Visual evoked potentials in stable kidney transplant recipients treated either with cyclosporine A- or tacrolimus-based regimens

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BACKGROUND: Uremia may cause a central nervous system disturbances, which result in visual evoked potentials (VEP) alterations, both in pre-dialysis and dialysis patients[1]. After kidney transplantation, uremia-induced changes partly subside[2], whereas the effects of long-lasting exposure to neurotoxic calcineurin inhibitors (CNI) – cyclosporine A (CyA) or tacrolimus (Tc) – remains unknown. The aim of the present study was to analyze VEP in a selected cohort of stable kidney transplant recipients (KTR), treated either with CyA or Tc based regimens.

PATIENTS AND METHODS: This cross-sectional study was performed in stable KTR at least a year after transplantation, treated with the same type of CNI since the transplantation procedure. As history of diabetes mellitus, cerebrovascular episodes, neural or optic disturbances was previously shown to interfere with VEP results, we excluded such patients from the analysis. Flash and pattern VEP (stimulation 1 deg of arc and 15 min of arc) were performed, and trough CNI blood levels were measured in all patients.

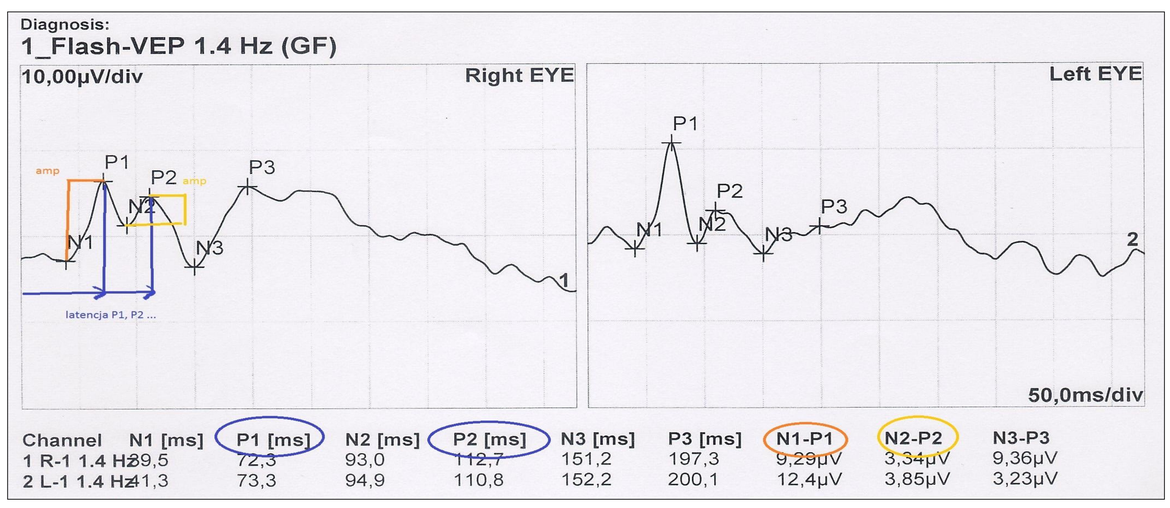
RESULTS: We enrolled 62 patients (31 in CyA group and 31 in Tc group), with a mean age 50±10 years and mean post-transplant period of 92±39 months (similar in both groups). Dialysis vintage was also similar (29 months). Mean CyA trough level was 99±28 ng/ml, mean Tc trough level was 6.1±1.7 ng/ml. Similar mean values of latencies and amplitudes were observed in both groups, with a high percentage of pathologic values (Table 1). When analyzing results of pattern VEP, a significant correlation was found between maximal P100 latency (measured in both eyes) after the stimulation 15 minutes of arc (but not maximal amplitude) and CyA trough level (r=0.56, p=0.001) (Fig. 1). Contrary, in Tc group we did not observe such an association (Fig. 1). In flash VEP, there was a correlation between maximal P2 component and Tc (r=0.34, p<0.05), but not CyA trough level (Fig. 2).

Table 1. The results of pattern and flash VEP measurements in patients treated with cyclosporine or tacrolimus.

