# Standardizing sputum sample processing

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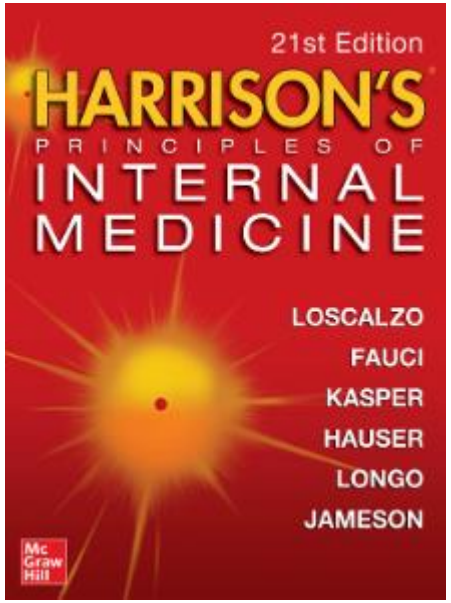
양재 aT 센터 4층 창조룸 I

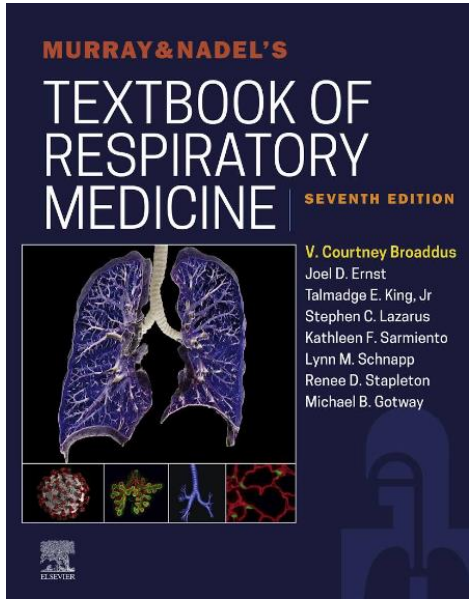
# Standardizing sputum sample processing

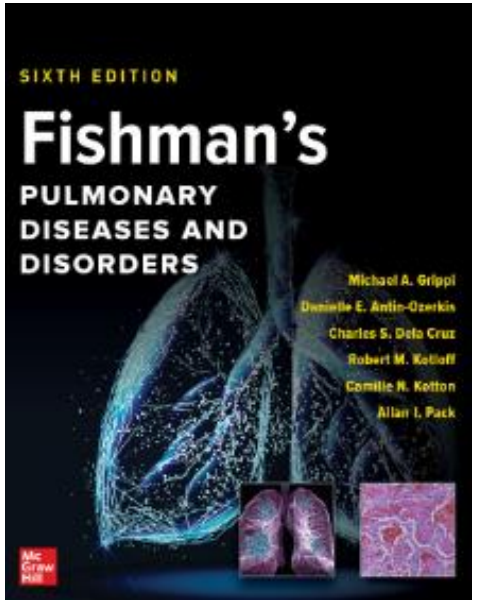
## 강의 순서

- Definition of sputum
- Normal cellular profile in sputum (≈Bronchial washing), BAL fluid
- Adequate Sputum Specimen for sputum analysis and culture
- Sputum induction and sample processing
- Standard Operating Procedures (SOP) & sputum processing WORKSHEET
- Summary

# Definition of Sputum




Part 2: Cardinal Manifestations and Presentation of Diseases

**Section 5:** Alterations in Circulatory and Respiratory Functions

**Chapter 37:** Dyspnea

**Chapter 38:** Cough

**Chapter 39:** Hemoptysis

**Chapter 40:** Hypoxia and Cyanosis

**Chapter 41:** Edema

**Chapter 42:** Approach to the Patient with a Heart Murmur

**Chapter 43:** Palpitations

36. Dyspnea
37. Cough
38. Chest Pain
39. Wheezing And Stridor
40. Hemoptysis

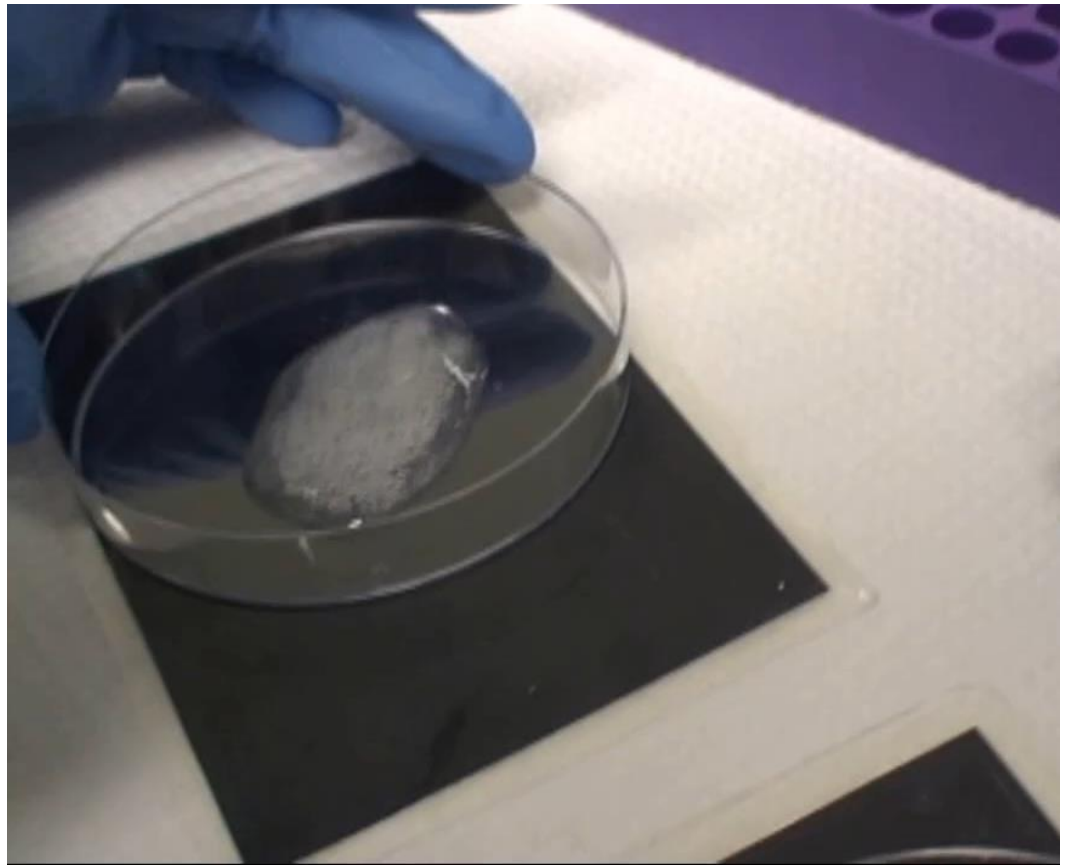
+ DIAGNOSTIC TESTING IN THE EVALUATION OF DYSPNEA
+ COUGH
+ HEMOPTYSIS
+ CYANOSIS
+ CLUBBING
+ HYPERTROPHIC OSTEOARTHROPATHY
+ CHEST PAIN
+ FEVER

# Definition: Sputum versus Saliva

**Definition of sputum**

- Sputum, which is defined as expectorated lower respiratory secretions, is composed of fluid and cellular components, including macrophages, bronchial epithelial cells and inflammatory cells.

- The more viscid portions, considered to be sputum, are usually easy to recognize macroscopically when the sample is poured into a Petri dish.

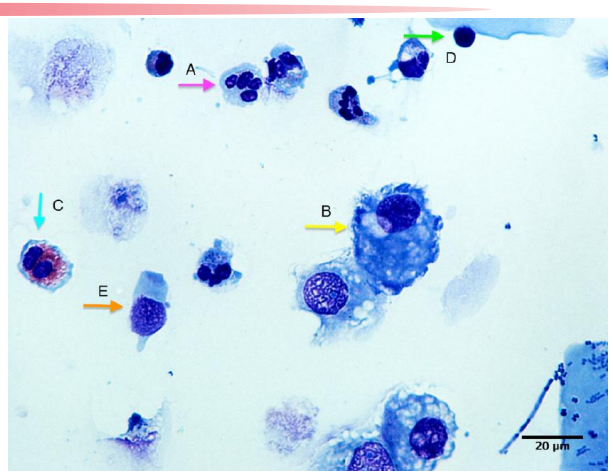


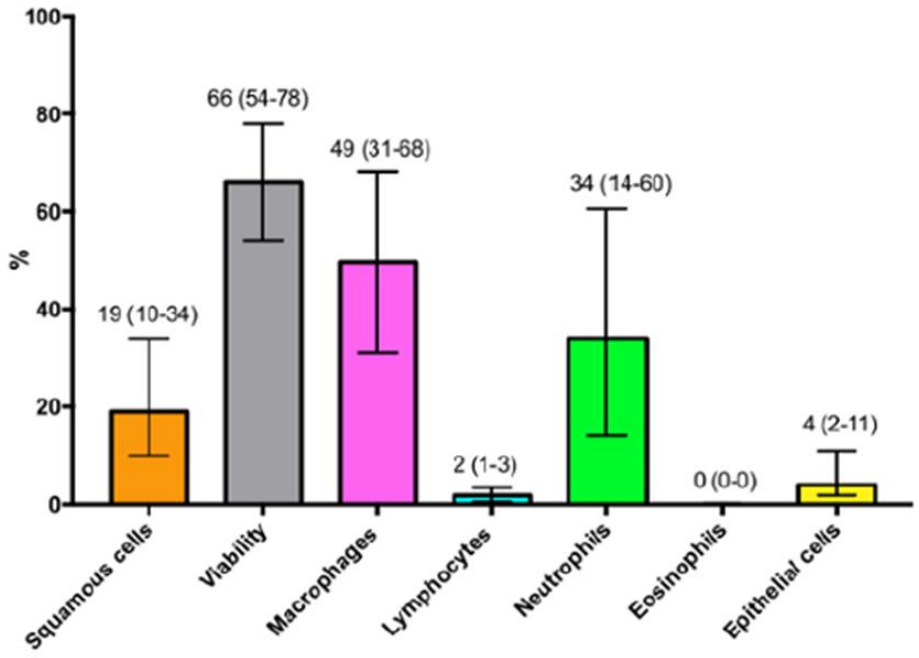
Dorland's Illustrated Medical Dictionary. Philadelphia, WB Saunders Co., 27th ed., 1988; p.1570.

