Coll. Antropol. **33** (2009) 1: 281–288
Professional paper

# Neuropsychiatric Systemic Lupus Erythematosus: Diagnostic and Clinical Features According to Revised ACR Criteria

**Ante Bućа[1], Dijana Perković[2], Duška Martinović-Kaliterna[2], Mirela Vlastelica[3] and Marina Titlić[4]**

[1] Department of Radiology, University Hospital »Split«, Split, Croatia
[2] Division of Rheumatology and Clinical Immunology, University Hospital »Split«, Split, Croatia
[3] Private Psychiatric Office, Split, Croatia
[4] Department of Neurology, University Hospital »Split«, Split, Croatia

**A B S T R A C T**

*Neuropsychiatric disorders appear in about 70% of the patients diagnosed with systemic lupus erythematosus (SLE). The aim of this study was to evaluate morphological and functional abnormalities of central nervous system (CNS) in SLE patients with neuropsychiatric manifestations (NP) of disease by testing their relationship. We tested 10 patients (9 females, 1 male) with clinical manifestations of neuropsychiatric systemic lupus erythematosus (NP-SLE). That means clinical evaluation of symptoms, standard immunoserological tests, electroencephalogram (EEG), component of audio-evoked potentials P300, MMPI-202 test, Rey Complex Test and magnetic resonance imaging (MRI). MRI abnormalities were seen in all of our patients, while in 9 patients abnormalities in neuropsychological and neurophysiologic tests have been proved. The most common structural brain change, detected by MRI, was cortical atrophy (in 8 out of 10 patients). According to revised classification of the American College of Rheumatology (ACR) NP-SLE, the most frequent disorder was cognitive dysfunction (in 9 out of 10 patients). Cortical atrophic brain changes have been established in 7 out of 9 patients with cognitive dysfunction. Because of already known correlation of cortical atrophy with cognitive dysfunction in SLE patients, without neuropsychiatric manifestation, we can conclude that neuropsychological examination is required in every patient with systemic lupus erythematosus.*

***Key words:*** *systemic lupus erythematosus, neuropsychiatric systemic lupus erythematosus, magnetic resonance imaging, cognitive dysfunction*

## Introduction

SLE is chronic multi-systemic disease of unknown etiology. The basic pathogenic mechanism of the disease is production of the whole spectrum of antibodies and immune complexes, as well as the disorder of suppression in their production and elimination. Clinical presentation can vary from milder skin and joint manifestations to life threatening disorders, such as kidney and heart malfunction and hematological and neuropsychiatric disturbance[1]. Diagnosis has been based on positive criteria of the ACR-four positive out of eleven criteria[2].

Neuropsychiatric disorders appear in about 70% of the patients with SLE. They can be manifested as subclinical disorders in cognitive functions (reasoning, thinking, memory, studying, orientation etc) or as serious clinical manifestations, such as stroke, aseptic meningitis and transverse myelitis[3,4].

Neuropsychiatric disorders are likely to be primary to genesis of SLE or to other concomitant conditions, which frequently occur in SLE patients. These conditions include uremia, hypertension, infection, Libman-Sackžs endocarditis, as well as those as a result of corticosteroid and immunosuppressive therapy. The primary NP-SLE is immunologically mediated disease with consequential vasculopathy and coagulopathy (antiphospholipid antibodies) and vasculitis. However, frequently we find elements of vasculopathy and vasculitis concurrently with concomitant conditions[3–7]. With reference to diversity of clinical presentation, NP-SLE represents a major diag-

Received for publication December 20, 2007

nostic and therapy problem[8]. That is why more diagnostic simultaneous procedures are usually applied. Most frequently used techniques are computed tomography (CT), magnetic angiography (MRA), digital subtraction angiography (DSA), single photon emission computed tomography (SPECT) and definitely MRI.

Conventional MRI, providing opportunity for a detailed description of structural changes in NP-SLE, has become a »golden« standard in its diagnostics. Structural changes can be found in 25–50% of patients without NP-SLE symptoms and in 33–100% of those with clinical manifestations[9–17]. Beside its diagnostic usefulness, this method can be advantageous in evaluation and monitoring therapy outcome in NP-SLE patients[15,18].

Nevertheless, a considerable number of patients diagnosed with SLE have cognitive disorders, according to ACR criteria, with absence of neurological or psychiatric symptoms[19]. Namely, using common radiological diagnostic procedures (CT or MRI), structural changes in those patients sometimes remain undetected, so the functional deterioration of central nervous system (CNS) is possible to detect only through various clinical neuropsychological tests. In previous studies association of cortical atrophy and cerebral attacks with cognitive disorders was mentioned[4,20–22].

In spite of an increasing number of sophisticated diagnostic procedures, there still are significant difficulties in defining diagnostic criteria and the treatment of NP--SLE. Revised ACR nomenclature NP-SLE which includes nineteen different neuropsychiatric syndromes should make classification and diagnostic of neuropsychiatric disorders in SLE easier, and therapy procedures uniform[23]. So far only a few prospective controlled studies have been issued, based on new ACR criteria of NP--SLE[3,24–28].

