



Use of COPAN SL Solution For Processing Sputum From Patients With and Without Cystic Fibrosis

C. Young, K. Cullen, W. LeBar, D. Newton
University of Michigan Health System, Ann Arbor, MI

Carol Young/Kathy Cullen
Clinical Microbiology/Virology Laboratories
University of Michigan Health System
1500 E. Medical Center Dr. UH2F461
Ann Arbor, MI 48109
734-936-6846

Abstract

Background:

COPAN SL solution (SL) is a new device used to homogenize and liquefy sputum for manual processing or processing on the Walk Away Specimen Processor (WASP) (COPAN, Murrieta, CA). Sputum is transferred with a dipper device to the SL tube (containing dithiothreitol), vortexed and liquefied before plating. We compared standard processing to SL for sputa from patients with cystic fibrosis (CF) and without cystic fibrosis (non-CF).

Method:

There were 104 sputum specimens (CF=52 and non-CF=52) included in this study. Sputa were cultured by standard processing and residual samples transferred to the SL solution with the sputum dipper. The SL tube was vortexed for 15 seconds and left undisturbed for 15 minutes. The specimen was then inoculated using a 10uL loop on the same media as used for traditional culture. Standard incubation and identification methods were used. Organisms isolated from each processing method were compared.

Results:

CF sputa: There were 140 isolates by standard processing and 158 from SL. Fifteen of 19 additional isolates from SL were identified as *Pseudomonas aeruginosa* (PA). One additional isolate from standard processing was identified as *S. aureus*.

Cystic Fibrosis Sputum (n=51)

Method	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>A. xylosoxidans</i>	<i>S. maltophilia</i>	<i>B. cepacia</i>	<i>H. influenzae</i>	Mold	TOTAL Isolates
Standard	29	79	7	8	9	1	7	140
COPAN	28	94	7	8	10	2	9	158

Non-CF sputa: Ten cultures contained only normal respiratory flora, 4 showed no growth and 38 cultures had potential respiratory pathogens. There were 50 isolates recovered by standard processing and 56 from SL.

Non-CF Sputum (n=52)

Method	<i>S. aureus</i>	Enterobacteriaceae	<i>P. aeruginosa</i>	Nonfermenters	Other	TOTAL Isolates
Standard	10	16	14	6	4	50
COPAN	12	17	17	5	4	55

Conclusion:

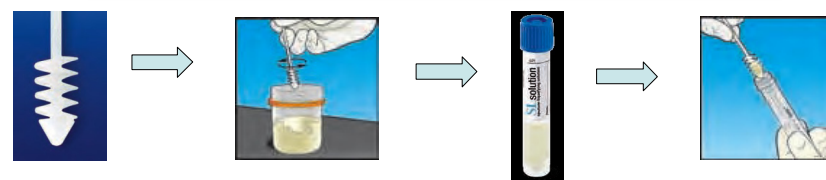
SL processing solution using the sputum dipper is an efficient system to liquefy sputum for manual or automated processing. SL is better than standard processing for CF and non-CF sputum. For CF sputum there was improved recovery of all organisms and significant increase of PA strains.

Introduction

Copan's SL solution is a ready to use mucolytic agent for sputum samples with the principle active ingredient being dithiothreitol (DTT). SL solution quickly liquefies sputum specimens without affecting the morphology, growth or microscopic staining of pathogens in the sputum. It enables the emulsification of sputum and mucus resulting in a homogenous suspension allowing for easier, more consistent and reproducible planting and streaking of specimens.

