

VALIDATION OF A NEW METHOD OF STERILITY TESTING FOR THE VITAMIN AND LIPID MIXTURES DESTINED FOR THE NEONATOLOGY DEPARTMENT

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INTRODUCTION :

Three vitamin and lipid mixtures are produced by the parenteral nutrition unit (UNP):

- MVL1 : 100% of VITALIPIDE®
- MVL2 : 50% of VITALIPIDE® and 50% of SMOFLIPID®
- MVL3 : 30% of VITALIPIDE® and 100% of SMOFLIPID®

Besides the controls performed on these preparations, a membrane filtration sterility test (STERITEST®) is carried out as required by the European pharmacopoeia (PE). Due to constraints associated with those tests alternative methods are available such as Bact/ALERT® 3D. It consists in direct inoculation of culture media followed by automatized microbial detection. This method doesn't respect all the criteria required by the PE but seems acceptable if validated.

The aim of this study is to compare both methods and to assess their respective efficiency

STUDY DESIGN :

All the manipulations of this study were done in a microbiological safety cabinet

- 1) Growth promotion test of the micro-organisms (MO) aerobes, anaerobes and fungi in media
- 2) Method suitability test: 5 colony-forming unit of the MO recommended by the PE were seeded on each bottle containing the MVL

Strain of the MO used : <i>BioBall MultiShot 30 UFC</i>	ATCC
<i>S.aureus</i>	6538
<i>B.subtilis</i>	6633
<i>P.aeruginosa</i>	9027
<i>C.sporogenes</i>	19404
<i>C.albicans</i>	10231
<i>A.brasiliensis</i>	16404

- 3) Comparison of the averages of the MO growth period for each method by a **t-test**:

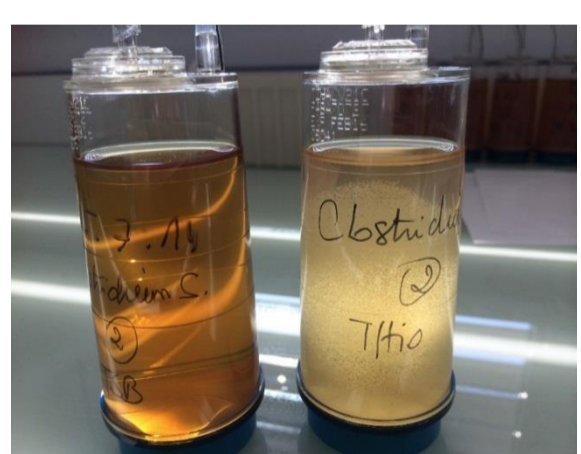
membrane filtration (STERITEST®)	Direct inoculation (Bact/ALERT®)
54 pairs of samples	54 pairs of samples
Media : TSB and THIO	Media : IFA+ and IFN+
14 days Incubation	14 days Incubation
Visual detection	Automatized detection



- 4) Identification of the MO in the bacteriology department by MALDI-TOF Mass Spectrometry

RESULTS :

- 1) MO growth is detected in all positive control which validates the growth promotion test of the MO
- 2) Method suitability test:



	Membrane Filtration (STERITEST)	Direct Inoculation (Bact/ALERT)
Pairs of samples +	91%	100%
Average MO growth period MVL 1	4.69 days	2.58 days
Average MO growth period MVL 2	7.64 days	2.29 days
Average MO growth period MVL 3	5.06 days	2.52 days



- 3) The average growth period with STERITEST (5,8 days) is longer than that with Bact/ALERT (2,5 days) ($p = 1.27 \text{ E-}18$)

- 4) All the MO identified by the bacteriology department match those seeded

DISCUSSION :

To validate a method of sterility testing, the PE requires that the seeded MO grow in less than 5 days. The results show us that the membrane filtration sterility test method is not suitable for our mixtures. Bact/ALERT® is more efficient for the detection of MO growth: increased sensibility and reproducibility, faster detection and identification of MO, less bias of reading.

CONCLUSION :

The UNP decides to replace STERITEST® method by Bact/ALERT® despite the fact that we were not meeting all the criteria of the PE. Bact/ALERT is an innovative technology that allows us to increase efficiency and quality of work.