

ORIGINAL PAPER  
ΕΡΕΥΝΗΤΙΚΗ ΕΡΓΑΣΙΑ

**Cost identification analysis  
of culture methods for trichomoniasis**

**OBJECTIVE** Presently, trichomoniasis is one of the most common curable sexually transmitted diseases worldwide. Culture is the standard diagnostic method for confirmation of trichomoniasis. However, there are several commonly used media, such as cysteine/peptone/liver-infusion maltose (CPLM), modified CPLM and BBL company. **METHOD** An evaluation was made of the costs of these tests in medical practice. **Cost identification analysis** was performed. **RESULTS** According to this study, it can be shown that the cost per accurate diagnosis for modified CPLM is the least expensive choice. **CONCLUSIONS** Modified CPLM is the best method for culture diagnosis of trichomoniasis, based on the principles of medical laboratory economics.

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Ανάλυση κόστους της καλλιέργειας  
ως μεθόδου διάγνωσης  
της τριχομονάδωσης

Περίληψη στο τέλος του άρθρου

**Key words**

Cost  
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Trichomoniasis is one of the most common curable sexually transmitted diseases (STDs) worldwide.<sup>1</sup> It is associated with potentially serious complications such as preterm birth and human immunodeficiency virus (HIV) acquisition and transmission.<sup>1</sup> *Trichomonas vaginalis* is the causative agent of trichomoniasis. *T. vaginalis* was originally considered a commensal organism until the 1950s when the understanding of its role as a sexually transmitted infection (STI) began to evolve.<sup>2</sup> *T. vaginalis* is site specific for the genitourinary tract and has been isolated from virtually all genitourinary structures.<sup>2</sup>

Asymptomatic disease is common in both men and women; thus screening for the disease is important.<sup>2</sup> Various sociodemographic factors have been correlated with the presence of *T. vaginalis*, and may be used to predict infection.<sup>2</sup> Presently, confirmation of the diagnosis of trichomoniasis is dependent mainly on culture of the organism. Culture of luminal protistan parasites has a long history.<sup>3</sup> Several culture media have been developed. At present there are some commonly used media, such as cysteine/peptone/liver-infusion maltose (CPLM), modified CPLM and BBL. In this study an evaluation was made of the relative cost of these tests in medical practice.

**MATERIAL AND METHOD**

Alternatives for culture of *T. vaginalis*

There are three common culture methods for confirmation of the diagnosis of trichomoniasis, namely cysteine/peptone/liver-infusion maltose (CPLM), modified CPLM and the BBL company commercial product.

Diagnostic property analysis

The three media were studied for their diagnostic property on 21 cases of trichomonas vaginitis diagnosed by microscopic examination of vaginal samples from patients with leukorrhea.

Cost analysis

The cost in US dollars for performing each test was reviewed. The cost used was set as the price of each test at the reference laboratory in Thailand (Division of Parasitology, King Chulalongkorn Memorial Hospital, Bangkok, Thailand).

Cost identification analysis

The cost for each alternative mode of diagnosis of trichomo-

niasis was calculated. Based on a recent validation study, it was assumed that the efficacy of the three studied tests is similar.<sup>4</sup> The cost identification analysis was then performed. The cost of each medium was calculated by summing up the cost of the ingredients. The costs of processing, workload and batch control of ingredients and medium were not included, since they are not part of the direct cost of the media and also they are similar for all the media.

## RESULTS

Regarding their diagnostic property, all three media provided positive results for all positive cases (sensitivity=100%). The costs of each alternative method of diagnosis of trichomoniasis are presented in table 1. The cost of CPLM is the highest and that of modified CPLM is the lowest.

