Newsdesk

Epidemiological evidence for toxoplasma chorioretinitis as mostly acquired infection

For decades the generally held view among ophthalmologists has been that toxoplasma infections of the retina and choroid were mostly congenitally acquired and that presentation of active disease during adulthood represented a reactivation of the disease. These beliefs were based on calculated and predicted rates of infection—for instance, by Perkins in the late 1960s, who studied records of patients with disease in the London boroughs. However, the advent of AIDS and the high risk of development of toxoplasmic chorioretinitis among other low virulence infections has led to a re-examination of how toxoplasma is acquired in adulthood. Indeed, it would now appear that acquired infection is a commonly accepted route of infection by many countries in Europe and the South American continent where the infection of oocysts is likely from infected meat products. At the most recent ARVO, several new aspects concerning toxoplasma infection were presented during a mini-symposium session. Firstly, it is now considered that seroconversion to toxoplasma antigen probably represents the period of most recent infection and this usually occurs in childhood or early adulthood. Several strains of *Toxoplasma gondii* exist and their virulence is related to their nuclear genome but precisely how the organism induces cellular immunity is at present something of a puzzle since it appears to evade both the classic MHC class I and II pathways. Interleukin 10 and interleukin 4 appear to be important in protection from the severe effects of disease since mice deficient in these cytokines are more susceptible to severe lethal infection. The most convincing evidence concerning acquired versus congenital routes of infection came from C Gilbert who presented the results of a prospective study of toxoplasma infection in four regional health authorities in England and Wales. In this study it was shown that the peak of infection occurs around 10–40 years and that West African individuals are particularly susceptible. Calculations based on facts such as the age at first presentation and the overall lifetime risk of developing toxoplasmosis suggest that acquired infection is overwhelmingly more likely than congenital infection and that genetic background is a major regulator of disease susceptibility.

Realising our full potential

A recent report in *Nature* (News and views, 1999;**399**:211) commenting on a paper by Snyder and Mitchell (*Proceedings of the Royal Society of London B* 1999;**266**:599) has highlighted neatly how studies of the behaviour of autistic savants combined with functional MRI (fMRI) can provide insights into how the normal brain may work. Apparently, autistic savants with special skills, such as abilities in mental arithmetic or instant reproduction of musical pieces after a single hearing, use what is known as low level processing in regions of the brain where function may be "automatic". Many of these studies in the past have utilised a range of techniques evaluating visual functions and the question is how are the many simultaneously received sensory inputs processed—for example, for form, colour, texture, space, etc (similar divisions of labour occur, for instance, in auditory processing)? Event related brain potentials measured by fMRI indicate that processing for the first 100–150 ms occurs at a low level and then is subject to conscious input which regulates how the information is to be perceived. In visual attention studies the first 50 ms are used to receive "basic" information—that is, how many objects there are, what is their locality, shape, etc; during the next 70–100 ms, features such as motion disparity, symmetry, colour, and other features are processed. From 100 to 140 ms, information concerning contours, patterns, etc, is extracted. Then the conscious overlay "kicks in" and in the normal individual much of the early information is "suppressed". However, in autistic savants, these later events are absent and thus memory for the early stages of processing is intact and sometimes reproducible. According to the authors it is possible for normal individuals to utilise these low level processing abilities more fully with the use of appropriate training techniques.

Activated factor XII (AFT) a better marker of thrombosis than fibrinogen or factor VIIc

An association between blood lipids and risk of coronary vascular disease has long been established but precisely how this link was formed has been unclear until recently. Factor XII is a known component of the clotting cascade and is activated by tissue injury—for example, from damage to the endothelium during rupture of an atheromatous plaque. However, it has now been shown that there is a correlation between blood lipid levels per se and activated factor XII (*Arteriosclerosis, Thrombosis and Vascular Biology* 1999; **17**:2103–6) and it appears that certain types of soft lipid can directly activate factor XII, thus initiating intravascular coagulation. Furthermore levels of activated factor XII appear to correlate with risk of cerebrovascular disease (CVD) more closely than levels of fibrinogen or activated factor VIIc, both of which are involved in the coagulation process. High fibrinogen levels are also know to be associated with certain forms of retinal vascular occlusion but the predictive, or even the diagnostic, value of the test has not been strong. However, as for CVD, it may well be possible that AFT levels are a better predictor of retinal vascular occlusive disease and may be worth investigating in an appropriate cohort of patients.

Visual attention located to the primary visual cortex

The use of fMRI (see Realising our full potential, above) has delineated the site of many physiological cortical visual processes and will continue to provide new information for a considerable time to come. One area of intense current interest is visual attention. As reported by Sengpiel and Hubener (*Current Biology* 1999;R318–R312), our interpretation of the sensory input (the retinal image) is as important as the image itself in how we view the external world (almost a metaphysical statement!). Ingenious techniques for the analysis of visual attention (see figure 1 in the paper by Sengpiel and Hubener) indicate that there is a hierarchy of cues, some objects being easily discriminated from distractors while others require object by object evaluation to identify the distinguishing features (eg, colour, shape, orientation, etc). Visual attention tasks may be performed as overt events, in which eye movement is directed towards the target, or covert, in which fixation is kept steady but object discrimination is still possible. fMRI studies conducted using covert techniques eliminate the effect of eye movement and thus small object displacements on the interpretation of the image. Recent studies have shown that contrary to previous reports, visual attention tasks of this nature involve retinotopic distribution in the primary visual cortex and further showed that attention in one area is accompanied by reduced activity in other areas, in a kind of push-pull technique. Intuitively, it would appear that such mechanisms function in the visual cortex since most of us find it difficult to pay attention to more than one or two things at a time. According to the authors, the organisation of these mechanisms appears to occur in a "top down" manner with central control probably exerted by the primary visual cortex but receiving edited or "gated" information from other regions such as M-T or the pulvinar.

Wellcome Trust Audit of neurosciences research activity in the UK

The Wellcome Trust, the world's largest independent medical charity, recently published an audit of neuroscience research activity in the UK (The Wellcome Trust, An Audit of Research Activity, March 1999). The study comprised a survey of the burden of neurological disease both worldwide and in the UK, a survey of the funds available for research, a bibliometric analysis of publications, and an opinion poll of neuroscience experts, culminating in a workshop. The main findings were that neurological disease represents a major burden for developed countries more than third world countries, and that the economic burden for the UK is considerable with mental disorders representing the greatest burden (accounting for approximately 25% of the total payments for sickness and disability in 1990–1). Several initiatives are already in place worldwide to combat this level of disease such as the USA's "Decade of the brain" and the Japanese "Human frontier science" programme. The UK also funds several programmes through the research councils and the medical charities. Some areas for special attention in the UK were identified, such as maximum exploitation of research findings and incentives for initiation of high quality clinical research. A need for a multidisciplinary approach, new scientific opportunities, and application of the many modern approaches to both basic and clinical neuroscience, such as genetic technology and fMRI, were identified during the workshop.

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