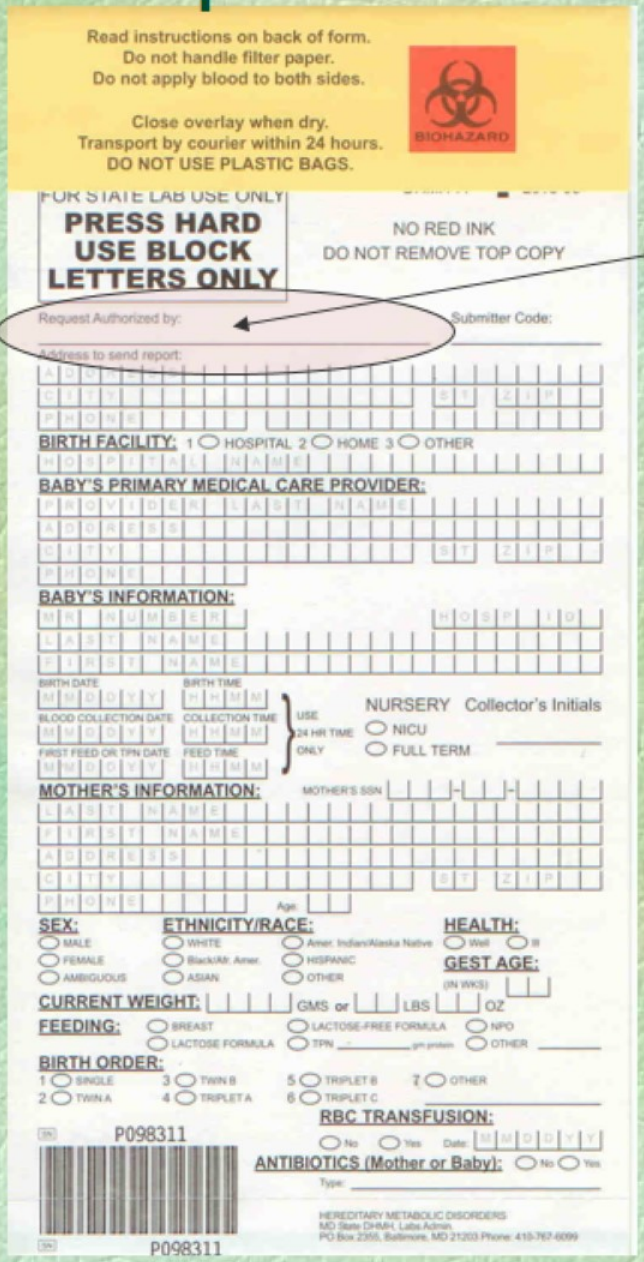
DHMH 77 (five spot card) is another collection card for babies <7 days of age. These are primarily used in the birth facilities.

Completion of Collection Form

- Specimen cards are legal documents.
- Accurate information is crucial for valid and reliable testing, as well as linking of initial and repeat specimens.
- Use BLOCK LETTERS in the spaces provided. Use of BLOCK LETTERS allows for faster and more accurate data entry into the State Lab computer system
- Stickers **should not** be applied to the front of the collection form. Identification stickers, if used, should be placed on the back side of the top white slip.

Do not place any stickers either on the front or the back of the actual filter paper. The front and back of the bloodspots should never be covered*

Completion of DHMH 77 Collection Form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Request Authorized by:

Submitter Code:

Address to send report:

BIRTH FACILITY: 1 HOSPITAL 2 HOME 3 OTHER

BABY'S PRIMARY MEDICAL CARE PROVIDER:

BABY'S INFORMATION:

BIRTH DATE

BIRTH TIME

BLOOD COLLECTION DATE

COLLECTION TIME

USE 24 HR TIME ONLY

NURSERY Collector's Initials

NICU

FULL TERM

FIRST FEED OR TPN DATE

FEED TIME

MOTHER'S INFORMATION:

MOTHER'S SSN

Age:

