A DELETION IN THE CHEMOKINE RECEPTOR 5 (CCR5) GENE IS ASSOCIATED WITH TICK-BORNE ENCEPHALITIS

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Background: Tick-borne encephalitis (TBE) virus, belonging to the flavivirus family, is endemic in many areas of Europe and Asia. The virus is mainly transmitted to humans by Ixodes ricinus and I. persulcatus ticks. Infections with TBE virus can be asymptomatic as well as result in moderate to severe injuries of the central nervous system. The reasons for differences in severity of symptoms between individuals are not clear, but we have recently published observations showing that a deletion in the gene encoding the chemokine receptor CCR5 is associated with increased susceptibility to TBE among Lithuanian patients (1). CCR5 affects the migration of leukocytes and the deletion may cause impaired leukocyte trafficking to the brain, leading to increased viral load and more severe disease.

Objectives, methods & results: To confirm our findings we have used pyrosequencing to analyze a Swedish material of 36 TBEV infected individuals with meningitis or encephalitis. Our new results confirm that the mutated CCR5 allele is associated with increased susceptibility to TBE (P=0.02) and homozygous carriers of the mutated allele were found significantly more frequently among TBE patients (n=165) than controls (n=399) (P=0.03).

Clinical data indicated that the Swedish patients were low producers of IL10 and therefore three mutations in the 5' UTR of the IL10 gene (-1082, -819 and -592) were analysed. The low producing phenotype (IL10 -1082 AA) was found more often among patients (n=31) than among controls (n=307), but the difference was not significant (P=0.23).

Conclusion: In summary we show that a deletion in the CCR5 gene is associated with increased susceptibility to TBE both in Lithuania and in Sweden. Experimental studies in a mouse model lacking CCR5 are currently ongoing.

References: (1) Kindberg E et al., A Deletion in the Chemokine Receptor 5 (CCR5) Gene is Associated with Tickborne Encephalitis. JID. 2008:197, 266-9