



Background

Accurate pathogen identification is crucial for managing post-surgical infections in neurosurgical patients. While **FilmArray® BCID2 panel** is validated for bloodstream infections, its performance in **non-blood samples**, such as cerebrospinal fluid (CSF) and abscesses, is not yet fully understood.

This study evaluates its off-label use in these samples, comparing its performance to conventional cultures to assess strengths and limitations.

Methods



- **Design:** Single-center, observational, retrospective study.
- **Setting:** Hospital Universitari Mútua Terrassa, an acute-care-hospital with Neurosurgery Department.
- **Period:** October 2022–January 2024.
- **Cases:** Adult patients with **suspected post-surgical CNS infections** who underwent diagnostic sampling (abscess, CSF, or skull-bone biopsy).
- Samples were analyzed using FilmArray®BCID2 panel, being **compared with conventional cultures** to evaluate the panel's diagnostic performance.

Results

47 patients (16 women, 31 men; mean age: 59 years) with suspected infection and 73 samples (63 CSF, 9 brain abscesses, 1 skull-bone biopsy) were analyzed.

FilmArray was positive in only 14%(10/73) of the analyzed samples, while 24 microorganisms were isolated by culture in 31.5%(23/73) including 16 CSF, 6 abscesses, and 1 skull-bone biopsy*.

Regarding sample types, the panel demonstrated the **highest positivity rate in abscess samples(44.4%, 4/9)**, significantly higher than the rate observed in CSF(7.9%, 5/63; $p = 0.031$).

| Positive FilmArray® Sepsis Panel (BCID2) Results in Neurosurgical Samples | Microorganisms detected By using Filmarray | Conventional culture (Direct plates) | Sample Type | ≥10 White blood cells per high-power field (HPF) in CSF (cerebrospinal fluid) |
|---|--|--------------------------------------|--|---|
| Positive Filmarray/Positive Culture | | | | |
| <i>Pseudomonas aeruginosa</i> | 1 | 1 | CSF | 1/1 |
| <i>Escherichia coli</i> | 1 | 1 | Abscess | - |
| <i>Staphylococcus aureus</i> | 2 | 2 | Abscess x2 | - |
| <i>Staphylococcus epidermidis</i> | 5* | 5 | Skull bone biopsy, CSF x4 | 4/4 |
| Positive Filmarray/Negative Culture | | | | |
| <i>Haemophilus influenzae</i> | 1 | 0 | Abscess | - |
| Total | 10 | 9 | CSF x5 Abscess x4 Skull bone biopsy* | 5/5 |

*FilmArray detected one strain of *S.epidermidis* in two simultaneous samples from a single patient.

*One of the *Cutibacterium acnes* grew in a mixed culture alongside an *S.epidermidis*, which was detected by FilmArray.

Table 1. Etiology of Microorganisms Detected in Neurosurgical Samples Processed Using the **FilmArray®** Sepsis Panel (BCID2): Comparison with Conventional Culture Methods.

Of the 24 culture-positive results, **62.5%(15/24)** were missed by **FilmArray®**. **Table 1** summarizes the FilmArray® results and their correlation with culture findings, while **Table 2** highlights culture-positive cases **not detected by FilmArray®**, distinguishing between microorganisms with target in the panel and those without. Additionally, some cultures were classified as contaminants by clinicians.

| Conventional Culture Isolates Negatives by FilmArray® Sepsis Panel (BCID2) in Neurosurgical Samples | Microorganisms Isolated By Conventional Culture | Direct Plates Isolates | Thioglycolate Broth Isolates | Sample Type | ≥10 White blood cells per high-power field (HPF) in CSF (cerebrospinal fluid) |
|---|---|------------------------|------------------------------|--|---|
| Negative FilmArray/Positive Culture With Target on Panel | | | | | |
| <i>Escherichia coli</i> | 2 | 0 | 2 | CSF x2 | 1/2 |
| <i>Staphylococcus epidermidis</i> | 4 | 1 | 3 | CSF x4 | 4/4 |
| <i>Staphylococcus capitis</i> (Contaminant) | 1 | 0 | 1 | CSF | 1/1 |
| <i>Staphylococcus hominis</i> (Contaminant) | 1 | 1 | 0 | Brain abscess | - |
| <i>Staphylococcus saccharolyticus</i> (Contaminant) | 1 | 1 | 0 | CSF | 1/1 |
| <i>Staphylococcus auricularis</i> (Contaminant) | 1 | 0 | 1 | CSF | 1/1 |
| Negative FilmArray/Positive Culture Without Target on Panel | | | | | |
| <i>Cutibacterium acnes</i> | 5* | 2 | 2 | Brain abscess x2 CSF x2 1 Bone biopsy* | 1/2 |
| Total | 14 | 5 | 9 | CSF x10 Brain abscess x3 | 9/11 |

**C.acnés* grew in two different samples from a single patient

*One of the *Cutibacterium acnes* grew in a mixed culture alongside an *S.epidermidis*, which was detected by FilmArray.

Table 2. Conventional Culture Isolates with a Negative Result by using Filmarray Sepsis Panel (BCID2) in Neurosurgical Samples.

Among the 13 culture-positive CSF samples with clinical significance, 84.6% (11/13) had leukocyte counts above 10 per field. Of these, FilmArray® was positive in 45.4% (5/11). The FilmArray® was negative in all samples (100%) with leukocyte counts below 10 per field.

Conclusions

FilmArray®BCID2 panel showed **limited sensitivity in non-blood neurosurgical samples**, particularly CSF with **low leukocyte counts**. While it performed better with abscess samples, it missed several clinically relevant pathogens. These results highlight the need for combining molecular and conventional cultures for more accurate infection-diagnosis.