

# Dengue

## A neglected disease

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### Santa Casa de Misericórdia, Sobral, Ceará, Brazil

A mother with her little, visibly ill daughter enters the Emergency Room. The girl is two years old and has been ill for six days with high fever, headaches, backpain and myalgia. When the mother started to think the girl was getting better, the child began to lose weight, accompanied by nausea and vomiting with the strange addition of a very sensitive skin. Physical examination reveals a maculopapular rash on extremities, face and trunk, scattered petechiae on the legs, bleedings of the gingiva, a rapid, weak pulse, hypotension and cyanosis. Abdominal palpation and percussion show hepatomegaly. The girl is lethargic and in a state of shock.

The hospital files show the girl's history: a year ago she was treated for dengue fever, which resulted in a full recovery. A blood differential is ordered and confirms the doctor's fear: leukopenia and thrombocytopenia are apparent. Immediately the girl is admitted to the Intensive Care unit and monitored carefully. She is started on oxygen administration and five percent dextrose in Ringer's lactate intravenous infusion. Treatment against disseminated intravascular coagulation (DIC) is also initiated. After ELISA on IgM the serum shows antibodies against two different types of dengue virus.



**Diagnosis:** Dengue shock syndrome (DSS) as a result of dengue haemorrhagic fever (DHF) after two sequential infections of different serotypes of dengue virus.



Brazil



189 323 000  
inhabitants



8 700  
income per year



♂ 68yrs ♀ 75yrs  
life expectancy



7.9%  
of GDP for health



1.15  
doctors/1000 people

## History

There are four types of the dengue virus: DENV-1, -2, -3 and -4. They all belong to the family of the Flaviviridae. The virus is transmitted by the *Aedes aegypti* mosquito.

*Aedes aegypti* probably has its origin in Egypt. It crossed the Atlantic Ocean from Africa in times of slavery. The name dengue is derived from the Swahili sentence *ki denga pepo*, which means *it is a sudden overtaking by an evil spirit*. It refers to the rapid onset of the disease. This appeared in English literature during a Caribbean outbreak in 1827-28. The first definite clinical report of dengue is attributed to Benjamin Rush in 1789, but the viral aetiology and its mode of transmission via mosquitoes were not established until early 20<sup>th</sup> century.

### Global Medicine presents Neglected Diseases

About one billion people in the world are affected by one or more neglected tropical diseases (NTDs). Neglected, because these diseases persist exclusively in the poorest and the most marginalized communities, and have been largely eliminated and thus forgotten in wealthier places.

[www.who.int/neglected\\_diseases](http://www.who.int/neglected_diseases)

This is the first article in a series on neglected diseases. For additional information, check [www.globalmedicine.nl](http://www.globalmedicine.nl).

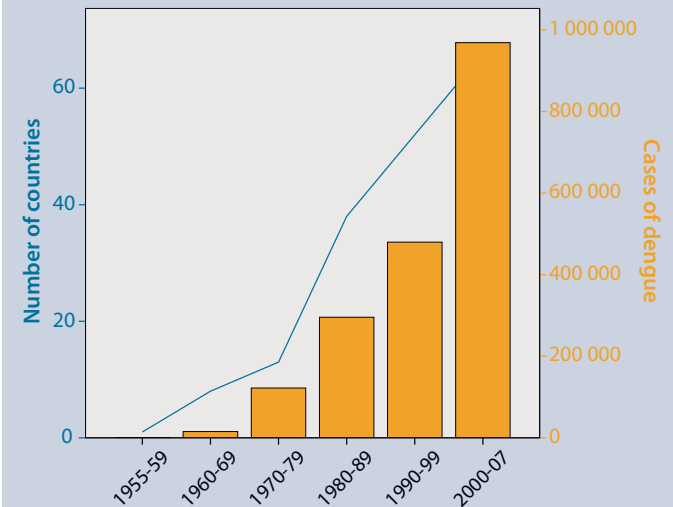
## Epidemiology

Two hundred years ago, dengue only sporadically caused an epidemic. It spread from South-East Asia to America, the Pacific Ocean, Africa and the Caribbean. The reason for the spread is the increasing possibilities for travelling. Nowadays dengue is the most important mosquito-transmitted viral disease worldwide. In comparison to five decades ago, the recent incidence multiplied thirtyfold; a very disturbing evaluation. More countries are infected and also the epidemics are massively explosive. For instance in 2007 there was an outbreak in Venezuela, reporting 80 000 cases of dengue, including over 6 000 cases of DHF.

## Pathophysiology

Frequently, dengue viral infections are asymptomatic. Symptomatic dengue predominantly occurs in the immunocompromised or non-indigenous. The symptoms include fever, rash, pain in muscles and joints and start abruptly with minor illness for two to four days followed by rapid worsening, after an incubation period of five to ten days. Being infected with one serotype gives a life-long immunity against that serotype, but merely a small and passing protection against the other ones. A small percentage of patients who have previously been infected by one dengue serotype develop bleeding and

## Reported cases of dengue to WHO



## Mortality rates

Dengue fever	1%
	(in specialized institutions)
Treated DHF/DSS	3%
Untreated DHF/DSS	50%

## Epidemiology

People living in infected areas worldwide	2.5 billion
Endemic countries	100
Annual infections	50 million
Cases of DHF	500 000
Child deaths	22 000

Data adapted from WHO

<http://www.who.int/csr/disease/dengue/en/index.html>



Countries and areas at risk of dengue transmission, data 2008.

Red lines indicate the 10°C isotherms (upper line: January, lower line: July).

Adapted from WHO.

endothelial leak upon infection with another dengue serotype. This syndrome is termed dengue haemorrhagic fever (DHF) which can result in dengue shock syndrome (DSS) and may cause death.

### Transmission

Dengue fever is transmitted from human to human or from primate to human by the female *Aedes aegypti* mosquito. The mosquito lays her eggs in standing water in garbage dumps in inner cities. Clothing provides no protection against *Aedes aegypti* that bites during daytime, as opposed to the malaria mosquito. The virus circulates in the patient's blood for two to seven days.

### Diagnosis

First dengue infection can be diagnosed by the IgM-capture Enzyme-Linked Immuno-Sorbant Assay (ELISA). For second infection other serological diagnostic tests are needed as research shows that 28% of the second infections were missed by ELISA. For DHF the blood pressure tourniquet test is used. The test is DHF positive when more than 20 petechiae per square inch appear.

### Treatment

Dengue fever is self-limiting and therefore treatment is only needed to reduce symptoms. DHF and DSS are a different story. Patients should be admitted right away. Administration of oxygen, hydration with intravenous sodium solution and treatment against DIC can be life saving.

“

**Marcelo Lucena, Brazilian medical student**  
Yes, dengue, it's just like you write there. But remember that dengue is an educational problem. To combat the disease we must teach the people to combat the standing water in their homes.

”

### Prevention

Until today there is no dengue vaccine but research is in progress. Education can inform people about standing water as the source of mosquito multiplication and about how vinegar might be used to destroy the eggs and larvae of the *Aedes aegypti*.

### Further reading

- WHO. Dengue Haemorrhagic Fever: early recognition, diagnosis and hospital management. 2006 via [www.who.int/csr/disease/dengue/en/index.html](http://www.who.int/csr/disease/dengue/en/index.html)
- Harrison's principles of Internal Medicine