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Research interests

With a diverse background in neuroscience, neuroimaging, neurobiology and development, Dr Lowe is interested in imaging populations of neurons to reveal the underlying principles of computation and organisation associated with normal and altered sensory physiology. With a comprehensive background in several modalities that includes magnetic resonance imaging (MRI), optical imaging, intrinsic imaging and electrophysiology, Dr Lowe has:

Examined supra-spinal adaptations associated with perturbed sensory processing in a neuropathic pain model.

Enabled assays of cortical processing during whisking

Conducted pharmacological assays (fMRI) in pre-clinical models of addiction and acute and neurodegenerative diseases

Derived primary visual pathways using novel agents

Characterised and quantified the functional properties and topographic organisation of the visual thalamus and superior colliculus

Examined the functional output of the retina as inputs to the optic tectum

And revealed emergent properties of the optic tectum.

Current work is focused on extending experimental and analysis techniques to investigate novel retinal encoding strategies and the topographic organisation of visual inputs to the optic tectum. Building imaging datasets that cumulatively span visual space and collectively reside within the same standardised anatomical-space will enable an *efficient* means of deriving what one 'sees' and how it is delivered to the brain. Dr Lowe's future programme of research represents the intersection of brain mapping, sensory neuroscience and informatics to derive the functional architecture underlying sensory encoding in vertebrates. It is underpinned by a belief that such integrative science makes one of the most captivating questions in science tractable – *what do the senses tell the brain?*

Research output

In Vitro Modeling of Nerve–Muscle Connectivity in a Compartmentalized Tissue Culture Device

Barcellos Machado, C., Pluchon, P., Harley, P., Rigby, M., Gonzalez Sabater Budilov, V., Stevenson, D. C., Hynes, S., Lowe, A., Burrone, J., Viasnoff, V. & Lieberam, I., 31 Jul 2019, In: *Advanced Biosystems*. 3, 7, p. 1-14 1800307.

Distance-dependent gradient in NMDAR-driven spine calcium signals along tapering dendrites

Walker, A. S., Neves, G., Grillo, F., Jackson, R. E., Rigby, M., O'Donnell, C., Lowe, A. S., Vizcay-Barrena, G., Fleck, R. A. & Burrone, J., 7 Mar 2017, In: *Proceedings of the National Academy of Sciences of the United States of America*. 114, 10, p. 1986-1995

The assembly of developing motor neurons depends on an interplay between spontaneous activity, type II cadherins and gap junctions

Montague, K., Lowe, A. S., Uzquiano, A., Knüfer, A., Astick, M., Price, S. R. & Guthrie, S., 1 Mar 2017, In: *Development*. 144, 5, p. 830-836 7 p.

Geniculo-Cortical projection diversity revealed within the mouse visual thalamus

Leiwe, M. N., Hendry, A. C., Bard, A. D., Eglen, S. J., Lowe, A. S. & Thompson, I. D., 4 Jan 2016, In: *PLoS One*. 11, 1, 11 p., A80.

Rapid Bidirectional Reorganization of Cortical Microcircuits

Albieri, G., Barnes, S. J., de Celis Alonso, B., Cheetham, C. E. J., Edwards, C. E., Lowe, A. S., Karunaratne, H., Dear, J. P., Lee, K. C. & Finnerty, G. T., 1 Sept 2015, In: *Cerebral cortex (New York, N.Y. : 1991)*. 25, 9, p. 3025-35 11 p.

Zebrafish brain mapping-standardized spaces, length scales, and the power of N and n

Hunter, P. R., Hendry, A. C. & Lowe, A. S., 1 Jun 2015, In: *Developmental Neurobiology*. 75, 6, p. 557-568 12 p.

BDNF promotes axon branching of retinal ganglion cells via miRNA-132 and p250GAP

Marler, K. J., Suetterlin, P., Dopplapudi, A., Rubikaite, A., Adnan, J., Maiorano, N. A., Lowe, A. S., Thompson, I. D., Pathania, M., Bordey, A., Fulga, T., Van Vactor, D. L., Hindges, R. & Drescher, U., 15 Jan 2014, (E-pub ahead of print) In: *Journal of Neuroscience*. 34, 3, p. 969 – 979 11 p., N/A.

A Systems-Based Dissection of Retinal Inputs to the Zebrafish Tectum Reveals Different Rules for Different Functional Classes during Development

Lowe, A. S., Nikolaou, N., Hunter, P. R., Thompson, I. D. & Meyer, M. P., 28 Aug 2013, In: *Journal of Neuroscience*. 33, 35, p. 13946-13956 11 p.

Emergent properties of the optic tectum revealed by population analysis of direction and orientation selectivity

Hunter, P. R., Lowe, A. S., Thompson, I. & Meyer, M. P., 28 Aug 2013, In: *Journal of Neuroscience*. 33, 35, p. 13940-13945 6 p.

Parametric Functional Maps of Visual Inputs to the Tectum

Nikolaou, N., Lowe, A. S., Walker, A. S., Abbas, F., Hunter, P. R., Thompson, I. & Meyer, M. P., 18 Oct 2012, In: *Neuron*. 76, 2, p. 317-324 8 p.

Lipid peptide nanocomplexes for gene delivery and magnetic resonance imaging in the brain

Writer, M. J., Kyrtatos, P. G., Bienemann, A. S., Pugh, J. A., Lowe, A. S., Villegas-Llerena, C., Kenny, G. D., White, E. A., Gill, S. S., McLeod, C. W., Lythgoe, M. F. & Hart, S. L., 10 Sept 2012, In: *Journal of controlled release : official journal of the Controlled Release Society*. 162, 2, p. 340-348 9 p.

