



Danger of Dengue

Duncan MacDonald
Jakarta 26 February 2014



Aedes aegypti mosquito - She is a Blood Sucking Killer – He is a sugar sipping (nectar) Wimp

What is Dengue Fever?

Dengue fever is a virus transmitted by mosquito bite. The *Aedes aegypti* mosquito is the main transmitter of dengue viruses, although a 2001 outbreak in **Hawaii** was transmitted by *Aedes albopictus*. The disease occurs only in the tropics. Both mosquitos feed almost exclusively during daylight hours.

There are 2 types; *dengue fever (DF)* which is generally a mild illness and a more severe form called *dengue haemorrhagic fever (DHF)* which causes liver and lung damage. *Dengue* is caused by any one of four related viruses: *Dengue 1, 2, 3 and 4*. Infection with one type of *dengue* does not protect against the others. Sequential infections put people at greater risk for *dengue hemorrhagic fever (DHF)*.

There are over 2,500 different species of mosquitos throughout the world. The Spanish called mosquitos "*muskatas*" and the native Hispanic Americans called them "*zancudos*". "Mosquito" is a Spanish or Portuguese word meaning "*little fly*" while "*zancudos*" a Spanish word means "*long legged*". The English called mosquitos "*gnats*", the French "*Les moucheron*" or "*Les cousins*", Germans used "*Stechmucker*" or "*Schnacke*".

The plural for mosquito would be "*mosquitos*" in Spanish and in English "*mosquitoes*" (with the "e"). As **dMAC Health Digest** endeavors to keep things simple and use fewer rather than more words to convey our meaning, **we opt for the Spanish spelling.**

What are the Symptoms?

Symptoms of *dengue fever* appear 4 - 8 days after a bite from an infected mosquito and typically last 3 - 10 days. Symptoms are most commonly seen in adults and older children. *Young children may show no symptoms*. Death rarely occurs, but the patient is left debilitated and requires considerable convalescence

The main symptoms of the milder **DF** are fever, severe headaches or pain behind the eyes, muscle pain and rash. Sometimes it can cause strange skin sensations and metallic taste in the mouth. Bleeding of the gums and a low platelet cell count can occur.

DHF is a much more severe disease and can be fatal. It starts with the same symptoms as fever, severe headaches and muscle pains. It can cause infection of the liver and lung. *It can also cause hemorrhage within the organs of the body and result in shock and death.*

Since the disease causes severe pain in the muscles and joints, it is also known as “*breakbone fever*”.

Watch for warning signs as temperature declines 3 to 7 days after symptoms began. **Go immediately** to the nearest health care provider if any of the following warning signs appear;

- ▶ Severe abdominal pain or persistent vomiting
- ▶ Red spots or patches on the skin
- ▶ Bleeding from nose or gums
- ▶ Vomiting blood
- ▶ Black, tarry stools (feces, excrement)
- ▶ Drowsiness or irritability
- ▶ Pale, cold, or clammy skin
- ▶ Difficulty breathing [1]

Homecare for Dengue Patients



Child with dengue hemorrhagic fever Dengue fever patients in Indonesia and Thailand

How to care for your sick child or family member. It is important to carefully watch them because *dengue can rapidly become severe between the third and seventh day of illness when the fever is going away*. Your doctor can order tests to determine if your sick family member has dengue.

With Fever

◇ Bed rest - let your sick family member rest as much as possible

Control High Fever

◇ Do not give ibuprofen (Motrin, Advil), aspirin, or aspirin-containing drugs

◇ Sponge the patient's skin with cool water if fever remains high

◇ Give acetaminophen or paracetamol (Tylenol) every 6 hours if needed for high fever (maximum 4 doses per day)

Prevent Dehydration: Give plenty of fluids and watch for dehydration, which occurs when a person loses too much body fluid from fever, vomiting, or if he or she does not drink enough fluids. Bring your sick child or family member to a clinic or emergency room if any of the following signs appear:

