PO.152

## Correlation between vitamin D status and Wechsler Adult Intelligence Scale's comprehension subtest in patient with end-stage renal diseases

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**Aim:** Cognitive decline is an important problem for individuals, as well as for the community. Increasing evidence suggests that vitamin D may play a role in maintaining cognitive function and vitamin D deficiency may accelerate cognitive decline. The aim of this study was to evaluate the status of vitamin D in chronic renal failure (CRF) patients on peritoneal dialysis (PD) and to correlate the findings with cognitive functions.
**Materials and methods:** The study was performed in Inonu University Turgut Ozal Medical Center. Serum 25hydroxyvitamin D (25(OH)D) was measured and cognitive functions (Wechsler Adult Intelligence Scale's (WAIS) Comprehension Subtest) tested with 51 peritoneal dialysis patients and a control group consisting of 51 healthy individuals have similar conditions with patients. Individuals with other chronic diseases and smoking and alcohol habits which may impair cognitive functions were excluded from the study.
**Results:** Compared to each groups we found negative correlation between 25(OH)D3 levels and WAIS's Comprehension Subtest in patient and control group. The correlation between data was evaluated with the Spearman's test ($P = 0.597$, $r = -0.76$ and $P = 0.010$ $r = -0.356$ respectively).
**Conclusions:** In the literature, there is no consensus on the presence of an association between vitamin D levels and cognition. In this study vitamin D levels were measured as deficiency in both groups. Further studies are needed to investigate for increasing actual knowledge about this association.

PO.153

## Modulation of spatiotemporal calcium dynamics in single astrocytes by neuronal activity

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Astrocytes play a number of important functions in the brain trough a generation of a repertoire of complex $Ca^{2+}$ events. Although the astrocytic $Ca^{2+}$ signalling has been intensively studied for a several last decades the principle of $Ca^{2+}$ events integration in astrocytes during synaptic activity, however, remains unknown. Here we implemented an analysis of whole $Ca^{2+}$ events (Wu et al., 2014 in single astrocytes in mice hippocampal slices and we found that spreads and durations of $Ca^{2+}$ events follow power law distributions, a fingerprint of scale-free systems. The power law exponent ($\alpha$) was decreased by activation of metabotropic glutamate receptors (mGluRs) either by specific receptor agonist, glutamate uncaging around astrocytic processes or by low frequency stimulation of glutamatergic fibers in hippocampal slices. Decrease in $\alpha$ indicated an increase in proportion of large $Ca^{2+}$ events. Notably, mGluRs activation did not increase the frequency of whole $Ca^{2+}$ events. This result suggests that neuronal activity does not trigger new $Ca^{2+}$ events in astrocytes (detectable by our methods), but modulates the properties of existing ones. Pharmacological blockade of mGluRI leads to the decrease of the proportion of large $Ca^{2+}$ events, suggesting that such $Ca^{2+}$ dynamics might arise from intracellular inositol-3-phosphate diffusion triggered by mGluRs activation during synaptic transmission. Thus, our results provide a new perspective on how astrocyte responds to neuronal activity by changing its $Ca^{2+}$ dynamics, which might further affect synaptic transmission and local network functioning.

PO.154

## Effect of specific energy substrates on astrocytes calcium dynamic in the rat hippocampus

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Recent studies have demonstrated the important role of astrocytes in memory formation through delivery of lactate to neurons. During neuronal activity and in certain pathologies, the synthesis of lactate is activated in astrocytes. Because neuronal activity depends on energy substrate accessibility, this process serves as a regulatory mechanism for some neuronal functions. Lactate and pyruvate also become the main energy substrates in the brain when the glucose level is low. In addition, ketone bodies can serve as energy substrate in the neonatal brain. Using laser confocal microscopy we investigated how lactate, pyruvate and beta-desoxybutirate, thereafter specific energy substrates (SES), affect calcium dynamics in astrocytes in rat hippocampal slices at different stages of postnatal brain development: postnatal day (P) 5, 15 and 30. The astrocytes were stained with Oregon Green BAPTA AM (7.95 $\mu$M) and specific astrocytic marker

 