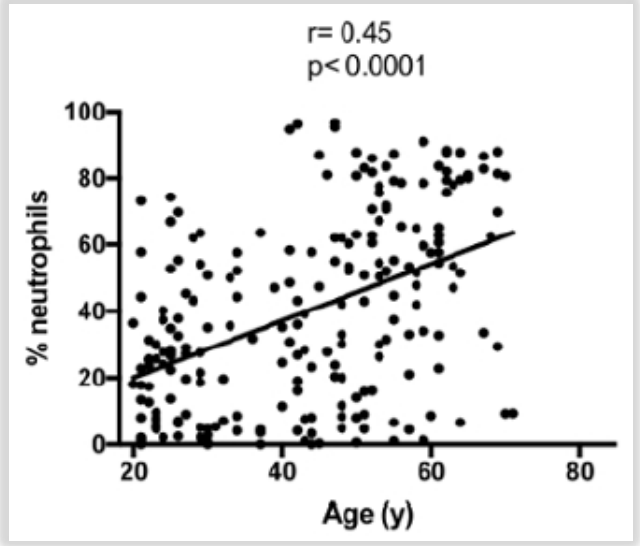
# Sputum differential cell count observed in healthy subjects

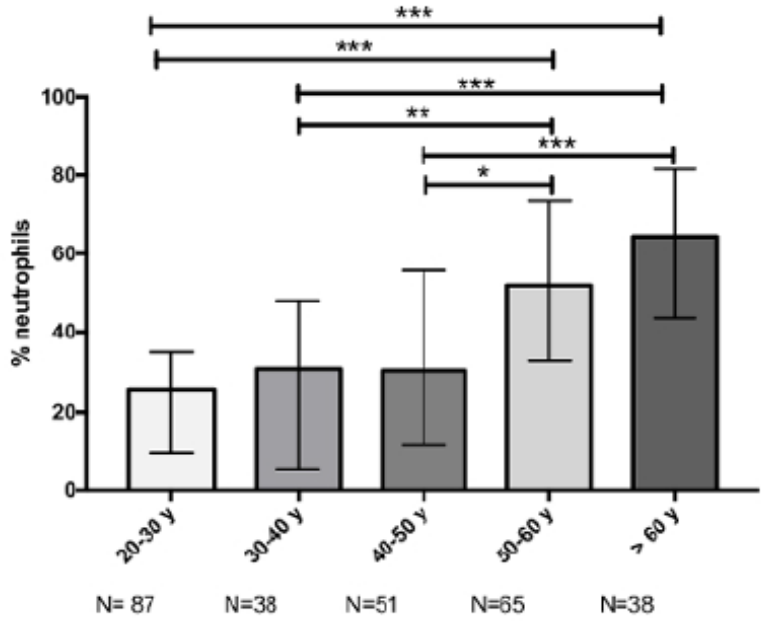
| Variable | Mean ± SD | Median | Minimum | Maximum |
|---|---|---|---|---|
| Total cell count × $10^6$/ml | 2.7 ± 2.5 | 1.8 | 0.4 | 14.2 |
| % Macrophages | 69.2 ± 13 | 69.0 | 40 | 95 |
| % Neutrophils | 27.3 ± 13 | 28.5 | 2 | 49.2 |
| % Eosinophils | 0.6 ± 0.8 | 0.2 | 0 | 2.4 |
| % Lymphocytes | 1.0 ± 1.2 | 0.8 | 0 | 5 |
| % Epithelial cells | 1.5 ± 1.8 | 1 | 0 | 8.2 |

Am J Respir Crit Care Med Vol 162. pp 1172–1174, 2000



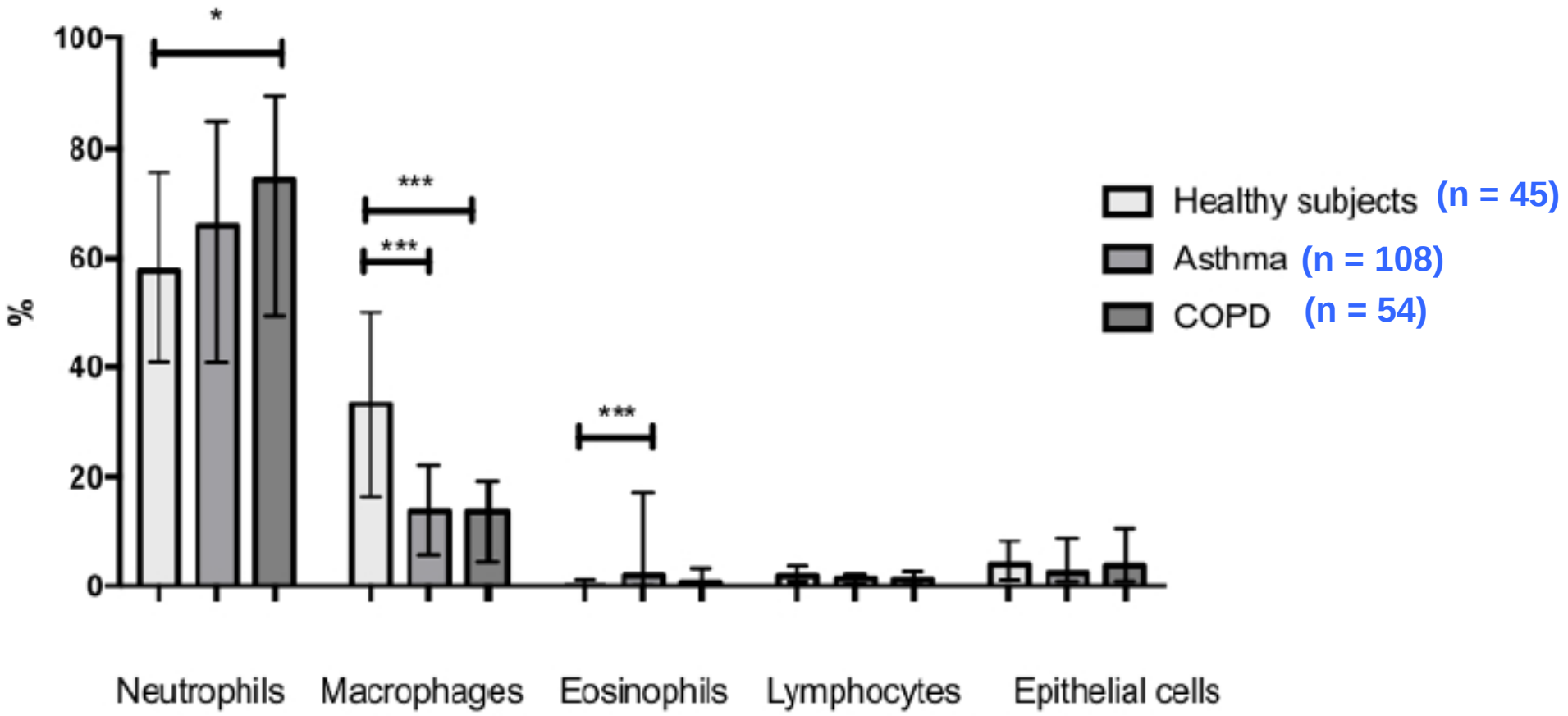




J. Vis. Exp. 2017: 130; e56612. doi:10.3791/56612

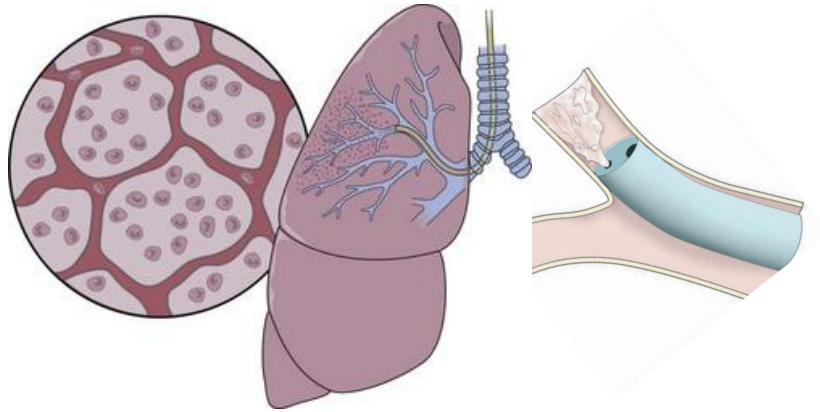
# Sputum inflammatory cell profile of healthy subjects and patients suffering from airway diseases




J. Vis. Exp. 2017: 130; e56612. doi:10.3791/56612

# BAL cellular patterns in normal adult nonsmokers and in ILD patients

| I. Normal Adults (Nonsmokers) | BAL Differential Cell Counts |
|---|---|
| Alveolar macrophages | >85% |
| Lymphocytes (CD4+/CD8+ = 0.9–2.5) | 10–15% |
| Neutrophils | ≤3% |
| Eosinophils | ≤1% |
| Squamous epithelial*/ciliated columnar epithelial cells† | ≤5% |



| Lymphocytic cellular pattern | Eosinophilic cellular pattern | Neutrophilic cellular pattern |
|---|---|---|
| >15% lymphocytes | >1% eosinophils | >3% neutrophils |
| Sarcoidosis | Eosinophilic pneumonias | Collagen vascular diseases |
| Nonspecific interstitial pneumonia (NSIP) | Drug-induced pneumonitis | Idiopathic pulmonary fibrosis |
| Hypersensitivity pneumonitis | Bone marrow transplant | Aspiration pneumonia |
| Drug-induced pneumonitis | Asthma, bronchitis | Infection: bacterial, fungal |
| Collagen vascular diseases | Churg-Strauss syndrome | Bronchitis |
| Radiation pneumonitis | Allergic bronchopulmonary aspergillosis | Asbestosis |
| Cryptogenic organizing pneumonia (COP) | Bacterial, fungal, helminthic, *Pneumocystis* infection | Acute respiratory distress syndrome (ARDS) |
| Lymphoproliferative disorders | Hodgkin's disease | Diffuse alveolar damage (DAD) |

