

Cerebrospinal Fluid Composition of Infants with Ischemic Stroke



Duke Clinical Research Institute

FROM THOUGHT LEADERSHIP
TO CLINICAL PRACTICE

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BACKGROUND

- Neonatal ischemic stroke occurs in 1:1600-1:2300 live births and carries risk of lifelong morbidity with few acute treatment options
- In infants with neurological symptoms, stroke and bacterial meningitis are possible
- There is minimal research describing the cerebrospinal fluid (CSF) of infants with stroke
- In particular, whether their CSF parameters differ from bacterial meningitis is unknown

OBJECTIVE

Characterize the **CSF parameters** of infants with stroke and compare them to those without stroke and/or bacterial meningitis.

METHODS

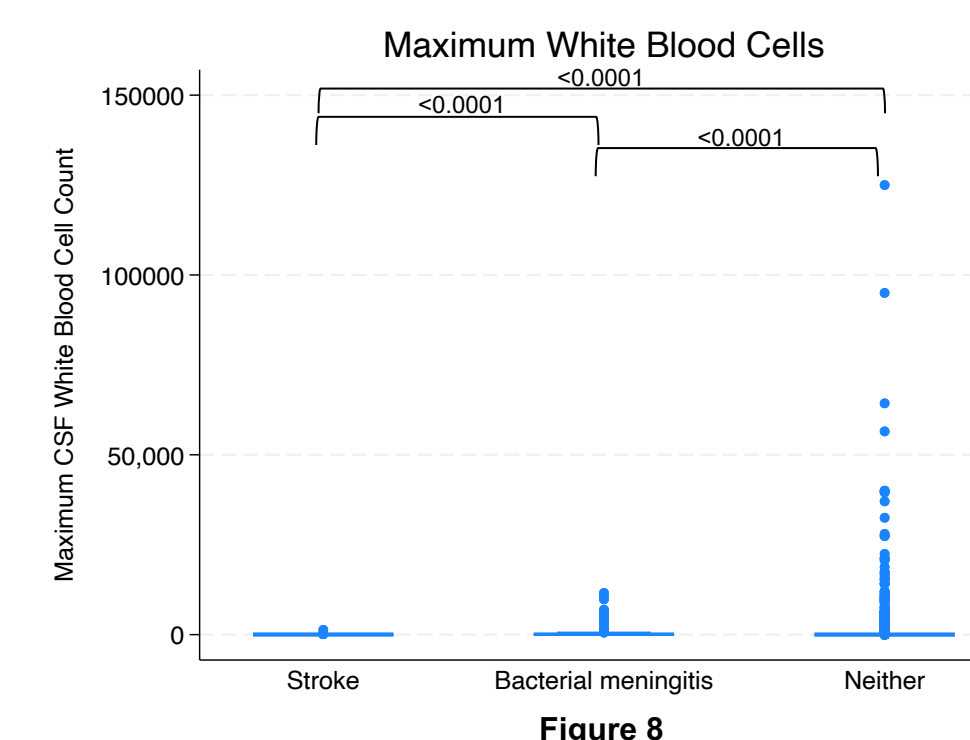
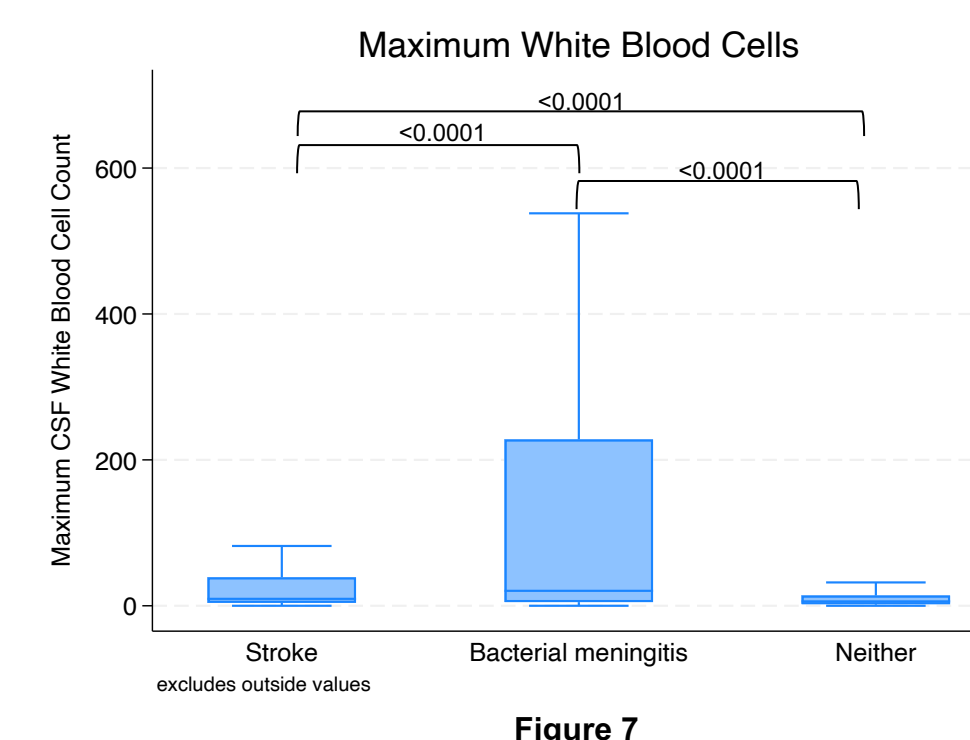
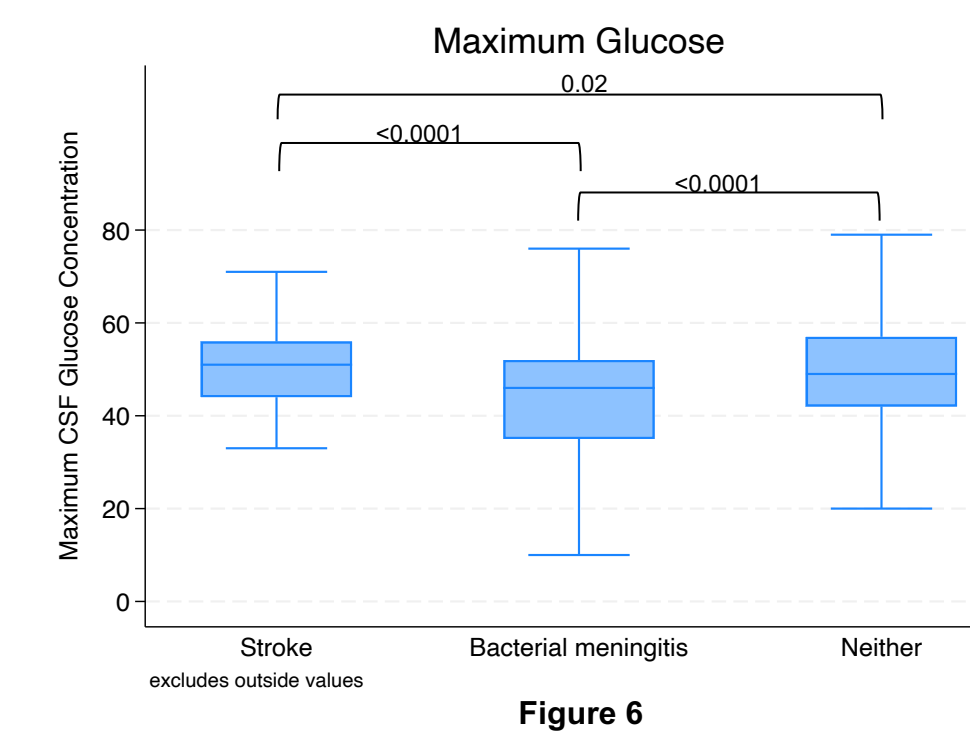
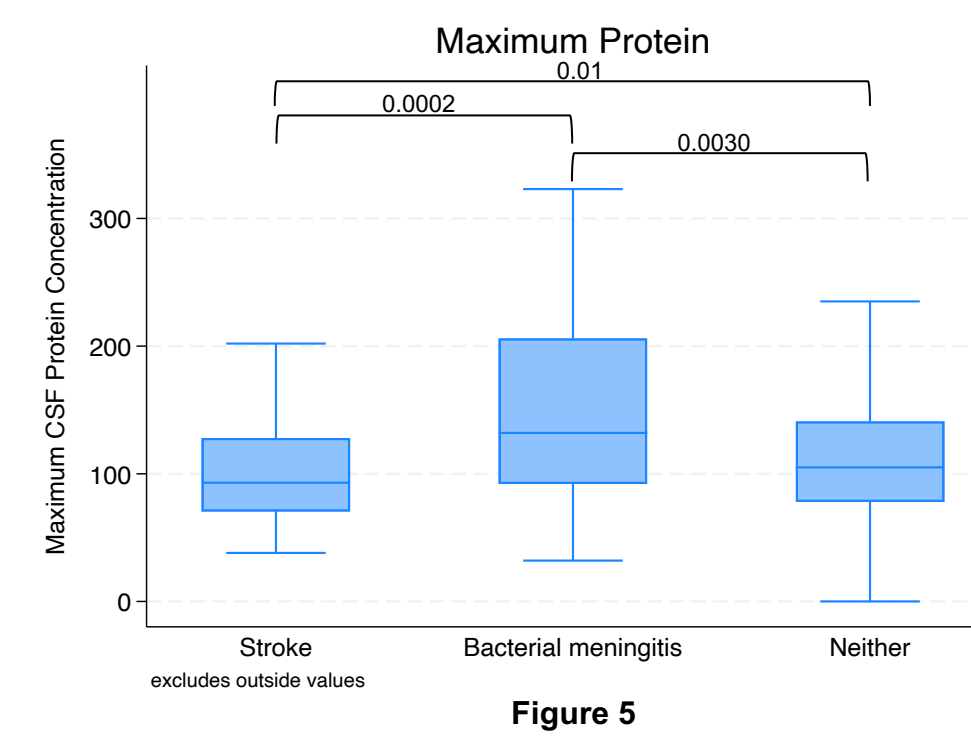
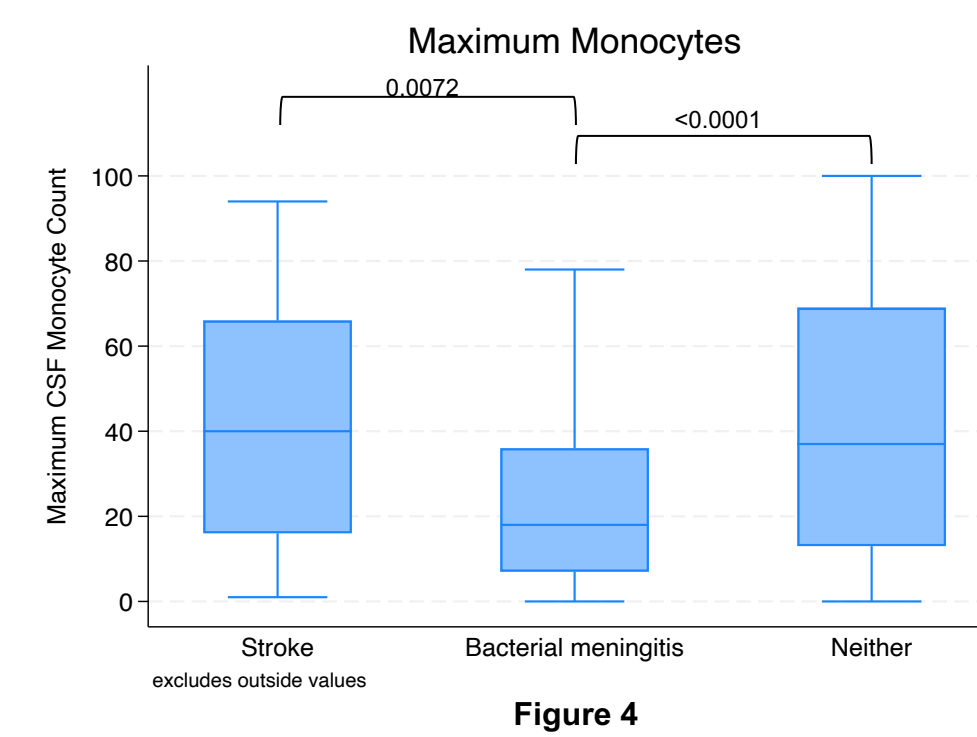
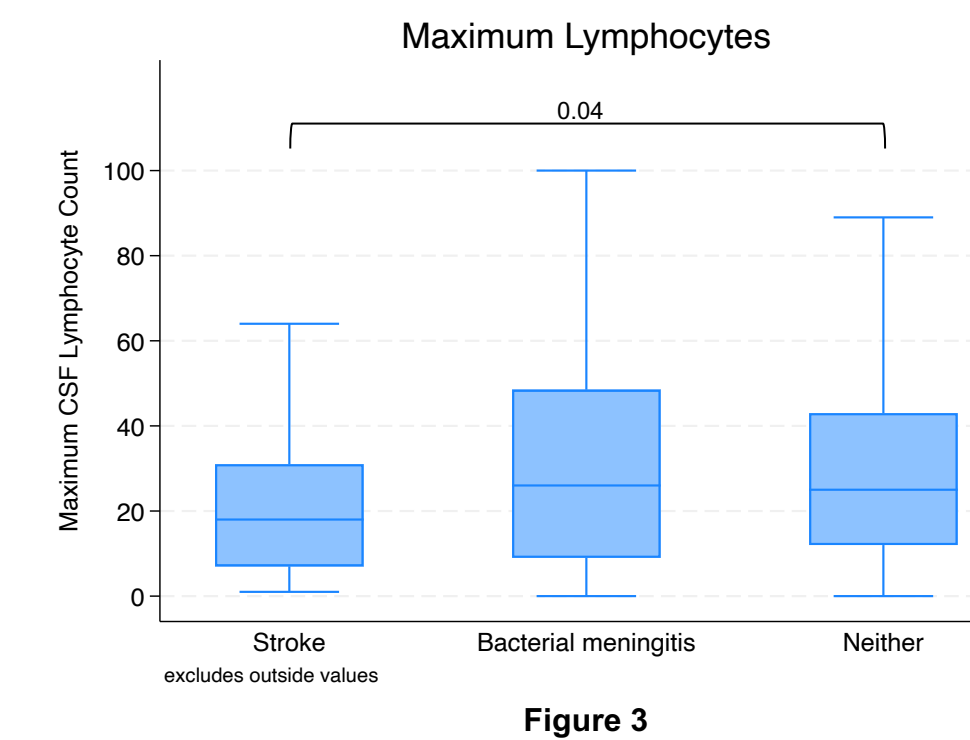
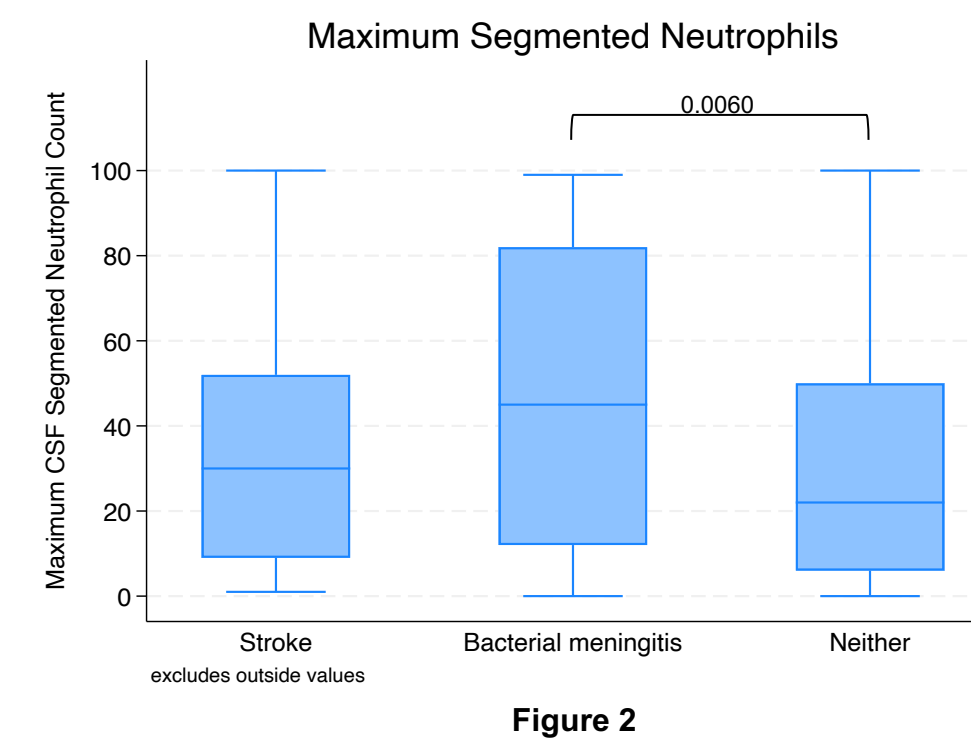
