AIRY BEAM LIGHT SHEET FOR NEUROSCIENCE

George Chennell[1], Robert Chester[1], James Crowe[1], Dwaipayan Adhya[1], Rouqi Yang[1], Iain. A. Watson[1], James Seyforth[2], Pedro Almada[2], Neveen Hosny[2], Robert Forster[2], Anthony Vernon[1,3], Deepak Srivastava[1,3].

[1]Basic and Clinical Neuroscience Dept, King's College London, 5 Cutcombe Road, SE5 9NU, UK.
[2] M Squared Life, The Surrey Technology Centre, 40 Occam Road, Guildford, Surrey, GU2 7YG United Kingdom
[3]MRC centre For Neurodevelopmental Disorders, King's College London

Email: george.chennell@kcl.ac.uk

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The use of airy beams provides light sheets with a large field of view of excitation. This beam is non diffractive over a much greater range than Gaussian or Bessel beams[1]. We present the use of the Aurora light sheet microscope to image GFP expressing neurons in Tg(Thy1-GFPM)2Jrs/J Mice. These express GFP in a subset of layer 5 neurons throughout the neocortex and subcortical regions; labelled neurons are ideal for morphological studies. Subcortical tissue which included the striatum was optically cleared using CLARITY. Subsequently, images of GFP positive cells in the striatum were acquired and processed using the microscope and included deconvolution software (Fig. 1). This data is then used for neuronal branching analysis. Furthermore, we have tested the use of this system to image cortical spheroids derived from human induced pluripotent stem cells. These data allowed us to examine the development of neural tube-like structures within cortical spheroids. These data demonstrate the ability of this airy light sheet to quickly acquire large volumes in tissue at high resolution. This allows for detailed reconstruction of morphological parameters in a number of different sample preparations. In addition, this system is capable of imaging of live cell imaging data with rapid volumetric time lapse.

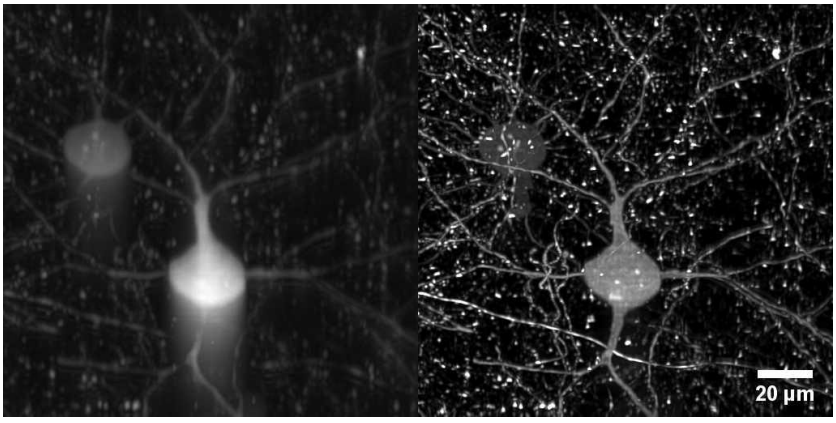

Figure 1 – XZ Maximum projection of data before (left panel) and after deconvolution (right panel).

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