

Rabies vaccination in HIV infected cases

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Abstract

Human immunodeficiency virus (HIV) infection is a common problematic infection that can be seen worldwide. Of interest, the tropical zone of Asia, where the HIV is highly prevalent, there are also several tropical infections. An important infection is rabies, a neurological fatal infectious disease. The vaccination must be assigned to all cases getting risk animal bite wound. The main query is how the vaccination in HIV infected cases is. This article will focus on this topic.

Key words: vaccination, HIV, rabies.

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Introduction

Human immunodeficiency virus (HIV) infection is a common problematic infection that can be seen worldwide. This disease is a major immunodeficiency syndrome at present. Millions of global populations get infected with HIV. The high rate of HIV infection is reported in the developing Asian countries. Of interest, the tropical zone of Asia, where the HIV is highly prevalent, there are also several tropical infections. An important infection is rabies, a neurological fatal infectious disease. Rabies is mainly due to the bite of infected animal. Infected patients end up with respiratory paralysis and death. The good medical action to rabies is post exposure vaccination for the exposed case. The vaccination must be assigned to all cases getting risk animal bite wound. The main query is how the vaccination in HIV infected cases is. This article will focus on this topic.

during a period of 4 weeks and in plasma viral load during 12 months [3]. No associated clinical deterioration or any adverse reactions was also reported in this paper [3]. Thisyakorn et al. concluded that rabies vaccination in HIV was effective and safe [3]. However, the failure of post exposure vaccination could still be seen [4]. Pancharoen et al. found that post exposure rabies prevention in HIV infected cases at severe immune deficiency status could not be successful due to the failure of immune generation [4]. Tantawichien et al. reported that this observation could bring failure of vaccination in HIV infected cases in both pre – and post- exposure rabies vaccination [5]. Based on the quoted publications, it can be said that further clinical researches on efficacy and safety of rabies vaccination on HIV infected cases is still necessary.

Efficacy and safety of rabies vaccination in HIV infected cases

The efficacy and safety of rabies vaccination in HIV infected cases are still controversy. There are some interesting reports on this topic. The efficacy and safety of pre-exposure rabies vaccination were documented by Thisyakorn et al. [1]. Jaijaroensup et al. also reported similar findings in their clinical study [2]. Thisyakorn et al. studied the post exposure rabies vaccination among Thai HIV infected cases and reported that there were no significant change in serial measurements of CD4+/CD8+ T cells

Effect of rabies vaccination on immune status of HIV infected cases

As previously noted, there was a report from Thailand confirming no effect of rabies vaccination on immune status of HIV infected cases [1]. However, an interesting aspect is the report on false seroconversion after vaccination [6]. Although this is not common it can be problematic. The main cause is believed to be due to molecular mimicry between the rabies virus and human immunodeficiency virus [7]. Bracci et al. said that the cross-reacting antibodies directed to the gp120 sequence could bring the mimicry with the rabies virus glycoprotein [8]. By the same process,

a false HIV seropositive was also reported in cases after rabies vaccination [9]. Indeed, this finding is similar to the situation of false HIV seropositive after influenza vaccination [10]. Recently, Gelinck et al. reported that immune restoration in HIV-infected individuals treated with highly active antiretroviral therapy, resulting in a CD4 T-cell count greater than 500 cells/mul, was incomplete [11]. However, Gelinck et al. further noted that the majority of HIV-infected individuals were capable of mounting a long-lasting immune response upon vaccination with the rabies vaccine [11].

Effect of immune status of HIV infected cases on rabies vaccination

Effect of immune status of HIV infected cases on rabies vaccination is of concern; because it is believed that the immune status is the main determinant for the effectiveness of vaccine. The failure of rabies vaccine in the HIV infected patients with severe immune deficiency was noted [12]. For evidence, Tantawichien et al. reported on the failure of post exposure rabies vaccination in HIV infected patients with low CD4+ T lymphocyte counts, less than 200/microL [12]. Pancharoen et al. concluded that rabies prevention in HIV-infected persons with severe immune suppression required more additional studies [4].

Recombinant rabies virus as potential live-viral vaccines for HIV

Due to the cross mimicry between HIV and rabies virus, recombinant rabies virus are proposed as potential live-viral vaccines for HIV [13].