## DISCUSSION

Trichomoniasis is perhaps the most common curable STD worldwide. It is associated with potentially serious complications such as preterm birth and the acquisition and transmission of HIV.<sup>7</sup> The immunology of a related organism, *T. foetus*, which causes disease in cattle, has been

investigated to some extent, but more work is needed for the human strain, *T. vaginalis*.<sup>5</sup> In addition, although trichomoniasis is easily treated with oral metronidazole, there is concern that the number of strains resistant to this antibiotic are increasing.<sup>1</sup>

For diagnosis, microscopy of a wet mount from a vaginal specimen is a routine screening test, while there are many confirmation tests. According to a recent study, the sensitivity of the various alternative methods were: polymerase chain reaction technique (PCR) 95%, enzyme-linked immunosorbent assay 82%, direct fluorescence antibody 85%, and culture 95%.<sup>5</sup> It can be shown that the sensitivity of the culture is similar to that of PCR, and therefore, it is accepted as a standard confirmation test for trichomoniasis.

In this study an economic analysis of the three common culture tests widely used for the diagnosis of trichomoniasis was performed, from which it can be shown that modified CPLM is the least expensive choice. Therefore, this alternative is the best method for culture diagnosis of trichomoniasis, based on the principles of medical laboratory economics.

**Table 1.** Cost and utility of each alternative method of diagnosis of trichomoniasis.

CPLM		Modified CPLM		BBL*	
Composition	Cost (US dollar)	Composition	Cost (US dollar)	Composition	Cost (US dollar)
Bacto peptone	3.75	Bacto peptone	3.75	BBL	18.59
Bacto agar	0.34	Bacto agar	0.34		
Cystein HCl	1.69	Cystein HCl	1.69		
Maltose	1.09	Maltose	1.09		
Liver infusion	5.00	Liver infusion	5.00		
NaCl	0.03	NaCl	0.03		
CaCl <sub>2</sub>	0.03	CaCl <sub>2</sub>	0.03		
NaHCO <sub>3</sub>	0.03	NaHCO <sub>3</sub>	0.03		
Horse serum	37.50	Amino acid (BME)	0.13		
Amphotericin B	0.69	Human serum	0**		
Penicillin G	0.38	Amphotericin B	0.69		
Streptomycin	0.16	Penicillin G	0.38		
		Streptomycin	0.16		
Total	50.69	Total	9.57	Total	18.59

\*Commercially available

\*\* This can be obtained by collection of left fresh refrigerated serum from routine analysis at any medical laboratory. This can be done without any additional cost since the separation of serum is the basic procedure in laboratory analysis in every routine medical laboratory. There is also no ethical problem since the used serum is the serum left from analysis

## ΠΕΡΙΛΗΨΗ

## Ανάλυση κόστους της καλλιέργειας ως μεθόδου διάγνωσης της τριχομονάδωσης

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**ΣΚΟΠΟΣ** Σήμερα, η τριχομονάδωση αποτελεί ένα από τα συχνότερα ιάσιμα σεξουαλικά μεταδιδόμενα νοσήματα παγκοσμίως. Η καλλιέργεια είναι συνήθης μέθοδος διάγνωσης. Εντούτοις, υπάρχουν αρκετά συχνά χρησιμοποιούμενα υλικά, όπως cysteine/peptone/liver-infusion maltose (CPLM), τροποποιημένη CPLM και BBL. **ΥΛΙΚΟ-ΜΕΘΟΔΟΣ** Γίνεται αξιολόγηση του κόστους των χρησιμοποιούμενων εξετάσεων στη συνήθη ιατρική πρακτική. **ΑΠΟΤΕΛΕΣΜΑΤΑ** Το χαμηλότερο κόστος για την ακριβή διάγνωση της τριχομονάδωσης αφορά στη χρησιμοποίηση της τροποποιημένης CPLM μεθόδου. **ΣΥΜΠΕΡΑΣΜΑΤΑ** Η συγκεκριμένη μέθοδος αποτελεί την καλύτερη μέθοδο καλλιέργειας για τη διάγνωση της τριχομονάδωσης με βάση τα οικονομικά δεδομένα του ιατρικού εργαστηρίου.

**Λέξεις ευρητηρίου:** Διάγνωση, Καλλιέργεια, Κόστος, Τριχομονάδωση

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