

SHORT COMMUNICATION

VACCINE FOR NEUROCYSTICERCOSIS: A PRESENT UPDATE

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ABSTRACT

Cysticercosis is an important tropical parasitic worm infestation. This infection can result in cyst in any organs of human beings including to brain. The brain involvement of cysticercosis or neurocysticercosis is an important neurological infection that can cause serious neurological problem. A good sanitation is the basic prevention for cysticercosis. Nevertheless, the hope is the use of vaccination. Here, the author briefly reviews and discusses on the present situation of neurocysticercosis vaccine.

Keywords: Neurocysticercosis, vaccine, infection

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INTRODUCTION

Neurological infection is usually an important problem in neurology. There are several tropical neurological infections and an important group is the parasitic neurological infection. Several parasites can infect neurological system and cause serious neurological problem. Of several diseases, cysticercosis is a common problem in tropical medicine.¹ In general cysticercosis is an important tropical parasitic worm infestation cause by pathogenic *Taenia spp.* Cestode.¹ This infection can result in cyst in any organs of human beings including to brain. The brain involvement of cysticercosis or neurocysticercosis is an important neurological infection that can cause serious neurological problem.² Although most cases might be asymptomatic silent infection, some case care presents severe neurological problems as well as death.^{2,3} A good sanitation is the basic prevention for cysticercosis.⁴ Nevertheless, the hope is the use of vaccination. Here, the author briefly reviews and discusses on the present situation of neurocysticercosis vaccine.

Researches on neurocysticercosis vaccine: present situation

There are some reports regarding neurocysticercosis vaccine. Most reports are on the basic studies on the antigenic property and epitopes finding that can be useful for further vaccine development. The use of bioinformatics technique becomes a new useful tool for epitope searching for cysticercosis vaccine development. The good example is the report by Zimic et al.⁵ Zimic et al. reported the “immunoinformatics prediction of linear epitopes from *Taenia solium* TSOL18.”⁵ An additional study by Guo et al. on “mapping of *Taenia solium* TSOL18 antigenic epitopes by phage display library” is also very interesting.⁶ Guo et al. noted that “the antigenic epitope could be mapped through screening the phage-displayed peptide libraries with mAbs and a mimotope of TSOL18, which could provide an alternative approach for the diagnosis and development of a vaccine for *T. solium*.⁶” The data from these reports are used for further study on epitope testing and there are also some reports on testing in animal models. For example, Kyngdon et al. reported the pig model study on the

“antibody responses and epitope specificities to the Taenia solium cysticercosis vaccines TSOL18 and TSOL45-1 A.” Until present, the test result in pigs are favorable and et al. concluded that *“a control scenario involving vaccination plus oxfendazole treatment delivered at 4 monthly intervals was predicted to achieve the best outcome .”*⁸

The interesting issue is the vaccine candidate for human beings. There are some reports on new available vaccine candidates. The good examples of vaccine candidate is “S3Pvac vaccine antigens” which is *“constituted by three protective synthetic peptides: KETc1, KETc12 and GK.”*^{9,10} This

candidate was approved for effectiveness in pigs and is ongoing test for human subjects.¹¹ Apart from vaccine candidate finding, another interesting issue in tropical vaccinology for neurocysticercosis is the development technique for the vaccine. Based on advanced biomedical engineering, several new techniques are proposes as useful methods for vaccine development. The recombinant protein technology I basicllay used.¹² Many reports confirm the antigenicity of the products resulted from recombinant protein technology.^{13, 14}

