

|  |   |       |           |
|--|---|-------|-----------|
| 標 題  | 陰道滴蟲( <i>Trichomonas vaginalis</i> )的檢驗方法 |       |           |
| 姓 名  | 蔡雅雯                                       | 審 閱 者 | (申請人不用填寫) |
| <p>內容：</p> <p>陰道滴蟲 (<i>Trichomonas vaginalis</i>)為原蟲寄生蟲 (protozoan parasite)，所導致的陰道滴蟲炎 (trichomoniasis)為常見之非病毒感染經由性行為傳染疾病 [1]，據研究，滴蟲感染陰道炎 (trichomonas vaginitis)約佔常見陰道不適症的 15-20%，僅次於比例約 40-50%的細菌性陰道炎 (bacterial vaginosis)及佔 20-25%的念珠菌陰道炎 (vulvovaginal candidiasis)，表一詳列陰道炎常見的原因與症狀[2]。陰道滴蟲透過附著於宿主泌尿生殖道上皮細胞，輕約有 25%女性感染者可能從未有任何症狀，嚴重者會產生陰道異味分泌物增多、會陰部搔癢、下腹部疼痛等泌尿道不適外，亦有可能造成子宮頸糜爛及早產、不孕等其他症狀；此外，男性則可能會導致尿道炎、良性前列腺增生及前列腺癌 [3, 4]。目前沒有國家將此列為須通報之法定傳染病，再加上有些患者為無症狀感染，醫療人員及患者易輕忽陰道滴蟲的感染，但無庸置疑的是陰道炎長期來為世界各地婦科最常見之就診原因，所以正確的鑑別診斷需仰賴實驗室採用合適的方法。</p> <p>目前常用於診斷陰道滴蟲感染的方法為濕片包埋法 (wet-mount)、快速抗原測定法、及培養法，但上述方法和分子診斷法相較下，靈敏度差，且患者本身有無症狀產生也會影響濕片包埋法和快速抗原測定法的表現 [5]。</p> <p>以下簡述各方法概要，參考表二 [4]：</p> <p>一、 鏡檢法</p> <p>1. 濕片包埋法 (wet-mount)</p> <p>為觀察陰道滴蟲炎最傳統簡便的方法，將陰道分泌物混合少量生理食鹽水置於玻片上，立即於光學顯微鏡下觀察具運動性的滴蟲 [4, 5]。檢體採集後若無法立即鏡檢，將大幅降低此法靈敏度；此外，不佳的儲存和運送條件，例如：溫度低於 22°C 會降低陰道滴蟲鏡檢時活動力。</p> |   |       |           |

## 2. 子宮頸抹片檢查 (Pap Smear)

### a. 傳統抹片檢查(Conventional Pap Smear)

婦女於檢查子宮頸是否有異常增生細胞之抹片篩檢時偶發現(incidental finding)，根據一項綜合文獻分析(Meta-analysis) 以培養法(Culture)做為標準法指出，傳統抹片檢查低靈敏度(57%)，非診斷陰道滴蟲有效的方法 [6]。

### b. 液態基質薄層抹片檢查 Liquid-based Pap Smear)

細胞收集在液態固定液中，將細胞與血液、黏液等干擾物質分開，接著以反轉過濾 (reverse filtration) 或沉降 (liquid density grading) 方式，製作薄層細胞抹片 (monolayer smear)。傳統抹片檢查會有血球、黏液、細菌混雜，及多層細胞重疊的現象，品質不良抹片多等缺點，判讀易受干擾。研究已證實，與傳統抹片法相較下，此法的固定效果佳，能增加所有感染病原菌的檢出率 [6]。

## 二、 培養法 (Culture)

### a. Diamond's modified medium

此培養基存放於 4°C，使用前需回溫，檢體採集後須於 1 小時內於厭氧環境下接種，培養於 37 °C，連續觀察五天，是否有運動性出現，女性之陽性檢體通常於接種後 1-3 天即可診斷出，但男性檢體需 5 天或更長的時間才能讓蟲體長到最低可偵測量。