◇ Decrease in urination (check the number of wet diapers or trips to the bathroom)

◇ Few or no tears when a child cries

- ◇ Dry mouth, tongue or lips
- ◇ Sunken eyes
- ◇ Listlessness, overly agitated or confused
- ◇ Rapid heartbeat (more than 100 beats per minute)
- ◇ Cold or clammy fingers and toes
- ◇ Sunken soft spot (fontanel) in an infant's head

As Fever Goes Away

Watch for warning signs as temperature declines 3 - 7 days after symptoms begin *Return immediately to clinic or emergency room if any of the following warning signs appear:*

- ◇ Severe abdominal pain or persistent vomiting
- ◇ Red spots or patches on the skin
- ◇ Bleeding from nose or gums
- ◇ Vomiting blood or blood in stools
- ◇ Drowsiness or irritability
- ◇ Pale, cold, or clammy skin
- ◇ Difficulty breathing [2]

How do I catch Dengue?

Dengue is transmitted to people by the bite of *Aedes* mosquito that is infected with a *dengue* virus. *Dengue cannot spread from person to person.* This mosquito is found mostly in tropical countries, particularly Indo-China, Indonesia, Africa and South America. It has also occurred in Northern Australia, New Guinea and the Pacific Islands.

In order for the transmission to occur the mosquito must feed on a person during a 5 day period when large amounts of virus are in the blood; this period usually begins shortly before the person becomes symptomatic. After entering the mosquito in the blood meal, the virus requires an additional 8 -12 days incubation before it can be transmitted to another human. *The mosquito remains infected for the rest of its life, which may be days or up to four weeks.*

How can I avoid catching Dengue Fever?



Fogging marginally reduces mozzie population mosquito coils; better sleep under bed net; best

Prevent being bitten by mosquitos by;

- Avoid going outdoors at dawn and dusk when the mosquito is more active. Mosquitos also bite at night when the lights are on.

- Cover up when you go out. Wear long sleeves and long pants, socks and closed shoes.
- Wear light colored clothing – dark colors attract the mosquito
- Avoid perfumes, perfumed soaps and deodorants – these attract mosquitos.
- Use mosquito repellents containing 15-20% DEET for protection against insects because of the annoyance, or 35-50% DEET for protection from *dengue or malaria* carrying mosquitos. **Do not use high concentration of DEET on young children.** Apply repellent sparingly to exposed skin or clothing. One application will last 4-6 hours. Saturation does not increase efficacy.
- Use knockdown mosquito's sprays or mosquito coils in your room.
- Impregnate your clothing with mosquito repellent such as Permethrin (Permanone) 100% DEET can also be used, but it will damage synthetic fibers.
- Use repellent impregnated (Permethrin) mosquito nets above your bed and drape over children's cots or strollers.
- Keep insect screens and doors closed, especially at night. If available, use air-conditioning.
- KILL all mosquitos. Sleep under a mosquito bed net.
- *Fogging only marginally reduces mosquito population.* It kills mosquitos that are airborne at that particular time. However most mosquitos rest under foliage or indoors in dark places for a greater part of the day. Emptying all water containers is far more effective.

NOTE: the mosquito that causes dengue fever bites *mostly* during the day, so daytime protection using repellents is needed. The mosquito will breed in any available fresh water such as water storage containers, coconut shells old tires etc.

Aedes mosquitos search for a blood meal early in the morning, at dusk and into the evening. They are painful and persistent biters. Some are daytime biters, especially on cloudy days and in shaded areas. They prefer to bite mammals like humans. Other mosquitos prefer horses, cattle, smaller mammals and birds.

Anopheles mosquitos are also persistent biters and the only mosquitos which transmit *malaria* to humans.

Aedes aegypti Information



Water filled containers can harbour *dengue pupae*

- The dengue mosquito lays its eggs on the walls of water-filled containers in the house, patio and garden or surrounding areas.
- The eggs hatch when submerged in water. *Eggs can survive for months.*
- Female mosquitos lay dozens of eggs up to 5 times during their life time.

