



UNLOCKING
CONSCIOUSNESS



BRIAN MIND FORUM

Appendix 031

Scanning systems

There are a number of scanning systems. Some can scan living cells, others only on dead brain minds.

Early systems like the Electro EncephaloGraphy (EEG) can measure electrochemical activity in live brains.

Others use variations on the principles of X-Rays.

Magnetic Resonance Imaging MRI and the derivative functional MRI (Real Time) or *f*MRI can measure the oxygen uptake of targeted areas of the brain. *f*MRI can do this so fast that the microsecond by microsecond activity of the brain can be scanned as it occurs.

Optogenetics has made great breakthroughs. The principal is that phosphates can be introduced into neurons, thus laser beams can cause active individual neurons to 'light up'. Karl Deisseroth at Stanford University, who led the team who was responsible for Optogenetics has recently published a way of studying brain structure in minute detail, giving insight into the biology of the brain and its disorders. Using a technique called *Clarity* (Clear Lipid-exchanged Acrylamide- hybridised Rigid Imaging immunostaining in situ hybridisation compatible Tissue- hYdrogel) it is possible to remove all the extraneous cells like fats (lipids) from post mortem brains just leaving the neural tissues in a form in which they can be viewed

MRI Magnetic Resonance Imaging

*f*MRI functional MRI (Real Time)

CAT Computed axial tomography

PET Positron Emission Tomography

MEG MagnetoEncephaloGraphy Physics World 41 May 2013

SQUIDS Superconducting Quantum Interference Devices. Based on Josephson Junctions. Measures magnetic fields at the Femtotesla scale 10^{-11} Tesla.
 The neuromagnetic field 10^8 times smaller than the Earth's magnetic field

EEG Electro EncephaloGraphy

Electrocorticography

Oedema: Hydrogels

NS 35 7June 2014

2 Photo Microscopy

[Sci Am 44 June 2013]

Gamma oscillations 40-60 Hz [can be 30 – 100 Hz]

GABA Gamma Amino Butyric Acid. Inhibitory neurotransmitter.

Neuronal Assemblies

Matt Brookes Nottingham.

Physics World May 2013 p 39

fNIRS Functional Near- infrared Spectroscopy

NS p22 23 Feb 2012

Optogenetics

Sci Am p 28 Oct 2012

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Alpha Waves: Prefrontal Cortex 10Hz
 Circadian Rhythms

Mind p27 August 2012

fMRI Blood Flow. Energy

Mind p 63 Sep 12

Neuron Firing

Sci Am p28 Oct 2012

Spiny Stellate Neurons

Neuron reception field

Basket Cells

100 Hertz

Theta Band 4-8 Htz

Transcranial Magnetic Stimulation Designed to stimulate specific localised brain areas to treat depression, post traumatic stress and migraines Foer p225

2018 // Book Final // Appendices NEW // 031 Scanning Systems