

OBJECTIVES

The aim of this study is to realize quantitative 3D reconstructions of layer 5 (L5) synaptic boutons and their target structures, in the human gyros temporals using biopsy material from patients that underwent tumor but in most cases- epileptic brain surgery, in order to directly compare structural and functional aspects of synaptic transmission and plasticity.

METHODS

RESULTS

3.1 General description of L5 cortical synapses

3.2 Ciliary coverage of L5 synaptic boutons

3.3 Synaptic organization of L5

3.4 3D volume reconstructions

3.5 Individual synaptic boutons

3.6 Quantitative analysis

Table 1: Quantitative analysis of structural parameters of L5 human synaptic boutons vs L4 adult rat

CONCLUSIONS

REFERENCES

We have investigated -for the first time- the cortical synapses of L5 in human neocortex. This layer is characterized by large pyramidal neurons representing (~85%) of the neurons. The others were various types of GABAergic interneurons much smaller in size. Astrocytes, the non-neuronal cells, form a dense, lattice-like network showing, sometimes, cluster-wise arrangements around neurons. ~85% of spines contain a spine apparatus, a specialized form of the endoplasmic reticulum, which makes them more mobile. They are thought to modulate short- and long-term synaptic plasticity (Gray 1999a, b; Deller et al., 2003; Konur and Yuste, 2004; Holmesma et al., 2005; Umeda et al., 2005). Both pre- and post-synaptic densities are often perforated with periodic interruptions of the protein matrix. Also non-perforated ones were frequently found. Furthermore, we observed multi-vesicular bodies, i.e. endosome organelles involved in endocytosis and trafficking functions. Synaptic boutons are relatively large and the size of the total pool of synaptic vesicles was nearly 3-fold larger when compared with layer 4 of the "barrel" field in the adult rat somatosensory cortex (Rollenhagen et al., 2014).