

EP-126

만성 창상에서 MolecuLight 형광영상신호를 이용한 *Pseudomonas aeruginosa* 검출: 창상 배양검사와의 비교

(Cyan Fluorescence on MolecuLight Imaging for Detecting *Pseudomonas aeruginosa* in Chronic Wounds: Comparison with Wound-bed Culture)



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Purpose: *Pseudomonas aeruginosa* (PA) is associated with delayed healing and infection progression in complex wounds, yet bedside localization of bacterial burden remains challenging. MolecuLight fluorescence imaging provides real-time visualization of bacteria-associated fluorescence, and cyan signals have been linked to *Pseudomonas* spp (Figure 1). We evaluated the clinical correlation and agreement between cyan fluorescence on MolecuLight imaging and wound-bed culture for PA.

Methods: We analyzed 19 patients who underwent MolecuLight fluorescence imaging and wound-bed culture at a single institution between February 2025 and January 2026. Cyan fluorescence was classified as positive (“clearly observed”) or negative (“not clearly observed”). Culture identification of PA served as the reference standard. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), accuracy, and Cohen’s kappa (κ) were calculated. Representative wound-bed and cyan fluorescence images are provided (Figure 2)

Results: PA was isolated in 9/19 patients (47.4%). Cyan fluorescence was positive in 14/19 (73.7%); among these, 7 were culture-positive for PA. Cyan fluorescence was negative in 5/19 (26.3%), including 2 culture-positive cases. Diagnostic performance of cyan fluorescence for culture-confirmed PA was sensitivity 77.8% (7/9), specificity 30.0% (3/10), PPV 50.0% (7/14), NPV 60.0% (3/5), and accuracy 52.6% (10/19). Agreement between cyan fluorescence and culture was low ($\kappa \approx 0.08$) (Table 1).

Conclusion: In this small cohort, cyan fluorescence demonstrated relatively high sensitivity but low specificity and low agreement with wound-bed culture for PA. Cyan fluorescence may support targeted sampling and bedside decision-making (cleansing/debridement planning), but it should not replace culture, and negative cyan findings should not be used to rule out PA.



Figure 1. MolecuLight fluorescence imaging device. Representative photograph of the MolecuLight system used for point-of-care fluorescence imaging to visualize bacteria-associated signals in wounds.



Figure 2. Representative wound-bed photograph and corresponding MolecuLight fluorescence imaging. (A) White-light wound-bed photograph at the time of culture sampling. (B) Corresponding MolecuLight fluorescence image demonstrating cyan fluorescence signal within the wound field, suggesting possible *Pseudomonas* spp.-associated fluorescence.

	Culture PA (+)	Culture PA (-)	Total
Cyan fluorescence (+)	7	7	14
Cyan fluorescence (-)	2	3	5
Total	9	10	19

Table 1. Correlation between cyan fluorescence and wound-bed culture for *Pseudomonas aeruginosa* (n=19)