Neuroanatomical targets of reboxetine and bupropion as revealed by pharmacological magnetic resonance imaging

Sekar, S., Van Audekerke, J., Vanhoutte, G., Lowe, A. S., Blamire, A. M., Van der Linden, A., Steckler, T., Shoaib, M. & Verhoye, M., Oct 2011, In: *Psychopharmacology*. 217, 4, p. 549-57 9 p.

Neuroadaptive responses to citalopram in rats using pharmacological magnetic resonance imaging

Sekar, S., Verhoye, M., Van Audekerke, J., Vanhoutte, G., Lowe, A. S., Blamire, A. M., Steckler, T., Van der Linden, A. & Shoaib, M., Feb 2011, In: *Psychopharmacology*. 213, 2-3, p. 521 - 531 11 p.

Regional differences in neurovascular coupling in rat brain as determined by fMRI and electrophysiology

Sloan, H. L., Austin, V. C., Blamire, A. M., Schnupp, J. W. H., Lowe, A. S., Allers, K. A., Matthews, P. M. & Sibson, N. R., 1 Nov 2010, In: *NeuroImage*. 53, 2, p. 399-411 13 p.

Real-time electrochemical monitoring of brain tissue oxygen: a surrogate for functional magnetic resonance imaging in rodents

Lowry, J. P., Griffin, K., McHugh, S. B., Lowe, A. S., Tricklebank, M. & Sibson, N. R., 15 Aug 2010, In: *NeuroImage*. 52, 2, p. 549-555 7 p.

Neither in vivo MRI nor behavioural assessment indicate therapeutic efficacy for a novel 5HT(1A) agonist in rat models of ischaemic stroke

Ashioti, M., Beech, J. S., Lowe, A. S., Bernanos, M., McCreary, A., Modo, M. & Williams, S., 2009, In: *BMC NEUROSCIENCE*. 10, 82.

Quantitative manganese tract tracing: dose-dependent and activity-independent terminal labelling in the mouse visual system

Lowe, A. S., Thompson, I. D. & Sibson, N. R., Oct 2008, In: *Nmr in Biomedicine*. 21, 8, p. 859 - 867 9 p.

Sensory inputs from whisking movements modify cortical whisker maps visualized with functional magnetic resonance imaging

Alonso, B. D. C., Lowe, A. S., Dear, J. P., Lee, K. C., Williams, S. C. R. & Finnerty, G. T., Jun 2008, In: Cerebral Cortex. 18, 6, p. 1314 - 1325 12 p.

A method for removing global effects in small-animal functional MRI

Lowe, A. S., Barker, G. J., Beech, J. S., Ireland, M. D. & Williams, S. C. R., Jan 2008, In: Nmr in Biomedicine. 21, 1, p. 53 - 58 6 p.

In vivo magnetic resonance imaging of acute brain inflammation using microparticles of iron oxide

McAteer, M. A., Sibson, N. R., von Zur Muhlen, C., Schneider, J. E., Lowe, A. S., Warrick, N., Channon, K. M., Anthony, D. C. & Choudhury, R. P., Oct 2007, In: Nature Medicine. 13, 10, p. 1253-8 6 p.

Multi-modal characterisation of the neocortical clip model of focal cerebral ischaemia by MRI, behaviour and immunohistochemistry

Ashioti, M., Beech, J. S., Lowe, A. S., Hesselink, M. B., Modo, M. & Williams, S., 11 May 2007, In: Brain Research. 1145, 1, p. 177-189 13 p.

Small animal, whole brain fMRI: innocuous and nociceptive forepaw stimulation

Lowe, A. S., Beech, J. S. & Williams, S., 1 Apr 2007, In: NeuroImage. 35, 2, p. 719 - 728 10 p.

The in vitro effects of a bimodal contrast agent on cellular functions and relaxometry

Brekke, C., Morgan, S. C., Lowe, A. S., Meade, T. J., Price, J., Williams, S. C. R. & Modo, M., Apr 2007, In: Nmr in Biomedicine. 20, 2, p. 77-89 13 p.

Mapping the effects of the selective dopamine D2/D3 receptor agonist quinlorane using pharmacological magnetic resonance imaging

Ireland, M. D., Lowe, A. S., Reavill, C., James, M. F., Leslie, R. A. & Williams, S. C. R., 2005, In: Neuroscience. 133, 1, p. 315 - 326 12 p.

Imaging localised dynamic changes in the nucleus accumbens following nicotine withdrawal in rats

Shoaib, M., Lowe, A. S. & Williams, S., Jun 2004, In: NeuroImage. 22, 2, p. 847 - 854 8 p.

Awards

Mapping the functional topography of vision in the zebrafish

Lowe, A.

Wellcome Trust: £90,799.00

7/09/2015 → 6/09/2017

Teaching Experience

•Lectures in MSc Neuroimaging and BSc Neuroscience: Systems Biology •Personal Tutor •Steering Committee for Biomedical Sciences •Administration of module assessments •PhD student due to complete 09/15 – joint primary supervisor •New PhD student expected 09/15 – primary supervisor.

Skills

•Home Office personal and project licence holder. •Experience in mouse, rat, ferret and zebrafish model systems. •Extensive surgical and behavioural experience. •In depth knowledge of several imaging platforms: MRI, confocal and 2-photon imaging,multi-unit electrophysiology and optical imaging. •Health and Safety Officer Experience. •Extensive programming skills in C, UNIX, LINUX, Labview and Matlab.