

## Viability of *Trichomonas vaginalis* in Transport Medium

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**The ability of Amies gel agar transport medium to maintain the viability of *Trichomonas vaginalis* was determined by comparing transported vaginal specimens to specimens immediately inoculated into culture medium. The prevalence of trichomonosis in the study population was 26% (68 of 260 women). The immediate inoculation method detected infections in 64 of 68 infected women (sensitivity of 94.1%). The transport method detected 62 of 68 infections (sensitivity of 91.2%). There was no significant difference between the two methods.**

*Trichomonas vaginalis* remains a common cause of vaginitis worldwide and in many segments of the U.S. population. Recently it was estimated that the annual incidence and prevalence of this infection in the United States were 5 million and 20 million cases respectively (2). Unlike the bacterial sexually transmitted diseases, there is no nationwide reporting system for trichomonosis, and case detection and treatment remain low priorities for public health programs despite the fact that vaginal trichomonosis has been associated with both preterm birth and human immunodeficiency virus acquisition (3, 8). Currently, trichomonosis is most frequently diagnosed by wet-preparation examination of vaginal fluid. However, this technique has a sensitivity of only about 60% compared to culture methods (7), and many physicians' offices either lack a microscope or fail to perform routine microscopy for the diagnosis and screening of vaginitis. Further, culture medium for *T. vaginalis* is also not always readily available to clinicians. Thus, the purpose of our study was to determine if a transport medium could maintain the viability of the organisms prior to inoculation into culture media.

Women attending the Jefferson County Department of Health Sexually Transmitted Disease Clinic (Birmingham, Ala.) for either a routine check-up or a new problem were eligible for inclusion in the study. The study was approved by the institutional review boards for the University of Alabama at Birmingham and the Jefferson County Department of Health.

During the routine pelvic examination, two extra swab specimens were collected from the vaginal vault. One of these was used to inoculate culture medium for *T. vaginalis* at the bedside (InPouch TV test; BioMed Diagnostics, Inc., San Jose, Calif.). This system contains specific medium for the cultivation of *T. vaginalis* in a clear plastic pouch which can be examined directly under a microscope (1). The second swab was part of an Amies gel transport system (Copan Diagnostics, Inc., Corona, Calif.) (6). Vaginal fluid wet preparations were collected and interpreted by the examining clinician as part of the routine examination of the patient. Vaginal symptoms, including discharge, pruritus, and odor were recorded. Transport swabs were held at room temperature for  $24 \pm 6$  h prior to inoculation of the specimen into a culture pouch. Pouches were incubated at 37°C and were examined daily (magnification,  $\times 100$ ) for up to 5 days for the presence of motile trichomonads. Trichomonosis was defined as the presence of motile tricho-

monads as determined by either wet-mount examination of the vaginal fluid or a positive culture by either collection technique.

Statistical comparisons were made by using the EpiInfo software program, version 6 (4). Fisher's exact test was used to compare categorical variables. Ninety-five percent confidence intervals were calculated to evaluate statistically significant differences between collection methods (5).

Two hundred and sixty women were enrolled in the study. The prevalence of trichomonosis was 26% (68 of 260 women). Comparisons between the diagnostic methods are shown in Table 1. The sensitivity of wet-preparation examination was 63%. There was excellent agreement between the culture pouches which were held in Amies gel transport medium prior to inoculation and those which were inoculated at the bedside. As shown in Table 1, there was no significant difference in sensitivity between the two methods (91.2 versus 94.1%). The mean number of days to positivity for culture pouches inoculated at bedside and for Amies gel transport medium were 1.59 and 1.76, respectively ( $P = 0.3$ ). The specimens from five patients were positive for trichomonads by the bedside inoculation method but negative for trichomonads by the transport method. Of these, two specimens were positive after 1 day of incubation, and one specimen each was positive at days 3, 4, and 5. The specimens from three patients were positive only by the transport method, all of which gave the positive result at day 4 of incubation. There was no significant difference between specimens with concordant and discordant results with respect to the mean number of hours that the swabs were held in the transport medium prior to inoculation (25.1 versus 25.8;  $P = 0.9$ ). One specimen was positive by wet-preparation examination only. There was no significant association between patient complaints of vaginal discharge, pruritus, or odor and the ability to detect trichomonads by any of the methods (data not shown). Sixty percent (26 of 43) of those women with a positive wet-preparation examination for *T. vaginalis* denied these symptoms.