A non-segmented negative-stranded RNA virus (NNSV) from cDNA for recombinant rabies virus based production is described and used as basic tool for further development of potential live-viral vaccines for HIV [14]. Of interest, McGettigan et al. reported that rabies virus-based vectors expressing HIV-1 envelope protein could induce a strong, cross-reactive cytotoxic T-lymphocyte response against envelope proteins from different HIV-1 isolates [15]. In addition, the potential use of interleukin-2 in rabies virus-based HIV-1 vaccine strategies was proposed by McGettigan et al. [16]. Faul et al. recently reported that interferon-beta expressed by a rabies virus-based HIV-1 vaccine vector could serve as a molecular adjuvant and decreases pathogenicity [17]. These information bring the hope for developing of new HIV vaccine.

References

1. Thisyakorn U, Pancharoen C, Ruxrungtham K et al. (2000): Safety and immunogenicity of preexposure rabies vaccination in children infected with human immunodeficiency virus type 1. *Clin Infect Dis* 2000; 30: 218.
2. Jaijaroensup W, Tantawichien T, Khawplod P et al (1999): Postexposure rabies vaccination in patients infected with human immunodeficiency virus. *Clin Infect Dis* 28: 913-914.
3. Thisyakorn U, Pancharoen C, Wilde H (2001): Immunologic and virologic evaluation of HIV-1-infected children after rabies vaccination. *Vaccine* 19: 1534-1537.
4. Pancharoen C, Thisyakorn U, Tantawichien T et al. (2001): Failure of pre- and postexposure rabies vaccinations in a child infected with HIV. *Scand J Infect Dis* 33: 390-391.
5. Tantawichien T, Jaijaroensup W, Khawplod P, Sitprija V (2001): Failure of multiple-site intradermal postexposure rabies vaccination in patients with human immunodeficiency virus with low CD4+ T lymphocyte counts. *Clin Infect Dis* 33: E122-E124.
6. Henderson S, Leibnitz G, Turnbull M, Palmer GH (2002): False-positive human immunodeficiency virus seroconversion is not common following rabies vaccination. *Clin Diagn Lab Immunol* 9: 942-943.
7. Bracci L, Neri P (1995): Molecular mimicry between the rabies virus and human immunodeficiency virus. *Arch Pathol Lab Med* 119: 391-393.
8. Bracci L, Ballas SK, Spreafico A, Neri P (1997): Molecular mimicry between the rabies virus glycoprotein and human immunodeficiency virus-1 GP120: cross-reacting antibodies induced by rabies vaccination. *Blood* 90: 3623-3628.
9. Plotkin SA, Loupi E, Blondeau C (1995): False-positive human immunodeficiency virus screening test related to rabies vaccination. *Arch Pathol Lab Med* 119: 679.
10. Hsia J (1993): False-positive ELISA for human immunodeficiency virus after influenza vaccination. *J Infect Dis* 167: 989-990.
11. Gelinck LB, Jol-van der Zijde CM et al. (2009): Restoration of the antibody response upon rabies vaccination in HIV-infected patients treated with HAART. *AIDS*. Sep 8. [Epub ahead of print].
12. Tantawichien T, Jaijaroensup W, Khawplod P, Sitprija V (2001): Failure of multiple-site intradermal postexposure rabies vaccination in patients with human immunodeficiency virus with low CD4+ T lymphocyte counts. *Clin Infect Dis* 33: E122-E124.
13. Schnell MJ, Foley HD, Siler CA (2000): Recombinant rabies virus as potential live-viral vaccines for HIV-1. *Proc Natl Acad Sci U S A* 97: 3544-3549.
14. McKenna PM, McGettigan JP, Pomerantz RJ et al (2003): Recombinant rhabdoviruses as potential vaccines for HIV-1 and other diseases. *Curr HIV Res* 1: 229-237.
15. McGettigan JP, Foley HD, Belyakov IM et al. (2001): Rabies virus-based vectors expressing human immunodeficiency virus type 1 (HIV-1) envelope protein induce a strong, cross-reactive cytotoxic T-lymphocyte response against envelope proteins from different HIV-1 isolates. *J Virol* 75: 4430-4434.
16. McGettigan JP, Koser ML, McKenna PM (2006): Enhanced humoral HIV-1-specific immune responses generated from recombinant rhabdoviral-based vaccine vectors co-expressing HIV-1 proteins and IL-2. *Virology* 344: 363-377.
17. Faul EJ, Wanjalla CN, McGettigan JP, Schnell MJ (2008): Interferon-beta expressed by a rabies virus-based HIV-1 vaccine vector serves as a molecular adjuvant and decreases pathogenicity. *Virology* 382: 226-238.