University Of California, San Francisco --- Department Of Laboratory Medicine
San Francisco General Hospital
1001 Potrero Avenue, San Francisco, CA 94110
Clinical Laboratory –Eberhard Fiebig, M.D., Director

Clinical Laboratory:	Point of Care Testing / Microbiology
Date of Original:	November 1, 2010
Prepared by:	Eberhard Fiebig, MD R. Clayton Hooper, MS, RN Point of Care Coordinator
Approved by:	Barbara Haller, MD, PhD Chief, Microbiology
	Eberhard Fiebig, MD Director, Clinical Laboratory
	Toby Maurer, MD Chief, Dermatology

10% POTASSIUM HYDROXIDE (KOH) SKIN AND NAIL PREPARATIONS

PURPOSE

KOH preparations of skin scrapings and nail samples are used for the direct microscopic identification of fungal elements such as yeast and hyphae.

PRINCIPLE

KOH facilitates the microscopic observation of fungal elements by dissolving obscuring cellular material and debris, thus making fungal elements more visible.

TESTING PERSONEL

- Qualified Licensed Physicians
- Qualified Licensed Nurse Practitioners, Physician Assistants, Midwives

Interns, residents and fellows enrolled in an ACGME approved training program may set-up, read and interpret KOH skin or nail preparations when supervised by a qualified, licensed provider.

INSTRUMENTATION, REAGENTS AND SUPPLIES

A. Instrument:

Binocular microscope with 10x and 40x objectives. Preventive maintenance should be done annually, evidenced by a dated label on the microscope.

To maintain the microscope in good working order for day-to-day use:

- Keep it covered when not in use
- Keep surfaces free from dust
- Clean objectives, lenses, eye pieces and condenser daily or as needed, using lens paper and cleaner fluid specifically designed for optical instruments
- Do not use dry lens paper, Kimwipes, non-optical tissues or gauze

B. Reagents:

10% Potassium hydroxide (KOH) in a dropper bottle, available from SFGH Pharmacy. Store at room temperature – use until the expiration date on the bottle.

C. Supplies:

1. Alcohol wipes
2. Glass slide(s)
3. Coverslip(s)
4. Scalpel or curette

D. Personal Protective Equipment

1. Safety Glasses
2. Exam Gloves
3. Long-sleeve Lab Coat

PROCEDURE

I. Specimen Collection

A. Using two patient identifiers, verify patient identity and explain procedure to the patient and/or family.

B. Observe universal precautions; wear gloves and other personal protective equipment as appropriate. Caution: 10% KOH is corrosive.

C. Label clean glass slide(s) with patient name and medical record number

Skin Sample Collection:

1. Cleanse skin to be sampled with alcohol wipe to remove contaminating microorganisms.

2. If characteristic dermatophyte "ring" is present on skin, collect samples from the outer margin of the ring at its junction with normal skin. Otherwise collect samples from areas where skin appears to be scaling.

3. Use edge of glass side or scalpel to scrape off surface skin scales. **Do not use swabs since the swab fibers may resemble hyphae.**

4. Collect sample on labeled glass slide. Apply cover slip.

Nail Sample Collection:

1. Cleanse nail with alcohol wipe.

2. Using a curette or scalpel, collect nail debris onto labeled glass slide. Apply cover slip.

II. KOH Treatment

1. Check the appearance of the 10% Potassium hydroxide (KOH) solution. It should be clear with no visible contamination.

   - If the solution is clear, proceed with test.
   - If the solution is not clear, discard and obtain new solution from the SFGH Pharmacy, then proceed with test.

2. Place one drop of KOH on the glass slide containing the skin or nail specimen at the edge of the coverslip. Allow the KOH to diffuse under the coverslip.

3. Gently heat the slide using the butane lighter tethered to the microscope table. Using a pen, put light pressure on top of the coverslip to spread and separate the skin or nail material. Specimen should be flat and transparent for microscopic viewing.

4. Scan the preparation microscopically with the low power objective (10x) with reduced light, looking for fungal elements such as yeast cells and hyphae.

5. Change to the high power objective (40x) to verify fungal elements seen with the low power objective.

6. Dispose of swabs and other contaminated materials in a red biohazard waste container. Slides and coverslips must be discarded in red hard-sided sharps container.

RESULTS AND PRECAUTIONS

Yeast elements can be difficult to differentiate from cotton fibers and other debris. True hyphae crisscross epidermal cells in a random fashion and the strands are usually of a uniform diameter.

REPORTING OF RESULTS

- Report the presence or absence of yeast or hyphae.
- Document results in a designated place on the physical assessment form in the medical record.
- Date and sign result entry. Entries by supervised trainees or providers who have not completed required competency assessments must be countersigned by qualified providers who are authorized to perform the test.

LIMITATIONS OF PROCEDURE

- The KOH preparation should be set-up immediately after sampling for optimal recovery of fungal elements.
- Small quantities of yeast and hyphae may be missed in the KOH preparation. Thus failure to visualize fungal elements in the preparation does not completely exclude yeast or fungal infection.
- When fungal infection is suspected but KOH preparation negative, samples may be sent to the SFGH Clinical Laboratory for culture. Skin and nail specimens may be kept at room temperature, but must be received in the clinical laboratory within 24 hours after collection. Use a plain, sterile, screw-capped container without media for specimen transport.

REFERENCES

1. Lowe, Shirley, and Joanne Saxe. Microscopic Procedures for Primary Care Providers. 1999. Lippincott, Philadelphia PA.
2. Kern, WE. 1985. Medical Mycology, a self-instructional text. F.A. Davis Company, Philadelphia, PA.
3. NCCLS. Provider Performed Microscopy Testing; Approved Guideline. NCCLS Document HS2-A, NCCLS, Wayne PA; 2003.

IX. DISTRIBUTION:

A. Point of Care Master Procedure Book (2M14)

B. Approved Point of Care Testing Locations