Methods

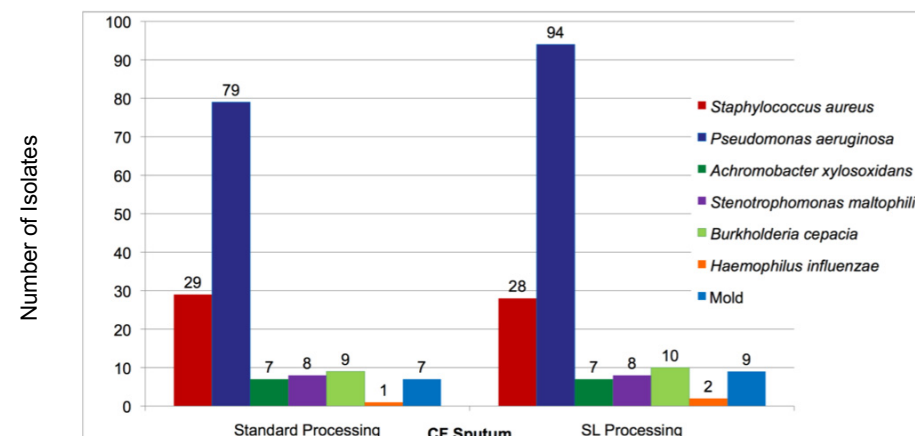
Specimen	Standard		SL Processing	
	Sputum		Sputum	
Processing			Use COPAN sputum dipper to transfer sputum to SL solution. Vortex 15 seconds Stand 15 minutes	
Media	Non-CF SBAP MAC Choc	CF SBAP MAC Choc-bacitracin Mannitol salt BCSA	Non-CF SBAP MAC Choc	CF SBAP MAC Choc-bacitracin Mannitol salt BCSA
Inoculation	Swab		10 uL loop	
Incubation	CO2: SBAP, MAC, Choc Air: Mannitol salt, BCSA		CO2: SBAP, MAC, Choc Air: Mannitol salt, BCSA	
Reading	24/48 hr: all 72 hr: BCSA		24/48 hr: all 72 hr: BCSA	
Interpretation	Standard identification		Compare morphology Standard ID additional organisms	



Results

Cystic Fibrosis Sputum (n=51)

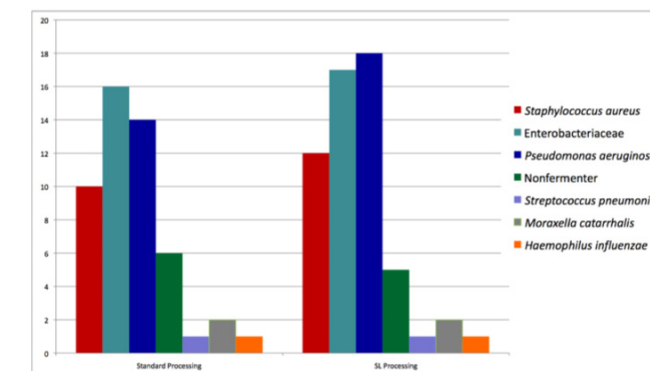
	Standard Processing	SL Processing
<i>Staphylococcus aureus</i>	29	28
<i>Pseudomonas aeruginosa</i>	79	94
<i>Achromobacter xylosoxidans</i>	7	7
<i>Stenotrophomonas maltophilia</i>	8	8
<i>Burkholderia cepacia</i>	9	10
<i>Haemophilus influenzae</i>	1	2
Mold	7	9
TOTAL Isolates	140	158



Non-CF Sputum (n=52)

	Standard Processing	SL Processing
<i>Staphylococcus aureus</i>	10	12
Enterobacteriaceae ¹	16	17
<i>Pseudomonas aeruginosa</i>	14	18
Nonfermenter ²	6	5
<i>Streptococcus pneumoniae</i>	1	1
<i>Moraxella catarrhalis</i>	2	2
<i>Haemophilus influenzae</i>	1	1
TOTAL Isolates	50	56

¹ *E. coli* (2), *Klebsiella* (3), *Enterobacter* (6), *Serratia* (4), *Morganella* (1), *Proteus* (1), *Providencia* (1)
² *Acinetobacter* (1), *Stenotrophomonas* (3), *Achromobacter* (1)



Additional Isolates

	CF Sputum		Non-CF Sputum	
	Standard	SL	Standard	SL
<i>Staphylococcus aureus</i>	1			2
<i>Pseudomonas aeruginosa</i>		15		4
Enterobacteriaceae				1
<i>Stenotrophomonas maltophilia</i>			1	
<i>Burkholderia cepacia</i>		1		
<i>Haemophilus influenzae</i>		2		
Mold		2		
TOTAL	1	20	1	7

➤ **SL solution liquefies sputum to produce a homogenized specimen for plating**

➤ **SL processing facilitates detection of more organisms than standard processing**

➤ **SL processing method is superior for recovery of *Pseudomonas aeruginosa*, especially from CF sputa**

Acknowledgement: COPAN supplied the SL Solution and provided travel support