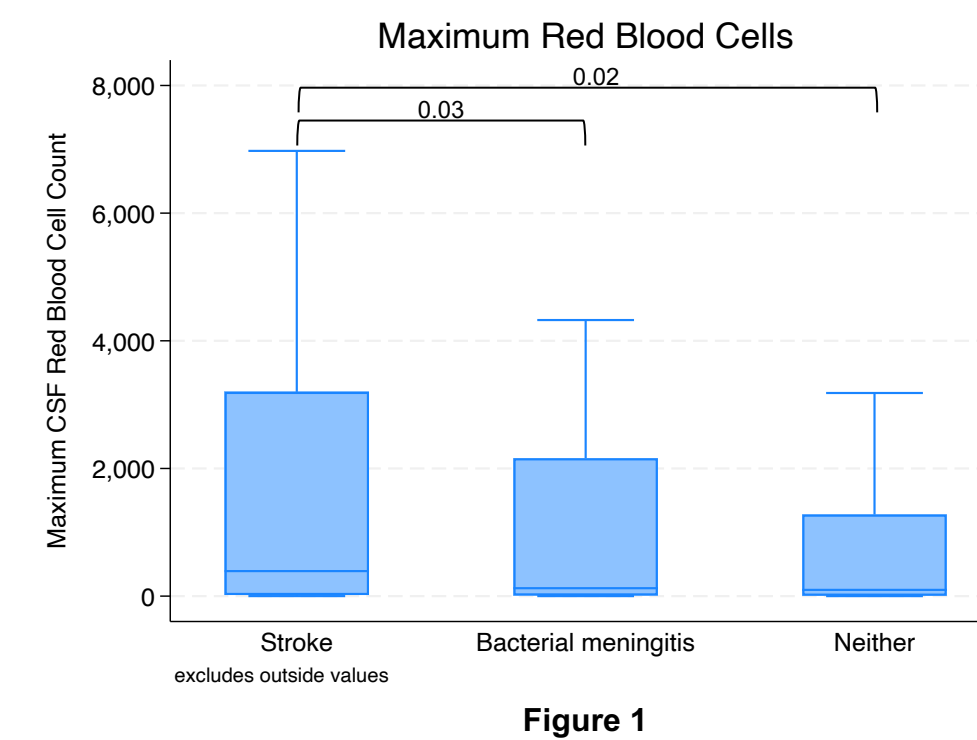
- **Multicenter cohort study** of infants admitted to a Pediatrix Medical Group NICU from **1997-2020**
- Included inborn infants with lumbar puncture in first 14 postnatal days
- Excluded infants with intracranial devices, intracranial hemorrhage, and viral or fungal meningitis in study period
- Infants with meningitis and stroke were identified
 - Bacterial meningitis: non-contaminant pathogenic bacteria in CSF culture
 - Stroke: clinician defined
- Compared demographic and clinical attributes and CSF parameters of infants with stroke, meningitis, or neither condition using Kruskal-Wallis testing
- Modeled CSF parameters using **quantile regression**

