

Tables

| Parameter section A | Bacterial Meningitis (n=33) | Viral Meningitis (n=19) | p (univariate) | p (multivariate) |
|--------------------------------------|--|--|---------------------------------|-----------------------------------|
| sCRP [mg/dl] | 172.8±120.2 161.0 (0.2-481.0) | 5.5±9.9 2.7 (0.2-42.5) | < 0.01 | 0.07 |
| Body temperature [°C] | 38.4 38.5 (36.1-40.6) | 37.7±1.4 37.2 (36.3-41.0) | 0.04 | 0.20 |
| Blood Leukocytes [μl] | 17690±82 15700 (3700-42300) | 9210±2255 8900 (5100-14300) | < 0.01 | < 0.01 |
| CSF Leukocytes [μl] | 3405±4794 980 (105-16210) | 173±212 97 (12-670) | < 0.01 | < 0.01 |
| CSF Protein [mg/l] | 4912±3861 3514 (870-18040) | 820±509 628 (399-2480) | < 0.01 | < 0.01 |
| Q _{Albumin} × 1E-3 | 90.7±80.4 59.3 (10.6-320.0) | 11.9±7.5 9.1 (5.3-37.2) | < 0.01 | < 0.01 |
| CSF Lactate [mmol/l] | 12.1±7.4 10.5 (2.4-42.3) | 2.2±0.6 2.1 (1.3-3.6) | < 0.01 | 0.16 |
| CSF Tau [pg/ml] | 244.0±528.1 60.0 (60.0-2791.0) | 110.0±73.9 76.0 (16.7-290.0) | 0.64 | - |
| CSF S100B [ng/ml] | 14.0±31.4 5.2 (0.1-178.4) | 1.6±0.6 1.6 (0.6-3.1) | < 0.01 | 0.03 |
| Parameter section B | Bacterial Meningitis (Borrelia and Tb incl.) (n=48) | Viral Meningitis (n=19) | p (univariate) | p (multivariate) |
| CSF Leukocytes [μl] | 2439±4220 | 173±212 | < 0.01 | < 0.01 |

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|--------------------------------|---|---|----------------------------------|------------------------------------|
| | 602 (1-16210) | 97 (12-670) | | |
| CSF Protein [mg/l] | 3756±3649 2375 (502-18040) | 820±509 628 (399-2480) | < 0.01 | < 0.01 |
| QAlbumin x 1-E3 | 66.2±74.4 66.2 (6.7-320.0) | 11.9±7.5 9.1 (5.3-37.2) | < 0.01 | < 0.01 |
| CSF Lactate [mmol/l] | 9.1±7.7 8.0 (1.3-42.3) | 2.2±0.6 2.1 (1.3-3.6) | < 0.01 | 0.04 |
| CSF Tau [pg/ml] | 229.3±462.6 88.0 (60.0-2791.0) | 110.0±73.9 76.0 (16.7-290.0) | 0.33 | - |
| CSF S100B [ng/ml] | 10.4±26.5 4.1 (0.1-178.4) | 1.6±0.6 1.6 (0.6-3.1) | < 0.01 | 0.03 |
| Parameter section C | <i>Bacterial Meningitis (Borrelia and Tb incl.), all with CSF Leukocyte counts < 1000/μl (n=31)</i> | <i>Viral Meningitis (n=19)</i> | <i>p (univariate)</i> | <i>p (multivariate)</i> |
| CSF Leukocytes [/μl] | 362±301 332 (1-1000) | 173±212 97 (12-670) | < 0.05 | 0.07 |
| CSF Protein [mg/l] | 2890±2850 1510 (502-10430) | 820±509 628 (399-2480) | < 0.01 | 0.07 |
| QAlbumin x 1E-3 | 54.3±72.6 31.1 (6.7-320.0) | 11.9±7.5 9.1 (5.3-37.2) | < 0.01 | 0.05 |
| CSF Lactate [mmol/l] | 7.8±8.4 85.0 (1.3-42.3) | 2.2±0.6 2.1 (1.3-3.6) | < 0.01 | 0.11 |
| CSF Tau [pg/ml] | 194.3±277.2 98.0 (60.0-1395.0) | 110.0±73.9 76.0 (16.7-290.0) | 0.24 | - |

