CUBA'S CAMPAIGN AGAINST

DEADLY DENGUE

by WILSON RUIZ

On the morning of June 1, 1981, 12-year-old Octavio Veliz was rushed to the Hermanos Almeida Hospital in Havana. His mother told the admissions nurse her son had awakened with fever, nausea, and vomiting. The boy complained of abdominal pains and his face and legs were covered with a rash.

The doctor in charge of the out-patient clinic ordered a series of tests. Five hours later the diagnosis came back: dengue fever, a viral infection transmitted by the *Aedes aegypti mosquito.*

The hospital notified the Pedro Kouri Institute of Tropical Medicine (IPK) and within hours the well developed Cuban health care system went into action. A public appeal, through radio and TV, advised that anyone suffering from the symptoms observed in Octavio Veliz should immediately report to the nearest hospital or medical centre. Twenty-four hours later, over 1000 adults and children were hospitalized and the Public Health Ministry announced that Cuba had been hit by a dengue epidemic.

Of the several clinical syndromes caused by arboviruses (viruses transmitted by insects) the hemonhagic fevers are among the most feared because of the significant number of deaths they cause. The Cuba" medical authorities did not believe that the dengue epidemic affecting their people was the sometimes fatal Dengue Hemorrhagic Fever/Dengue Shock Syndrome (DHF/DSS). But on June 5, Octavio Veliz died and the Public Health Ministry declared a national state of emergency

The civil defence system and the Revolutionary Neighborhood Committees were mobilized. With massive public participarion, an anti-dengue campaign went into effect and advanced with the precision of a military operation. Those already infected were isolated in specially selected hospitals. Unfortunately the medical teams were not prepared to deal with the disease since DHF/DSS had never before been seen in the Western Hemisphere.

To diagnose cases of DHF among the epidemic's victims, doctors applied tourniquets to patients' arms for a short period Those suffering from DHF experienced a great accentuation of hemorrhaging under the skin, even at points away from the tourniquet. The skin became dark violet in colour Other evidence included the vomiting of black material similar in appearance to coffee grounds, a drop in body temperature, cold and clammy skin, and conspicuous sweating.

Photo: Neale MacMillan

Dengue researchers Dr Gustavo Kouri (left) and Dr Maria G. Guzman, both from Havana, with Dr José Esparza of WHO's Division of Communicable Diseases.

Anti-mosquito brigades

Later in June the medical authorities decided that the epidemic had to be attacked at its source. So three weeks after the first case of dengue was reported, 10 000 volunteers, organized into mini-brigades of two or three people, spread out over the country in an attempt to wipe out the *Aedes aegypti* mosquito. A major breeding ground of the insect was water storage containers used in homes that have no running water. Because the volunteers were operating in their own neighbourhoods, they had no problem gaining access to people's homes to check for mosquitoes.

Through massive public participation and cooperation, the Cubans managed to stop the epidemic and eradicate the *Aedes aegypti* mosquito in six months. During the epidemic 350 000 adults and children were infected with dengue and 116 000 of them were hospitalized. There were 10 000 cases of DHF/DSS, with 158 deaths, 101 of them children. According to Cuban medical experts, it was the all-out public participation that made control of the epidemic possible and offered an excellent opportunity for an in-depth study of the cases of DHF/DSS.

In the aftermath of the 1981 epidemic, IPK researchers in Havana, supported by IDRC, began investigating various characteristics of the virus that caused rhis outbreak and of the people affected. Led by IPK's director, Prof. Gustavo Kouri, a research team set out to identify possible risk factors related to race, sex, and a history of certain chronic diseases.

In an interview at IPK, Prof. Kouri said his study uncovered several "fascinating puzzles" that centre on the hemorrhagic fevers caused by dengue viruses. He explained that viruses similar to dengue serotypes I and II, which up to now have been recognized as producing only classic dengue, may be capable of producing a fatal hemorrhagic disease. This could occur when someone who has had a previous dengue infection is re-infected with a different serotype within a five-year period.

This theory is consistent with recent outbreaks of dengue in Cuba, specifically an epidemic of dengue serotype I in 1977 and the epidemic of dengue serotype II in 1981.

High-risk groups

The research project also revealed an increased risk of severe DHF/DSS in whites, and females, and in association with certain chronic diseases such as asthma and diabetes. The course of the disease in adults is different from that in children, and the virulence of the virus seems to incrase during the course of the epidemic.

The study has been successful not only from a scientific point of view but also because it has helped to upgrade the expertise, skills, and facilities at IPK. However, as often happens, the findings of this study have created even more questions.

In a second phase of IDRC-supported

research, IPK is continuing its investigation of the pasible risk factors associated with DHF/DSS, and of the characteristics of the virus. Prof. Kouri and his team are trying to determine why some areas of Cuba had more or less severe manifestations of the disease. In each of two selected areas, a sample of about 1200 people will have blood tests to determine whether dengue antibodies are present and will be given questionnaires asking for general information and past health history.

