Novel modernisation of Golgi-Cox stain and its optimisation of tissue clearing

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High resolution neuronal information is extraordinarily useful in understanding the brain's functionality. Development of the Golgi"Cox stain allowed observation of the neuron in its entirety with unrivalled detail and remains still one of the best ways to visualise a neuron. However, the Golgi"Cox method is restricted by tissue transparency, so imaging is typically 200um in depth using confocal microscopes.

Within recent years, modern tissue clearing techniques such as CLARITY and CUBIC have been used to great effect, completely clearing tissue. Currently, there is no literature on the combination of Golgi"Cox and modern tissue clearing. The application of a Golgi"Cox stain to cleared brain tissue would allow complete neurons to be 3D rendered within intact biology, offering the most accurate data on neuron morphology.

We aim to modernise the Golgi"Cox stain, by combining with modern clearing techniques, and visualizing with multiphoton microscopy, which has the advantage of deeper laser penetration, penetrating up to 2 mm. This will rectify the restrictions currently imposed by the Golgi"Cox stain and lead to even greater neuron resolution, allowing for improved 3D rendering and morphology visualisation.