Am J Respir Crit Care Med. 2012; 185(9): 1004–1014

# Adequate Sputum Specimen for sputum analysis or culture

- Percentage or number of squamous epithelial cells
  - 80% before cytospin vs. 20% after cytospin
- Viability
  - A cell viability of < 40% may affect the Differential Cell Counts.
- Number of neutrophils
  - Grading system for assessing the quality of sputum samples for culture
- Presence of mucus plug

# Grading system for assessing the quality of sputum samples for culture

**Box 1-4 Bartlett's Grading System for Assessing the Quality of Sputum Samples**

| No. of Neutrophils Per 10 × Low-Power Field | Grade |
|---|---|
| <10 | 0 |
| 10–25 | +1 |
| >25 | +2 |
| Presence of mucus | +1 |
| **No. of Epithelial Cells Per 10 × Low-Power Field** | |
| 10–25 | −1 |
| >25 | −2 |
| Total* | |

** Average the number of epithelial cells and neutrophils in about 20 or 30 separate 10× microscopic fields and then calculate the total. A final score of 0 or less indicates lack of active inflammation or contamination with saliva. Repeat sputum specimens should be requested.*

**Box 1-5 Murray and Washington's Grading System for Assessing the Quality of Sputum Samples**

| | Epithelial Cells Per Low-Power Field | Leukocytes Per Low-Power Field |
|---|---|---|
| Group 1 | 25 | 10 |
| Group 2 | 25 | 10–25 |
| Group 3 | 25 | 25 |
| Group 4 | 10–25 | 25 |
| Group 5 | <10 | 25 |

TABLE I. MODIFIED BARLETT'S CRITERIA

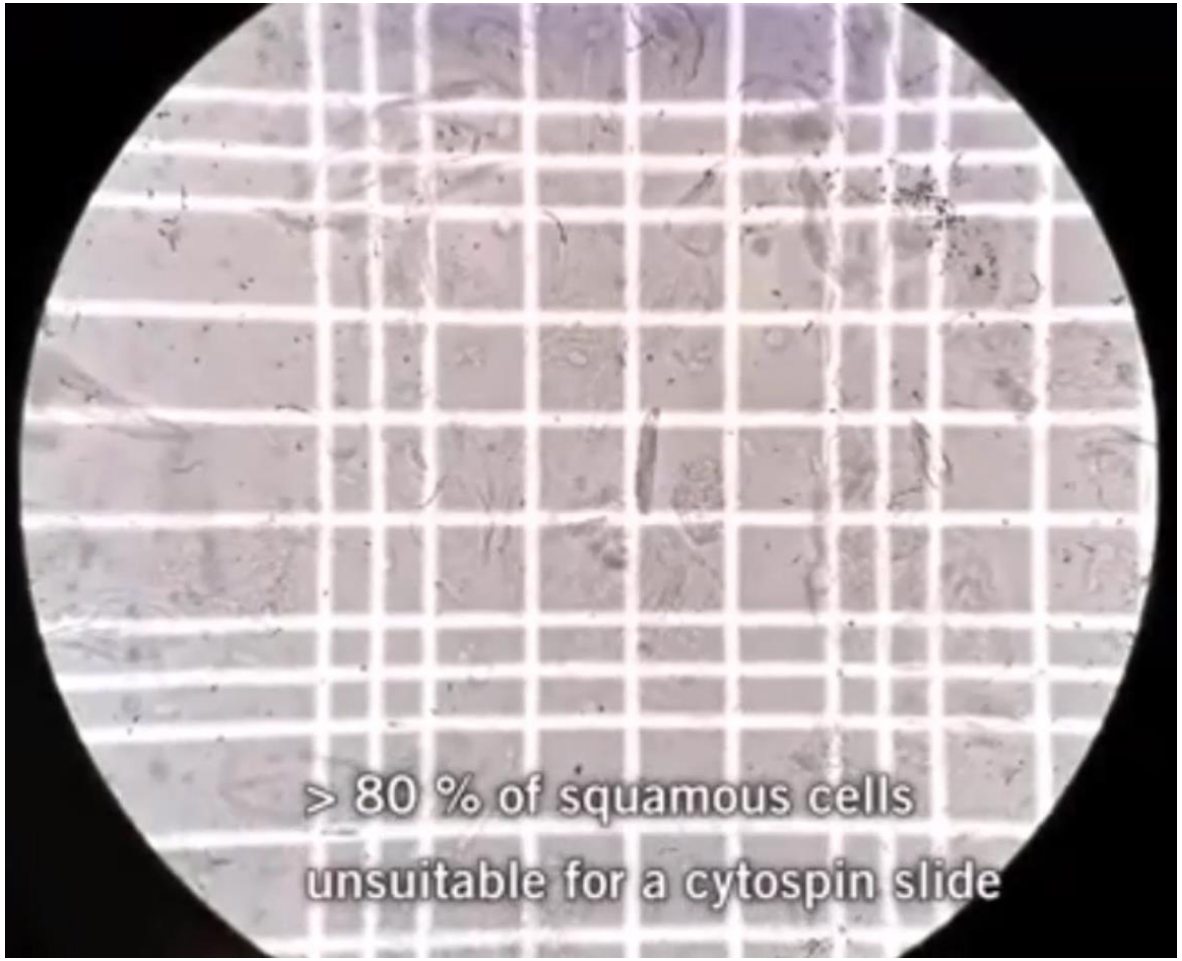
| | Criteria | Score |
|---|---|---|
| **Neutrophils (pus cells) count (Score A)** | < 10 neutrophil/10x field | 0 |
| | 10-25 neutrophils/10x field | +1 |
| | >25 neutrophils/10x field | +2 |
| **Macroscopy (Score B)** | Mucoid, Mucopurelent, Purelent, or Blood stained | +1 |
| **Squamous epithelial cell count (Score C)** | < 10 Squamous epithelial cell/10x field | 0 |
| | 10-25 Squamous epithelial cell /10x field | -1 |
| | >25 Squamous epithelial cell /10x field | -2 |

- If the total score is 1 and above, the sputum will be cultured, and the specimens will be proceeded accordingly. Whereas if the total score is 0 and below, the process of sputum will stop.

Murray PR, Washington JA. Microscopic and baceriologic analysis of expectorated sputum. Mayo Clin Proc. 1975 Jun;50(6):339-44.

Lester K. et al. Comparison of Six Different Criteria for Judging the Acceptability of Sputum Specimens. Journal of clinical microbiology, 1982; 16(4): p. 627-631.

# Inadequate sputum sample for sputum analysis




- If the percentage of squamous epithelial cells is greater than 80%, the sample is considered unsuccessful

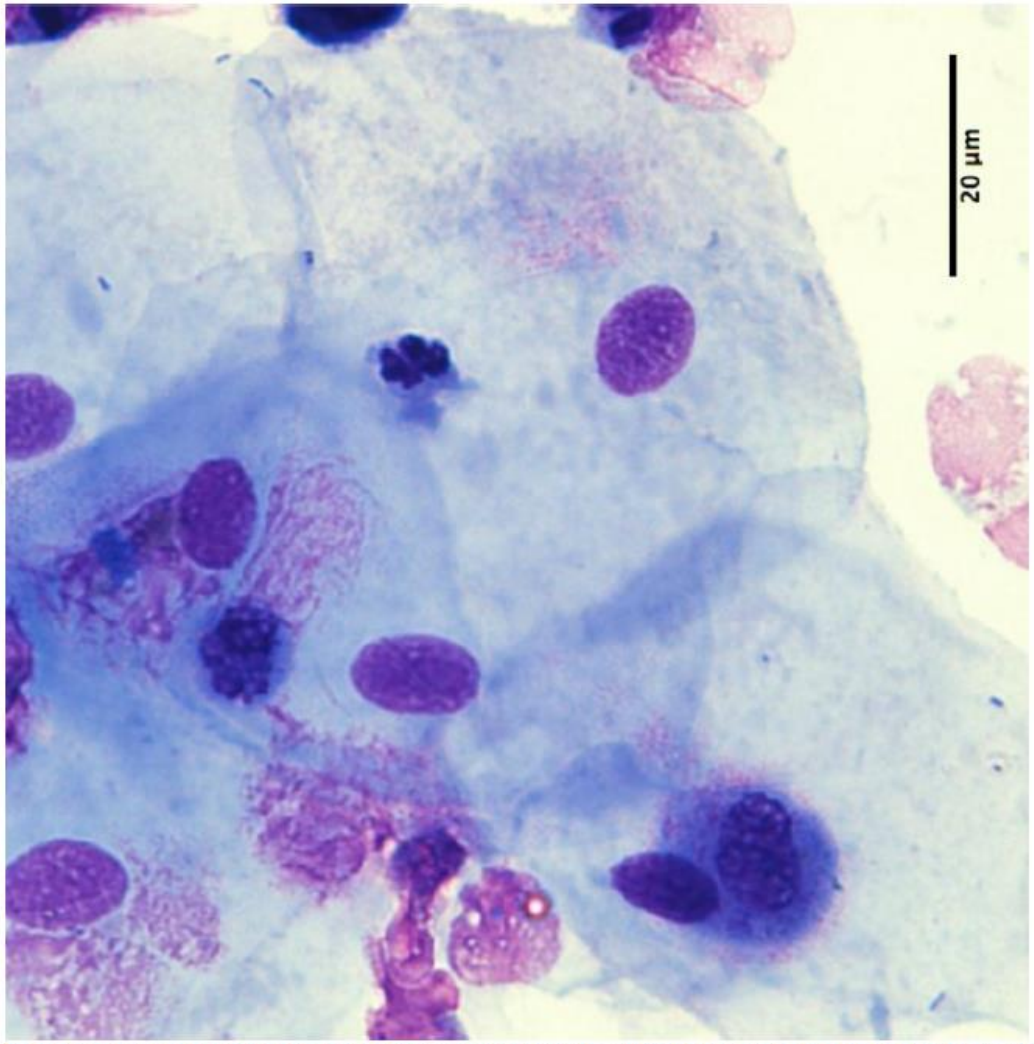



**Figure 3:** Example of a poor quality cytospin slide with >80% of squamous cells. Scale bar = 20 µm.

# Sputum induction and sample processing

# 국내 진료 현장에서 객담 세포 분석 검사 수행 현황

환자 진료 목적으로 객담 세포 분석 검사를 시행하고 있다.

