

OBJECTIVE We have recently compared free light chains (FLC) and oligoclonal bands (OB) in patients with multiple sclerosis (MS) and patients with non-inflammatory diseases of the central nervous system (NID CNS)¹. Our aim in this study was to test kappa and lambda FLC (κ -FLC and λ -FLC respectively) in cerebrospinal fluid (CSF) and serum of patients with inflammatory diseases of the nervous system and patients without neurological diseases.

MATERIALS AND METHODS We measured κ -FLC, λ -FLC, IgG and albumin in serum and CSF of: 25 patients diagnosed with inflammatory diseases of the CNS (Group 2), 11 patients diagnosed with inflammatory diseases of the peripheral nervous system (PNS) (Group 3) and 13 patients who underwent locoregional anesthesia before surgery and didn't have any neurological diseases (Group 5). We compared these values with the same ones previously obtained ¹ in 59 patients diagnosed with MS (Group 1) and 31 patients with NID CNS (Group 4).

All these five groups shown in Tab.1 were also tested for OB that were determined using SAS IgG IEF kit (Helena Biosciences, UK). FLC were performed on SPA Plus turbidimeter using Freelite kit (The Binding Site, Birmingham, UK).

K-ratio (CSF κ -FLC/serum FLC)* and K-index [(CSF κ -FLC/serum κ -FLC)/(CSF Alb/serum Alb)]**, compared to OB, were used as Ig intrathecal synthesis marker². Mann-Whitney test was performed to assess statistical differences in the medians between the groups.

	Group 1 MS (n = 59)	Group 2 CNS inflam. (n = 25)	Group 3 PNS inflam. (n = 11)	Group 4 NID CNS (n = 31)	Group 5 Controls (n = 13)
MS	59				
Meningo-encephalitis, n		25			
Guillain Barré syndrome, n			11		
Miscellanea (epilepsy, cerebral vasculopathy, headache), n				31	
No neurological disease, n					13
Mean age (min-max)	40.8 (15-73)	48.8 (15-85)	54.7 (34-77)	51.3 (22-77)	42.6 (20-59)
Sex (F/M)	39/20	11/14	3/8	20/11	4/9

Tab.1: Patients considered in our study divided into five groups according to the diagnosis.

RESULTS The results of this study (Groups 2,3 and 5), together with the results recently presented (Groups 1 and 4)¹ are shown in Tab. 2, so that a complete background is provided.

The median CSF κ -FLC concentration in Group 2 was 0,73 mg/L (range: 0,11-8,21), 0,55 mg/L in Group 3 (range: 0,22-2,9) and 0,25 mg/L in Group 5 (range: 0,13-0,32). The median κ -index was 2,55 in Group 2 (range: 0,89-27,3), 1,89 in Group 3 (range: 0,85-3,05) and 3 in Group 5 (range: 2,06-3,93). All the patients did not present intrathecal synthesis in OB analysis (Tab.3), except in one case of amyotrophic lateral sclerosis in Group 4. Statistically significant ($p < 0,05$) differences were confirmed previously ¹ between Group 4 (patients with NID CNS) and the MS Group and, with this study, in the medians between the three Groups (2-3-5) and the MS Group. No statistically significant differences were instead outlined between Group 5 and the Group 4. The box plot in Fig. 1 represents the five groups distributions of CSF κ -FLC, κ ratio and κ index.

κ index was the most statistically significant intrathecal synthesis marker, as it is shown in Fig.1 and furtherly highlighted in Fig.2.

		Group 1 MS	Group 2 CNS inflam.	Group 3 PNS inflam.	Group 4 NID CNS	Group 5 Controls
CSF κ -FLC (mg/L)	Range Median	0,06-32,3 2,53	0,11-8,21 0,73	0,22-2,9 0,55	0,06-1,27 0,21	0,13-0,32 0,25
CSF λ -FLC (mg/L)	Range Median	0,06-6,2 0,51	0,13-4,58 0,33	0,18-2,1 0,41	0,06-0,43 0,15	0,14-0,28 0,18
K ratio *	Range Median	0,01-7,42 0,21	0,01-0,21 0,04	0,01-0,1 0,03	0,003-0,08 0,01	0,01-0,05 0,02
λ ratio	Range Median	0,01-1,9 0,06	0,01-0,34 0,037	0,01-0,1 0,03	0,005-0,4 0,015	0,01-0,04 0,02
K index **	Range Median	2,8-1232 39,07	0,89-27,3 2,55	0,85-3 1,89	0,92-6,07 1,92	2,06-3,93 3
λ index	Range Median	2,9-503,5 12,98	1,37-21,3 3,07	1,28-4 2,09	1,51-23,4 2,72	2,31-5,29 4,27

Tab.2: Range and Median values of CSF κ -FLC and λ -FLC, κ ratio*, λ ratio, κ index** and λ index.