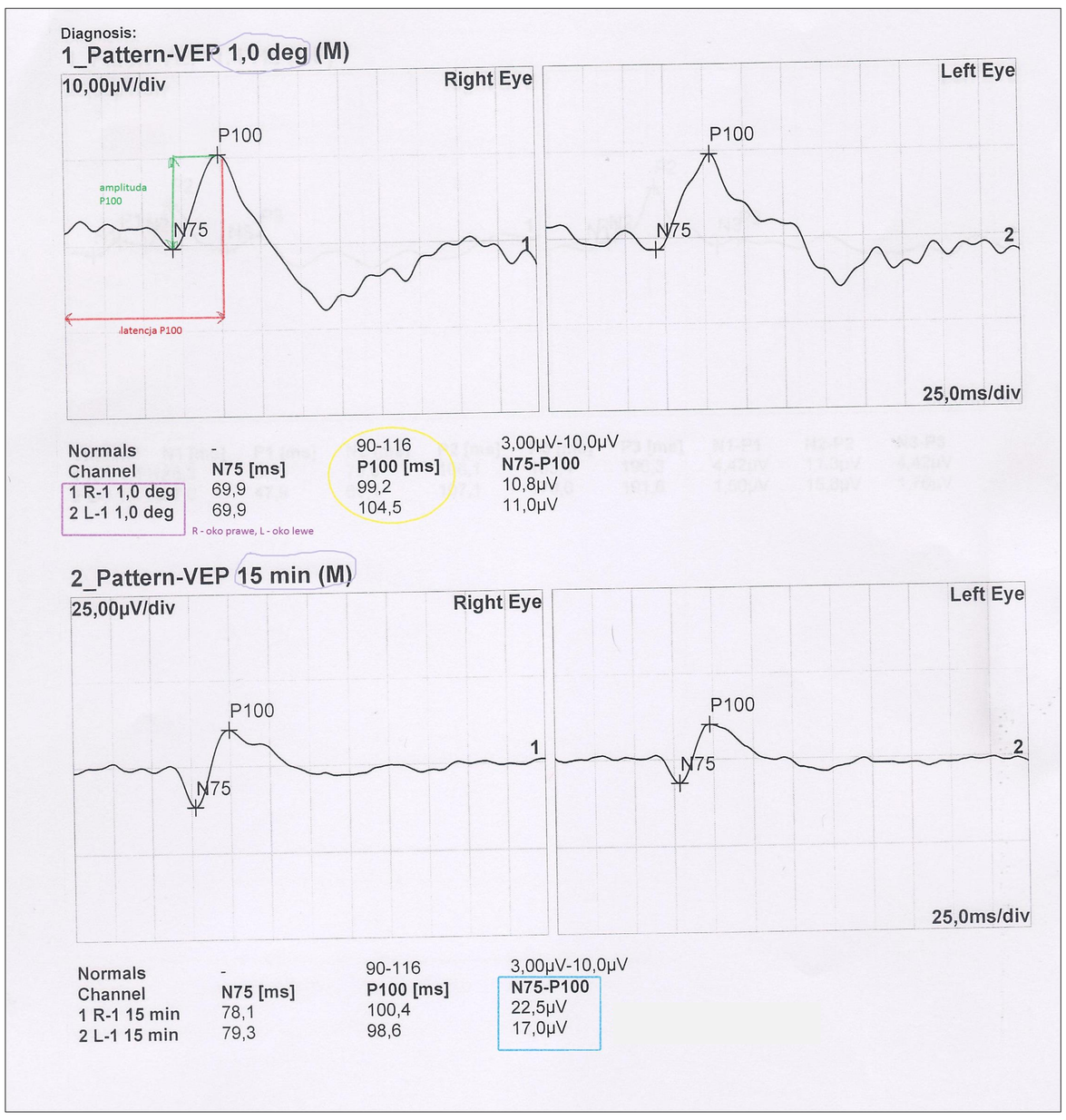
	Pattern VEP				Flash VEP	
	LAT (1) [ms]	LAT (15) [ms]	AMP (1) [μV]	AMP (15) [μV]	P1 [ms]	P2 [ms]
Cyclosporine group						
Mean values	109±6	120±12	11±5	14±7	71±12	118±14
Pathologic values [%]	13	68	55	71	43	23
Tacrolimus group						
Mean values	110±7	116±9	12±5	14±7	71±15	121±15
Pathologic values [%]	19	42	61	74	48	23

Data presented as means ± SD. LAT (1): P100 latency after pattern reversal 1 degree of arc; LAT (15): P100 latency after pattern reversal 15 minutes of arc ; AMP (1): P100 amplitude after pattern reversal 1 degree of arc ; AMP (15): P100 amplitude after pattern reversal 15 minutes of arc; P1: the latency of P1 wave after flash stimulation; P2: the latency of P2 wave after flash stimulation.