연구 목적으로 객담 세포 분석 검사를 시행하고 있다.

객담세포분석 검사는 병원에 세팅/
표준화가 필요한 검사이다.

| 처방코드 | 처 방 명 |
|---|---|
| L23261 | Eosinophil stain sputum |
| L23262 | Eosinophil stain & Diff. |

| 처방명 | 급비 | 1회량 | 수가 |
|---|---|---|---|
| 체액-호산구수(혈액 외) | 급여 | 1.00 | 1,860 원 |
| | | | 1,860 원 |

## SPUTOLYSIN® Reagent - CAS 578517 - Calbiochem

| 카탈로그 번호 | 재고 정보 | 패킹 | 포장 단위 | 가격(VAT 별도) |
|---|---|---|---|---|
| 560000-10MLCN | 현재 재고 없음 | Glass bottle | 10 ml | KRW 107,200.00 고객님의 가격을 보려면 로그인하십시오 |
| 560000-1SETCN | 현재 재고 없음 | Glass bottle | 1 set | KRW 539,600.00 고객님의 가격을 보려면 로 |

### Description

**Overview**

Concentrate of Dithiothreitol (DTT; Cat. No. 233155) in phosphate buffer, pH 6.5-7.5. Intended for the isolation of epithelial cells, pathogenic or saprophytic bacteria, fungi, and yeasts from sputum. Each vial is sufficient to make 100 ml of working solution.

Note: 1 set = 20 x 10 ml.

**References**


Hirsch, S.R., et al. 1969. *J. Lab. Clin. Med.* **74,** 346.
Shah, R.R. and Dye, W.E. 1966. *Am. Rev. Respir. Dis.* **94,** 454.
Dixon, J.M.S. and Miller, D.C. 1965 (November). Lancet p. 1046.
Cleland, W.W. 1964. *Biochemistry* **3,** 480.
May, J.R. 1953 (September). Lancet p. 535.

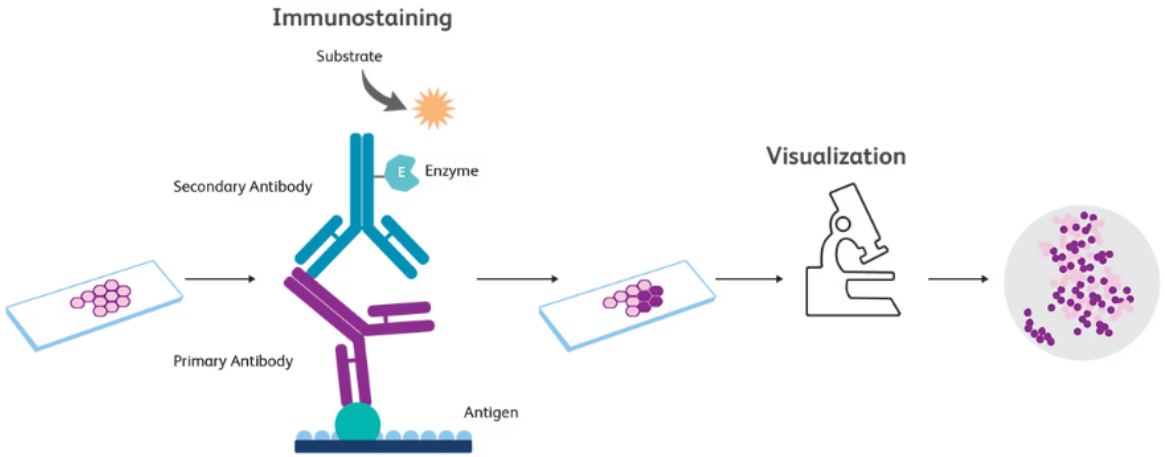

| | |
|---|---|
| Catalogue Number | 560000 |
| Brand Family | Calbiochem® |

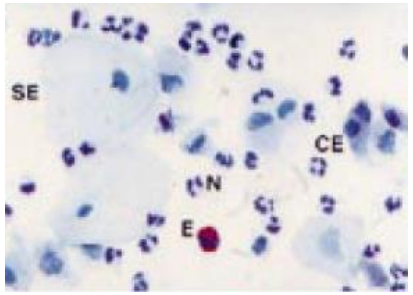

40um pore sized nylon mesh

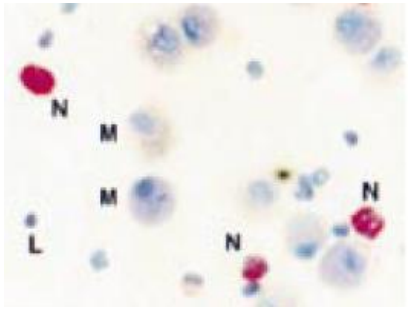
# The utility of sputum analysis

- Sputum ≈ Bronchial washing, ≠ BronchioloAlveolar Lavage
- Supernatant of sputum & expectorants: measure biochemical markers
- Differential count: provide the information about the inflammation status in the airway
- Flow cytometry, Genomics, transcriptomics, Proteomics
- Immunocytochemical staining, *In situ* hybridization, Microarray

# Immunohistochemistry

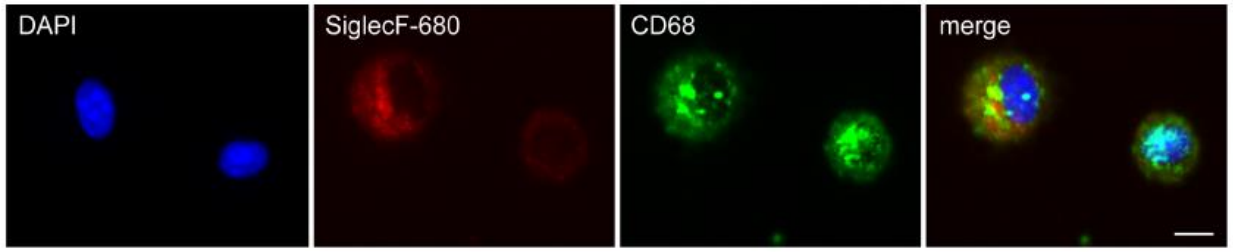


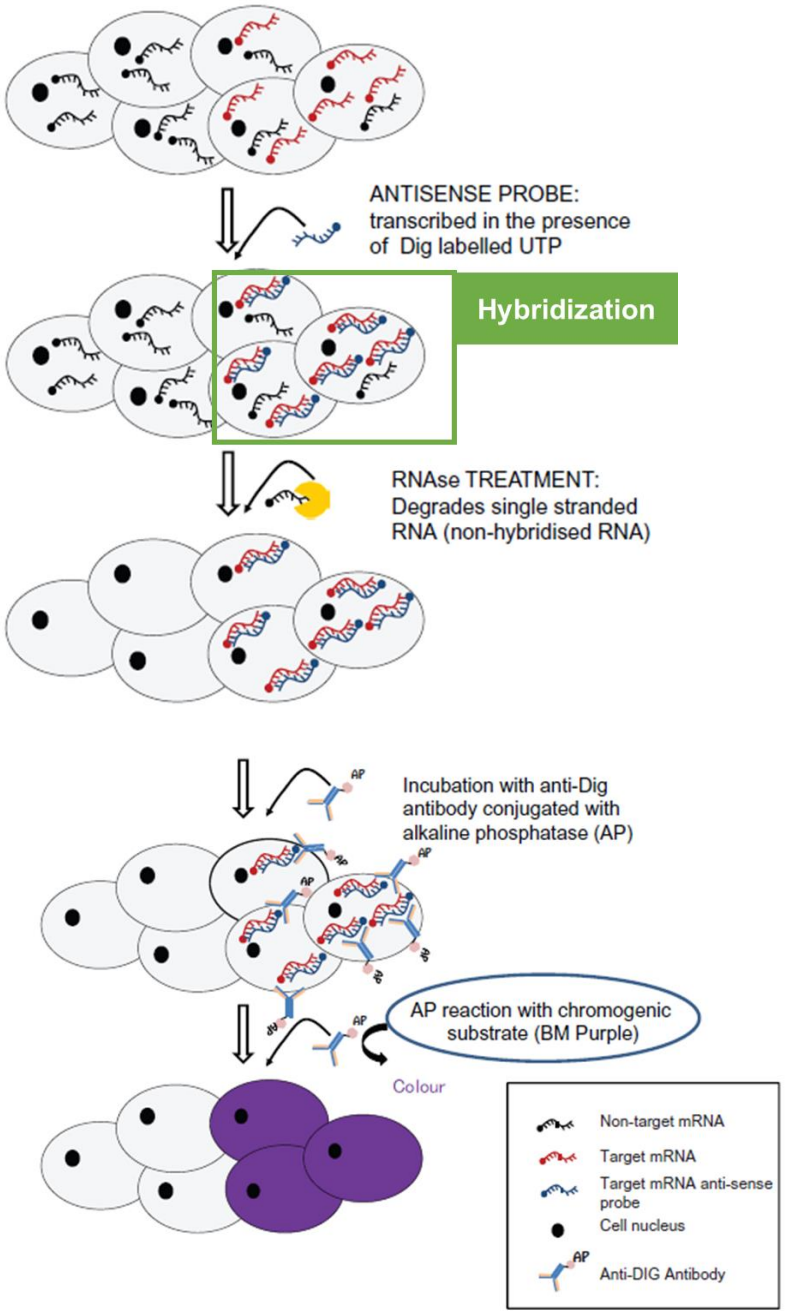




https://www.bdbiosciences.com/ko-kr/learn/applications/immunohistochemistry#Overview
Thorax 2002;57:449–451