SEX: MALE FEMALE AMBIGUOUS

ETHNICITY/RACE: WHITE Amer. Indian/Alaska Native Black/Afr. Amer. HISPANIC ASIAN OTHER

HEALTH: Well Ill

GEST AGE: (IN WKS)

CURRENT WEIGHT: GMS or LBS OZ

FEEDING: BREAST LACTOSE-FREE FORMULA NPO LACTOSE FORMULA TPN gm protein OTHER

BIRTH ORDER: 1 SINGLE 2 TWIN A 3 TWIN B 4 TRIPLET A 5 TRIPLET B 6 TRIPLET C 7 OTHER

RBC TRANSFUSION: No Yes Date:

ANTIBIOTICS (Mother or Baby): No Yes Type:

SN P098311

P098311

HEREDITARY METABOLIC DISORDERS
MD State DHMH, Labs Admin.
PO Box 2355, Baltimore, MD 21203 Phone: 410-767-6099

Note: Required changes to updated Newborn Screening form 77

Mandatory New Field –
all clinical tests must contain the name of the authorized person who ordered the test

An authorized person in the State of Maryland is:

- **A court of law**
- **A doctor of medicine or osteopathy**
- **A certified nurse midwife**
- **A certified nurse practitioner**
- **A physician's assistant**
- **Another person authorized to order laboratory tests under the Annotated Code of Maryland**

Completion of Collection Form

Occasionally, special circumstances arise such as in the case of an adoption, surrogacy or involvement of protective services.

✓*If the baby is being adopted, please write* ***"adoption"*** *on the lab slip and write in the adoptive parent's name and phone number. Also indicate birth mother's name on the lab slip.*

✓*If the birth mother was a surrogate mother, please write* ***"surrogate"*** *on the lab slip and write in the contact information for the custodial parents. Also indicate birth mother's name on the lab slip.*

✓*If the baby is under protective services, please write* ***"protective services"*** *on the lab slip and indicate the name and phone number of the baby's case worker, along with the birth mother's name.*

*****The purpose of this information is to link the baby's 2nd specimen to the intial and to provide a way to find the infant with a positive result promptly in order to facilitate further testing.*****

Collecting a Specimen

Once the collection form is completely and accurately filled out, gather supplies for the collection of the specimen

- ✓Sterile Lancet with a tip less than 2.0 mm (Scalpel bladed lancets are best)
- ✓Sterile alcohol swab
- ✓Sterile gauze pads
- ✓Soft cloth or heel warmer
- ✓Completed Blood Collection form
- ✓Gloves (powder free)

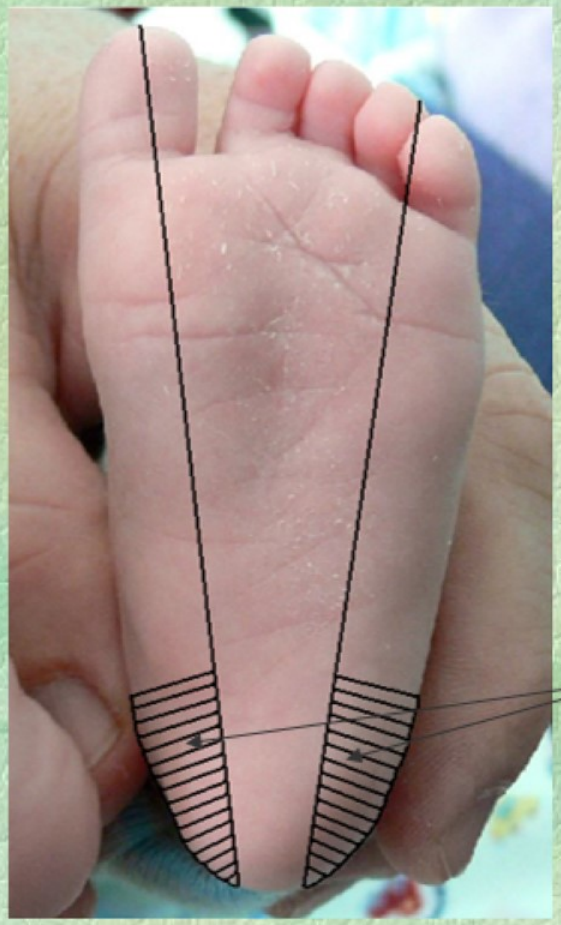
Preparation for neonatal capillary blood sampling

Warm infant's heel with soft cloth or diaper, moistened with warm water for 3 to 5 minutes.