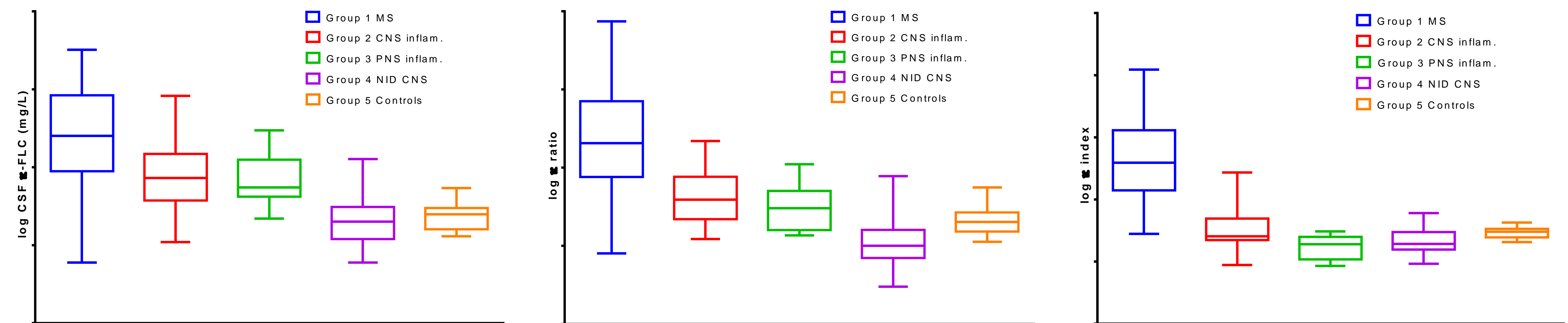


Fig. 1: Box plot of CSF κ -FLC, κ ratio and κ index (all log10 graphs). Median, 25° and 75° percentiles (boxes), 10° and 90° percentiles (error bars) are shown. The Mann-Whitney test confirmed statistically significant differences between Group 1 (MS) and : Group 2 (CNS inflam.), Group 3 (PNS inflam.), Group 4 (NID CNS) and Group 5 (Controls)

	OB positive	OB negative
Group 1 MS (n=59)	52	7
Group 2 CNS inflam (n=25)	-	25
Group 3 CNS inflam (n=11)	-	11
Group 4 NID CNS (n=31)	1	30
Group 5 Controls (n=13)	-	13

Tab. 3: OB results of all the patients in the five groups.

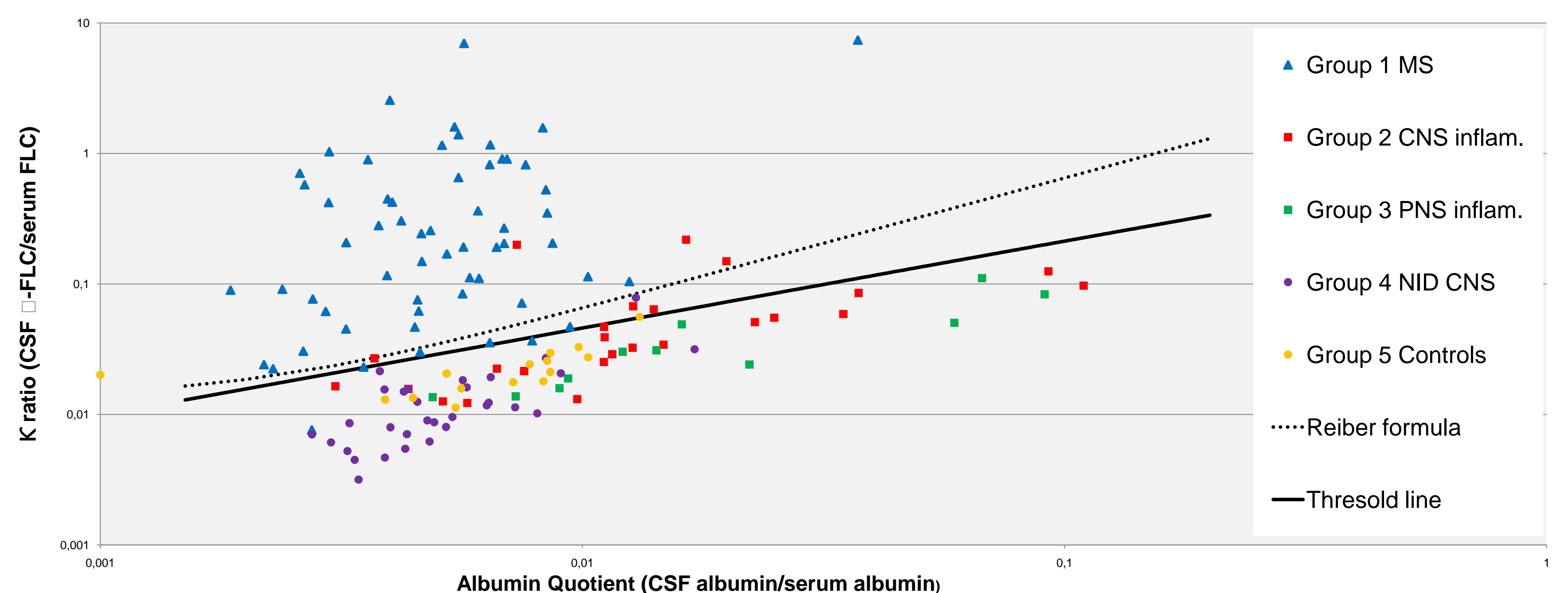


Fig. 2: Threshold line ($= 0,9358^{Qalb} Qalb^{0,6687}$)² and hyperbolic line derived from Reiber formula ($= \frac{a}{b} \sqrt{Qalb^2 + b^2} - c$) with results in the five groups of patients.

CONCLUSION

The laboratory procedure to measure FLC is fast, precise and objective and, according to our study, results seem to be comparable to OB testing in revealing Ig intrathecal synthesis. CSF κ -FLC and κ -index are simple tests that can help the neurologist to recognize MS among different possible diseases, inflammatory or not.

BIBLIOGRAPHY

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