Activity-dependent growth of cortical interneuron dendrites and axons

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We have studied the role of ionotropic receptors and GPCR-coupled receptors for dendritic growth of neocortical inhibitory interneurons (our preferred prey) and excitatory pyramidal cells (the "bycatch", but also delivering stories) over the past years. Recently, we turned to interneuronal axons, many of which emerge actually from dendrites, not cell bodies. These privileged dendrites have been termed "axon-carrying dendrites (AcD)". When depolarized, they can fire action potentials without somatic integration, thus avoiding perisomatic inhibition.

The proportion of AcD cells varies between cell type, cortical layers, and mammalian species. We started to look for a developmental influence of such AcDs and the axon it carries. The picture emerging is that both are in a mutual growth-promoting relationship, and - up to debate - our recent findings argue for a role of GluN2D-containing NMDA receptors.

The talk will conclude with something to muse on: What is the purpose and role of neurons with more than one axon?

Prof. Dr. Petra Wahle is head of the Developmental Neurobiology Group at the Department of Zoology and Neurobiology, Ruhr-University Bochum, Germany. Her many contributions to the field has uncovered distinct roles for neuronal activity, growth factors and cytokines, among others, in how the mammalian nervous system is shaped throughout development and which of these factors might play a role in neurodevelopmental pathologies.

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Questions
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