In the study we investigated 10 patients (9 females, 1 male) with clinical manifestations of neuropsychiatric systemic lupus erythematosus (NP-SLE). That includes clinical evaluation of symptoms, standard immunoserological tests, electroencephalogram (EEG), component of audio-evoked potentials P300, MMPI-202 test, Rey Complex Test and magnetic resonance imaging (MRI). The aim of the study was to evaluate morphological and functional abnormalities of central nervous system (CNS) in tested SLE patients with neuropsychiatric manifestation (NP) and their relationship.

## Patients and Methods

Our pilot study included 10 (9 females and 1 male) SLE patients (all of them fulfilled at least four of the eleven ACR criteria for the classification of SLE[2]) hospitalized in our Clinic with neuropsychiatric SLE manifestations. These clinical manifestations were as follows: a

**TABLE 1**
DEMOGRAPHIC DATA AND CLINICAL CHARACTERISTICS OF NP-SLE PATIENTS

| Patient | Age (years) | Sex | SLE duration (years) | NP-SLE duration (years) | Neuropsychiatric manifestations | Previous therapy |
|---|---|---|---|---|---|---|
| 1 KR | 43 | F | 0.5 | 0.1 | convulsions | Methylprednisolone 8 mg/day<br>Chloroquine 250 mg/day |
| 2 MV | 53 | F | 6 | 0.3 | paraparesis<br>mood disorder | Methylprednisolone 8 mg/day<br>Methotrexate 10 mg/week |
| 3 ŽP | 24 | M | 0.3 | 0.1 | psychosis | Methylprednisolone 32 mg/day |
| 4 BI | 38 | F | 4.5 | 0.5 | anxiety disorder | Methylprednisolone 8 mg/day<br>Warfarin 4.5 mg/day<br>ASA 100 mg/day |
| 5 VŠ | 24 | F | 10 | 8 | depression | Methylprednisolone 16 mg/day<br>Chloroquine 250 mg/day<br>Olanzapine 10 mg/day<br>Alprazolam 1.5 mg/day |
| 6 MG | 62 | F | 5 | 1.5 | headache | Methylprednisolone 6 mg/day<br>Methotrexate 10 mg/week |
| 7 NM | 53 | F | 13 | 0.2 | TIA<br>anxiety disorder | Methylprednisolone 8 mg/day<br>Chloroquine 250 mg/day<br>ASA 100 mg/day |
| 8 IB | 42 | F | 10 | 0.4 | headache | Chloroquine 250 mg/day |
| 9 ABK | 44 | F | 19 | 0 | stroke<br>hemiparesis | Methylprednisolone 8 mg/day<br>Hydroxychloroquine 200 mg/day<br>Azathioprine 100 mg/day |
| 10 MK | 50 | F | 9 | 0 | convulsions | Methylprednisolone 12 mg/day<br>Warfarin 7.5 mg/day |

F – female, M – male, TIA – transient ischemic attack, ASA – acetylsalicylic acid

**TABLE 2**
SEROLOGICAL INDICATORS IN NP-SLE PATIENTS

| Patient | ECLAM | ANA | C3 | C4 | LaC | aCL | antids DNA | ANCA MPO/PR3 |
|---|---|---|---|---|---|---|---|---|
| 1 KR | 4 | 1:80 | 0.927 | 0.183 | 1.26 | 5 | 76 | 1/1 |
| 2 MV | 9 | 1:80 | 0.48 | 0.084 | 1.17 | 2 | 52 | 2/2 |
| 3 ŽP | 10 | 1:160 | 0.24 | 0.01 | 0.86 | 4 | >1000 | 6/3 |
| 4 BI | 5 | 1:20 | 0.724 | 0.0864 | 2.4 | 32.48 | 174 | 0/0 |
| 5 VŠ | 9 | 1:160 | 0.423 | 0.0855 | 1.22 | 2 | 764 | 2/1 |
| 6 MG | 3 | negative | 1.23 | 0.37 | 0.9 | 5 | 51 | 2/2 |
| 7 NM | 6 | 1:160 | 1.090 | 0.160 | 0.9 | 4 | 461 | 3/1 |
| 8 IB | 4 | 1:40 | 0.732 | 0.124 | 0.76 | 5 | 8 | 1/2 |
| 9 ABK | 5 | 1:160 | 1.47 | 0.146 | 1.1 | 9 | 525 | 1/2 |
| 10 MK | 5 | 1:40 | 0.722 | 0.0809 | 1.1 | 23 | 58 | 1/1 |

protracted headache, transitory ischemic attack, stroke, convulsions, and weakness of lower limbs, psychosis, anxiety disorders and depression (Table 1). The whole SLE patients were selected by examination of rheumatologist, neurologist and psychiatrist. We excluded patients with positive history of neurological or psychiatric disease before the first SLE presentation. NP-SLE classification has been based on revised ACR Ad Hoc Committee NP nomenclature[22]. In Table 1 we evaluated all the therapy the patients were taking before hospitalization. Disease activity was evaluated using the ECLAM index[29].

Serological profile, important for our follow-up is presented in Table 2.

Antinuclear antibodies were detected by indirect immunofluorescence using HEp-2 cell as substrate[30]. Level of complement components C3 and C4 was measured by laser nephelometry (Behring Pro Spec nephelometer)[31]. Lupus anticoagulant (LA) was determined by coagulometric method on coagulation analysis machine BCT[32]. Anticardiolipin antibodies (aCL), anti-proteinase 3 (anti--PR3/c-ANCA), anti-mieloperoxidase (anti-MPO/p-ANCA) and anti-dsDNA antibody were detected by ELISA[33–35].

