



## Bacterial Survival in Different Transport Media

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### OBJECTIVES

A variety of clinical specimens are sent daily to Microbiology laboratories in swab transport devices. One of the crucial factors affecting the possibility of detecting pathogens is the efficacy of the transport system to maintain organisms viability until the clinical sample is fully processed. The ideal transport system maintains the viability of bacteria in the specimen without promoting bacterial multiplication. Fastidious microorganisms, such as *Neisseria gonorrhoeae*, *Streptococcus pneumoniae* and *Haemophilus influenzae*, may survive only few hours, after specimen collection, if placed in swab transport system; other organisms, on the other hand, like *Pseudomonas sp.*, *Enterobacteriaceae* or *Staphylococci* proliferate during transport leading to an overestimate bacterial count. Another important aspect to be considered is the protection of anaerobic bacteria from the exposure to oxygen during the transport. Although some available transport systems are effective in maintaining anaerobiosis, they are costly and not always available to the clinicians, so it is advisable that commonly used swabs could guarantee a satisfactory recovery both of aerobic and anaerobic pathogens.

The purpose of this study was to evaluate three commercial bacterial transport systems for their ability to sustain bacterial viability over a 48-hours period at room temperature for fastidious organisms (*Neisseria gonorrhoeae*, *Streptococcus pneumoniae* and *Haemophilus influenzae*) and for one anaerobe (*Fusobacterium nucleatum*).

### METHODS

Three commercial **bacterial transport systems**, with Amies agar gel without charcoal, were evaluated:

- Venturi Transystem – COPAN Italia SpA., (Brescia - Italy)
- EUROMED (Italy)
- KIMA (Italy)

#### Organisms tested:

- *Fusobacterium nucleatum* ATCC 25586
- *Haemophilus influenzae* ATCC 10211
- *Neisseria gonorrhoeae* ATCC 43069
- *Streptococcus pneumoniae* ATCC 6303

**Procedure:** Bacterial suspensions, in sterile physiological solution, were prepared for each organism with an optical density equivalent to 0.5 McFarland turbidity standard (about  $1.5 \times 10^8$

CFU/ml). Four swabs from each company were inoculated with exactly 100  $\mu$ l of suspensions. Swabs were then placed into the correspondent transport medium and stored at room temperature. At times 0, 6, 24 and 48 hours swabs were removed from media, placed in 1 ml of sterile saline solution and vigorously vortexed. Serial dilutions of suspensions were prepared and 100  $\mu$ l were spread, in triplicate, over the entire surface of appropriate culture plates: chocolate agar (Oxoid) for *N. gonorrhoeae*, *H. influenzae* and *S. pneumoniae*; 5% sheep blood agar (Sanofi) for *F. nucleatum*. The plates are incubated at 37°C for 24–48 hrs in correct atmospheric conditions (anaerobic conditions for *F. nucleatum*; microaerophilic conditions for the other microorganisms) and observed for growth.

### RESULTS

The results are presented in Table 1 and Figures 1 – 4.

- There were no significant differences in survival of *F. nucleatum* in the different transport systems tested: in any case the percentage of recovery dropped at about 0% after 24 hrs. (only few colonies detectable in COPAN system, nothing in KIMA or EUROMED systems).
- For *H. influenzae* COPAN system allowed the survival, after 48 hrs., of 12.5% of bacterial population (16% after 24 hrs.) while for the other two systems the recovery rates were 0% (after 24 hrs.: 0% and 0.35% for EUROMED and KIMA respectively).
- The percentage of survival of *N. gonorrhoeae* was of 2.2% after 48 hrs. for COPAN system (14.8% after 24 hrs.) and 0% for the other two companies (1.8% and 0.04% after 24 hrs. for EUROMED and KIMA respectively).
- *S. pneumoniae* survived only 24 hrs. in KIMA and EUROMED swabs (0.3% and 4.75% of recovery, after 24 hrs.: 0% after 48 hrs.) while in COPAN device the survival was 1.5% after 48 hrs. (6.2% after 24 hrs.)

### CONCLUSIONS

The Venturi Transystem manufactured by COPAN demonstrated, in comparison with the other swabs tested, the highest guarantee of survival of fastidious organisms, both for the percentage of recovery and for the time of survival.

TABLE (1)  
Percentage of Survival

	6 hours			24 hours			48 hours		
	COPAN	KIMA	EUROMED	COPAN	KIMA	EUROMED	COPAN	KIMA	EUROMED
<i>S. pneumoniae</i>	54.5	2.8	9.8	6.2	0.3	4.75	1.5	0	0
<i>H. influenzae</i>	33.5	18.5	20.7	16	0.35	0	12.5	0	0
<i>N. gonorrhoeae</i>	100	7	41	14.8	0.04	1.8	2.2	0	0
<i>F. nucleatum</i>	60.8	50	33	<0.1	0	0	0	0	0

FIGURE 1

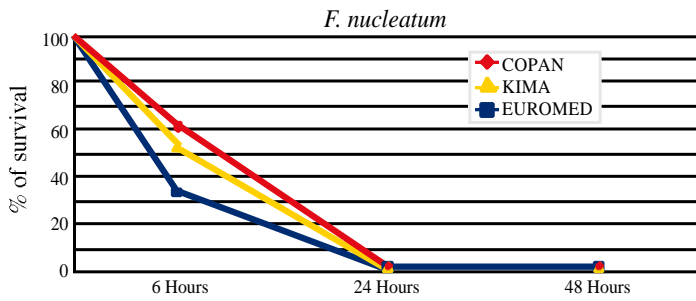


FIGURE 2

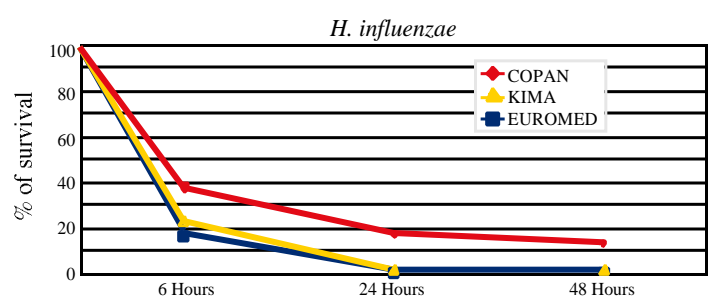


FIGURE 3

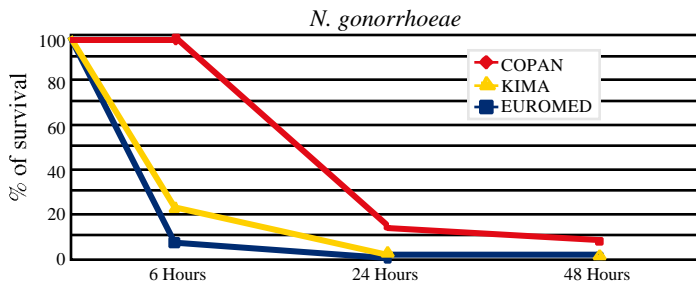


FIGURE 4