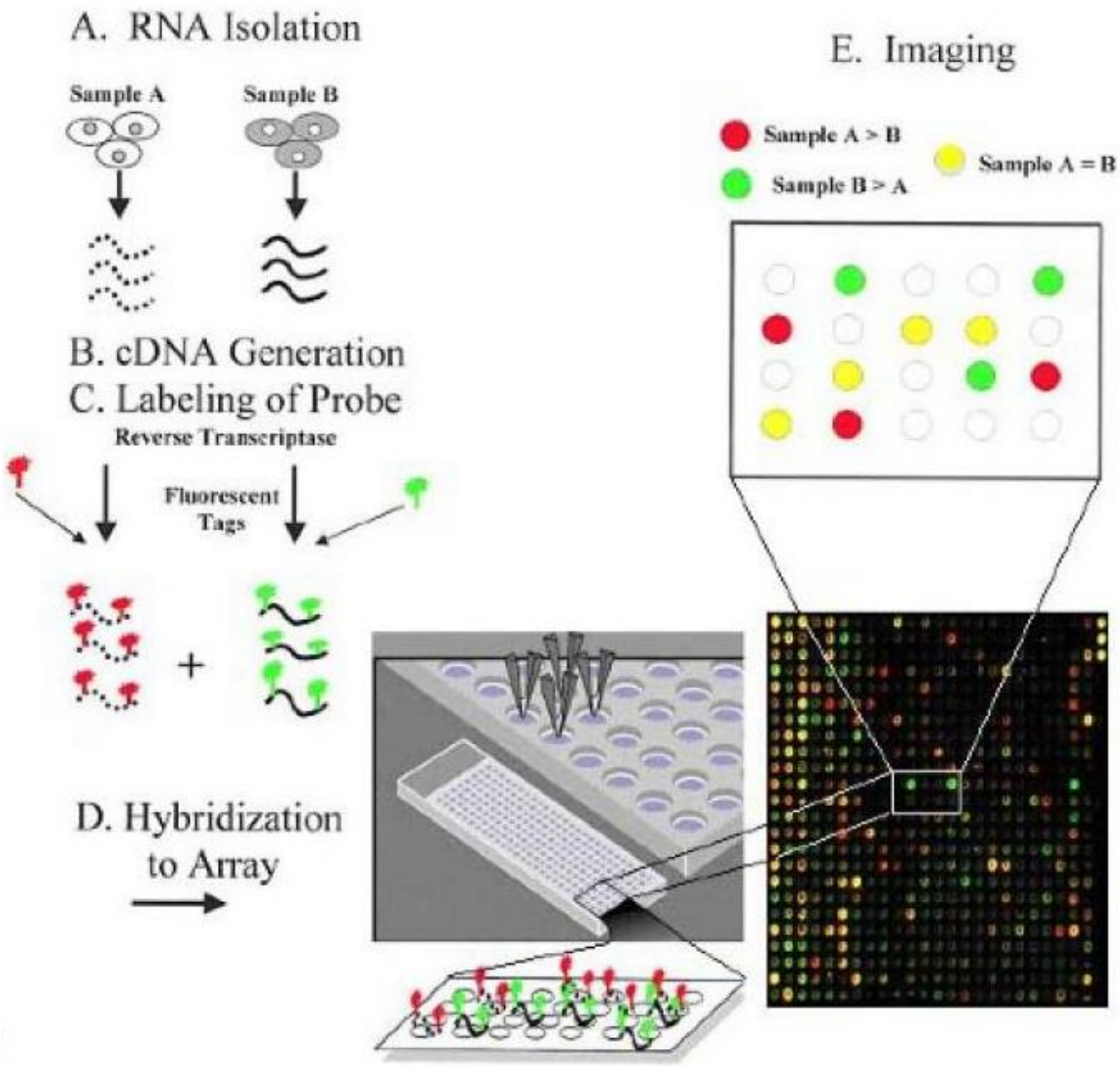
# In situ hybridization with more specific RNA probe




PLoS ONE 9(2): e90017.

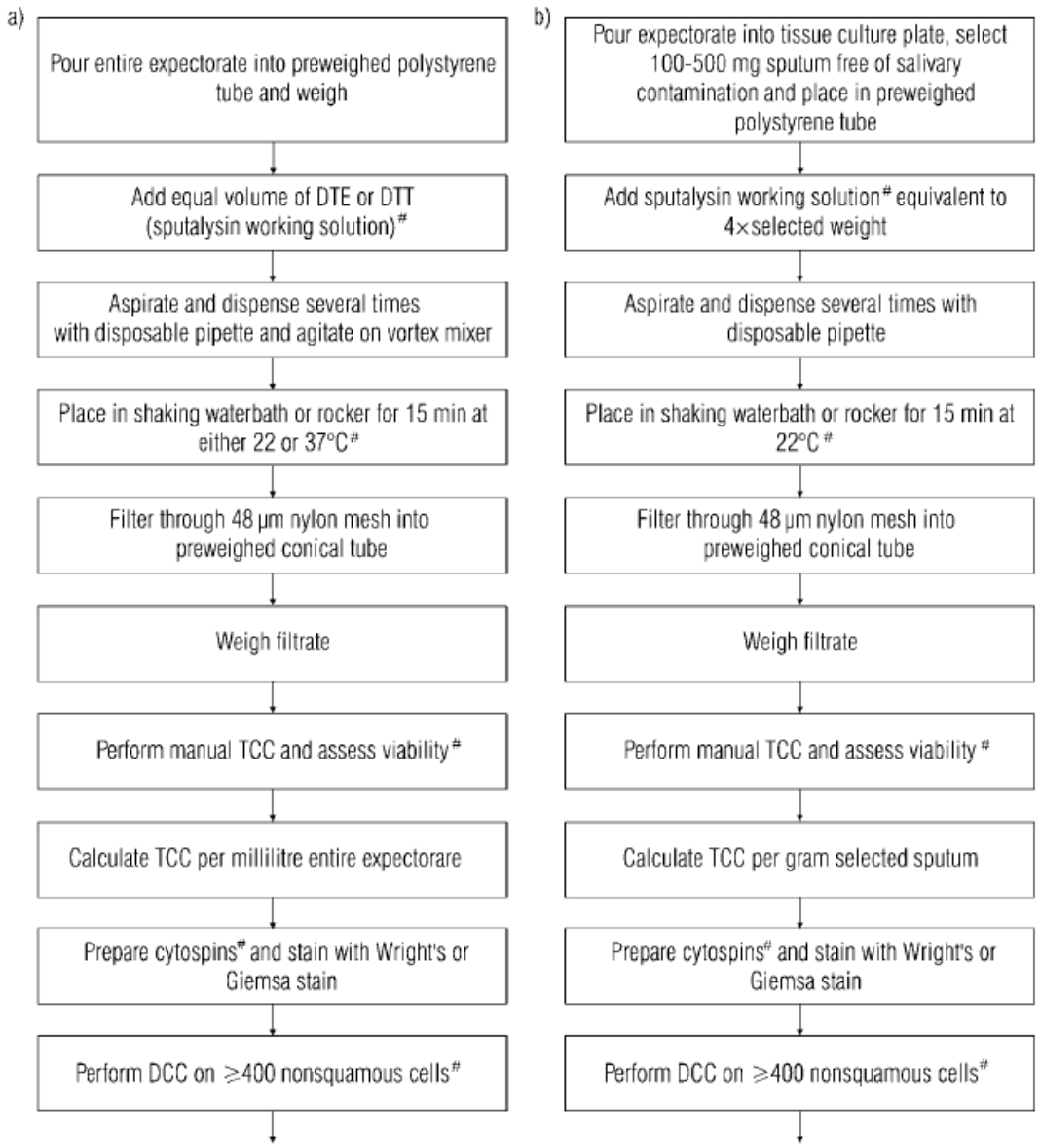


# Microarray




https://nanohub.org/app/site/resources/2013/05/17915/slides/001.01.jpg

# Sputum processing method for: entire sputum and selected sputum




- The advantage of using the entire expectorate is that the technique is **quicker** to perform.
- 목표 squamous cell contamination: < 20% vs. < 5%
- There is conflicting data as to whether or not differential cell counts (DCCs) differ between the two methods.
  - higher eosinophils % in sputum processed by the selection method compared to the entire expectorate [AJRCCM 1998; 157: 665–668]
  - no difference between two methods [ERJ 1996; 9: 2448–2453]
- Protocols for "Analysis of fluid-phase mediators"

DTE: dithioerythritol; DTT: dithiothreitol;
TCC: total cell count; DCC: differential cell count

Eur Respir J 2002; 20: Suppl. 37, 19s–23s

# Sputum induction: Standard procedure

1. Explain the procedure in detail to the subject (rinse mouth before procedure, saline inhalation with tidal breathing, saliva handling during inhalation; after 5 min intervals cough and try to expectorate into the sputum cup).
2. Set nebuliser (output ~1 mL·min$^{-1}$), fill it with sterile saline solution (usually with concentration of 4.5%).
3. Measure baseline (pre-salbutamol) $FEV_1$ (or PEF).
4. Premedicate the subject with inhaled salbutamol (200 µg) and repeat $FEV_1$ (or PEF) measurement after 10 min.
5. Start nebulisation and ask the subject to perform tidal breathing (set the clock for 15–20 min). Ask the patient to perform inhalation for 5 min intervals followed by coughing and expectoration (the clock should be stopped at each coughing episode). Encourage the subject to cough and spit at any time during the induction if he/she feels the urge to do so.
6. After each 5 min interval carry out $FEV_1$ (or PEF) repeat spirometry. If $FEV_1$ or PEF falls more than 20% from the post-salbutamol value, stop the procedure. If induction is stopped due to an adverse effect (or for any other reason), record the total induction time.

