Celebrating the past and imaging the future

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Breaking down the barriers to our understanding of the key events in the neurobiological processes responsible for neurodegenerative diseases and mental disorders is emerging as one of the most intriguing and important challenges of the new century.

Last year's Nobel Prize for Physiology or Medicine was awarded to two scientists whose contribution to the development of medical imaging was to perfect a technique called nuclear magnetic resonance, thereby giving us magnetic resonance imaging (MRI).
Indeed, before the hunches and the work of Paul Lauterbur and Peter Mansfield doctors struggled to examine organs and soft tissue using X-rays. Today clinicians and medical researchers can readily view details of the internal structure of a patient's entire body.

In particular, contemporary technological progress has made structural and functional neuroimaging a reality, and thus paved the way for experiments and observations that were once quite inconceivable.
A wealth of data, now under scrutiny in the spheres of neurophysiology and neuropathology, are not only helping to further our understanding of the contribution of genetic background and environmental conditions to the expression of phenotypes in neurological diseases and mental disorders, but also making it possible to monitor the progression, negative or positive, of the pathology in the single patient.

However, as has recently been stressed, data are not yet knowledge and knowledge has yet to be transformed into understanding. Neuroimaging must be combined with many other branches of neuroscience, ranging, for instance, from genetics to molecular biology and behaviour.
And neuroimaging is certainly not the exclusive prerogative of brain cartographers. It also plays a vital role in the clinical arena. Structural and functional MRI have dramatically altered attitudes towards mental illness by providing a neurobiological context for understanding schizophrenia, depression, and dementias.
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However, the new year now upon us will see us not only considering this bright future, but also celebrating important anniversaries and significant achievements of the recent past. One need only consider the editorial, "Breakthrough of the Year", published in the December 19, 2003 issue of Science magazine: "At the top of life sciences (in 2003) was a mix of studies implicating particular genes in mental illness and mood disorders, including impressive evidence that one of these combines with early-adult environmental stress to increase the risk of depression".

Most important for biology and medicine, 2004 will bring the 100th anniversary of the publication of the third and last volume of Santiago Ramon y Cajal's "Histologia del sistema nervioso del hombre y de los vertebrados" (1904), in which, says a commentary recently published in Nature, "…. he proved the individuality of neurons, untangled their interconnections with the central nervous system, and set the framework for modern neuroscience" ("1904 and all that" Nature, 18-25 December 2003).

“Above all,” wrote Cajal in his autobiography, “I wanted my book to be – please excuse the presumption – a trophy to be laid at the feet of our prostrate national science and an offering of fervent devotion by a Spaniard to his scorned country”.
Cajal, who shared the 1906 Nobel prize for Physiology or Medicine with Camillo Golgi, the inventor of the staining methods they both used, also left us another remarkable book, “Advice for a Young Investigator”.
Every young physician or biologist involved in medical research would be well advised to read carefully, and to assimilate Cajal’ s important message.
“In my own view, some advice about what should be known, about what technical education should be acquired, about the intense motivation needed to succeed, and about the carelessness and inclination toward bias that must be avoided is far more useful than all the rules and warnings of theoretical logic”.