Electrophysiological tests included electroencephalogram (EEG), as well as the component of audio-evoked potentials P300[36,37].

Neuropsychological examinations included: 1) MMPI--202 test which provides an insight into intrapsychic patient's dynamic, so called personality profile, 2) Complex Figure Test (CFT) or Rey Complex Test which detects perceptive-mnemonic capabilities as important cognitive functions. The test values are expressed in centiles[38,39]. Patients were tested individually by an experienced psychiatrist and a psychologist who were unaware of the clinical data.

MRI was performed on EPIOS 5 unit, Shimatzu, 0.5 T using standard spin-echo technique (19 layers of 5 mm thickness, with sagital, transversal and coronary cross--section). Measuring times T1 (TR/TE = 779/22) and T2 (TR/TE = 4935/88) and proton density were applied to obtain brain analysis in all patients. Paramagnetic contrast-agent was employed likewise. MRI was analyzed by a neuroradiologist who was unaware of the clinical data.

## Results

### *Demographics*

We analyzed ten SLE patients (9 female, 1 male) who have been hospitalized because of neuropsychiatric manifestation of disease, the average age was 43.3 (from 24 to 62). The average duration of SLE was 7.7 years (from 0.3 to 19) with duration of neuropsychiatric manifestation of about 1.1 year (from 0 to 8; Table 1). The activity of the disease was expressed through ECLAM scale with a value of approximately 6.6 (from 3 to 10; Table2).

Nine patients were treated with glucocorticoid at a dose less than 0.5 mg/kg/per day. Four female patients were treated with antimalarial agents at an average dose of 250 mg a day, one female patient was receiving azathioprine at an average dose of 100 mg daily, and two female patients were treated with methotrexate at an average dose of 10 mg per week.

Neuropsychiatric manifestations in two female patients were convulsions, psychotic behavior in one male patient, anxiety disorders in one female patient, headache in two female patients, hemiparesis in one female patient, depression in one female patient. Combined disorders of weakness in lower limbs and mood disorder was diagnosed in one female patient, TIA and anxiety was found in one female patient (Table 1).

When the patients were classified according to new ACR criteria of NP-SLE, the most common syndrome was cognitive dysfunction (Table 3).

### *Serologic profile*

In six patients lowered levels of complement components C3 and C4 were found. Two female patients previously diagnosed as secondary antiphospholipid syndrome had high levels of aCL antibodies The high level of LA was found in one of them. In the case of six patients the high level of anti-dsDNA was proved.

**TABLE 3**
RESULTS OF NEURORADIOLOGICAL, NEUROPHYSIOLOGICAL AND NEUROPSYCHOLOGICAL EXAMINATIONS

| Patient | NP-SLE | MRI | EEG | P 300 | MMPI-202 | Rey I | Rey II |
|---|---|---|---|---|---|---|---|
| 1 KR | convulsions cognitive dysfunction | cortical atrophic changes, esp. fissure Sylvi widened basal cisterna | slightly disrhytmic | normal | atypical profile focused on body | 100$^{th}$ centil normal visual perception, space fragmentar | 10$^{th}$ centil more serious impairment of visual data processing |
| 2 MV | demyelinization syndrome, cognitive dysfunction, polyneuropathy | focusses of demyelinization process | diffusely disrhytmic | extended EP latency | most expressed mania | under 10$^{th}$ centil massive lesion of visual perception | under 10$^{th}$ centil serious impaired visual data processing function |
| 3 ŽP | cognitive dysfunction, latent psychosis | cortical atrophic change parietoocipitalis bilateral | normal | extended EP latency | with safe protection possibility of psychosis development nondifferentiation type | 100$^{th}$ centil normal visual perception | under 10$^{th}$ centil serious impaired visual data processing function |
| 4 BI | anxiety | cortical atrophic changes parietal, a few hyperintensive T2 | normal | marginal EP latency | strongly manifested need to be socially accepted, higher values of anxiety, somatisation and depression | 100$^{th}$ centil normal visual perception | 100$^{th}$ centil normal visual data processing |
| 5 VŠ | cognitive dysfunction, psychosis | cortical atrophic changes, dilatation of occipital horns | diffusely disrhytmic | extended EP latency | psychotic profile with paranoid features | 100$^{th}$ centil normal visual perception | under 10$^{th}$ centil serious impaired visual data processing function |
| 6 MG | cognitive dysfunction, headache | cortical atrophic changes, esp. parietoocipitalis bilateral | diffusely disrhytmic with focal parietotemporal | extended EP latency | atypical clinical manifestation (psychoorganic personality alteration with paranoid manifestation) | 60$^{th}$ centil average visual perception related to age | 10$^{th}$ centil more serious impairment of visual data processing |
| 7 NM | cognitive dysfunction, anxiety | serious cortical atrophic changes, esp. parietotemporal, dilatation of occipital horns, subcortical right punctiform lesion | diffusely disrhytmic | normal | conversion with unexpectedly raised anxiety in restricted sense | 73$^{rd}$ centil visual perception slightly impaired | 50$^{th}$ centil impaired visual data processing, rotating parts of whole, impaired spatial organization |
| 8 IB | cognitive dysfunction, anxiety, headache | cortical atrophic changes parietal | normal | extended EP latency | higher values of anxiety and somatisation | 100$^{th}$ centil normal visual perception | 10$^{th}$ centil more serious impairment of visual data processing |
| 9 ABK | cognitive dysfunction, anxiety, CVD disease | left lacunar ischemic change temporal in Silvy fissure sphere and parietal changes | diffusely disrhytmic with focal parietotemporal | extended EP latency | higher values of depression | 76$^{th}$ centil slightly impaired visual perception, space fragment | 10$^{th}$ centil more serious impairment of visual data processing |
| 10 MK | cognitive dysfunction, convulsions, CVD disease | cortical atrophic changes, infratentorial one lacunar vascular lesion and one right dorsal and lateral from interhemispheric fissure | diffusely disrhytmic | extended EP latency | atypical clinical manifestation (psychoorganic personality alteration) | under 10$^{th}$ centil massive lesion of visual perception | under 10$^{th}$ centil serious impaired visual data processing function |

