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<td>Author(s)</td>
<td>Balint, G. A.</td>
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<tr>
<td>Citation</td>
<td>地帯医学 Tropical medicine 39(2). p39-44, 1998</td>
</tr>
<tr>
<td>Issue Date</td>
<td>1998-01-10</td>
</tr>
<tr>
<td>URL</td>
<td><a href="http://hdl.handle.net/10069/4738">http://hdl.handle.net/10069/4738</a></td>
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Central and Peripheral Neurological Abnormalities in HIV-Infection.

G. A. BALINT*

Abstract: This short review directed the attention toward the central and peripheral neurological disorders associated with human immunodeficiency virus infection. The probable pathogenesis and possible treatments are also mentioned briefly.

Key words: Human immunodeficiency virus, AIDS, neurology

INTRODUCTION

Soon after becoming infected with HIV, - after the state of incubation,- some people have an acute, self-limiting illness, practically indistinguishable from many other mild viral disease. (HIV-positive status, or "latency").

Mild neurological symptoms may occur,- headache with or without nausea and/or vomiting and rarely encephalopathy or neuropathy can be seen.

Abbreviations:
ADC: AIDS dementia complex;
AIDS: Acquired immunodeficiency syndrome;
AZT: Azidothymidine, "Zidovudine";
CD4+ cells: Lymphocytes of thymus origin, with helper phenotype;
CMV: Cytomegalovirus;
CNS: Central nervous system;
CSF: Cerebrospinal fluid;
ddC: Dideoxycytidine, "Zalcitabine";
ddI: Dideoxynozine, "Didanosine";
EBV: Epstein-Barr virus;
HIV: Human immunodeficiency virus;
HSV: Herpes simplex virus;
PML: Progressive multifocal leukoencephalopathy.

Received for publication, August 10, 1997.
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HIV can be isolated from blood and CSF of these patients, and the route of entry of the virus into the CSF is not certain. Most probably the virus gains entry to the CNS early in the course of the disease by macrophages and CD4+ lymphocytes.

There are data available that symptomatic acute-stage infection has a significantly higher risk of developing fully-blown AIDS than that of a symptomless carrier-state, and clinical presentation of AIDS with neurological features is associated with a worse (short-term) prognosis.

In this short review the author wants to direct the attention toward the central and peripheral abnormalities which usually may develop (after the latency) in the nervous system in due course of HIV-infection.

**CLINICAL CONSIDERATIONS**

The neurological changes associated with HIV-infection can be classified as follows:
- Encephalopathies;
- Meningitis;
- Myelopathy;
- Peripheral nerve disease;
- Muscle disease.

![Diagram of AIDS progression](image)

Development of the AIDS dementia complex and other neurological complications in relation to stage of HIV-1 infection

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<th>Central nervous system events</th>
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<td>Anti-HIV-1 immunity</td>
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<td>HIV-1</td>
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Encephalopathies.

A. ADC or HIV-associated cognitive-motor complex, which is basically a diffuse encephalopathy, is the most feared of the neurological consequences of AIDS.

The clinical presentation is as a subacute subcortical dementia, with slowness of thought, loss of initiative and poor memory.

The exact pathomechanism of this dementing status is not known. Atrophy is present in about 90 per cent of the cases. Moreover there are macrophages and microglia in abundance, forming characteristic nodules of HIV-encephalitis. According to recent data there is neuronal loss in the cortex, brainstem and basal ganglia, - together with some predictive markers of ADC. (4, 8, 9.)

ADC usually leads to death in couple of months from the onset (16).

It is believed that HIV infects only the microglia, lymphocytes and perhaps endothelial cells in the CNS and a current tenet states that the neuronal death together with dementia are secondary to the replication of HIV in the macrophages (18).

Therapeutic possibilities are (very) limited. AZT in high doses (over 1000 mg/day) may beneficial in ADC. The value of other agents with similar mechanism of action as of AZT, - dDC, ddI, etc., - is not established yet similarly to aevirdine. (5, 20, 24, 27.)

Associated opportunistic infections, - like CMV or Toxoplasmosis, - may produce also encephalitis in due course of HIV-infection. (21, 26.)

B. Primary CNS lymphoma associated with HIV-infection goes together with very advanced immunodeficiency and very low CD4+ cell-count. The tumour is very aggressive, widespread and multifocal, - with poor prognosis. Most patients have no longer life-span than 2 months.

Treatment with radio-, and/or chemotherapy is unsuccessful and high dose steroids will produce only a temporary improvement (2, 22).

It is worth mentioning that primary CNS lymphoma in AIDS is associated with EBV in all cases so far investigated (7).

C. PML is a rapidly progressive central demyelinating disorder in HIV-infection related to the ubiquitous papova virus: JC-virus. The clinical symptoms are similar to an aggressive multiple sclerosis and include hemi-, and para-paresis, visual defects and ataxia together with dementia. The survival-rate is about 3 months in 50 per cent of the cases from diagnosis. There is no proven treatment so far. (3, 11, 13, 14.)

Meningitis.

HIV is present in the lymphocytes in about 20 per cent of the cases. The CSF is usually abnormal, showing a raised protein and oligoclonal bands (15). Patients may experience recurrent episodes of an aseptic meningitis (1, 18.)

It is notable that meningitis may also be due to other causes than HIV, e. g. cryptococcosis, tuberculosis, HSV, fungal infections, etc. (Opportunistic infections.) (6, 18, 28.)

Myelopathy.

There are at least three forms of myelopathies associated with HIV-infection:
- Vacuolar myelopathy: The clinical symptoms are of a slowly (subacutely) progressive spastic-ataxic paraparesis (17);
- Degeneration of the gracile tracts, which may be associated with dorsal root ganglion necrosis (23) and finally:
- HIV-associated (multinucleate giant cell) encephalitic changes may extend into the spinal cord (18).

Peripheral nerve disease.
A wide range of such alterations have been described (10).
A sensory neuropathy can be detected in AIDS-related complex, while patients with fully-blown AIDS frequently develop a painful axonal sensory neuropathy.
Chronic inflammatory demyelinating neuropathies may occur in seropositive patients, very often during the asymptomatic period.
CMV has also been implicated, - usually in advanced AIDS, - in a variety of neuropathies (18).
Moreover it is necessary to emphasize that many of the drugs used in the treatment of HIV-infection may cause (usually painful sensory) neuropathy. (Reverse-transcriptase inhibitors: AZT, ddi, ddC.) (12.)

Muscle disease.
An inflammatory necrotizing myelopathy may occur curing the asymptomatic period of HIV-infection. The clinical feature of this pathological change corresponds (practically indistinguishable) to a polymyositis. There is no proven therapy but some authors recommed prednisolone (25).
There is also evidence for a HIV-specific myopathy, usually associated with advanced disease. The cause is not known and there is no treatment (19).

REFERENCES


