increased by 20% in the non-denervated IML. However, individual neurons but also individual segments within single neurons showed a broad variability in spine density changes in both layers. Different response types to denervation were identified and distinguished.

Conclusions: Granule cells show variable and layer-specific spine density changes after entorhinal denervation. These changes are mostly contrary and counterbalancing each other in the IML and MML, suggesting a quick and short-lasting response in the IML compensating for the denervation-induced loss of spines in the MML.

https://doi.org/10.1016/j.aanat.2025.152414

Presentation number: 3.4
Topic: Neuroanatomy

Older Pigeons Show Higher Neuron Numbers than Younger Pigeons

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Many data from the literature assume a decreasing cell number in the aged mammalian brain and associate this with a decline of (cognitive) brain functions. But this has not yet been conclusively proven and it is also not clear whether such morphological age-related changes are the same in all vertebrates or whether there are special features in e.g., birds.

Here we analyzed cell and neurons numbers of pallium, subpallium and cerebellum in groups of young adults (10 months) and senescent (> 10 years) pigeons using the isotropic fractionator method (i.e., cell counts based on tissue homogenates).

Overall cell numbers within the pallium and subpallium but not the cerebellum differed significantly between groups and were on average 46% and 28% higher in old as compared to young animals. Overall cell density was also significantly higher in the old age group. Specifically, neuron number as well as neuron density of pallium and subpallium were significantly higher in old animals, with an average increase of 80% and 45%, or 86% and 31%, respectively. Again, no such differences were found for the cerebellum. Comparing neuronal to non-neuronal cell ratios, we only found a significant difference for the pallium with an average increase of 23% in older pigeons.

Our results hint at a distinct life-long neurogenesis across the whole cerebrum what lies in contrast with aging of the mammalian brain. It might be worthwhile to further investigate age-related structural and especially functional changes in non-mammalian species like birds to deepen our knowledge of the underlying processes.

https://doi.org/10.1016/j.aanat.2025.152415

Presentation number: 3.5
Topic: Neuroanatomy

Maintenance of a Central High frequency Synapse in the Absence of Synaptic Activity

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Neural circuit formation and maintenance has long been considered to be mostly activity-dependent. Here, we explore whether the absence of neurotransmission influences the maintenance of the calyx of Held synapse, a giant auditory brainstem synapse known for its high fidelity, high frequency neurotransmission. We investigated this potential activity-dependency by inhibiting synapse activity by cell specific expression of the tetanus toxin light chain (TeNT).

Globular bushy cells of the ventral cochlear nucleus, which give rise to the calyces, were specifically targeted by usage of juvenile mice expressing cre-recombinase under the Math5-promotor. Using a cre-dependent adeno-associated viral vector (AAV), we delivered the genetic construct for TeNT-EGFP to the VCN by stereotaxic injection. Synaptic silence was determined by electrophysiology after 14 days of TeNT expression. After 21 days of TeNT expression and 10 days of synaptic silence, calyx structure was examined by immunofluorescence and correlative light and electron microscopy.

Evoked neurotransmission was abolished after two weeks of TeNT expression. The expression of TeNT did not alter the general structure (incl. fenestration) of calyces. TeNT did not affect the number of active zones or the composition of postsynaptic AMPA-type glutamate receptors. Electron micrographs showed a loss of synaptic vesicles near actives zones whereby remaining vesicles tended to be bigger.

Our results indicate that synaptic connectivity in the auditory brainstem is mostly genetically hardwired and does not rely on activity.

https://doi.org/10.1016/j.aanat.2025.152416

Presentation number: 3.6
Topic: Neuroanatomy

Singe-nucleus RNA-sequencing of the Motor Cortex in Huntington's Disease Mice Reveals Mechanisms of Neuronal Vulnerability to Degeneration

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Introduction: A common feature of neurodegenerative disorders is selective vulnerability, where certain neurons succumb to disease early, while others remain spared. Huntington's disease (HD) is an incurable hereditary movement disorder caused by a CAG repeat