A Japanese Macaque Virus Model for Multiple Sclerosis

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Technology description

There is considerable interest in the investigation of the mechanism of this disease and in the improvement of diagnosis and assessment of prognosis. Multiple sclerosis is not well characterized and no cure exists. Therapeutic agents are in continual development, and there is a need in much of this research for animal models related to disease processes, including demyelination/remyelination, inflammation, and axonal pathology. Several virus-induced and autoimmune models have been used to study the underlying mechanisms of myelin destruction in MS. These models include demyelinating diseases induced by infection with mouse hepatitis virus, Sindbis virus, Semliki Forest virus, herpesvirus, or Theiler's murine encephalomyelitits virus, as well as immunization with CNS autoantigens. Although these models have provided a wealth of knowledge about mechanisms of inflammatory demyelination and are attractive parallel models for human MS, their direct relevance to MS is unknown.
The current invention concentrates on a model of MS in Japanese macaques. Demyelinating encephalomyelitis with morphologic features similar to MS has been observed in these animals with the cause being of viral origin. Clinically, the disease is characterized by acute onset paresis or paralysis involving one or more limbs in robust, healthy animals that lack evidence of chronic disease. The severity is variable ranging from limb weakness to tetraparesis. Cerebrospinal fluid analysis generally reveals moderate to marked pleocytosis dominated by lymphocytes and elevated protein. The propensity of the chronic lesions to occur only in the white matter of these animals, their inflammatory demyelinating character and variable age are recognized features of MS. Therefore, these animals represent the nearest non-human model for the study of MS and evaluation of new potential MS therapeutics.
Market Summary
It is estimated that over 350,000 Americans (approximately 1 in 1,000 aged over 30 years) live with MS and approximately 3 million live with it worldwide. However, the prevalence may be higher because of the uncertainty in diagnosing the condition. Women are twice as susceptible as men and it is more common in people in northern latitudes over the age of 18 years. In addition, siblings of an individual with multiple sclerosis have a higher chance of developing the disease.
The incidence of MS varies throughout the world, although there is a significantly higher incidence of the disease found in the northern hemisphere. Multiple sclerosis is the most common cause of neurological disability in young adults in the UK.

It is variable in presentation and progression. Although there is no cure, there are many symptomatic treatments available. However, many patients do not respond to currently available products (30%) and the more chronic forms (secondary-progressive MS) are poorly treated with existing therapies.
The MS market is estimated to be worth US$4.9 billion in 2006 with a growth rate of 8.9% year-on-year. It is the fifth largest segment of the CNS market and has attracted considerable R&D investment from big pharma, biotechnology companies and specialty pharma. The market is currently driven by the use of six disease-modifying agents: Avonex (Biogen Idec), Betaseron/Betaferon (Schering AG), Copaxone (Teva), Novatrone (Schering AG), Rebif (Serono/Pfizer) and Tysabri (Biogen Idec/Elan).
Sales growth will be driven by current drugs gaining broader indications, MS medicine being prescribed earlier in treatment in clinically-defined multiple sclerosis patients and the longer-term use of combination therapies as more classes of drug become available.

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