Identification of HIV-1 in the aortic wall of AIDS patients

Dear Editors,

The development and the rapid rate in progression of aggressive atherosclerotic lesions in young AIDS patients without cardiovascular risk factors suggest that atherosclerosis may be accelerated following HIV infection [1]. Whether the virus influences lipid metabolism in HIV infected patients, or whether HIV-1 directly infects arterial wall cells and affects their function is unknown. To determine whether HIV-1 is present in the arterial wall cells, segments of the aortic wall removed at autopsy from two AIDS patients (males aged 39 and 47) were examined at the Institute of Forensic Medicine, Sydney, Australia. The specimens were fixed in formalin and embedded in paraffin and the sections were immunostained with the p24 antibody (Dako) to detect HIV-1. Sections of lymph nodes excised from the AIDS patients served as a positive control.

Immunohistochemical examination of both aortas demonstrated the presence of p24+ cells in the apparently non-diseased intima as well as in atherosclerotic lesions. In the non-diseased aortic segments, p24+ cells were sparsely disseminated throughout the subendothelial layer of the intima (Fig. 1A) and some were present around the adventitial vasa vasorum. In atherosclerotic segments, there were considerably more p24+ cells distributed throughout the lesions (Fig. 1B, C). Most p24+ cells were located in areas of neovascularisation under the necrotic core (Fig. 1C).

To determine the nature of the HIV-1 infected cells, consecutive parallel sections stained with p24 and with different cell-type specific antibodies (all from Dako) were compared. In non-diseased aortic segments, p24+ cells were found to be consistently positively co-stained with both S-100 antibody and the antibody to 55-kDa actin-bundling protein (p55, Fascin), but were negative for CD3, CD68, alpha-smooth muscle actin and for von Willebrand factor. In atherosclerotic lesions, only S-100+/p55+ cells and some CD3+ cells co-stained with p24 antibody. Double immunostaining confirmed the localization of HIV-1 within S-100+/p55+ cells (Figure D).

In the normal intima and in atherosclerotic lesions, the expression of both S-100 protein and 55-kDa actin-bundling protein (p55) is restricted to dendritic cells [2,3]. Dendritic cells specialise in antigen capture and the presentation of antigen to resting T lymphocytes [4]. Dendritic cells are responsible for initiating and modulating immune responses in various pathological conditions [4] and their involvement in the immune reactions associated with atherosclerosis has been demonstrated [3]. In HIV infected patients, dendritic cells are one of the initial targets for the infection and are involved in the replication of HIV-1 [4,5]. The accumulation of HIV-1 in dendritic cells in the arterial wall may influence the progression of atherosclerosis in AIDS patients.

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References


Yuri V. Bobryshev
Lipid Metabolism Unit
Massachusetts General Hospital
55 Fruit Street
Fig. 1. (A): p24<sup>+</sup> (brown) cells in the subendothelial layer of the intima in a non-diseased segment of the aorta. (B) p24<sup>+</sup> cells in the superficial portion of an atherosclerotic plaque. (C) p24<sup>+</sup> cells around a microvessel in the neovascularisation area in an atherosclerotic plaque. In (A) and (B), L-lumen of the aorta. (A–C) Peroxidase-antiperoxidase technique; counterstaining with Mays haematoxylin. (D) Double immunostaining demonstrating the presence of p24 antigen (brown) within p55<sup>+</sup> cells (red) (large arrows). Combination of peroxidase–antiperoxidase and alkaline–phosphatase–antialkaline phosphatase techniques. Small arrows show p24<sup>+</sup> lymphocytes. Bars = 50 μm.

Jackson 1328
Boston
MA 02114
USA
E-mail: bobryshev@moltbio.mgh.harvard.edu

Sanjay M. Cherian,
Stephanie J. Inder,
Reginald S.A. Lord
Surgical Professorial Unit

St Vincent’s Hospital
Sydney
NSW 2010
Australia

Dinh Tran
Division of Anatomical Pathology
St Vincent’s Hospital
Sydney
NSW 2010
Australia