EP, evokated potentials; CVD, cerebrovascular disease

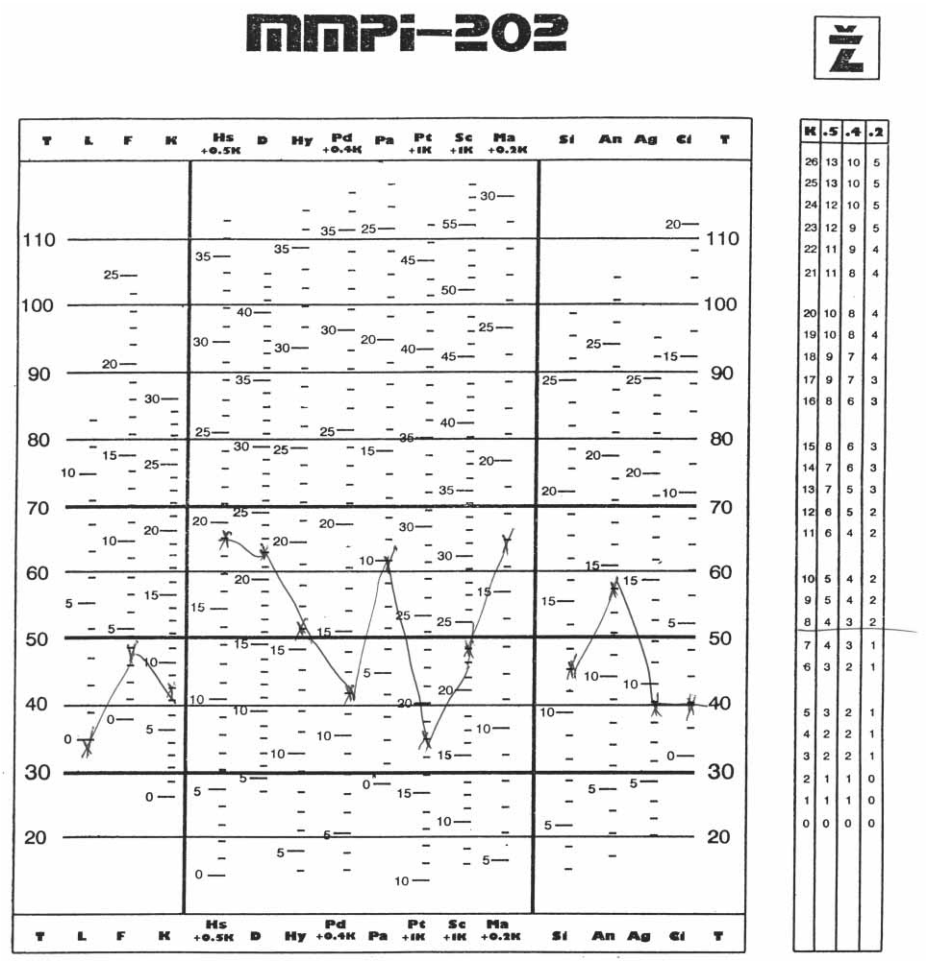


*Fig. 1. MMPI-202 of one of the patients with NP-SLE.*

In one patient the level of ANCA-MPO was slightly higher, while the levels of ANCA-PR3 were close to reference values in all tested patients (Table 2).

### *EEG*

In five female patients we found non specific diffuse paroxysmal disrhytmic changes on EEG, while in two female patients diffuse and parietotemporal focal changes were shown. Normal EEG was registered in three patients (Table 3).

### *P 300*

A disorder of amplitude and latency extension P 300 of audio-evoked potential was observed in eight patients (Table 3).

### *Neuropsychological examinations*

By means of MMPI-202 test (Figure 1) as well as Rey I (perceptive) and Rey II (mnemonic) tests (Figures 2, 2a and 2b), anxiety disorders were found in five patients, cognitive dysfunctions in nine patients (two very serious), mood disorder (manic type) in one female patient and psychosis in two patients (Table 3).

