Abstract

“San-ma,” an often-heard Chinese term used by healthcare workers, refers to three diseases, i.e. poliomyelitis, measles, and congenital rubella syndrome. Among these three, poliomyelitis is more life threatening and its sequel of lower limbs disability much more serious than those of the other two if any, so it was chosen to be the first of the three as global eradication target. Measles is going to be the second one. In the pre-vaccine era, it used to be the leading cause of infant mortality and still is in some poor sanitation areas. A good thing is, there is almost no sequel after the recovery from measles. The major cause of congenital rubella syndrome is rubella virus infection in a pregnant woman with developing fetus during the first trimester of gestation, and thereafter often comes out an abnormal baby. The degree of abnormality of the baby varies from deaf, cataracts to congenital heart disease. Because the symptom in a woman infected by rubella virus is rarely serious and may even be asymptomatic so it’s very difficult to interrupt the transmission of the disease in time. Fortunately, the successful development of vaccine for each of them has put these three diseases under control. After mass vaccination campaigns and improvement of overall sanitation in Taiwan societies, we were ready for the eradication or elimination phase of these three diseases and able to be part of the global eradication program.

Poliomyelitis was declared eradicated in Western Pacific Region on October 31, 2000, but some wild types of poliovirus are still active in Nigeria and India. In order to prevent the wild type virus from entering Taiwan from abroad and the transmission of vaccine-derived poliovirus (which endangers people in Haiti and Egypt), the surveillance of acute flaccid paralysis is a major task for preventing poliomyelitis during this post-eradication phase. The method is sampling the feces of acute flaccid paralysis patients under fifteen and their contacts to culture virus and make identification. We use RD, HEP-2C and L20B cells to isolate virus following a guideline announced by WHO, the isolated virus was first screened with a specific fluorescence poliovirus antibody, and the positive one was further processed with a RT-PCR method to determine its type. Finally, we sequence the most hyper variable region of the gene to discriminate the vaccine and wild type strains and thus prevent the outbreak of vaccine strain polio.

The method used for preventing measles in the elimination phase is to laboratory confirm each and every suspected case and try isolate virus and set up molecular surveillance at the same time. In this study we collected all positive measles cases between 1992 and 2003 and analyzes the data with a well-defined molecular epidemiological method. With the help of some standard reference strains and a guideline for genotyping of measles virus announced by WHO in 1998, we have chosen the carboxyl terminal 456 base pair sequence in the measles nucleoprotein as the basis for genotyping.

To reach the goal of eradicating congenital rubella syndrome, the first priority is surveillance and confirmation of suspected rubella cases, and we have to collect specimen from every suspected case. Because the major serological method used in the suspected case confirmation has a rather high rate for false positive, we ended up to set up a new IgG avidity method to assist the traditional IgM positive criteria to confirm rubella case. In this study, we collected rubella

IgM positive sera in the period of 1992-2005 and repeated the IgM test with kits of different brands and the IgG avidity test to compare the results.

In the result we obtained in the analysis of polio virus portion, we found that 30 polio virus strains we got from surveillance system were all belongs to vaccine strains.

In the results we obtained in the analysis for the measles portion, we found that the N gene sequence we got from 50 measles cases during the 1992-2003 period in Taiwan belong to H1, H2, D3, D5, D9 and G2 genotypes, and the H1 was predominant and lasted throughout 1992-2003, which was responsible for the endemic outbreaks in Tao-Yuan County in 1994, the small outbreak in Chu-Dong Township in 2001, and the endemic outbreaks of Tai-Chung County in 2002. G2 turned out to be the cause for small outbreaks in Tai-Chung in 1997, and H2 that of small outbreaks in Chia-Yi County in 1998.

As to the rubella portion, we have analyzed a total of 362 serological confirmed rubella cases. If we change the criteria of confirmed case from IgM positive to low IgG avidity, then only 347 cases (95.85%) were positive. We found 11 of the 15 discordant serum samples were collected after 2001 and 7 cases were asymptomatic, and thus the false positive rate rises according to the IgM results, albeit it would be a problem only when the incidence is low.

In the process of advancement into the eradication phase for measles, collecting virus strains and the surveillance in molecular epidemiological field should be actively kept on going in order to find out the distribution and transmission pathway of measles virus in the preparation for global eradication goal.

The issue for congenital rubella syndrome elimination includes that we should ascertain the morbidity of rubella in the first place. However, restricted to the technical limitations that we are not able to surmount at present, we recommend a change in the criteria for confirming a rubella case from only one positive IgM result to at least two IgM positive results matching each other using two different kits of varied principles, and get the low IgG avidity result at the same time to find out a true positive, it will be rather close to the real morbidity.

Keyword：polio, measles, CRS, IgG avidity test