

### **Follow-up campaigns are now critical**

The successful completion of the measles eradication goal by the year 2000 will require the implementation of PAHO's recommended vaccination strategy in its entirety in all countries of the Region. The objective of the strategy is the prevention of measles outbreaks. It is far more efficient and less costly to prevent an outbreak than to be forced to attempt to control one. In addition to achieving high levels of measles vaccination of children at 12 months of age through routine health services, all countries should conduct *follow-up* campaigns targeting all children 1-4 years of age, regardless of prior vaccination status or disease history, **at least** every four years to assure the highest

possible level of measles population immunity. Health authorities in the Region need to ensure that sufficient resources are allocated for *follow-up* measles vaccination campaigns, and that surveillance for the disease is strengthened in order to reach the eradication goal.

As reported previously, there are several countries overdue for a *follow-up* campaign or are due for such a campaign in 1998. Countries **overdue** for a campaign are at an increased risk of a measles outbreak and should conduct *follow-up* campaigns as soon as possible. These countries include: Cuba, Dominican Republic, Ecuador and Haiti. Countries that should conduct a *follow-up* campaign during 1998 include: Bolivia, Guatemala, Paraguay and Uruguay.

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## **Public Health Burden of Rubella and CRS**

*This article is the first of a series focusing on the public health importance of rubella and congenital rubella syndrome (CRS) in the Americas and worldwide. In April the Caribbean Community established the goal to eliminate rubella by the year 2000 (EPI Newsletter, June, 1998). The following article discusses the public health burden of rubella. A future article will address the characteristics of rubella vaccine and adequate vaccination strategies for rubella and CRS elimination.*

The recorded history of the rubella virus dates back to the mid-18<sup>th</sup> century when it was first described by German authors as *Rötheln*. Until the early 19<sup>th</sup> century, rubella was still known as the "third disease", a variant or combination of measles and/or scarlet fever. In 1814, Dr. George Maton further investigated a rash illness diagnosed as "scarlatina". He came to the conclusion that the disease did not fit the description of any known disease. In 1866, English Royal Artillery surgeon, Dr. Henry Veale, coined the name rubella. It was, according to him, short, pleasant sounding, and indicative of the disease.

Although formally recognized as an individual entity in 1881 at the International Congress of Medicine in London, rubella, the plural of Latin *rubellus* "red", was often referred to as "German Measles" until the second half of the 20<sup>th</sup> century. The term German may have referred to the initial identification made by Germans or it may have taken on the connotation of "closely akin to" because rubella was seen as a disease similar to measles. Acquired rubella, however, is milder than measles. It often causes mild fever, 3-day rash spreading from head to foot, and lymphadenopathy. Arthralgia and arthritis are common in adult women.

Following a severe rubella epidemic that swept across Australia in 1940, came the recognition of Congenital Rubella Syndrome (CRS) by an ophthalmologic surgeon, Dr. Norman McAlister Gregg. In 1941, Dr. Gregg noted an unusually large number of infants with congenital cataracts among his own patients. After inquiry to his colleagues, he found that similar observations had been made throughout Australia. In his report, "Congenital Cataract Following German Measles In The Mother," he described the infants as being "of small size, ill nourished, and difficult to feed", as having congenital heart defects, and developing an ec-

zematous condition or high fever. As has been discovered more recently, CRS clinical manifestations can be grouped into three categories: 1) transient conditions which present themselves at birth (eg. low birth weight), 2) permanent structural manifestations which may be present at birth or may become apparent during the first year of life (eg. cataract), and 3) late emerging conditions (eg. diabetes mellitus).

After extensive investigation, Dr. Gregg concluded that the cataract condition observed throughout the country was "the result of some constitutional condition of toxic or infective nature". He realized that the approximate period of early pregnancy corresponded with the peak of the "German Measles" epidemic. These findings allowed Dr. Gregg to make two correct assumptions: 1) rubella infection had inhibited fetal development, and 2) the earlier the mother is infected, the worse damage is. He also noted that the group primarily affected was young mothers because older women were more likely to have acquired natural immunity.

Dr. Gregg commented in his prognosis, however, that "we cannot at this stage be sure that there are not other defects present which aren't evident now but which may show up as development proceeds". He asked the question which sparked interest and focus on rubella and CRS. "what can we do to prevent a repetition of the tragedy in any future epidemic?" He also made a suggestion that has withstood the test of time and still applies today, "we must recognize and teach the potential dangers of such an epidemic". Unfortunately, Dr. Gregg's observations did not immediately receive the attention it deserved.