### *MRI*

The most common change, discovered on standard MRI unit, was cortical atrophy in eight patients (patients 1,3–8,10). Dominant changes observable in three patients (patients 6,7,10) were temporoparietal, in two patients (patients 4,8) parietal, in one patient (patient 3) parietooccipital and in one female patient (patient 1) in fissure Silvy region on both sides. In two young patients with different disease duration (patients 3 and 5), serious atrophic changes, inappropriate to their age, were discovered. Both patients showed symptoms of psychosis during neuropsychological tests.

Dilatation of basal cisterna and occipital horns was observed in three patients (patients 1, 5, 7). Hyper-intensity signals in measuring images T2 and T1 (Figure 3, 3a and 3b) were established in four patients (patients 4, 7, 9, 10). Lesions were multiple, of different localization, including both, white and grey matters, which corresponds to lacunar vascular lesion. The foci of demyelinization process, diffusely paraventricular of questionable etiology, were found in one patient (patient 2; Table 3). Two female patients with hyper-intensive changes in T2 measuring time, had the high level anticardiolipin antibody.

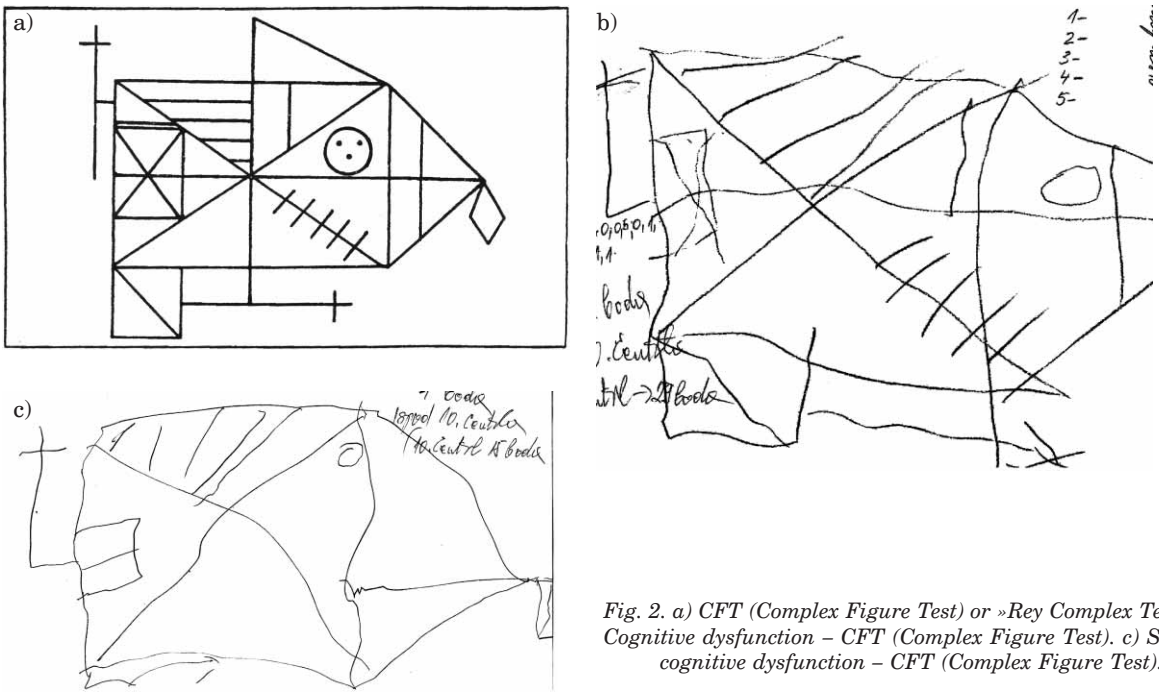


*Fig. 2. a) CFT (Complex Figure Test) or »Rey Complex Test«. b) Cognitive dysfunction – CFT (Complex Figure Test). c) Serious cognitive dysfunction – CFT (Complex Figure Test).*

