

# Cerebrospinal fluid microscopy in viral meningitis and encephalitis- can the cell count be used to guide acute management?

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## Background

Cerebrospinal fluid (CSF) microscopy results are often used by acute physicians to guide early management of suspected meningo-encephalitis before polymerase chain reaction (PCR) results are available. In a cohort of 23 patients in Thailand, 26.1% of patients with confirmed HSV encephalitis had a CSF white cell count (WCC) <5, indicating that it is a poor marker of PCR HSV positivity<sup>1</sup>.

Here, we describe low CSF WCC results in a cohort of patients with PCR-confirmed viral meningitis or encephalitis.

## Methods

CSF samples that were PCR-positive for either varicella zoster virus (VZV), herpes simplex virus (HSV) 1 or 2 DNA from a laboratory in East London between 2011 and 2016 were included in the study. Data on CSF microscopy and clinical presentation were retrospectively collected from the clinical records.

## Results

Of a total of 69 positive samples, 11 were excluded as they had no clinical history of meningo-encephalitis, 6 cases had unavailable CSF WCC data. Of those remaining, 26.9% (14/52) had a CSF WCC less than or equal to 5 cells/mm<sup>3</sup>; 8 of which had a WCC of less than 1. 21.4% (3/14) were immunocompromised.

Table 1. Results Summary

	VZV		HSV1		HSV2	
Positive samples	32		16		21	
Diagnosis of Meningitis 'M' or Encephalitis 'E'	M	E	M	E	M	E
Patients with clinical meningo-encephalitis	19	9	1	12	16	1
CSF WCC available	18	7	1	10	15	1
Immunocompromised	3	3	0	2	2	1
Total WCC <1 (cells/mm <sup>3</sup> )	1	1	1	4	1	0
No. aged < 18	0	0	1	3	0	0
No. Immunocompromised	0	1	0	1	0	0
Total WCC 1-5 (cells/mm <sup>3</sup> )	2	2	0	1	1	0
No. aged < 18	0	0	0	0	1	0
No. immunocompromised	0	1	0	0	0	0
% 'normal' CSF white cell count	16.7% (3/18)	42.9% (3/7)	100% (1/1)	50% (5/10)	13.3% (2/15)	NAD
% total 'normal' CSF white cell count	24.0% (6/25)		54.5% (6/11)		12.5% (2/16)	
Median age of patients with low CSF WCC (years)	38		0.62		19.35	

When analysed by virus, 24.0% (6/25) of VZV patients had a WCC of 5 or less; 1 patient had liver disease and 1 patient had HIV infection (CD4 = 4). For HSV1, 54.5% (6/11) of patients had a normal WCC ( $\leq 5$  cells/mm<sup>3</sup>); 4 of these patients were less than 1 year in age; 1 elderly patient had a history of metastatic malignancy. Within the HSV2 cohort, 12.5% (2/16) had a normal CSF WCC. Patients with encephalitis were more likely to have a normal WCC; 42.9% (3/7) in VZV and 50% in HSV1 (5/10).

## Conclusion

Our study emphasizes that early microscopy results should not be relied upon to guide management in cases of suspected meningo-encephalitis and viral PCR should be considered in all cases. Low CSF WCC counts were more frequently identified in patients with HSV1, particularly those under the age of 1 year, where clinical signs and symptoms are likely to be less apparent than in adults. Normocellular CSF was identified in non-immunocompromised patients.