You can also use a commercially prepared disposable heat pack. (make sure to follow your facility's guidelines for using heat packs)

Place infant's heel in a dependent position, head higher than feet.

Recommended sites for neonatal capillary blood sampling



Puncture site should be on the medial or lateral portion of the plantar surface of the heel. (The plantar surface is the part of the foot that touches the floor if standing or walking.)

The ***shaded areas*** show the best sites for puncture. Use of these areas will help prevent possible damage to the heel bone and the nerves and arteries in the foot.

Neonatal capillary blood sampling

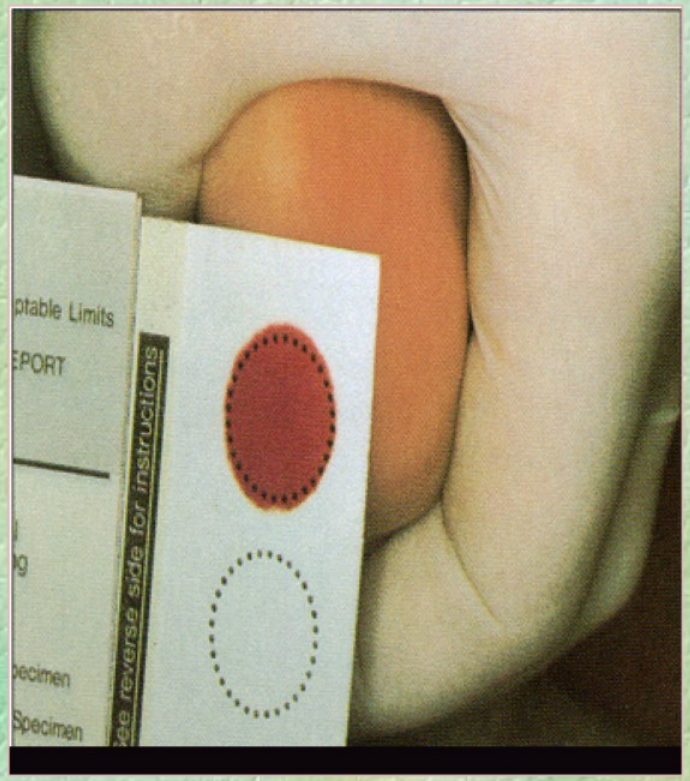
Cleanse site with alcohol prep and allow to dry.

Puncture heel with sterile lancet which has a puncture depth of less than 2.0 mm. The lancet should be labeled for use in newborn capillary specimen collection.

Wipe away first blood drop with sterile gauze pad.

Allow another LARGE blood drop to form.

Neonatal capillary blood sampling



Direct application of blood onto the filter paper is recommended. Capillector tubes should not be used as they may scratch the top of the filter paper.

Lightly touch filter paper to LARGE blood drop. Filter paper acts like a capillary tube, drawing blood into itself.

Allow blood to soak through and completely fill circle with SINGLE application. The blood should soak through the paper and be visible on the other side of the paper. *(To enhance blood flow, VERY GENTLE intermittent pressure may be applied to the heel. Do not milk or squeeze tissue next to the puncture site because this may cause serum to separate.)*

Apply blood to only one side of the filter paper. Fill remaining circles by lightly touching one LARGE blood drop to each circle.

If blood flow diminishes, clean a new site and repeat the process with a new sterile lancet.

Important Points to Remember

✓Do not touch the actual filter paper portion of the lab slip either before, during or after blood collection. Contamination of the filter paper with water, formula or powder from gloves will affect the results.

✓Check the specimen to make sure the blood saturated through the card and there is no overlapping of blood in the circles. If there is a problem with the specimen, the test should be repeated.