**Alternative procedure for high-risk patients: step by step**

◉ 수가조회

| 처방코드 | 처방명 | 급비 | 1회량 | 수가 |
|---|---|---|---|---|
| HM0046 | 객담유도채취 | 급여 | 1.00 | 23,430 원 |
| | | | | 23,430 원 |

- 유도된 객담은 4°C에서 보관하여야 하고, **1-3시간** 내에 **객담 처리를 시작**하여야 한다.
- 유도객담검사는 호기산화질소 측정검사, 폐기능검사, 기관지천식유발시험 등을 먼저 시행하고, 객담유도를 가장 마지막에 시행하는 것이 좋다.
- 객담유도를 2회 이상 시행하여야 하는 경우 객담유도 간 최소 24시간 간격을 두는 것이 염증세포 결과에 있어, 재현성을 높일 수 있다.

Breathe 2013; 9: 300-306. DOI: 10.1183/20734735.042912
Allergy Asthma Respir Dis 2017; 5(6):307-311. https://doi.org/10.4168/aard.2017.5.6.307

# [대한결핵 및 호흡기학회] 건강한 숨, 행복한 삶

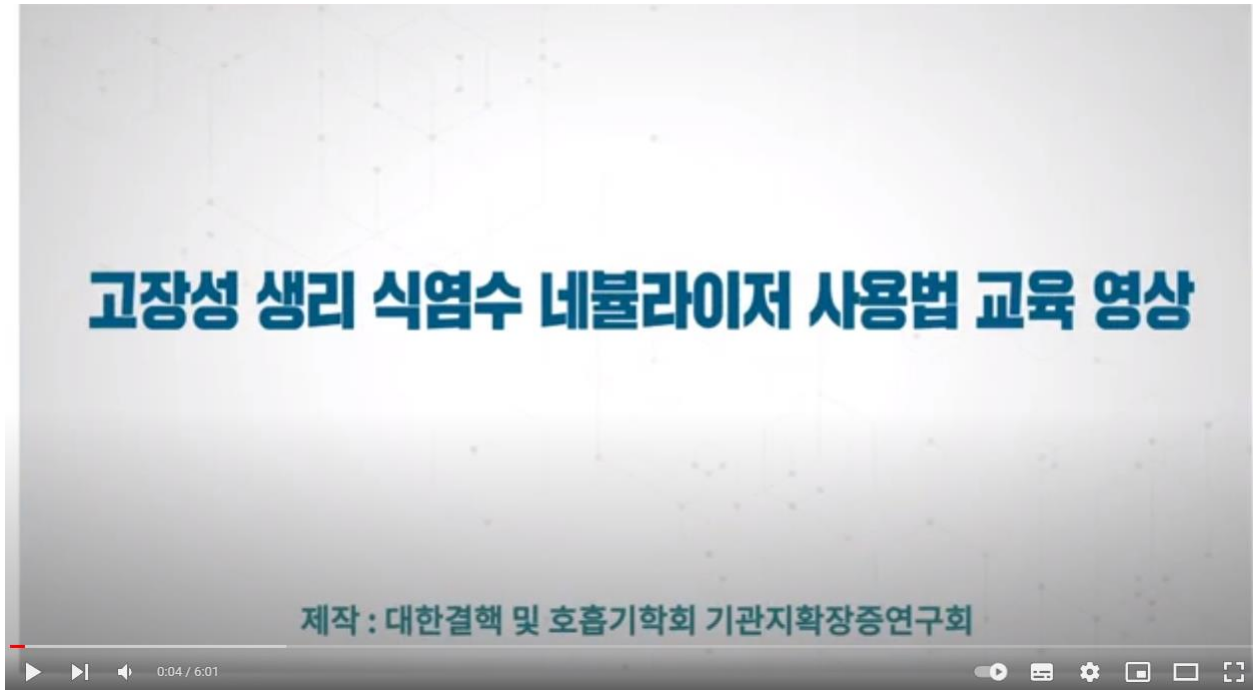
@katrd1953 구독자 1.01만명 동영상 110개

The Korean Academy of Tuberculosis and Respiratory Diseases >

홈 동영상 SHORTS 라이브 재생목록 커뮤니티 채널 정보


고장성 네블라이저 사용법

조회수 533회 • 2개월 전



# Sputum sample homogenization: entire expectorates

- 유도객담 처리는 세포 수 측정 목적의 경우 실온에서 시행 가능
- 객담 샘플의 **부피**와 무게를 기록
- 0.1%의 dithiotreitol (DTT)

  → 개봉하면 5일 이내 실온에서 사용 (UCSF protocol: 4주 이내 사용 가능)

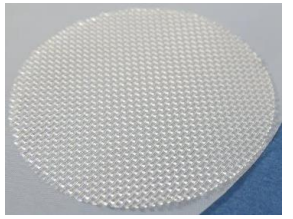
  → 증류수로 1:9로 희석하여 사용 해야함. 10% sputolysin이라고도 하며 매일 새로 희석하여 사용

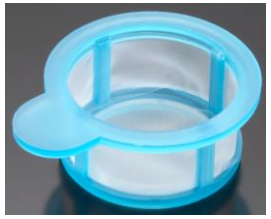
  → 1:1 같은 부피로 넣어 이때 균질화를 위해 pipetting 및 vortex를 이용

  → 실온에서 15분간 rotatory shaker (또는 rocker)로 섞어준다. (5분 간격 sputolysin 추가 가능)


# Sample filtration, Total cell count and viability

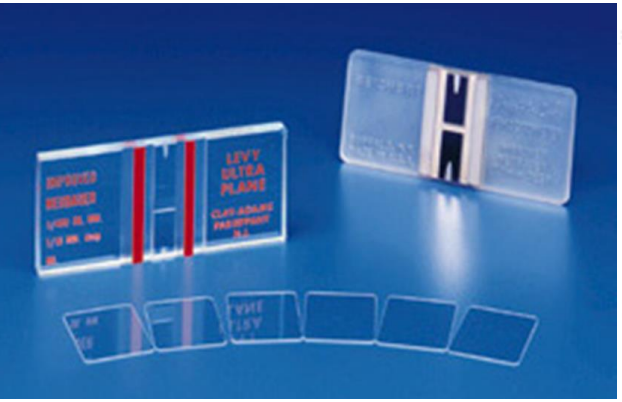
- 슬라이드 질을 높이기 위해 나일론 mesh (48 µm)에 여과
  → 국내 구입 가능한 40 µm pore sized nylon mesh 사용 가능

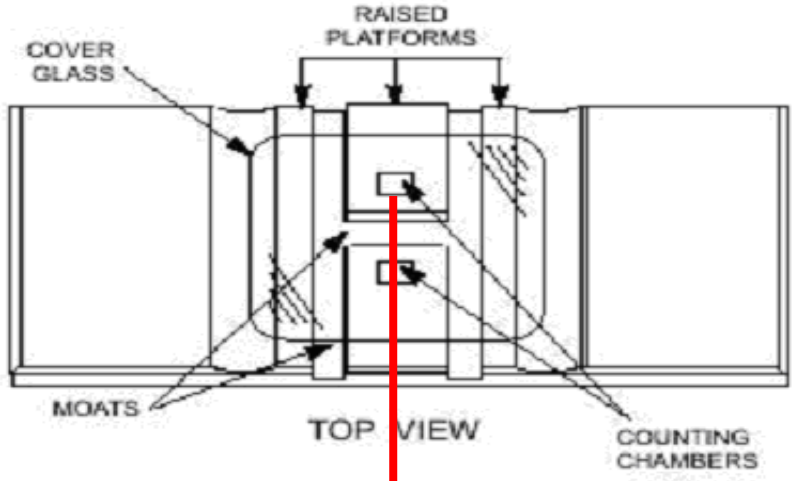


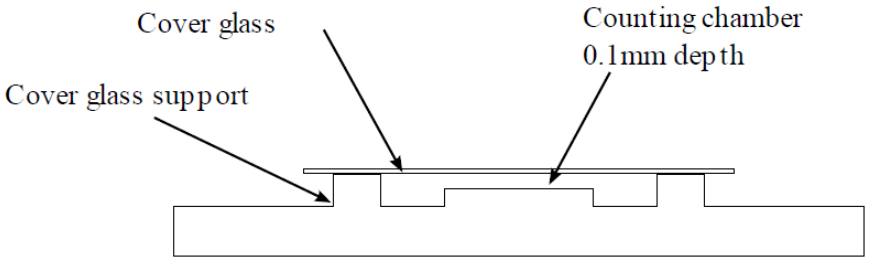


- 세포 생존 여부(viability)를 평가하기 위해 10 µL의 세포 현탁액과 10 µL의 tryptan blue를 섞어서 염색을 하고 혈구계(hemocytometer counting chamber)를 이용하여 총 세포의 개수를 센다.
- 총 세포 수에 대한 생존 세포(cell viability) 수의 분율은 %로 보고한다.
  → 신뢰할 수 있는 결과를 얻기 위해 수작업으로 진행할 것을 권장

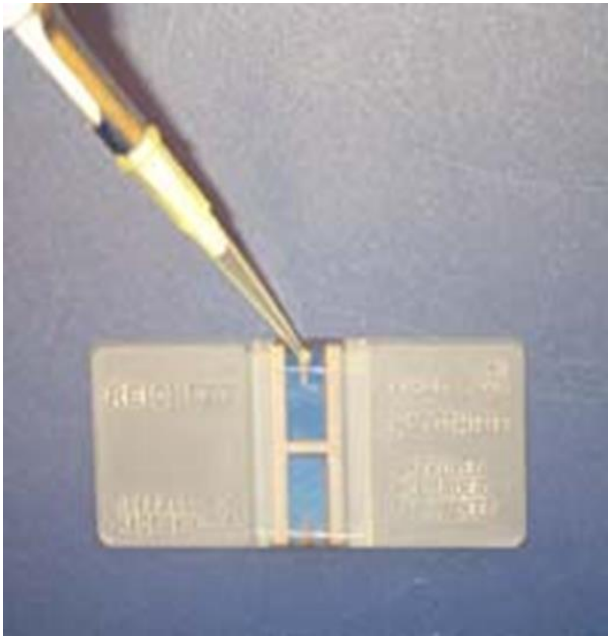
# Hemocytometer and total cell counting (TCC)