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|-------------------|------------------------------|--------------------------|--------|------|
| CSF S100B [ng/ml] | 10.4±26.5 4.1 (0.1-178.4) | 1.6±0.6 1.6 (0.6-3.1) | < 0.01 | 0.14 |
|-------------------|------------------------------|--------------------------|--------|------|

Table 1 Comparison of laboratory parameters between patients with either confirmed bacterial or viral meningitis (section A). Descriptive values are given either as mean ± standard deviation or median (minimum-maximum). The multivariate p-value indicates a group difference independent from the age factor. Section B provides the same parameters as section A but includes Neuroborreliosis and *M. tuberculosis* meningitis patients. Section C contains the data for all groups of patients with bacterial meningitis displaying CSF leukocyte counts <1000/μl in comparison to the viral meningitis group.

| Parameter section A | Optimal Cut-off | Sensitivity 95%-CI | Specificity 95%-CI | AUC 95%-CI |
|---|------------------------|-------------------------------------|-------------------------------------|-----------------------------|
| Blood Leukocytes [/μl] | 10600 | 85% [68%, 95%] | 84% [60%, 97%] | 0.85 [78%, 97%] |
| CSF Leukocytes [/μl] | 285 | 88% [72%, 97%] | 84% [60%, 97%] | 0.92 [85%, 100%] |
| CSF Protein [mg/l] | 1047 | 97% [84%, 100%] | 84% [60%, 97%] | 0.96 [0.91, 1.00] |
| Q _{Albumin} × 1E-3 | 20.2 | 88% [72%, 97%] | 95% [74%, 100%] | 0.89 [0.80, 0.94] |
| CSF S100B [ng/ml] | 3.1 | 76% [56%, 89%] | 100% [82%, 100%] | 0.90 [0.82, 0.99] |
| Patients with BM, neuroborreliosis or neurotuberculosis vs. VM | Optimal Cut-off | Sensitivity 95%-CI | Specificity 95%-CI | AUC 95%-CI |

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|--|------------------------|-------------------------------------|-------------------------------------|-----------------------------|
| patients | | | | |
| section B | | | | |
| CSF Leukocytes [μ l] | 285 | 71% [56%, 83%] | 84% [60%, 97%] | 0.79 [0.68, 0.90] |
| CSF Protein [mg/l] | 1047 | 79% [65%, 90%] | 84% [60%, 97%] | 0.88 [0.79, 0.96] |
| QAlbumin x 1E3 | 20.2 | 69% [54%, 81%] | 95% [74%, 100%] | 0.86 [0.77, 0.94] |
| CSF Lactate [mmol/l] | 2.7 | 75% [60%, 86%] | 89% [67%, 99%] | 0.83 [0.73, 0.93] |
| CSF S100B [ng/ml] | 2 | 77% [62%, 88%] | 84% [60%, 97%] | 0.82 [0.72, 0.92] |
| Patients with BM (Borrelia and Tb included with CSF leukocytes <1000/μl | Optimal Cut-off | Sensitivity 95%-CI | Specificity 95%-CI | AUC 95%-CI |
| section C | | | | |
| CSF Leukocytes [μ l] | 285 | 55% [36%, 73%] | 84% [60%, 97%] | 0.67 [0.52, 0.83] |
| CSF Protein [mg/l] | 1047 | 71% [52%, 86%] | 84% [60%, 97%] | 0.83 [0.71, 0.94] |
| QAlbumin x 1E-3 | 20.2 | 58% [39%, 75%] | 95% [74%, 100%] | 0.80 [0.68, 0.93] |
| CSF Lactate [mmol/l] | 2.7 | 68% [49%, 83%] | 89% [67%, 99%] | 0.74 [0.60, 0.89] |
| CSF S100B [ng/ml] | 2 | 71% [52%, 86%] | 84% [60%, 97%] | 0.80 [0.64, 0.90] |

Table 2 Classification characteristics for promising parameters to distinguish between bacterial and viral meningitis. Optimal cut-offs, sensitivity and specificity are determined according the Youden criterion. Section A: Bacterial meningitis without *Borrelia* infection and without neurotuberculosis vs. viral meningitis. Section B: Bacterial meningitis with *Borrelia* infection and with neurotuberculosis vs. viral meningitis. Section C: Bacterial meningitis with *Borrelia* infection and with neurotuberculosis with CSF leukocyte counts below 1000/ μ l vs. viral meningitis.