✓Allow specimen to dry on a clean flat non-absorbent surface for a minimum of 4 hours.

✓Completed specimen should be sent by mail to the Maryland State Laboratory within 24 hours of collection. Do not hold or "batch" specimens while waiting for several specimens to be mailed together.

✓If the newborn screening specimen is unsatisfactory, needless delay will occur while the doctor and family are contacted to have another specimen collected.

Schleicher & Schuell

Simple Spot Check

Valid Specimen

Allow a sufficient quantity of blood to soak through to completely fill the pre-printed circle on the filter paper. Fill all required circles with blood. Do not layer successive drops of blood or apply blood more than once in the same collection circle. Avoid touching or smearing spots.

Invalid Specimens:

Possible Causes:

Specimen quantity insufficient for testing

- Removing filter paper before blood has completely filled circle or before blood has soaked through to second side.
- Applying blood to filter paper with a capillary tube.
- Touching filter paper before or after blood specimen collection with gloved or ungloved hands, hand lotion, etc.
- Allowing filter paper to come in contact with gloved or ungloved hands or substances such as hand lotion or powder, either before or after blood specimen collection.

Specimen appears scratched or abraded.

- Applying blood with a capillary tube or other device.

Specimen not dry before mailing.

- Mailing specimen before drying for a minimum of four hours.

Specimen appears supersaturated.

- Applying excess blood to filter paper, usually with a device.
- Applying blood to both sides of filter paper.

6. Specimen appears diluted, discolored or contaminated.

- Squeezing or "milking" of area surrounding the puncture site.
- Allowing filter paper to come in contact with gloved or ungloved hands or substances such as alcohol, formula, antiseptic solutions, water, hand lotion or powder, etc., either before or after blood specimen collection.
- Exposing blood spots to direct heat.

Specimen exhibits serum rings.

- Not wiping alcohol from puncture site before making skin puncture.
- Allowing filter paper to come in contact with alcohol, hand lotion, etc.
- Squeezing area surrounding puncture site excessively.
- Drying specimen improperly.
- Applying blood to filter paper with a capillary tube.

Specimen appears clotted or layered.

- Touching the same circle on filter paper to blood drop several times.
- Filling circle on both sides of filter paper.

No blood.

- Failure to obtain blood specimen.

Information provided by The New York State Department of Health

Schleicher & Schuell Inc. • 10 Optical Avenue • Keene N.H. 03431 USA • Tel. (603) 352-3810 • Fax (800) 368-4624 • Internet: http://www.s-and-s.com • e-mail: solutions@s-and-s.com
Schleicher & Schuell GmbH • P.O. Box 4, D-37582 Dassel • Germany • Tel. 49-5561-791-0 • Fax 49-5561-791838 • Internet: http://www.s-und-s.de • e-mail: solutionsgermany@s-und-s.de

Check the blood after it's dry to make sure it's a satisfactory specimen

Allow sufficient amount of blood to soak through to completely fill the circle

Common Problems with Newborn Bloodspot Collection

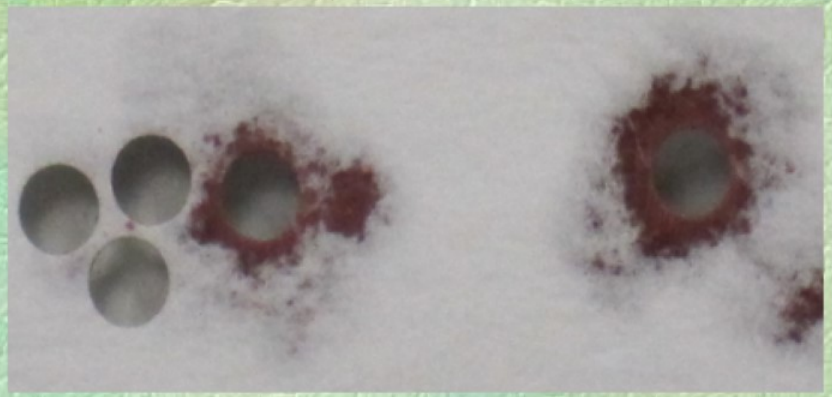
- The most common problem with newborn bloodspot screening specimens is layering of blood on the circles.