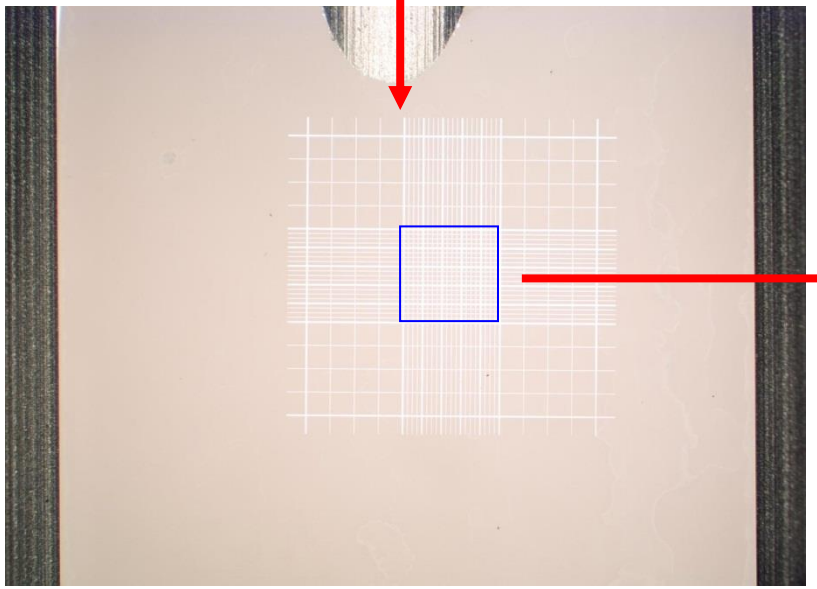


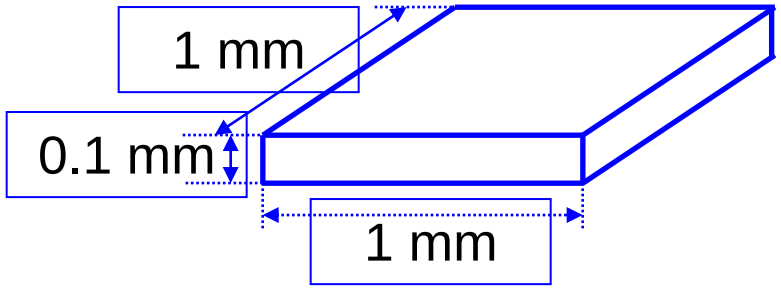



SIDE VIEW








Volume : 0.1mm$^3$

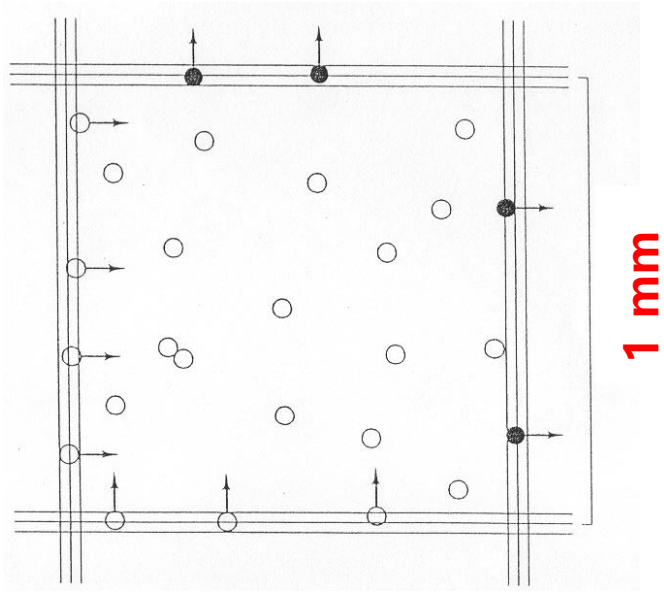
1 ml = 1 cm$^3$ = 1000 mm$^3$

# Example

TB : Trypan blue

Count

Uncount




| Dilution factor | Vol. of Cell Solution | Cell count | Total viable cells |
|---|---|---|---|
| 0.1 ml CS + 0.1 ml TB (2) | 20 ml | 23 | $20 \times 2 \times 23 \times 10^4 = 9.2 \times 10^6$ cells |
| 0.1 ml CS + 0.3 ml TB (4) | 15 ml | // | $15 \times 4 \times 23 \times 10^4 = 1.38 \times 10^7$ cells |
| 0.1 ml CS + 0.9 ml TB (10) | 10 ml | // | $10 \times 10 \times 23 \times 10^4 = 2.3 \times 10^7$ cells |

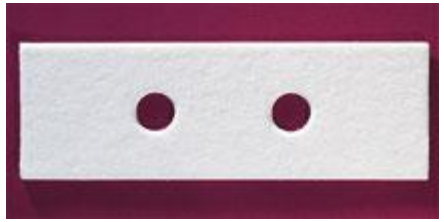
# Centrifugation and storage of supernatant

- 세포와 상층액(supernatant)을 분리하기 위해 원심분리(400×g, 10분)를 하고, 상층액은 이후의 분석을 위해 따로 분리하여 -80°C에서 보관할 수 있다.

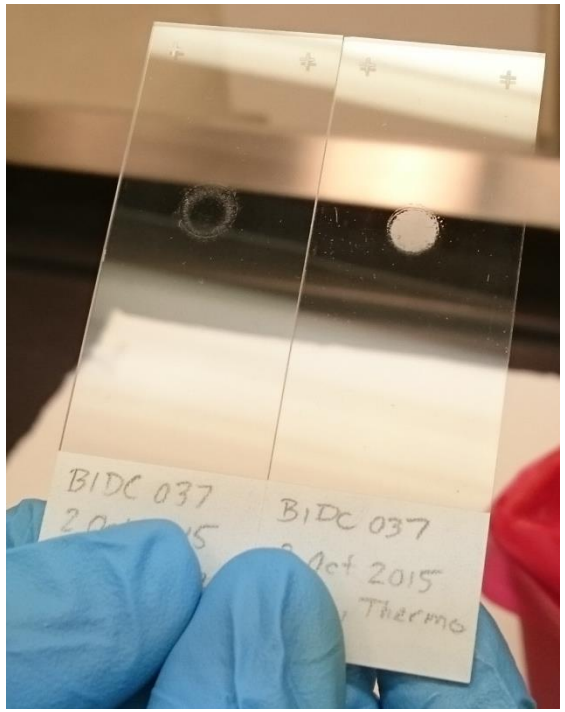
# Cytospin centrifugation, staining and counts

- 여기에서 얻은 세포 침전물을 balanced salt solution (혹은 buffer)에 다시 녹이며, 이때 세포 농도는 $1.0\times10^6$ cells/mL로 맞춘다. 이 후 각각의 cytospin에 대략 40–65 µL의 샘플 ($450–650\times10^3$ cells)을 분주한다.
- cytospin 원심 속도는 22×g으로, 6분간 시행할 것을 권장한다.
- 이후 cytospin 슬라이드 염색을 위해 Giemsa 또는 Wright 염색을 이용할 수 있으며 다른 염색 방법도 가능하다. 감별 세포 계산(differential cell count)을 위해 400–500개의 비편평세포(nonsquamous cells)를 세면서, 이들 중 호산구, 호중구, 대식세포, 림프구, 기관지 상피세포의 분율을 퍼센트로 기록한다.
- 편평세포의 분율도 따로 기록해야 하며, 전체 세포 중 편평세포 분율이 높을 경우 (>20%), 즉 비편평세포가 80% 미만일 경우 감별 세포 계산의 재현성이 낮아지기 때문에 부적절한 검체로 생각해야 하며, 결과 해석에 주의가 필요하다.

# Cytocentrifugation (Cytospin™)



200,000 cells,
**Fisherbrand filter card**




200,000 cells,
**Thermo Shandon filter card**

# SPUTUM PROCESSING WORKSHEET

ID NUMBER: ☐☐☐☐☐☐☐☐ FORM CODE: SPW VERSION: 6.0 04/22/2019 Event_____

0a) Form Date ☐☐/☐☐/☐☐☐☐ 0b) Staff Code ☐☐☐

0c) Date Collected ☐☐/☐☐/☐☐☐☐

0d) Processing Started ☐☐:☐☐ AM/PM (circle one)

*Instructions:* *Complete this form while processing the sputum sample. Carefully record all data in the space provided.*

1) Weight of Entire Sample ☐☐☐.☐☐ grams

**Color and Description of Sample:**

2) Salivary Contamination (check all that apply):
   a) ☐ Minimal
   b) ☐ Mild
   c) ☐ Moderate
   d) ☐ Excessive

3) Consistency (check all that apply):
   a) ☐ Watery
   b) ☐ Mucoid
   c) ☐ Purulent (puss)

4) Mucus "plugs" (material that is colored and/or more opaque than clear surrounding saliva) (check all that apply):
   a) ☐ Numerous
   b) ☐ Moderate number
   c) ☐ Sparse
   d) ☐ Large
   e) ☐ Small
   f) ☐ Dense/flocculent
   g) ☐ Diffuse opacity
   h) ☐ None

ID NUMBER: ☐☐☐☐☐☐☐☐ FORM CODE: SPW VERSION: 6.0 04/22/2019 Event_____

5) Color of plugs (check all that apply):
   a) ☐ Clear
   b) ☐ White
   c) ☐ Yellow/Tan
   d) ☐ Brown
   e) ☐ Green

6) General Notes/Comments:

6a) Sputum processing condition
- ☐ Condition 1: Induced initial sample Wt. is > $1g_1$ → **Perform Steps 7-14 below**
- ☐ Condition 2: Induced initial sample Wt. is 0.5g-$1g_2$ → **Perform Step 7; then 10-14 below**
- ☐ Condition 3: Induced initial sample Wt. is <$0.5g_3$ → **Perform Steps 10-14 below**
- ☐ Condition 4: Induced initial sample Wt. is <0.5g and a spontaneous sputum sample was acquired prior to induction$_4$ → **Perform Steps 7-8 with induced sample; then 10-14 with spontaneous sample**
- ☐ Condition 5: No induced sputum sample was produced; but a spontaneous sample was acquired$_5$

6a1) Sputum processing for Condition 5
- ☐ Condition A: Spontaneous sample Wt. is > $1g_1$ → **Perform Steps 7-14 below**
- ☐ Condition B: Spontaneous sample Wt. is 0.5g-$1g_2$ → **Perform Step 7; then 10-14 below**
- ☐ Condition C: Spontaneous sample Wt. is <$0.5g_3$ → **Perform Steps 10-14 below**

7) Processing Whole Sample using the Mucin Method

| Mucin Sample | |
|---|---|
| Weighing tray (g) | 7a) |
| Whole sputum weight (g) | 7b) |
| Guanidine vol. (ml) | 7c) |

*Sample size should be from 0.100-0.250g. Add 0.5ml of guanidine reduction buffer (6M) to the sample and store at 2-8 $^0$ C in the refrigerator.

