

# Synaptic Input to Neuropeptide Y (Npy) Immunoreactive Neurones in the Amygdala of Pharmacoresistant Temporal Lobe Epilepsy Patients

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## Introduction

The lateral nucleus serves as the main sensory input of the amygdala and is well known for its involvement in the feed forward and feedback inhibitory role in generation of epileptic foci in pharmacoresistant temporal lobe epilepsy (TLE) patients.

## Methods

The NPY neurones being among the most abundant immunoreactive neurones in the region were studied at both a light and electron microscopic level. This is a single blind study amongst a population of patients who have undergone amygdalo-hippocampectomy for recalcitrant seizures not amenable to antiepileptic medication.

This quantitative study is amongst two groups, Ammon’s horn (AHS) and non-AHS group, looking at the excitatory and inhibitory driving forces acting on NPY neurons in the human epileptic amygdala.

The immunostained amygdala was sectioned utilising an ultramicrotome to obtain both semi- and ultrathin sections for both light and electron microscopic analysis.

## Conclusions

It was clearly noted that the NPY-ir interneurones neurons have both Type 1 & 2 axo-somatic synapses as compared to a previous recent study revealing that axo-somatic synapses on projection neurones in the lateral amygdala were only Type 2 synapses.

## Results

In a previous study projection neurones in the amygdala were investigated: on average every 2nd to 10th cross section of a projection neuron had only one Type 2 inhibitory axo-somatic synapse on an ultrathin section. However the analysis of NPY neurones showed that most neurones had 1-3 axo-somatic synapses per neuronal cross section, many of which were excitatory Type 1 synapses, although Type 2 synapses were also found. Final analyses also confirmed that the difference in the excitatory synapses between the two groups was statistically significant (p value = 0.007), with a greater number of synapses in the AHS group. It was also found that the AHS group of NPY neurons have more perisomatic gliosis than in the Non-AHS neurons.

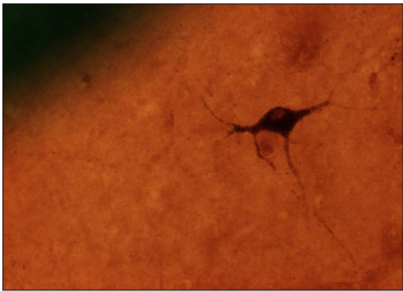
## Co-authors

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## References

Yilmazer-Hanke DM, Faber-Zuschratter H, Blümcke I, Bickel M, Becker A, Mawrin C, Schramm J (2007) Axo-somatic inhibition of projection neurons in the lateral nucleus of amygdala in human temporal lobe epilepsy: An ultrastructural study. Exp Brain Res 177: 384-399

Figure 1

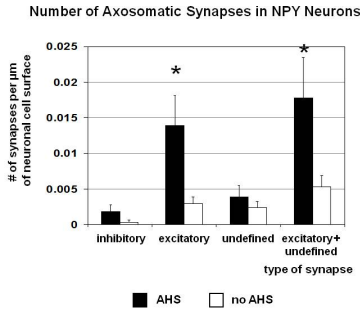


Photomicrograph of NPY neurone in durcupan embedded foil

## Learning Objectives

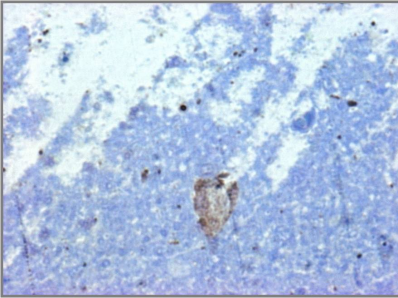
Results so far show that damage of the amygdala in TLE reveal local alterations in the inhibitory circuitries that may contribute to a lower seizure threshold and greater excitability within the amgdala.

Table 1



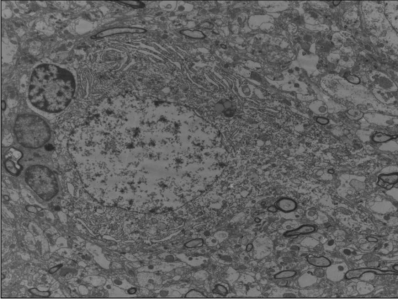
Bar chart revealing the number of axosomatic synapses in NPY Neurons

Figure 2



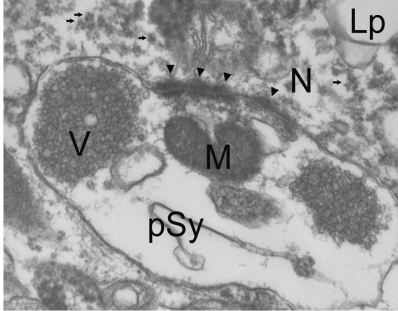
NPY labelled neuron identified in a semithin slide section

Figure 3



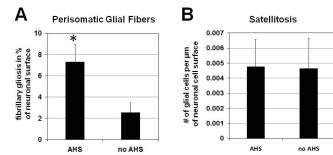
NPY labelled neuron identified in an Electron Micrograph

Figure 4



Electron photomicrograph from the cell body of a NPY-labelled neuron (N) in the human lateral amygdala of a TLE patient. The NPY-labelled neuron is contacted by a non-labelled presynaptic bouton (pSy). Lp: lipofuscin granule; M: mitochondrion; V: synaptic vesicles; small arrow: NPY-labelling; arrow head: active contact zone.

Table 2



Bar Charts showing perisomatic glial fibres in groups & Satellitosis