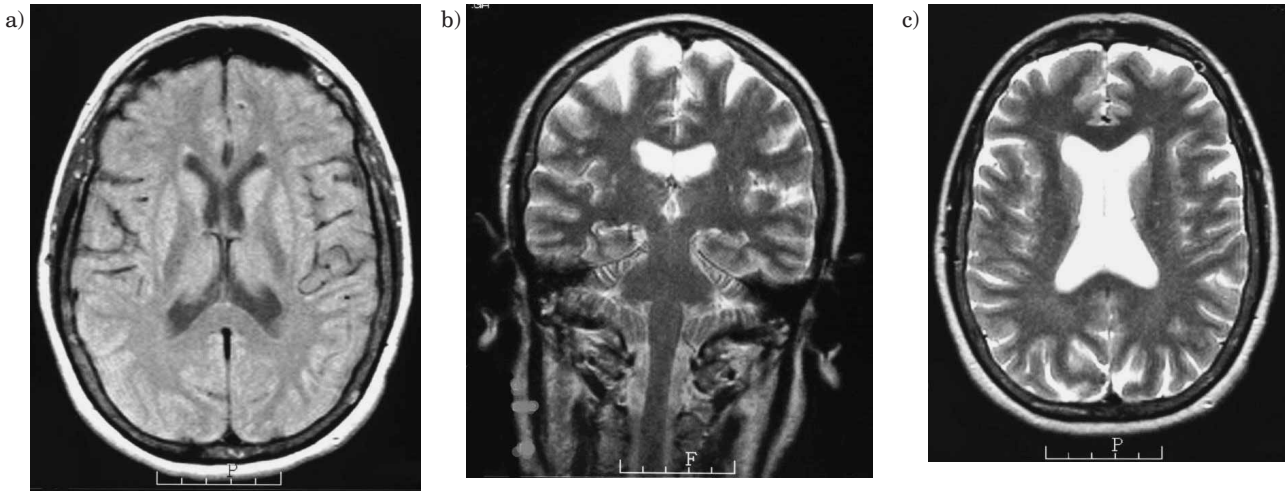


*Fig. 3. a) Transverse T2-weighted MRI with serious cortical atrophic changes especially parietotemporal with dilatation of occipital horns. b) Coronal T2-weighted MRI of the same patient as on Fig. 3a. c) Transverse T1-weighted MRI of the same patient as on Fig. 3a and 3b.*

## Discussion

Our study included 10 patients suffering from NP-SLE, who underwent neuroradiological, neurophysiologic and neuropsychological examinations. All of them had changes on MRI, while nine of them showed aberrations in neurophysiologic and neuropsychological tests.

Infarct of cortex and/or white matter, sub-cortical and periventricular lesions of white substance and cortical atrophy were most commonly described changes, detected by MRI[15,16,18,40–44]. In a majority of previous studies multiple slight punctiform vascular ischemic lesions were established as a common change[11,15,18,44–47]. Unlike those studies, the most common change in our study was cortical atrophic change, found in 8 out of 10 patients. Atrophic changes, inappropriate to age, were found in two young patients (24 years old). One patient has been suffering from SLE for 10 years and the other for 3 months. Both of them were treated with glucocorticoid but in quite different longines, with the last dosage less than 0.5mg/kg/daily. Beside cognitive dysfunction, both patients presented the symptoms of psychosis during neuropsychological tests. Although it is hard to distinguish how much glucocorticoid therapy influenced the occurrence of the neuropsychiatric disorders, it is interesting that in our patients one was receiving the glu-

cocortocoid therapy for 3 months, while the other was taking it at intervals for about 6 years, at an average dose of 8 mg per day.

In 5 of 10 patients punctiform lesions (hyper-intensity signals in T2 and T1 measuring time), dilatation of basal cisterna and occipital horns, foci of demyelinization process were also detected by means of MRI.

According to ACR classification of NP-SLE, the most common disorder has been cognitive dysfunction (in 9 out of 10 patients). The disorder is related to perceptive-mnemonic function impairments, as well as to audio-extended latency of cognitive evoked potential.

Cognitive disorders, such as attention and visual-spatial abilities, were already described in SLE patients, even without clinical manifestations of NP-SLE[44.48,49]. Beside lupus psychosis, several studies described some other psychiatric changes, the prevalence of which is dependent on SLE patient's structure, as well as on standardization of criteria used in diagnostics[50,51].

In majority of our patients, moderate cognitive dysfunctions were observable, while a serious cognitive disorder was found in two patients.

In seven out of nine patients suffering from cognitive dysfunction, cortical atrophic brain changes were found on MRI. This result is in accordance with certain studies[21,22] which stated that cortical brain atrophy and cerebral strokes were the only features of SLE significantly associated with cognitive disorders.

That suggests the conclusion that the most common change in our NP-SLE patients, found on MRI was cortical brain atrophy associated with cognitive dysfunction.

Although study was performed on small number of patients, strongly association of cortical brain atrophy with cognitive dysfunction suggested that all SLE patients required neuropsychological examination as a possible predictor of structural brain changes.

***Note***: ECLAM index for the assessment of disease activity in SLE patients include neuropsychiatric manifestation. In some paper published current contens indexed journal that we citated in our work was used ECLAM index[44].

