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Association of human endogenous retroviruses with multiple sclerosis

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Retroviruses can cause demyelinating diseases in sheep, mouse, macaque and man. In these cases, the retroviruses involved are contagious and propagate horizontally.

Recently, we described MS to be genetically associated with the endogenous retroviral locus HERV-Fc1, located on the X-chromosome (Nexø et al (2011) 6:16552). The association could be reproduced in several cohorts, encompassing a total of 1697 cases and 2828 controls. Also, we have described that expression of HERV-Fc1 RNA is 4-fold higher in plasma from MS patients with recent attacks, compared to patients in stable remission and from controls ($p = 0.001$) (Laska et al (2012) J. Virol., 86:3713-22). Thus, multiple sclerosis seems caused in part by endogenous retroviruses that are passed vertically as part of the chromosomes.

HERV-Fc1 has a defective pol gene. Therefore, a second virus may contribute to the activity. A statistical search showed that a virus, HERV-K13, on chromosome 19 interacts strongly with HERV-Fc1 in association to disease ((p-interaction) = 0.0003). Quantification of HERV-K13 RNA in plasma from MS patients and controls shows that this virus is approximately 4 fold increased in MS patients, in particular in those in a stable state ($p = 0.004$), but also in patients after attacks ($p = 0.03$) (Nissen et al (2012) manuscript in prep). Thus, expression of HERV-K13 seems associated with disease in general, while expression of HERV-Fc1 is specifically associated to attacks. These results move the association of retroviruses with MS from a result of purely scientific interest to a result with potential implications for the patients.

Biography

BAN holds a PhD from University of Copenhagen. He performed postdoctoral studies at The Johns Hopkins Medical School. He worked for a number of years at Novo Nordisk Inc, where he contributed to the development of NovoSeven®. For the last decade he has been an associated professor at Biomedicine, Aarhus University, Denmark. He has 90 publications in journals and monographs.

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