The Human Brain

Winston Ingram

***in*focus contributor and Fellow of the RMS Winston Ingram recently turned his attention to the circuitry of the human brain. Using a series of original MRI scans, Winston sought to enhance the detail contained within them using a combination of experimental microscopy techniques.**

Winston writes:

If we look at the human brain as a computer, it must have many electrical circuits and microcircuits. There is clearly much to learn in terms of identifying the various components, voltages, and how they travel to the different parts of the body to allow us to move, think, reason, learn and complete the many functions of the human mind and body. When these voltages go wrong, owing to mental or physical problems, might it one day be possible to find a way that is simple and not invasive to correct the voltages and restore them to their original values?

With a lot of experimentation I have found a way to show up the inner parts of the human brain. Though it may take many years of research by experts in the different fields we wish to treat, I hope I have opened the door with my experimental work to show the circuits and microcircuits in great detail.

These images were achieved using monochrome MRI scans. I first took the sheets and cut the brain images into small samples in order to get them under my microscope. I used my stereo microscope which I have modified to enable all the techniques – Fluorescence, Polarisation, Bright Field, Dark Field and Phase Contrast. This allows for mixing – e.g. Fluorescence with Phase, Polarisation with Fluorescence, among other combinations. I modified and built power supplies to enable upper and lower lighting to be used together. I then combined multiple microscopy techniques to colour, and also increase focus, contrast and depth of field. I mixed Polarisation with Fluorescence, Phase Contrast with fluorescence, some with Dark field, and in some cases, three techniques together. – e.g. Fluoresecence, Polarisation and Dark Field. The work was completed in Photoshop CS3.

This approach allows many colour variations and lighting, bringing out more detail than was previously visible in the originals.

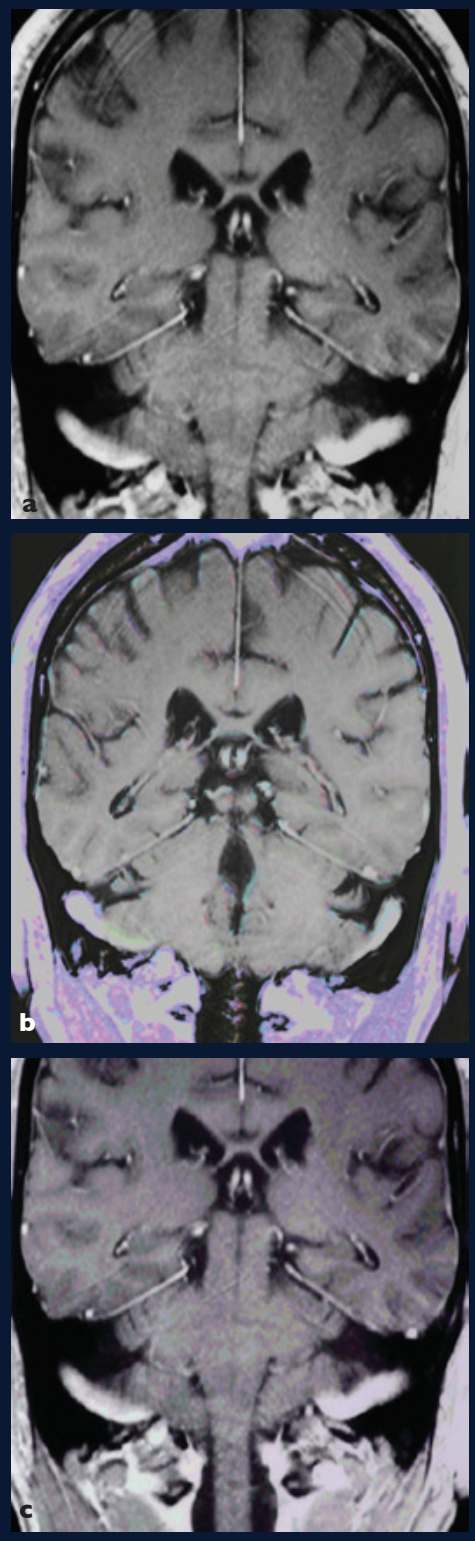


Figure 1. Original frontal brain scan (a) alongside new versions (b) and (c)