- The mosquito life cycle, from egg to larvae, pupae and on to adult mosquito, takes 8 days. It occurs in water. Adult mosquitos live for one month.
- Adult mosquitos ‘usually’ rest indoors in dark areas (closets, under beds, behind curtains). *Only female mosquitos bite humans.*
- The dengue mosquito can fly several hundred yards looking for water-filled containers to lay their eggs.
- A few mosquitos per household can produce large dengue outbreaks.
- The *dengue* mosquito **does not lay eggs in ditches, drains, canals, wetlands, rivers or lakes.** Pouring chlorine into these habitats is useless. Chlorine is harmful to aquatic life.
- *Aedes* mosquitos can be born with dengue virus inherited from their mothers. A mosquito hatched in your own yard and never going anywhere else, can transmit *dengue fever*. [3]

Common containers in which eggs develop into dengue mosquitos

Those that are filled with water by people:

◆ Drums and water cisterns, large and small buckets, plants in water, decorative fountains, broken water meters, animal drinking bowls, portable pools (not in use), potted plants and bases, open or unsealed septic tanks, septic tanks lacking vent pipe screen.

Those that are filled with rain water:

- ◆ Discarded tires, bottles, pots and pans, broken appliances (toilets, washbasins, refrigerators, washing machines).
- ◆ Items left outside such as garbage cans, paint trays, tarps, buckets and their lids, toys and coolers.
- ◆ Boats and other vehicles that can hold rain water.

Control of larvae & pupae to avoid adult mosquitos



Place fish (guppies, betas) in ornamental fountains. They eat the dengue larvae

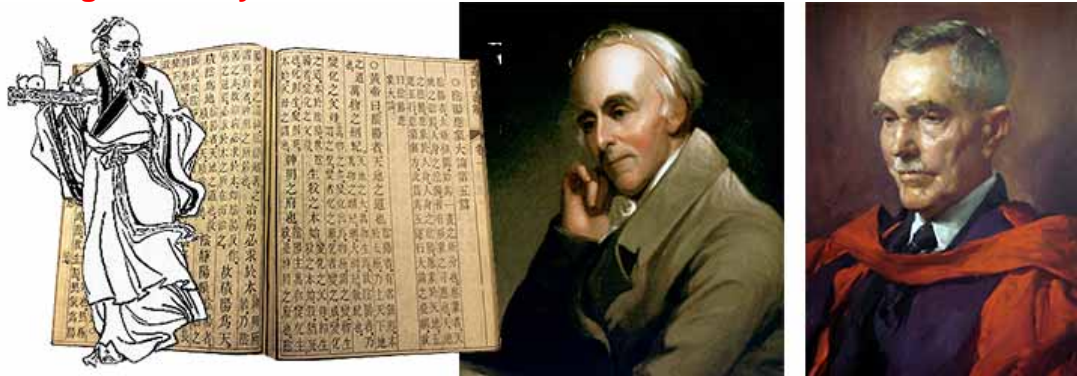
- ◆ Throw away, turn over, empty or store under a roof any container that may accumulate rain water.
- ◆ Always place a tight lid on containers used for water storage (buckets, drums).
- ◆ Verify that there are no larvae or pupae in stored water (empty the container, wash walls with a brush to remove eggs, rinse and cover).
- ◆ Maintain running water in fountains and artificial lakes. **Place fish (guppies, betas) in ornamental fountains** that are always filled with water.
- ◆ Empty ornamental fountains that are not in use.
- ◆ Clean animal drinking bowls every day, taking care to wash away eggs.

- ◆ Repair broken septic tanks and cover vent pipes with wire mesh.
- ◆ Protect boats and vehicles from rain with tarps that don't accumulate water.
- ◆ Maintain swimming pools in good condition and appropriately chlorinated. Empty plastic swimming pools when not in use.