## REFERENCES

1. NGUYEN QD, UY HS, AKPEK EK, HARPER SL, ZACKS DN, FOSTER CS, Lupus, 9 (2000) 288. — 2. TAN E, COHEN A, FRIES J, MC SHANE DJ, ROTHFIELD NF, SCHALLER JG, TALAL N, WINCHESTER RJ, Arthritis Rheum, 251 (1982) 1271. — 3. SANNA G, BERTOLACCINI ML, MATHIEU A, Lupus, 12 (2003) 935. — 4. WATERLOO K, OMDAL R, HUSBY G, MELLGREN SI, Rheumatology, 41 (2002) 411. — 5. FUTRELL N, SCHULTZ LR, MILLIKAN C, Neurology, 42 (1992) 1649. — 6. DENBURG JA, DENBURG SD, CARBOTTE RM, SAKIC B, SZECHTMAN H, Scand J Rheumatol, 12 (1995) 263. — 7. BOUMPAS DT, SCOTT DE, BALOW JE, J Rheumatol, 20 (1993) 1641. — 8. BOUMPAS DT, AUSTIN HA, FESSLER BJ, BALLOW JE, KLIPPEL JH, LOCKSHIN MD, Ann Int Med, 122 (1995) 940. — 9. MORITANI TD, SHRIER A, NUMAGUCHI Y, TAKAHASKI C, YANO T, NAKAI K, ZHONG J, WANG HZ, SHIBATA DK, NASELLI SM, Acad Radiol, 8 (2001) 741. — 10. LIEM MD, GZESH DJ, FLANDERS AE, Neuroradiology, 38 (1996) 134. — 11. SANNA G, PIGA M, TERRYBERRY JW, PELTZ MT, GIAGHEDDU S, SATTA L, AHMED A, CAULI A, MOUTALDO C, PASSIU G, PETER JB, SHOENFELD Y, MATHIEU A, Lupus, 9 (2000) 573. — 12. GRAHAM JW, JAN J, Lupus, 12 (2003) 891. — 13. GOVONI M, CASTELLINO G, PADOVAN M, BORELLI M, TROTTA F, Lupus, 13 (2004) 149. — 14. BRUYN GA, Ann Rheum Dis, 54 (1995) 159. — 15. SIBBITT W JR., SIBBITT RR, GRIFFEY RH, ECKEL C, BAUKHURST AD, Ann Rheum Dis, 48 (1989) 1014. — 16. JACOBS L, KINKEL PR, COSTELLO PB, ALUKAL MK, KINKEL WR, GREEN FA, J Rheumatol, 15 (1988) 601. — 17. JAREK MJ, WEST SG, BAKER MR, RAK KM, Arthritis Rheum, 37 (1994) 1609. — 18. MC CUNE WJ, MACGUIRE A, AISEN A, GERBARSKI S, Arthritis Rheum, 31 (1988) 159. — 19. DENBURG SD, DENBURG JA, Lupus, 12 (2003) 883. — 20. LEZAK MD, Neuropsychological Assessment (Oxford University Press, New York, NY, 1995). — 21. WATERLOO K, OMDAL R, JACOBSEN EA, KLOW NE, HUSBY G, TORBERGSEN T, MELLGREN SI, J Neurol, 246 (1999) 706. — 22. WATERLOO K, OMDAL O, SJOHOLM H, KOLDINGSNES W, JACOBSEN EA, SUNDSFJORD JA, HUSBY G, MELLGREN SI, J Neurol, 248 (2001) 595. — 23. THE AMERICAN COLLEGE OF RHEUMATOLOGY NOMENCLATURE AND CASE DEFINITIONS FOR NEUROPSYCHIATRIC LUPUS SYNDROMES, Arthritis Rheum, 42 (1999) 599. — 24. AINALA H, LOUKKOLA J, PELTOLA J, KORPELA M, HIETAHARJU A, Neurology, 57 (2001) 496. — 25. AINIALA H, HIETAHARJU A, LOUKKOLA J, PELTOLA J, KORPELA M, METSANOJA R, AUVINEN A, Arthritis Rheum, 45 (2001) 419. — 26. MOK CC, LAU CS, WONG RW, J Rheumatol, 28 (2001) 766. — 27. BREY RL, HOLLIDAY SL, SAKLAD AR, NAVARRETE MG, HERMOSILLO-ROMO D, STALLWORTH CL, VALDEZ CR, ESCALANTE A, DEL RINCON I, GRONSETH G, RHINE CB, PACHILLA P, MC GLASSON D, Neurology, 58 (2002) 1214. — 28. STOJANOVICH L, STOJANOVICH R, KOSTICH V, DZJOLICH E, Lupus, 12 (2003) 3. — 29. VITALI C, BENCIVELLI W, ISENBERG DA, SMOLEN JR, SNAITH ML, SCINTO M, NERI R, BOMBARDIERI S, Clin Exp Rheumatol, 10 (1992) 541. — 30. MILLER MH, LITTLEJOHN GO, JONES BW, STARND H, J Rheumatol, 12 (1985) 265. — 31. SCHARFSTEIN J, RERREIRA A, GIGLI I, NUSSENZWEIG V, J Exp Med, 148 (1978) 207. — 32. BRANDT JT, TRIPLETT DA, ALVING B, SCHARRER I, Thromb Haemost, 74 (1995) 1185. — 33. HARRIS EN, PIERANGELI SS, BIRCH D, Am J Clin Pathol, 101 (1994) 616. — 34. HAGEN EC, ANDRASSY K, CSERNOK E, DAHA MR, GASKIN G, GROSS WL, HANSEN B, HEIGL Z, HERMANS J, JAYNE D, KALLENBERG CG, LESAVRE P, LOCKWOOD CM, LUDEMAN J, MASCARD-LEMONE F, MIRAPEIX E, PUSEY CD, RASMUSSEN N, SINICO RA, TZIOUFAS A, WEISLANDER J, WIIK A, VAN DER WOUDE FJ, J Immunol Methods, 196 (1996) 1. — 35. AVINA-ZUBIETA JA, GALINDO-RODRIGEZ G, KWAR-YEUNG L, DAVIS P, RUSSELL AS, Lupus, 4 (1995) 370. — 36. MANNAN R, HIRAMATSU KI, HOKAMA H, OHTA H, Psychiatry Clin Neurosci, 55 (2001) 451. — 37. ELWAN O, MADKOUR O, ELWAN F, MOSTAFA M, ABBAS HELMY A, ABDEL-NESEER M, ABDEL SHAFY S, EL FAIUOMY N, J Neurol Sci, 211 (2003) 15. — 38. BIRO M, Diagnostic assessment of personality. In Serbian (Futura publikacije i Filozofski fakultet u Novom Sadu, Novi Sad, Serbia and Montenegro, 1995). — 39. REY A, Psychological examination due to traumatic encephalopathy. In French Archives de Psychologie, 28 (1941) 286. — 40. VERMESS M, BERNSTEIN RM, BYDDER GM, STEINER RF, YOUNG IR, HUGHES GR, J Comput Assist Tomogr, 7 (1983) 461. — 41. BELL CL, PARTINGTON C, ROBBINS M, GRAZIANO F, TURSKI P, KORNGUTH S, Arthritis Rheum, 34 (1991) 432. — 42. STIMMLER MM, COLETTI PM, QUISMORIO FP JR., Semin Arthritis Rheum, 22(1993) 335. — 43. GONZALEZ-CRESPO MR, BLANCO FJ, RAMOS A, CIRUELO E, MATEO I, LOPEZ PINO MA, GOMEZ-REINO JJ, B J Rheumatol, 34 (1995) 1055. — 44. SABBADINI MG, MANFREDI AA, BOZZOLO E, FERRARIO L, RUGALI C, SCORZA R, ORIGGI L, VANOLI M, GAMBINI O, VANZULLI L, CROCE D, CAMPANA A, MESSA C, FAZIO F, TINCANI A, AUZOLA G, CATTANEO R, PADOVANI A, GASPAROTTI R, GERLI R, QUARTESAN R, PICCIRILLI M, FARSI A, EMMI E, DOMENEGHETTI M, PICCINI C, MASSACESI L, PUPI A, DE CRISTOFORIS M, DANIELI M, CANDELA M, FRATICELLI P, BARTOLINI M, SAVOLINI U, DANIELI G, PASSALEVA A, Lupus, 8 (1999) 11. — 45. ROVARIS M, VITI B, CIBODDO G, GEREVINI S, CAPRA R, IANNUCCI G, COMI G, FILIPPI M, J Neurol Neurosurg Psychiatry, 68 (2000) 170. — 46. BAUM KA, HOPF U, NEHRIG C, STOVER M, SCHORNER W, Clin Neurol Neurosurg, 95 (1993) 29. — 47. BOSMA GP, ROOD MJ, ZWINDERMAN AH, HUIZINGA