The sophisticated techniques used by the Cuban researchers will furnish information about the origins of the virus not only in Cuba, but in other Third World countries. This marks a real breakthrough in integrating Cuban research into the activities of other countries in the region.

The results of the research in Cuba and the experience of mobilizing the populace to control the 1981 epidemic will have great importance throughout Central America and the Caribbean. Because at least three of the four dengue serotypes are found in the region, the risk of a DHF/DSS epidemic is ever present.

Some cases have already been reponed in Nicaragua and in Brazil an epidemic of dengue serotype I has infected over one million people in Ria de Janeiro and Sao Paulo. "The Aedes *aegypti* mosquito seems to be moving south," warns Prof. Kouri. "We must foster further regional cooperation to prevent the outbreak of another fatal DHF/DSS epidemic."■

Wilson Ruiz is a Canadian freelance writer specializing in Latin American affairs. He visited Cuba in January 1987.

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COMPARING NOTES IN MEXICO

by NEALE MACMILLAN

The puzzling tropical disease known as dengue fever and its more serious form, dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS), continue to spread in all regions of the tropics. The disease presents a growing threat to lives and public health in Southeast Asia, the Caribbean, and the Americas. Some parts of Africa may also be at risk.

The spread of dengue is a familiar but grim story to medical and health specialists who attended an IDRC-sponsored dengue conference from February 18–20, 1987 in Merida, Mexico.

Unfortunately, medical science is still some years away from developing a vaccine against the disease. In the meantime, the main culprit spreading dengue viruses, the *Aedes aegypti* mosquito, is invading new territory. Dengue fever causes a fever lasting six or seven days and intense pains in the head, muscles, and joints, followed by a rash. DHF/DSS is a potentially fatal form of dengue to which children appear to be more susceptible than adults. An untreated child can die from the shock syndrome in as little as six hours after the onset of symptoms. Nosebleeds, bleeding from the gums, and hemorrhaging under the skin may also occur. In severe cases internal bleeding occurs even in the brain.

In Southeast Asia, dengue fever and DHF/DSS have been a major public health problem since the 1960s. During the last four years, record numbers of dengue cases and deaths have been reported.

Now there are fears that the tropical Americas also may be developing a serious dengue problem. Three of the four dengue virus serotypes are now circulating in the region and epidemics occur with increasing frequency. The first outbreak of DHF in the Americas occurred in Cuba in 1981 (see accompanying article).

Research on various aspects of dengue fever is advancing around the world. Rapid diagnostic techniques are being developed and investigations are under way to improve the treatment of patients suffering from severe complications such as internal hemorrhages, severe hypotension (abnormally low blood pressure), and heart failure.

IDRC is supporting Malaysian researchers in an epidemiological study of children in a community near Kuala Lumpur. They are recording data on the prevalence of antibodies in the children and correlating them with other information such as knowledge, aptitude, and practices related to dengue. This makes it possible to determine the factors that put individuals at risk.

A Cuban dengue research project, which is also supported by IDRC, has identified various individual risk factors—such as asthma, diabetes, and sickle-cell anemia—related to the occurrence of DHF/DSS. There may also be a racial factor, since white people in Cuba proved more susceptible to the disease than blacks.

But efforts to develop a vaccine are hindered by a unique immunological feature of dengue viruses. Some 20 years ago Dr Scott Halstead, now associate director of health sciences for the Rockefeller Foundation in New York, attempted to explain this feature through his "sequential infections" hypothesis.

Dr Halstead, a participant in the Merida conference, observed that DHF/DSS usually occurs in people who already have antibodies to at least one of the four dengue virus serotypes. These antibodies either developed as a result of a previous dengue infection or were passed on by the person's mother.

This hypothesis implies that any vaccine that is developed must adequately protect against all four dengue viruses if it is to be effective. Immunity to only one virus may actually improve rather than lower one's chances of developing DHF/DSS. This has made the World Health Organization's vaccine development project in Thailand a slow process. "My prediction, unfortunately," says Dr Halstead, "is that it could be up to the turn of the century before this vaccine goes through all the stages of testing."

Dr Halstead and other conference participants therefore recommend that efforts be devoted to controlling *Aedes aegypti*. "I think that's where we really need to try to push," he says. "It's crazy to have human beings breeding a dangerous vector mosquito in the drinking water and the rainwater around their property." Discarded, water-filled car tires are also a favourite breeding ground.

Dr Halstead notes that 13 countries in Latin America had eradicated this urban mosquito by 1950. But surveillance and control programs were relaxed and *Aedes aegypti* is back. It can develop resistance to insecticides, so the most effective means of control appears to be long-term, community-based programs.

In Cuba, Puerto Rico, Singapore, and Malaysia, laws have been passed to stop the spread of *Aedes aegypti*. The enactment of similar measures in other affected areas of the tropics may represent the only realistic hope in coming years of containing the threat posed by the dengue viruses. ■

Neale MacMillan is a Canadian freelance writer working in Mexico.