



SPUTUM CULTURE

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Sputum collection for culture by the microbiology laboratory has been around for a long time. Although it has drawbacks, it is still a useful tool for the physician in making a diagnosis. It is the respiratory therapists responsibility to collect an appropriate specimen. The problem for therapists is that sputum collected by deep cough technique must pass through the oral cavity where numerous normal flora organisms reside. Common organisms found there include *Neisseria catarrhalis*, *Candida albicans*, *diphtheroides* (gram positive rods of the *Corynebacteria* species), alpha-hemolytic streptococci, some staphylococci and occasional gram negative rods of the *Haemophilus* species. The presence of these normal organisms in the oral cavity do not rule out infection, but they can be confounding variables for the laboratory to work through if an optimal specimen was not submitted for evaluation.

Have you ever spent 20-30 minutes obtaining an induced sputum only to have the patient's nurse or the unit secretary page you to recollect the sputum specimen because it was not a good sample? You question the nurse and she tells you the laboratory rejected it! What does the laboratory know about it, you were the one that was at the patient's bedside, not them! As we all know, in the hospital everyone has to work together for the betterment of the patient. The laboratory has an old saying, "garbage in, garbage out", meaning that the laboratory can only turn out useful information if they receive an appropriate sample. The laboratory will do a gram stain of the specimen you collected. A good specimen from the lungs will have only a rare or few number of squamous epithelial cells present. If more than 10-15 cells are seen on a low power field under the microscope, chances are this is a spit specimen or one severely contaminated by oral flora. The presence of a large number of neutrophils on the gram stain field are also a good indication that this is probably a specimen obtained from an inflamed area of the lung and not spit. The final clue that you have a good specimen is the presence of a very homogeneous microbial flora on the gram stain. Generally, a primary or secondary lung infection from bacteria will be composed of only one, perhaps two classes of organisms being the cause of the problem. You will therefore find a predominance of one type of bacteria on the gram stain. For example, something in the neighborhood of 3+ or 4+ gram negative rods and only few gram positive cocci. The laboratory will also be looking for a mucoid specimen with perhaps a distinct smell or discoloration, such as blood tinged, or a metallic sheen as in the case of *Pseudomonas* or *Proteus* infections. The amount of specimen is not as important as the consistency. However, if the physician is looking for mycobacteria, the amount is important. Because tuberculosis organisms are generally present in small numbers in the lungs, a larger quantity of

specimen is necessary, in the range of 10-15 milliliters of sputum. The laboratory will treat the specimen with n-acetyl-L-cysteine, yes, mucomyst, in an effort to free the organisms from the mucus. Next they will concentrate the specimen to maximize the number of organisms for inoculation of the TB media. This specimen processing is fruitful only if the laboratory receives enough specimen to work with. For routine bacterial culture only 1-2 cc's is necessary.

How can we as therapists obtain the best sputum specimen? Ideally, the specimen acquired by transtracheal aspirate or suctioning with the specimen drawn directly into a Lukens Tube would give the least contamination by oral flora. These two procedures are more invasive and run greater risk for the collecting therapist and certainly the patient. However, any time you can avoid passing the specimen through the oral cavity will increase your chances of an ideal specimen for analysis. Generally, physicians are looking for pathogenic organisms that are residing in the patient's lungs, not in their mouth.

For the patient that is going to expectorate sputum on their own, with or without induction, a few simple steps can go a long way in preventing contamination and ensuring a good quantity of specimen. Have the sputum collection done first thing in the morning. We all tend to have some sputum at that time, even if we are not sick. If possible, have the patient drink additional liquids the night before to assist in liquefying secretions for expectoration the following morning. Just before collecting the sample, assist the patient with oral cleaning to reduce contamination by organisms that normally inhabit the mouth. Have the patient sit upright as much as possible when they cough. Instruct the patient not to touch the edge or inside of the collection container with their hands or mouth.

Finally, inspect the specimen collected. Is it watery and very clear in appearance? This is probably a spit specimen. Is it thick and/or colorful? A good chance you found a gem! Be sure you have enough specimen for the tests requested. Tuberculosis and fungus cultures take more specimen, 10-15 cc's. Routine culture, 2-3 cc's is adequate. Once you have collected the specimen, give it to the unit secretary or patient's nurse to send to the laboratory. Just a word of advice, take it to the laboratory yourself. Sputum needs to be set up within one hour of collection. Don't leave all your hard work up to the nurse or transporter or unit secretary to finish. Remember, if you want it done right, do it yourself!

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