### b. InPouch™ TV culture system (Biomed Diagnostics, USA)。

為選擇性培養套組，存放於室溫(18-25°C)，其藉由抑制黴菌、酵母菌和其他細菌生長，增加診斷特異性，可於採檢後 48 小時內室溫接種，此套組內含耐養(oxygen-resistant)培養液，外觀為袋裝可直接用於顯微鏡檢運動性，通常於接種後 1 天可知結果 [7, 8]。

### 三、 快速診斷法 (Rapid Diagnostic Tests)

快速診斷法主要為偵測陰道滴蟲抗原，例如: OSOM® Trichomonas Rapid Test (Sekisui Diagnostics, USA)及 Tv latex agglutination test (Kalon Biological, UK)，或蟲體核酸，有 Affirm VPIII (Becton Dickinson, USA)，優點為無須嚴格的控制檢體處理和運送條件來保存蟲體活性和運動性，可延長採檢後到需檢驗的放置時間和更彈性的溫度。目前已研發不少快速診斷法，部分通過美國 FDA 核准上市，各廠牌套組靈敏度從 40%-95%，專一性為 92%-100% [4]。

### 四、 核酸放大法 (Nucleic Acid Amplification Tests)

如同其他已知的性行為傳染性疾病診斷法相同，運用 PCR 和 Transcription-mediated amplification(TMA)等分生技術診斷出感染，靈敏度達 76%-100%。已有實驗室自行設計陰道滴蟲之核酸放大檢驗法，商品化且通過美國和歐盟審查的套組有 TMA-based APTIMA T vaginalis assay (Hologic Gen-Probe Inc, USA) [4]。

目前發展出之陰道滴蟲診斷法多適用於女性，調查發現若女性感染，男性伴侶感染率為 14%-60%，因此選擇合適的診斷方法以利後續治療是避免反覆感染之最佳治癒策略；再者，不同層級的實驗室若受限設備與技術無提供分子診斷法，可綜合多種檢測法建立出一套檢驗流程以提高感染之檢出率。

表一 陰道炎 (Vaginitis)類別、病因及症狀 [2]

| Type                                    | Etiology   | Clinical symptoms   |  |                                      |
|---|--|---|--|--------------------------------------|
|   |  | Discharge   | Pain   | Pruritus                             |
| Bacterial vaginosis                     | <i>Gardnerella vaginalis</i> ,<br><i>Mycoplasma hominis</i><br>Anaerobic bacteria: <i>Prevotella</i><br>species, <i>Mobiluncus</i> species | Malodorous; homogenous;<br>clear, white, or gray; fishy<br>odor | Not primary symptom  | Not primary<br>symptom               |
| Trichomoniasis                          | <i>Trichomonas vaginalis</i>   | Green-yellow, frothy  | Pain with sexual intercourse,<br>vaginal soreness, dysuria | Not primary<br>symptom               |
| Vulvovaginal candidiasis                | <i>Candida albicans</i> , <i>Candida<br/>krusei</i> , <i>Candida glabrata</i>  | White, thick, lack of odor                                      | Burning, dysuria,<br>dyspareunia                           | Frequent                             |
| Atrophic vaginitis                      | Estrogen deficiency  | Yellow, greenish, lack of<br>odor                               | Vaginal dryness, pain with<br>sexual intercourse           | Rare                                 |
| Erosive lichen planus                   | Etiology is unknown  | Yellow or gray  | Intense pain, dyspareunia,<br>postcoital bleeding          | Intense                              |
| Irritant or allergic contact dermatitis | Contact irritation or allergic<br>reaction with episodic flares  | Minimal   | Burning on acute contact,<br>soreness                      | More likely in<br>allergic reactions |