The exemplary flash visual evoked potential examine chart



The exemplary pattern visual evoked potential examine chart, with values measured after stimulation with 1 deg and 15 minutes of arc



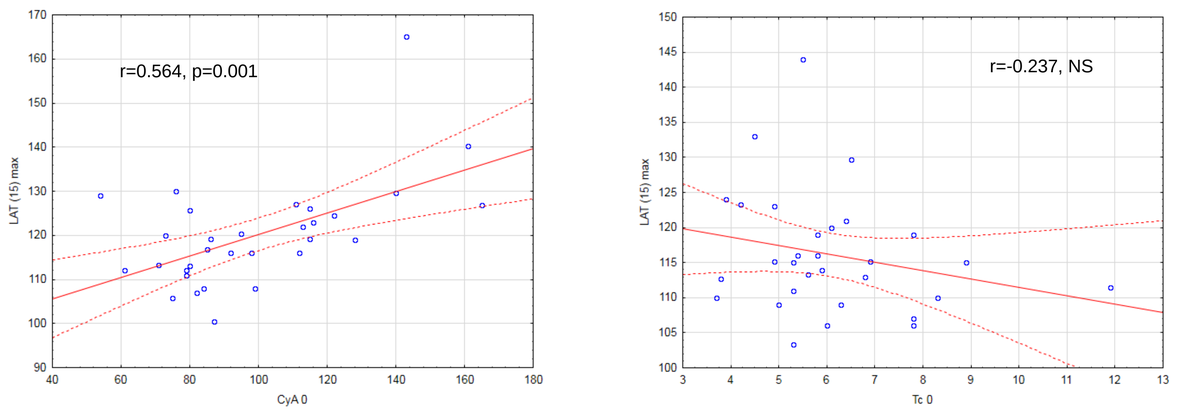


Fig 1. The correlations between maximal latency after 15 minutes - LAT (15) - and the trough levels of CyA (left panel) and Tc (right panel)

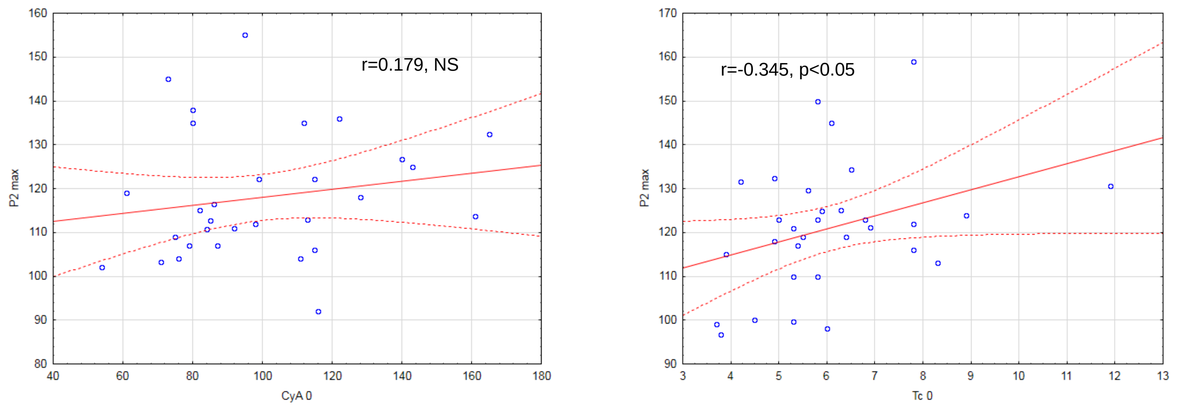


Fig 2. The correlations between maximal P2 component – P2 - and the trough levels of CyA (left panel) and Tc (right panel)

SUMMARY: 1. Pathologic values in VEP examination are frequently found in kidney transplant recipients, treated with CNIs. 2. Both CyA and Tc may exert similar disadvantageous effects on visual evoked potentials. 3. Optic pathway dysfunction in kidney transplant recipients seems to be directly dependent upon the CNIs trough levels.

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