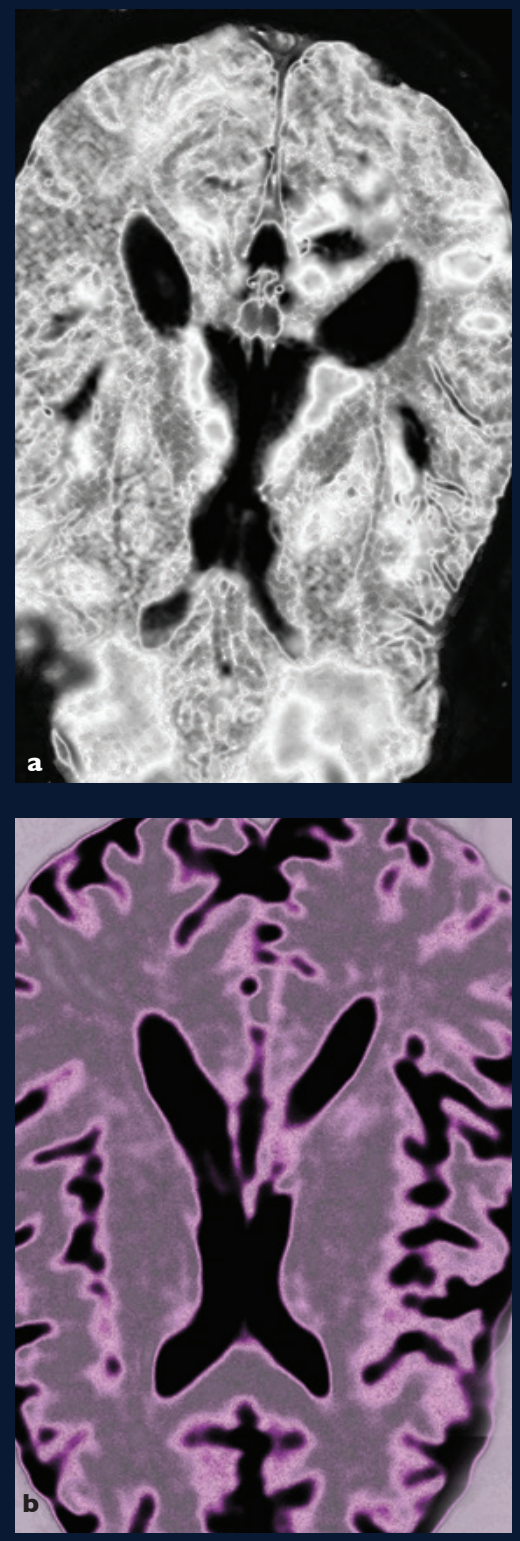


Figure 2. Hypothalamus original scan (a) alongside a new version (b)