表二 陰道滴蟲診斷各方法比較 [4]

| Category          | Test   | Sensitivity range* (%) | Specificity range* (%) | Advantages  | Limitations  |
|-------------------|--|------------------------|------------------------|---|--|
| Direct microscopy | Wet mount                                      | 44–68                  | 100                    | Same day results, inexpensive   | Low sensitivity, requires trained microscopist, not for use in men   |
|                   | Conventional Pap                               | 44–79                  | 83–99                  | Convenient for women undergoing cervical cancer screening   | Low sensitivity and specificity, requires confirmatory testing, requires trained microscopist, several days for results, not for use in men        |
|                   | Liquid Pap                                     | 60–96                  | 98–100                 | Improved sensitivity and specificity versus conventional Pap  | Requires trained microscopist, several days for results, not for use in men  |
| Culture           | Diamond's modified medium or InPouch           | 44–75                  | 100                    | Improved sensitivity versus microscopy, antimicrobial susceptibility testing possible   | Requires trained microscopist, incubator and controlled temperature transport, up to a week for results  |
|                   | OSOM rapid antigen test                        | 77–98                  | 99–100                 | Same day results, minimal training required, no equipment needed, specimen transport delays tolerated   | Not for use in asymptomatic women or in men  |
| NAATs             | Kalon TV agglutination                         | 55–99                  | 92–100                 | Same day results, minimal training required, no equipment needed, specimen transport delays tolerated   | Not for use in asymptomatic women or in men  |
|                   | Affirm VP III nucleic acid probe hybridisation | 64                     | 100                    | Same day results possible, <i>Gardnerella</i> and yeast detection included, specimen transport delays tolerated   | Moderate complexity, some training and equipment required, not for use in asymptomatic women or in men   |
|                   | APTIMA TV                                      | 88–100                 | 98–100                 | Highly sensitive and specific, specimens compatible with testing for other STIs, specimen transport delays tolerated, performs well with specimens from men | Expensive, requires laboratory equipment and highly trained personnel, several days for results, persistent positives following treatment possible |
|                   | Inhouse PCR                                    | 76–100                 | 96–100                 | Highly sensitive and specific, specimens compatible with testing for other STIs, specimen transport delays tolerated, performs well with specimens from men | Expensive, requires laboratory equipment and highly trained personnel, several days for results, persistent positives following treatment possible |

\*Wide ranges for sensitivity and specificity result from the use of different reference standards in published studies.  
NAAT, nucleic acid amplification test; Pap, Papanicolaou; STI, sexually transmitted infection; TV, *Trichomonas vaginalis*.

## REFERENCE

1. Lustig, G., et al., *Trichomonas vaginalis* contact-dependent cytolysis of epithelial cells. *Infect Immun*, 2013. **81**(5): p. 1411-9.
2. Hainer, B.L. and M.V. Gibson, *Vaginitis*. *Am Fam Physician*, 2011. **83**(7): p. 807-15.
3. Sobel, J.D., *Vaginitis*. *N Engl J Med*, 1997. **337**(26): p. 1896-903.
4. Hobbs, M.M. and A.C. Sena, *Modern diagnosis of Trichomonas vaginalis infection*. *Sex Transm Infect*, 2013. **89**(6): p. 434-8.
5. Andrea, S.B. and K.C. Chapin, *Comparison of Aptima Trichomonas vaginalis transcription-mediated amplification assay and BD affirm VPIII for detection of T. vaginalis in symptomatic women: performance parameters and epidemiological implications*. *J Clin Microbiol*, 2011. **49**(3): p. 866-9.
6. Aslan, D.L., et al., *The diagnosis of trichomonas vaginalis in liquid-based Pap tests: morphological characteristics*. *Diagn Cytopathol*, 2005. **32**(5): p. 253-9.
7. Levi, M.H., et al., *Comparison of the InPouch TV culture system and Diamond's modified medium for detection of Trichomonas vaginalis*. *J Clin Microbiol*, 1997. **35**(12): p. 3308-10.
8. BioMed Diagnostics, I. *InPouch™ TV (Trichomonas vaginalis)*. 2012 2012; Available from: <http://www.biomeddiagnostics.com/ivd-inpouch-tv/>.