8) Processing Microbiology sample

| Micro Sample | |
|---|---|
| Micro centrifuge tube (g) | 8a) |
| Whole sputum weight (g) | 8b) |
| Vol. of Zymo added (µl) | 8c) |
| Vol. per aliquot (8b+8c)/2 | 8d) |

| ID NUMBER: | | FORM CODE: SPW<br>VERSION: 6.0 04/22/2019 | Event_____ |
|---|---|---|---|

11) EDTA-DPBS Supernatants for Nucleotides and Cytokines

| Supernatants | Number of aliquots | Volume stored per aliquot (µl) |
|---|---|---|
| Nucleotides | a1) | b1) |
| Cytokines | c1) | d1) |
| Cytokine Zymo Research RNA/DNA | e1) | f1) |

*If the supernatant volume is greater than 8.6 ml, obtain 4 1000 µl aliquots for nucleotides and, 4 1000 µl aliquots for cytokines. Of the remaining sample, take 600 µl and mix it 1:1 with Zymo Research RNA/DNA shield. Apply the label called "SPU_DPBS_Zymo" to the aliquot containing the Zymo Research RNA/DNA shield.
If the sample volume is less than 8.6 ml start by getting 1 nucleotide sample between 200-500 µl and 1 cytokine sample at 200 µl. Mix one of the cytokine aliquots1:1with Zymo Research RNA/DNA shield and apply the label called "SPU_DPBS_Zymo" to this aliquot. If there is sample leftover after that, then continue alternating between nucleotide and cytokine aliquots (i.e., 200-500 µl for nucleotides, 200 µl for cytokines) until finished.
All supernatant samples are immediately stored in a -80° C freezer.

EDTA-DTT Supernatants

| Supernatants | Volume stored (ml) |
|---|---|
| Sputolysin Sup 01 | g1) |
| Sputolysin Sup 02 | g2) |

12)Cell Counts

| Cell Counts: | # Dead | # Live | Total | Squamous Epithelial |
|---|---|---|---|---|
| a) Quadrant 1 | 1) | 2) | 3) | 4) |
| b) Quadrant 2 | 1) | 2) | 3) | 4) |
| c) Quadrant 3 | 1) | 2) | 3) | 4) |
| d) Quadrant 4 | 1) | 2) | 3) | 4) |
| e) Totals: | 1) | 2) | 3) | 4) |

*Count live (clear) and dead (cell interior is blue) cells in each of the 4 corner quadrants. Include bronchial epithelial cells (BEC's), but exclude RBC's. Count squamous epithelial cells but do not include them in the total live/dead cell count. Perform total cell count and cell viability. Adjust the cell concentration of the sample to 0.5 – 1x$10^6$ cells/ml and make 4 cytospin slides.

# standard operating procedures

| 제목 | Eosinophil stain & Diff. | | | |
|---|---|---|---|---|
| | 검사코드 | L23262 | 보험분류번호 | |
| | | | 보험코드 | |

| 작성자 | 나 승 원 | 작성일자 | 2023.8.26 |
|---|---|---|---|

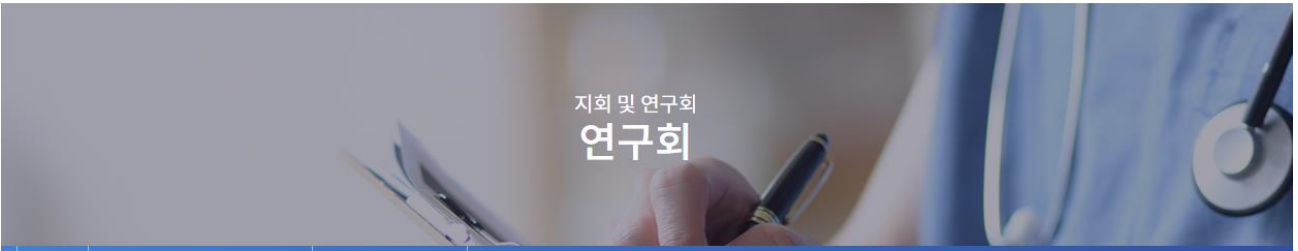
1. 검 사 명: Sputum differential count or neut/eos stain
2. 검사 원리
3. 검체 채취 및 관리
4. 시약 및 장비
5. 검사과정
6. 보고 방법
7. 정도 관리: 자체 제작 표준 슬라이드
8. 임상적 의의
9. 참고문헌

검색하실 내용을 입력해주세요.

대한결핵 및 호흡기학회
The Korean Academy of Tuberculosis and Respiratory Diseases

로그아웃 마이페이지 CONTACT US

학회소개 지회 및 연구회 학술행사 논문 및 간행물 뉴스레터 게시판 결핵과 전문의 자료실




지회 및 연구회 연구회

연구회 연례 사업 서식 지회 및 연구회 메뉴 매뉴얼

COPD 연구회 소개보기
ILD 연구회 소개보기
결핵 연구회 소개보기
금연 연구회 소개보기
기관지경 연구회 소개보기
기관지확장증 연구회 소개보기
기침 연구회 소개보기
분자폐암 연구회 소개보기
수면호흡장애 연구회 소개보기
집중치료 연구회 소개보기
천식 연구회 소개보기
폐혈관 연구회 소개보기
호흡기감염병 연구회 소개보기
호흡재활 연구회 소개보기
환경성폐질환 연구회 소개보기


알림 임원 회칙 게시판 일정 멤버 멤버관리

공지 객담 세포 분석 검사 프로토콜 NEW
메일보내기 조회수 : 3 / 추천수: 0 수정 / 삭제
23 2023.08
sputum induction_JOVE.mp4
sputum processing_JOVE.mp4

공지 2023년 11월 7일 저녁: 찰머 선생님 초청 강의 및 meet professor NEW
메일보내기

| | | | |
|---|---|---|---|
| 공지 | 공지: 4th World Bronchiectasis & NTM Conference - Virtual Edition<br>메일보내기 | 조회수 : 16 / 추천수: 0 수정 / 삭제 | 21 2020.09 |
| 공지 | 2020년 워크샵 강의록 다운로드<br>메일보내기 | 조회수 : 32 / 추천수: 1 수정 / 삭제 | 09 2020.10 |
| 공지 | 국내 기관지확장증 연구 출판논문 모음<br>메일보내기<br>01 KMBARC registry protocol_bmjopen-2020.pdf<br>02 Population-based prevalence of BE in South Korea.pdf | 조회수 : 37 / 추천수: 2 수정 / 삭제 | 18 2021.01 |
| 공지 | 국내 결핵파괴폐 연구 출판논문 모음<br>메일보내기 | 조회수 : 9 / 추천수: 0 수정 / 삭제 | 18 2021.01 |
| 공지 | 2021년도 기관지확장증 연구회 집담회 강의록<br>메일보내기<br>2021.02.17_Bronchiectasis in PID_김예진_강의록 제출.pdf<br>20210217 Future & direction of PCD (학회 제출).pdf | 조회수 : 12 / 추천수: 1 수정 / 삭제 | 02 2021.03 |
| 공지 | 심포지엄 (기관지확장증 주제) 다시보기 및 제 5차 세계 기관지확장증 conference 안내<br>메일보내기 | 조회수 : 18 / 추천수: 0 수정 / 삭제 | 13 2022.02 |
| 공지 | 연구회 연구비 공모 안내<br>메일보내기 | 조회수 : 6 / 추천수: 0 수정 / 삭제 | 09 2022.08 |
| 공지 | 2022년 우수 연구회 선정<br>메일보내기<br>2022년도 우수연구회 표창장.jpg<br>2022년도 우수연구회 시상 사진.jpg | 조회수 : 2 / 추천수: 0 수정 / 삭제 | 20 2022.11 |

# Key points: standardizing sputum sample processing

- ensure complete **homogenization** of sputum
- **filter** the sputum to remove excess mucus and debris
- perform a **manual Total Cell Count** prior to centrifugation
- count the entire **volume** of the counting chamber
- prepare cytopsins with an **optimum number of cells**
- ensure that buffers and stains are **optimized**
- perform a **400-nonsquamous** cell Differential Cell Counts
- report the **squamous cells separately**
- include positive and negative controls with special stains
- implement a regular **quality control** system
- use standard operating procedures (**SOP**) & sputum processing **WORKSHEET**

slido

# 객담세포분석 검사는 병원에 세팅/표준화가 필요한 검사이다.

ⓘ Start presenting to display the poll results on this slide.

# 경청해 주셔서

# 감사합니다.

ULSAN
UNIVERSITY
HOSPITAL

# 공지 사항

- 11월 7일 저녁: 찰머 선생님 초청 강의 및 meet professor (후원: 베링거) 확정
  - ROSE definition에 대한 내용과 BCO 환자에서 치료 전략 및 ICS 선별사용의 중요성
  - 국내연자 1명 (주제/연자 미정)
  - 연구회 회원분들 포함하여 많은 참석 부탁드립니다.
- 연구자료 활용 및 연구 활성화 위한 온라인 집담회
- 2024년 7월 4일(목)-6일(토) 7th World Bronchiectasis