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Area of research

Neurotransmitter receptor trafficking in plasticity and disease

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Summary

Understanding the processes that dictate the distribution, maintenance and dynamics of neurotransmitter receptors is of fundamental importance to the molecular basis of fast excitatory transmission, synaptic plasticity and brain function.

The Henley lab is interested in the mechanisms by which neurotransmitter receptors are targeted to, retained at and removed from synapses under normal, stimulated and disease conditions. Receptors share common biosynthetic and endocytic pathways but important specific differences allow selective regulation.

Increased understanding of the mechanisms of these processes will give important insights into synapse formation, stabilisation and plasticity and thus into the cellular mechanisms underlying learning and memory and some neurodegenerative diseases.

In particular we focus on the roles of posttranslational modifications, such as SUMOylation, and protein-protein interactions at AMPA and kainate receptors.

To address these questions we use a wide range of molecular, biochemical, cell biology and imaging techniques including the use of viral transduction and fluorophore protein tagging technology to visualise the dynamics of receptor movement in living neurones in real time.

Teaching

Advanced Options in Biochemistry

Keywords

- Glutamate receptor
- GABA
- NSF
- GluR2
- Syntenin
- GFP
- AMPA receptor
- PICK1
- SUMOylation
- SUMO

Memberships

Organisations

School of Biochemistry

Other sites

- Biochemistry
- Brissynbio
- Neuroscience

Links

- home page

Selected publications

- Petrovic, M, Silva, SVd, Clement, JP, Vyklicky, L, Mulle, C, Gonzalez, MI & Henley, JM, 2017, 'Metabotropic action of postsynaptic kainate receptors triggers hippocampal long-term potentiation'. *Nature Neuroscience*, vol 20., pp. 529?539
- Henley, J & Wilkinson, K, 2016, 'Synaptic AMPA receptor composition in development, plasticity and disease'. *Nature Reviews Neuroscience*, vol 17., pp. 337?350
- Tang, LT, Craig, TJ & Henley, JM, 2015, 'SUMOylation of synapsin Ia maintains synaptic vesicle availability and is reduced in an autism mutation'. *Nature Communications*, vol 6.
- Girach, F, Craig, TJ, Henley, JM & Henley, JM, 2013, 'RIM1α SUMOylation is required for fast synaptic vesicle exocytosis'. *Cell Reports*.
- Henley, JM, Craig, TJ & Wilkinson, KA, 2014, 'Neuronal SUMOylation: mechanisms, physiology, and roles in neuronal dysfunction'. *Physiological Reviews*, vol 94., pp. 1249-85

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Recent publications

- Binda, C, Nakamura, Y, Henley, J & Wilkinson, K, 2019, 'Sorting nexin 27 rescues neuroligin 2 from lysosomal degradation to control inhibitory synapse number'. *Biochemical Journal*, vol 476., pp. 293-306
- Evans, A, Gurung, S, Henley, J, Nakamura, Y & Wilkinson, K, 2019, 'Exciting Times: New Advances Towards Understanding the Regulation and Roles of Kainate Receptors'. *Neurochemical Research*, vol 44., pp. 572-584
- Fletcher-Jones, A, Hildick, K, Evans, A, Nakamura, Y, Wilkinson, K & Henley, J, 2019, 'The C-terminal Helix 9 motif in rat cannabinoid receptor type 1 regulates axonal trafficking and surface expression'. *eLife*, vol 8.
- Vijayakumaran, S, Nakamura, Y, Henley, JM & Pountney, D, 2019, 'Ginkgolic Acid Promotes Clearance of Intracellular Alpha-Synuclein Aggregates'. *Molecular and Cellular Neuroscience*.
- De Souza, ACG, Zanella, CA, Carmichael, R, Henley, J, Wilkinson, K & Cimarosti, HI, 2019, 'Effects of amyloid-β on protein SUMOylation and mitochondrial dysfunction in primary cortical neurons'. *BMC Neuroscience*.

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