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1: [J Alzheimers Dis.](#) 2004 Dec;6(6):639-49; discussion 673-81.



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## Borrelia burgdorferi persists in the brain in chronic lyme neuroborreliosis and may be associated with Alzheimer disease.

[Miklossy J](#), [Khalili K](#), [Gern L](#), [Ericson RL](#), [Darekar P](#), [Bolle L](#), [Hurlimann J](#), [Paster BJ](#).

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The cause, or causes, of the vast majority of Alzheimer's disease cases are unknown. A number of contributing factors have been postulated, including infection. It has long been known that the spirochete *Treponema pallidum*, which is the infective agent for syphilis, can in its late stages cause dementia, chronic inflammation, cortical atrophy and amyloid deposition. Spirochetes of unidentified types and strains have previously been observed in the blood, CSF and brain of 14 AD patients tested and absent in 13 controls. In three of these AD cases spirochetes were grown in a medium selective for *Borrelia burgdorferi*. In the present study, the phylogenetic analysis of these spirochetes was made. Positive identification of the agent as *Borrelia burgdorferi sensu stricto* was based on genetic and molecular analyses. *Borrelia* antigens and genes were co-localized with beta-amyloid deposits in these AD cases. The data indicate that *Borrelia burgdorferi* may persist in the brain and be associated with amyloid plaques in AD. They suggest that these spirochetes, perhaps in an analogous fashion to *Treponema pallidum*, may contribute to dementia, cortical atrophy and amyloid deposition. Further in vitro and in vivo studies may bring more insight into the potential role of spirochetes in AD.

PMID: 15665404 [PubMed - indexed for MEDLINE]

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- ▶ Alzheimer's disease--a spirochetosis? [Neuroreport. 1993]
- ▶ Beta-amyloid deposition and Alzheimer's type changes induced by *Borrelia* spirochetes. [Neurobiol Aging. 2006]
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