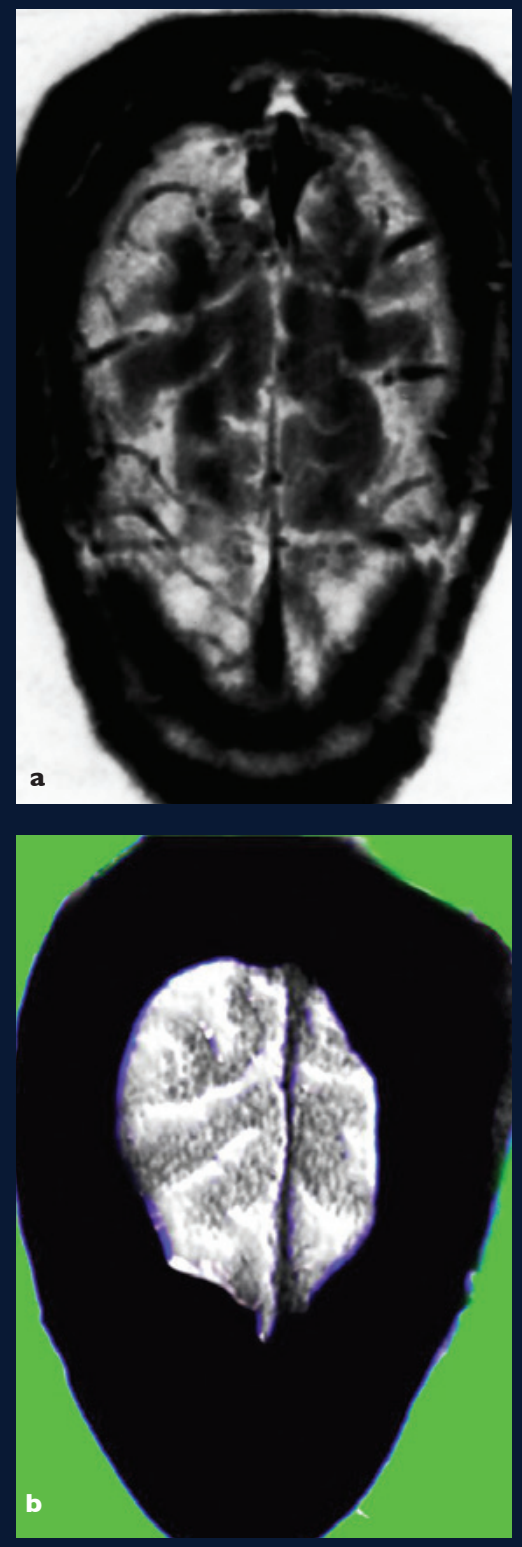
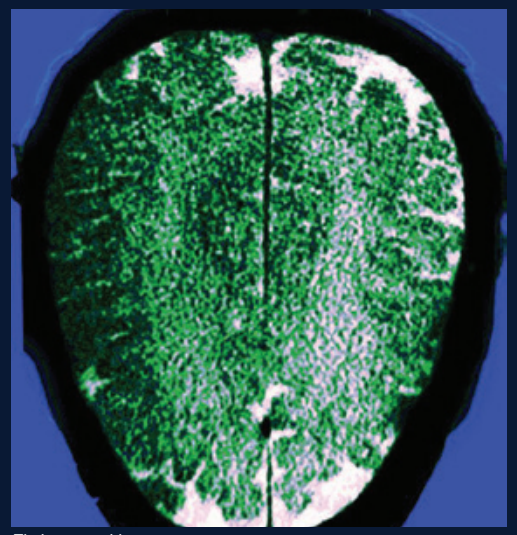
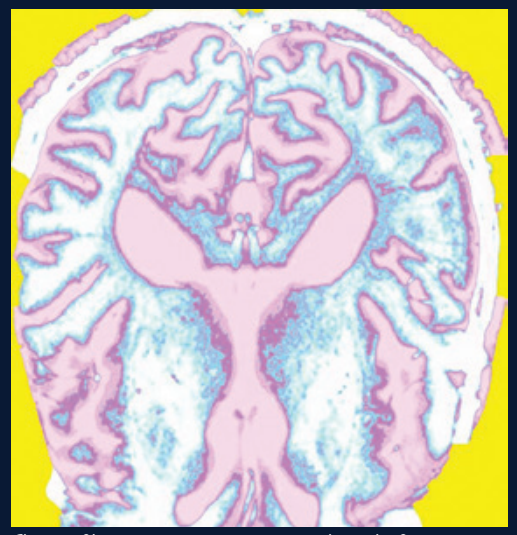


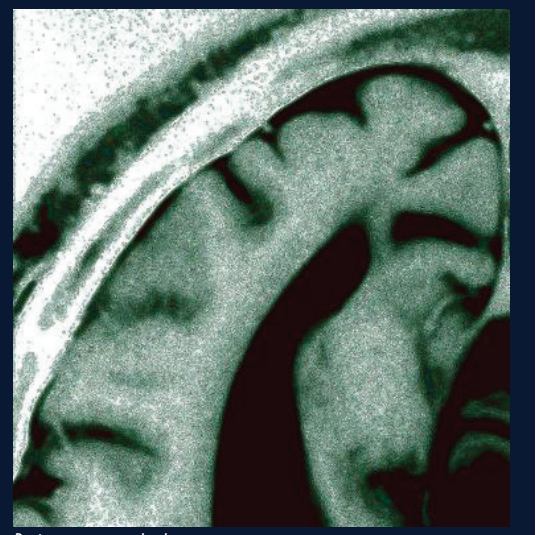
Figure 3. Thalamus original scan (a) alongside a new interpretation (b)