- Another common problem is not getting enough blood on the circles or not letting the blood soak through the filter paper.

- Scratching of the filter paper occurs frequently when capillector tubes are used and the blood is “colored” on the spots.

UNS 1 – Insufficient Blood to Run All Tests

From the front of the card, this specimen appears to be satisfactory.



Turning over the same specimen card shows that the blood did not saturate through the filter paper to the back of the card.

If a specimen looks like this, start over with a new card. Never apply blood to both sides of the card.*

UNS 2 – Surface of Filter Paper Scratched or Abraded

- Capillary tube used during collection process abrades the surface of the filter paper.
- Rubbing the filter paper against the heel also abrades the surface of the filter paper.

Use direct application of a large drop of blood to the filter paper. Gently touch filter paper to the large drop of blood.*

UNS 3 – Uneven Saturation of Blood Due to Multiple Applications

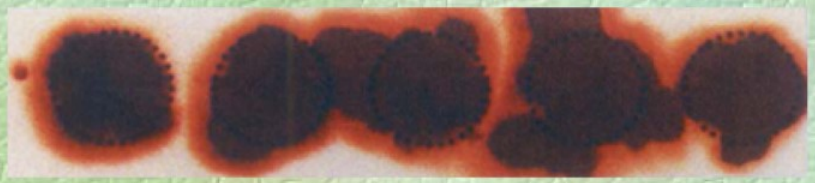
- Layers of blood can occur if more than one drop of blood are placed in each circle. Apply one large drop of blood to each circle and allow blood to soak into filter paper before moving the card.
- Blood applied to both sides of filter paper also causes layering of blood. ***Never apply blood to both sides of the filter paper.***
- Layering can also be caused by the application of excess blood, usually with a device, such as a syringe. Blood should not touch between circles.

UNS 4 – Blood Clots and Tissue on Surface of Filter Paper

The darkened areas in the spot on the right indicate the presence of clots. These clots can occur if blood sits in a capillector tube prior to application to the filter paper.

Direct application of blood from the heel is the preferred method for newborn screening specimen collection.

UNS 5 – Mottled Appearance of Blood Spot



- Foot not dried completely after cleaning with alcohol
- Something was spilled on filter paper before or after blood collection
- Separation can also occur if the baby has a history of anemia

UNS 6 – Filter paper damaged, stretched or wrinkled during collection process

Possible causes: Bending filter paper during application

Applying too much blood to one spot

Newborn Screening Results

- Results from the first screen are mailed to the hospital of birth.
- Results from the first screen will also be mailed to the medical home/primary care provider, but **only** if this information is indicated on the lab slip.
- If the baby has an abnormal screen, the Newborn Screening Follow-up Unit will contact the office and recommend further follow-up testing.
- If the baby's newborn screen results are normal, results from both the initial and subsequent screens will be sent by mail to the submitter noted on the labslip.
- Abnormal screens need to be followed up *immediately*

Electronic Results

- Hospitals and pediatricians can have access to NBS reports for their babies online.

- Please call 443-681-3900 to obtain access to reports for your babies on-line

Educational Tools

- Newborn Screening website:

  phpa.dhmh.maryland.gov/genetics

  (Click on Newborn Metabolic Screening)

- Educational brochure for parents:

  "Your Baby's First Test"

  - ✓ Available in both English and Spanish
  - ✓ Can be printed at the hospital

You Can Save a Life

Prompt and correct newborn screening practices can save the life of a baby. With early intervention and treatment, even babies with serious diseases can live a long, happy life.

Newborn Screening Program

For general questions and to request results for newborn screening specimens, please contact the Maryland State Newborn and Childhood Screening Laboratory at 443-681-3900.

For questions regarding specimen collection and abnormal results for newborn screening specimens, please contact Maryland Newborn Screening Follow-Up at 443-681-3916.