HIGHLIGHTS / CONCLUSIONS

Although **ischemic stroke and bacterial meningitis** may present similarly in infants, there are **differences in their CSF parameters**. This may allow for **faster recognition and initiation of appropriate treatment** before standard CSF culture would return.

RESULTS

Figures 1-8. Comparisons of CSF parameters in infants with stroke, meningitis, or neither condition. Significant p values for quantile regression through the median are noted in Figures 1-6. Significant p values for quantile regression through the 75th percentile are noted in Figures 7 and 8. Outside values are excluded for Figures 1-7 and included in Figure 8.



RESULTS

Table 1. Demographic and clinical characteristics of study population

	Stroke (n=88)	Meningitis (n=179)	Neither (n=29,825)	P value
Gestational age (weeks), n (%)				0.0001
<28	1 (1)	10 (6)	1688 (6)	
28-36	6 (7)	62 (35)	9015 (30)	
37+	81 (92)	107 (60)	19,111 (64)	
Male sex, n (%)	56 (64)	111 (62)	16,594 (56)	0.8
Birth weight (g), median [IQR]	3387 [2968 - 3685]	2962 [2155 - 3440]	2998 [2529 - 3456]	0.0001
Race, n (%)				0.0001
White	56 (68)	82 (48)	11,591 (41)	
Black	9 (11)	31 (18)	6168 (22)	
Hispanic	12 (14)	51 (30)	8769 (31)	
Other	6 (7)	5 (4)	1708 (6)	
SGA status, n (%)	6 (7)	20 (11)	2621 (9)	0.42
LGA status, n (%)	9 (10)	20 (11)	2348 (8)	0.17
Length of NICU hospitalization (days), median [IQR]	10 [7-14]	16 [11-26]	10 [7-19]	0.0001
Cesarean delivery, n (%)	46 (53)	80 (45)	13,746 (47)	0.49
Prolonged rupture of membranes status, n (%)	6 (7)	23 (13)	2585 (15)	0.05
5-minute Apgar score, n (%)				0.22
<3	0 (0)	4 (2)	503 (2)	
4-6	11 (13)	10 (6)	2131 (7)	
7-10	75 (87)	158 (92)	26,553 (91)	
Death, n (%)	0 (0)	9 (5)	261 (1)	<0.001
Major congenital anomaly, n (%)	3 (3)	7 (4)	1228 (4)	>0.99
Anti-epileptic drug exposure, n (%)	77 (88)	22 (12)	1992 (7)	<0.001
Postnatal age at LP (days), median [IQR]	2 [1-3]	3 [1-7]	2 [1-3]	0.0001
Age at stroke diagnosis, median [IQR]	3 [2-5]			

- No infants had both stroke and meningitis
- Certain parameters had no significant differences in medians but **significant differences at higher ranges of the distribution**: specifically white blood cell, lymphocyte, and segmented neutrophil count
- Characteristics of **infants with stroke who did and did not receive a lumbar puncture were similar**