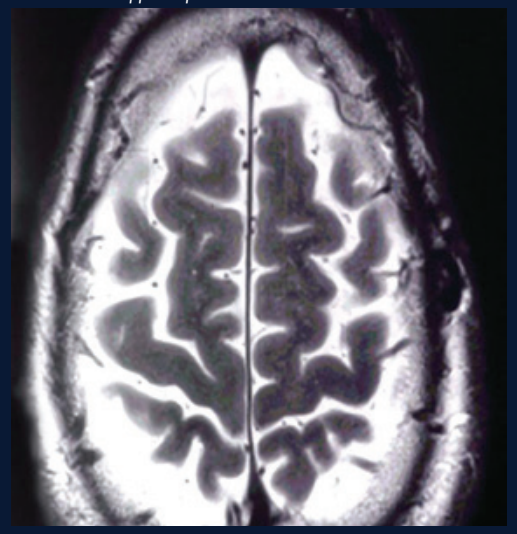
Thalamus and hippocampus



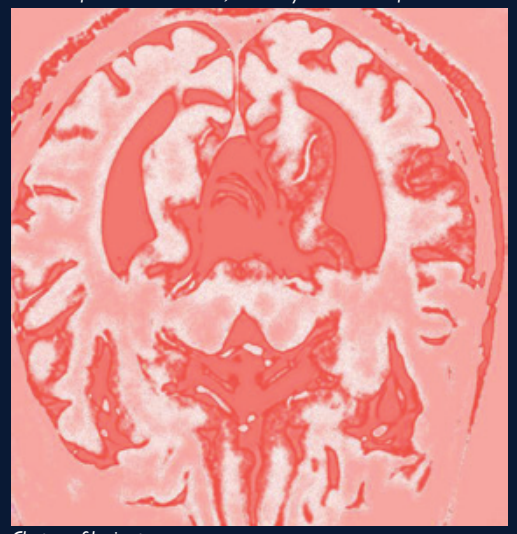
Clusters of brain stem neurons, excitatory and reticular formation



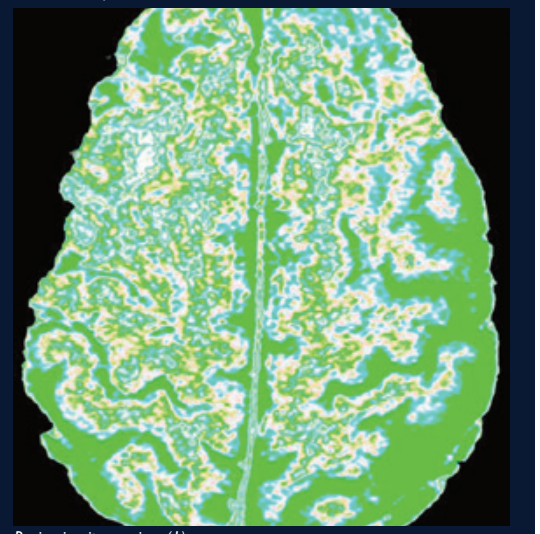
Brain texture, cerebral cortex



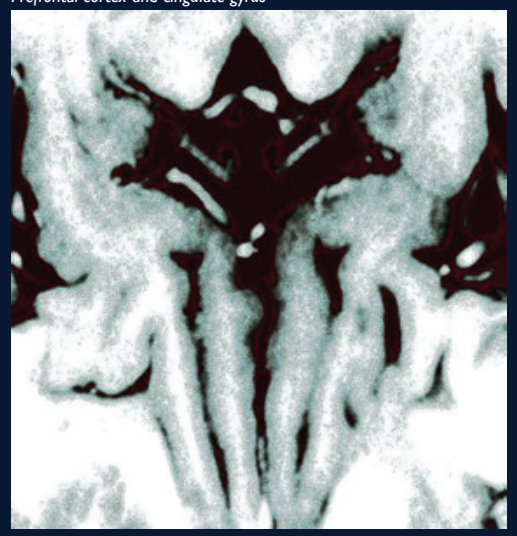
Prefrontal cortex and cingulate gyrus



Clusters of brain stem neurons

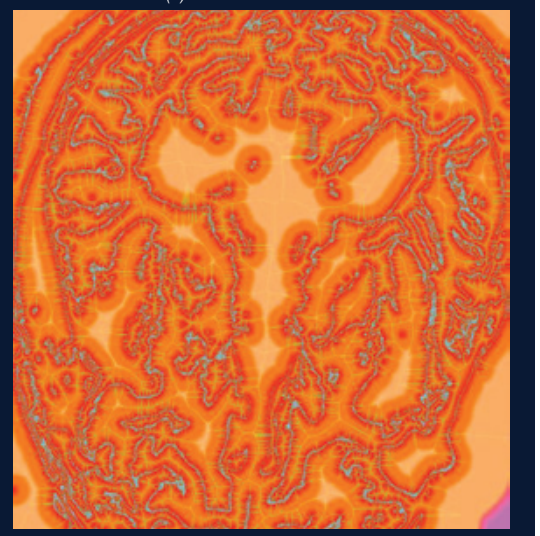


Brain circuit overview (1)



Hypothalamus and mid-brain

Cerebral white matter



Brain circuit overview (2)

About the author

Winston Ingram was born in 1940, and from an early age developed an interest in Science and Photography.

He went into private practice in 1978, working freelance for various companies, and teaching scientific, medical and technical photography. He retired in 2002 and started producing books using photo microscopy as an art form. He likes to explore different techniques with the microscope, and also mix the various facilities available.