Trichomonosis is an extremely prevalent curable infection which may cause distressing symptoms and has been associated with complications such as preterm birth and human immunodeficiency virus acquisition (3, 8, 10). However, screening for this frequently asymptomatic infection is rarely undertaken. The purpose of this study was to test the ability of a transport swab system to maintain viability of *T. vaginalis* for up to 24 h after collection. Clinicians are quite familiar with the concept of transport swabs and are likely to feel comfortable with this technique. This method would also overcome possible barriers to screening such as lack of or unwillingness to use a microscope. Further, although the wet-preparation examination is

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TABLE 1. Comparison of methods for diagnosing *T. vaginalis* infection<sup>a</sup>

Diagnostic method	No. of positive samples	No. of false-negative samples	Sensitivity (%)	95% CI <sup>b</sup>	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
Culture							
Bedside inoculation	64	4	94.1	84.9–98.1	100	100	98.0
Amies gel transport	62	6	91.2	81.1–96.4	100	100	97.0
Wet-preparation examination							
	43	25	63.2	50.6–74.4	100	100	88.5

<sup>a</sup> *n* = 260.<sup>b</sup> 95% CI, confidence interval for sensitivity.

the most common and inexpensive tool available for diagnosing trichomonosis, this technique is not sensitive enough to be useful for screening purposes. We have previously shown that the viability of trichomonads can be maintained for a short period (15 to 20 min) in vaginal secretions placed on a cotton swab prior to inoculation of culture medium (9). We chose the Amies gel transport system as our holding medium for this study because of its gel formulation and its ability to maintain fastidious organisms such as *Neisseria gonorrhoeae* (8a). Other transport systems might work equally well, but this will need to be studied in the future.

In summary, we have demonstrated the ability of a transport swab to maintain the viability of *T. vaginalis* in vaginal secretions for up to 24 h. Use of this transport system in conjunction with culture medium for *T. vaginalis* results in a diagnostic sensitivity of 91.2%. This technique may provide increased screening opportunities for this vaginal infection.

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## REFERENCES

- Borchardt, K. A., and R. F. Smith. 1991. An evaluation of an InPouch™ TV culture method for diagnosing *Trichomonas vaginalis* infection. *Genitourin. Med.* **67**:149–152.
- Cates, W., and The American Social Health Association Panel. 1999. Estimates of the incidence and prevalence of sexually transmitted diseases in the United States. *Sex. Transm. Dis.* **26**:52–57.
- Cotch, M. F., J. G. Pastorek, R. P. Nugent, S. L. Hillier, R. S. Gibbs, D. H. Martin, D. A. Eschenbach, R. Edelman, J. C. Carey, J. A. Reegan, M. A. Krohn, M. A. Klebanoff, A. V. Rao, and G. G. Rhoads. 1997. *Trichomonas vaginalis* associated with low birth weight and preterm delivery. *Sex. Transm. Dis.* **24**:361–362.
- Dean, A. G., J. A. Dean, and D. Columbeer. 1994. EpiInfo, version 6: a word processing database and statistics program for epidemiology on microcomputers. Centers for Disease Control and Prevention, Atlanta, Ga.
- Fleiss, J. L. 1981. *Statistical methods for rates and proportions*. John Wiley and Sons, Inc. New York, N.Y.
- Hudspeth, M. K., D. M. Citron, and E. J. Goldstein. 1997. Evaluation of a novel specimen transport system (Venture Transystem) for anaerobic bacteria. *Clin. Infect. Dis.* **25**(Suppl. 2):S132–S133.
- Krieger, J. N., M. R. Tam, C. E. Stevens, I. O. Nielsen, J. Hale, N. B. Kiviat, and K. K. Holmes. 1988. Diagnosis of trichomoniasis. *JAMA* **259**:1223–1227.
- Laga, M., A. Manoka, M. Kivuvu, B. Malele, M. Tuliza, N. Nzila, J. Goeman, F. Behets, V. Batter, and M. Alary. 1993. Non-ulcerative sexually transmitted diseases as risk factors for HIV-1 transmission in women: results from a cohort study. *AIDS* **7**:95–102.
- Olsen, C. C., J. R. Schwebke, W. H. Benjamin, Jr., A. Beverly, and K. B. Waites. 1999. Comparison of direct inoculation and Copan transport systems for isolation of *Neisseria gonorrhoeae* from endocervical specimens. *J. Clin. Microbiol.* **37**:3583–3585.
- Schwebke, J. R., M. F. Venglarik, and S. C. Morgan. Delayed versus immediate bedside inoculation of culture media for diagnosis of vaginal trichomonosis. *J. Clin. Microbiol.* **37**:2369–2370.
- Wolner-Hanssen, P., J. N. Krieger, C. E. Stevens, N. B. Kiviat, L. Koutsky, C. Critchlow, T. DeRouen, S. Hillier, and K. K. Holmes. 1989. Clinical manifestations of vaginal trichomoniasis. *JAMA* **261**:571–576.