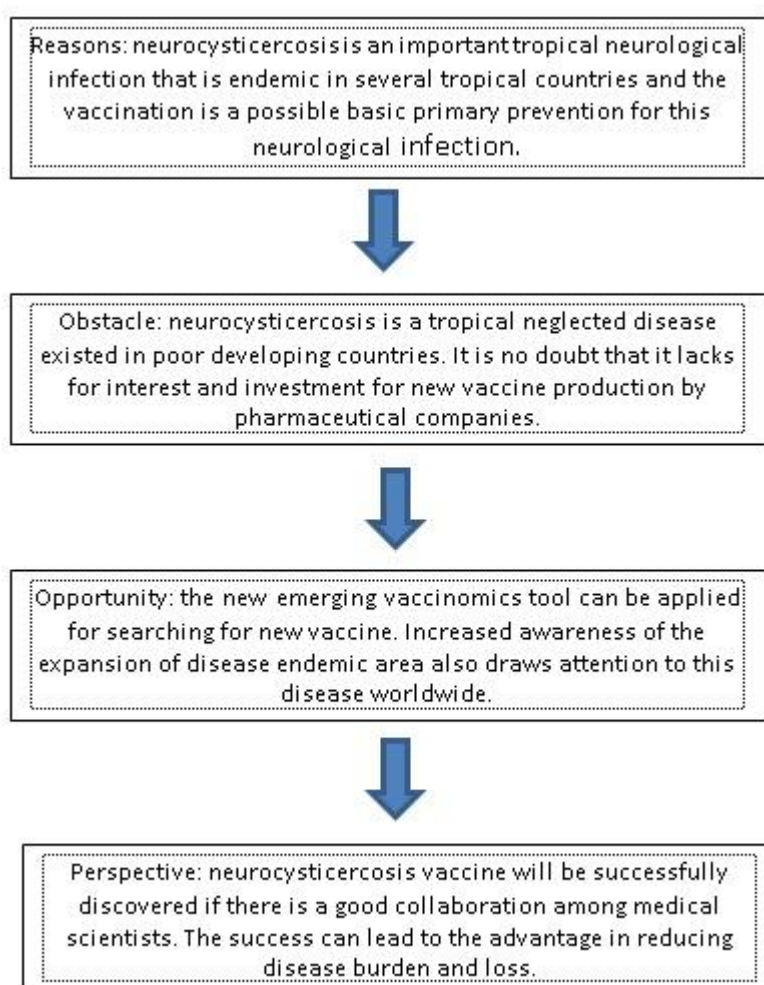


Figure 1. Brief concept for vaccine finding for neurocysticercosis

Nevertheless, as already noted, most of the studies are on the animal models and there is still no report on trial on human subjects. The recent trial on human mononuclear cell by Díaz-Orea et al. is very interesting.⁹ Díaz-Orea et al. reported that “S3Pvac vaccine antigens” could be a useful adjuvant for treatment of the patients with

neurocysticercosis.⁹ Hence, the new vaccine candidate can be a hope for further development of therapeutic vaccine against neurocysticercosis.

CONCLUSION

There are ongoing researches on the new vaccines against cysticercosis and this is an actual hope for

prevention and control of cysticercosis including to neurocysticercosis. Nevertheless, as a tropical neglected disease, the limitation of grant and fund for cysticercosis vaccine research and development can be expected and this might result in delayed success in new vaccine finding.

REFERENCES

1. Pawlowski Z, Schultz MG. Taeniasis and cysticercosis (*Taenia saginata*). *Adv Parasitol*. 1972;10:269-343.
2. Mewara A, Goyal K, Sehgal R. Neurocysticercosis: A disease of neglect. *Trop Parasitol*. 2013 Jul;3(2):106-13.
3. Joob B, Wiwanitkit V. Neurocysticercosis. *Arq Neuropsiquiatr*. 2014 Mar;72(3):260.
4. Pawlowski ZS. Control of neurocysticercosis by routine medical and veterinary services. *Trans R Soc Trop Med Hyg*. 2008 Mar;102(3):228-32.
5. Zimic M, Gutiérrez AH, Gilman RH, López C, Quiliano M, Evangelista W, Gonzales A, García HH, Sheen P. Immunoinformatics prediction of linear epitopes from *Taenia solium* TSOL18. *Bioinformation*. 2011;6(7):271-4.
6. Mapping of *Taenia solium* TSOL18 antigenic epitopes by phage display library. Guo A1, Cai X, Jia W, Liu B, Zhang S, Wang P, Yan H, Luo X. *Parasitol Res*. 2010 Apr;106(5):1151-7.
7. Kyngdon CT, Gauci CG, Gonzalez AE, Flisser A, Zoli A, Read AJ, Martínez-Ocaña J, Strugnell RA, Lightowlers MW. Antibody responses and epitope specificities to the *Taenia solium* cysticercosis vaccines TSOL18 and TSOL45-1A. *Parasite Immunol*. 2006 May;28(5):191-9.
8. Lightowlers MW. Control of *Taenia solium* taeniasis/cysticercosis: past practices and new possibilities. *Parasitology*. 2013 Nov;140(13):1566-77.
9. Díaz-Orea MA, Mijares JM, Arcega R, Gómez-Conde E, Castellanos-Sánchez VO, Briones-Rojas R, Flores-Alonso JC, Marín-Briones MÁ, Santos-López G. In vitro effect of the S3Pvac vaccine against cysticercosis in human mononucleate cells]. [Article in Spanish; Abstract available in Spanish from the publisher. *Rev Neurol*. 2013 May 1;56(9):456-63.
10. Sciutto E, Fragoso G, Hernández M, Rosas G, Martínez JJ, Fleury A, Cervantes J, Aluja A, Larralde C. Development of the S3Pvac vaccine against porcine *Taenia solium* cysticercosis: a historical reviewJ *Parasitol*. 2013 Aug;99(4):686-92.
11. De Aluja AS, Herrera GS, Hernández M, Plancarte A, Fragoso G, Sciutto E. Limits of the therapeutic properties of synthetic S3Pvac anti-cysticercosis vaccine. *Vet Parasitol*. 2011 Apr 19;177(1-2):90-6.
12. Gauci C, Jayashi C, Lightowlers MW. Vaccine development against the *Taenia solium* parasite: the role of recombinant protein expression in *Escherichia coli*. *Bioengineered*. 2013 Sep-Oct;4(5):343-7.
13. Ding J, Zheng Y, Wang Y, Dou Y, Chen X, Zhu X, Wang S, Zhang S, Liu Z, Hou J, Zhai J, Yan H, Luo X, Cai X. Immune responses to a recombinant attenuated *Salmonella typhimurium* strain expressing a *Taenia solium* oncosphere antigen TSOL18. *Comp Immunol Microbiol Infect Dis*. 2013 Jan;36(1):17-23.
14. Monreal-Escalante E, Bañuelos-Hernández B, Hernández M, Fragoso G, Garate T, Sciutto E, Rosales-Mendoza S. Expression of Multiple *Taenia Solium* Immunogens in Plant Cells Through a Ribosomal Skip Mechanism. *Mol Biotechnol*. 2015 Jul;57(7):635-43.