It was not until the 1960's, with the rubella pandemic of 1962-1965, that the world became fully aware of the damage that rubella could cause. The morbidity-mortality rates in the United States alone were astonishing. In 1964-1965, there was an estimated 12.5 million acquired rubella cases. As for the consequences of infection during pregnancy, there were over 11,000 reported abortions (spontaneous and surgical) and approximately 20,000 infants born with CRS, of whom 2,100 died in the neonatal period. Of the CRS infants, almost 12,000 reported deafness, 3,580 blindness, and 1,800 were mentally retarded. An example of a city that suffered greatly is New York. The number of children affected by rubella represented 1% of births in the city. This

may have been due to high population density and immigration. The epidemic took a financial toll on the country as well. The estimated cost of this epidemic is estimated to have been over US\$800 million.

The ultimate outcome was the recognition of the significance of CRS. In 1966, rubella and CRS became reportable on a national basis in the United States. Rubella was found to be a disease primarily of young children with the highest incidence rate among 5-9 year olds. The greatest number of total annual rubella cases, 57,686, was reported in 1969. Throughout the following decades, communities continued to endure the aftermath of the epidemic. In 1980, more than 6,000 students with hearing impairment due to CRS were enrolled in special programs throughout the country.

As for financial costs today, in the English-speaking Caribbean, it was estimated that expenditures for care and rehabilitation of 1,500 CRS cases expected to occur over the next 15 years would be approximately US\$60 million. The lifetime cost of treating one patient with CRS in the United States today is estimated to be over US\$200,000. Direct annual national cost of care for persons with multiple rubella defects was estimated in 1985 to be US\$90 million.

The figures recorded and documented are not highly accurate due to the problem of underreporting. Factors contributing to this underreporting are 1) 30-50% of rubella infections are subclinical, 2) in the case of mild symptoms, no medical care is sought, and 3) symptoms are not highly specific and sporadic cases frequently go unrecognized by physicians.

Susceptibility is an indicator of the likelihood of an outbreak. Epidemiological observations suggest that outbreaks may occur when rates are >10%. In the 1980's some Latin American countries reported relatively high suscepti-

bility rates (30-60%) among women of childbearing age. In Mexico, where rubella is not included in the Health Ministry's Universal Vaccination Program, results of studies testing susceptibility support the assumption that women living in lower socio-economic areas and rural areas are less likely to be immune than those in urban settings. This is due to the fact that those in areas of low population density are less frequently exposed to the virus. These studies suggest that CRS is an under-recognized public health problem and improved CRS surveillance is necessary.

In the Caribbean, rubella epidemics occurred annually between 1989-1991. From 1991 to 1995, there was decreased incidence reported until a resurgence occurred in 1995. In some countries in the sub-region, susceptibility has been found to be as high as 40-50%. Although rubella is a notifiable disease throughout the sub-region, CRS is not. For 1997, 20 CRS cases were found in the Caribbean. Nevertheless, it has been estimated that there may be 20,000 or more infants born with CRS each year in Latin America and the Caribbean. One source of rubella data is through measles surveillance. To increase reporting, the criteria for clinical diagnosis have been simplified. Health care workers should suspect rubella and/or measles in patients exhibiting fever and rash illnesses. In these patients, a single blood specimen should be collected and tested for both rubella and measles IgM antibodies.

From the above information, it is clear that rubella and CRS pose serious public health problems throughout the world. Since Dr. Gregg's discovery in 1941, there has been a great deal of progress towards prevention of these diseases. Since vaccine licensure in 1969, rubella incidence has dropped significantly in the countries where it is used. A tool to eliminate rubella and CRS exists. It is important to continue this effort and improve surveillance and vaccination so as to free the world of the threat of rubella and CRS.

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## Vaccination against *Haemophilus influenzae* type b

Public health control of meningitis and other infections caused by Hib requires active immunization of infants and children. Routine use of Hib vaccines is recommended and justified due to:

- severe disabling complications of Hib survivors
- increased antibiotic resistance
- availability of safe and effective Hib vaccines.

Initially, a Hib polysaccharide (PRP) vaccine was used, but like other polysaccharide vaccines, the immunological response was age-dependent and immunogenicity was particularly poor in children under the age of two years. A more effective vaccine was developed through the conjugation of the Hib polysaccharide to carrier proteins. This new vaccine is immunogenic in young children and appears to induce immunological memory. Since 1990, several conjugated vaccines have been developed and are available for use.

### Safety, immunogenicity and efficacy

The safety of Hib-conjugate vaccines has been proven in extensive field trials in Finland, the United States and the United Kingdom, and through their use in routine immunization programs in most developed countries. Antibody responses to the conjugated vaccines are T-cell dependant. The minimum protective antibody concentration is 0.15 µg/ml, and a level of 1.0 µg/ml is considered for long-term protection. There is, however, no strict correlation between the antibody concentration and protective efficacy. In addition to bacterial antibodies directed against the PRP-antigen, cellular immunity is also important for protective efficacy. Vaccine efficacy exceeds 95% in infants with a complete Hib vaccination schedule who are immunized starting from 2 months of age.

### Recommendations

All infants, including those born prematurely, should