TW, VAN BUCHEM MA, Arthritis Rheum, 43 (2000) 48. — 48. FISK JD, EASTWOOD B, SHERWOOD G, HANLY JG, Br J Rheumat, 32 (1993) 458. — 49. DENBURG SD, DENBURG JA, CARBOTTE RM, FISK JD, HANLY JG, Rheum Dis Clin North Am, 19 (1993) 815. — 50. RIMON R, KRONQVIST R, HELVE T, Scand J Rheumatol, 17 (1988) 143. — 51. KREMER JM, RYNES RI, BARTHOLOMEW LE, RODICHOK LD, PELTON EW, BLOCK EA, TASSINARI RB, SILVER RJ, Semin Arth Rheum, 11 (1981) 182.

*M. Vlastelica*

*Private Psychiatric Office, Vukasovićeva 10, 21000 Split, Croatia*
*e-mail: mirelavlastelica@yahoo.com*

## NEUROPSIHIJATRIJSKI PREMEĆAJI U BOLESNIKA SA SISTEMSKIM LUPUSOM PREMA REVIDIRANIM KRITERIJIMA AMERIČKOG REUMATOLOŠKOG DRUŠTVA

### S A Ž E T A K

Neuropsihijatrijski poremećaji se javljaju u oko 70% bolesnika sa sistemskim lupus eritematodesom (SLE). Cilj ove studije je bio utvrditi strukturne i funkcionalne poremećaje središnjeg živčanog sustava u bolesnika sa sistemskim lupus eritematozusom s neuropsihijatrijskim manifestacijama i njihovu povezanost. Analizirali smo 10 bolesnika (9 žena, 1 muškarac) s kliničkim manifestacijama neuropsihijatrijskog sistemskog lupus eritematodesa (NP-SLE). Uz kliničku procjenu i određivanje standardnih imunoseroloških parametara, svim bolesnicima je učinjen elektroencefalogram, P300 audio-evocirani potencijali, MMPI-202 test, Rey Complex test i magnetska rezonanca (MR) mozga. Promjene na MR su nađene u svih bolesnika, dok su u devet bolesnika nađeni poremećaji u neuropsihološkim i neurofiziološkim testovima. Najčešća strukturna promjena mozga utvrđena magnetskom rezonancom je bila kortikalna atrofija (u 8 od 10 bolesnika). Prema revidiranoj klasifikaciji Američkog reumatološkog društva (ACR) NP-SLE-a najčešći poremećaj je bio kognitivna disfunkcija (u 9 od 10 bolesnika). U sedam od devet bolesnika s kognitivnom disfunkcijom su utvrđene kortikalne atrofičke promjene mozga. S obzirom da se kognitivna disfunkcija u bolesnika sa SLE-om može naći bez neuropsihijatrijskih manifestacija te postojanje korelacije kortikalne atrofije s kognitivnom disfunkcijom, možemo zaključiti da je neuropsihološko ispitivanje potrebno provesti u svih bolesnika sa sistemskim lupus eritematozusom.