Mosquito Control

- Fit screens on doors and windows.
- Use patio insecticides such as *Permethrin* (pesticide repellent) and *Allethrin* (candles and lanterns).
- Use repellents containing DEET or Picaridin on your clothing and exposed skin.

Dengue History



Jin Dynasty medical encyclopedia (256-420 AD) Dr Benjamin Rush (1745-1813) Sir John Burton Cleland (1878-1971)

The four dengue viruses originated in monkeys and independently jumped to humans in Africa or South East Asia perhaps 1,800 years ago. The first recorded case of probable dengue fever is in a Chinese medical encyclopedia from the **Jin Dynasty** (256 - 420 AD) which refers to a “*water poison*” associated with flying insects.

The first confirmed case report dates from 1789 by American **Dr Benjamin Rush**, who coined the term “*breakbone fever*”. [4]

That the virus was transmitted by mosquitos was discovered by Australian doctor **Sir John Burton Cleland** (1878 -1971) of Adelaide University in the 1940s. [5]

Dengue remained a relatively minor, geographically restricted disease until the middle of the 20th century. The second world war - in particular the coincidental transport of *Aedes* mosquitos around the world in cargo - is thought to have played a crucial role in spreading the viruses.

A global pandemic of *dengue* began in Southeast Asia in the 1950s and has intensified in last 15 years, due in no small part to the discontinuation of DDT to eradicate mosquitos.

DHF was first documented in the 1950s during epidemics in the Philippines and Thailand. It was not until 1981 that large numbers of **DHF** began to appear in the Caribbean and Latin America

By the late 1990s *dengue* was the most important mosquito-borne disease affecting humans after *malaria*. Unlike *malaria*, *dengue* is prevalent in urban areas as well as rural districts.

Today about 2.5 billion people, or 40% of the world’s population, live in areas where there is a risk of *dengue* transmission. *Dengue* is endemic in at least 100 countries in Africa, Asia, the Pacific, the Americas, and the Caribbean.

The World Health Organisation (WHO) estimates that 50 to 100 million infections occur yearly, including 500,000 **DHF** cases with 22,000 deaths, mostly among children.

Is there a Vaccine?

To date, there are no vaccines to prevent infection with *dengue* virus. *The most effective protective measure is to avoid mosquito bites.*

Australian scientists in collaboration with others throughout the world are working on infecting *Aedes aegypti* mosquitos with the bacteria *Wolbachia*. Mosquitos infected with *Wolbachia* suffer reduced ability to become infected with other viruses, including *dengue* and *malaria*.

Prolonged survival of adult mosquitos is critical to dengue transmission cycles. It takes time for the *dengue virus* to infect the mosquito midgut, replicate and infect the salivary glands before transmission can occur. Reducing mosquito lifespan is possible using a life-shortening strain of *Wolbachia* bacteria.

Wolbachia trials have been ongoing on for more than 12 months at Tri Nguyen village on Hon Mieu island in central **Vietnam**. There is no piped water on the island so householders store water in a variety of containers ranging from small vessels to large tanks - the major larval habitat of *Aedes aegypti*. Survival patterns of mosquitos in the village varied between seasons. It was estimated that 64% of the mosquito population survived long enough to transmit dengue during the cool/dry season (January-April) and hot/dry season (May-August) respectively; however this was reduced to 29% during the wet/cool season (September-December).

The relatively high survival rate of *Aedes aegypti* year round is a major contributor to the continuity of dengue transmission in the region and **provides rationale for reducing mosquito survival to break the transmission cycle.** [6]

Indonesia's first *Wolbachia* trial began in January 2014 with approval of regulators, in **Yogyakarta**.

***Wolbachia* shows promise in Cairns.** As the number of *dengue* cases continues to rise throughout Cairns, **Australia** (75 cases since December 2013), *there has been no local dengue transmissions in the areas where Wolbachia* mosquitos have been released. [7]

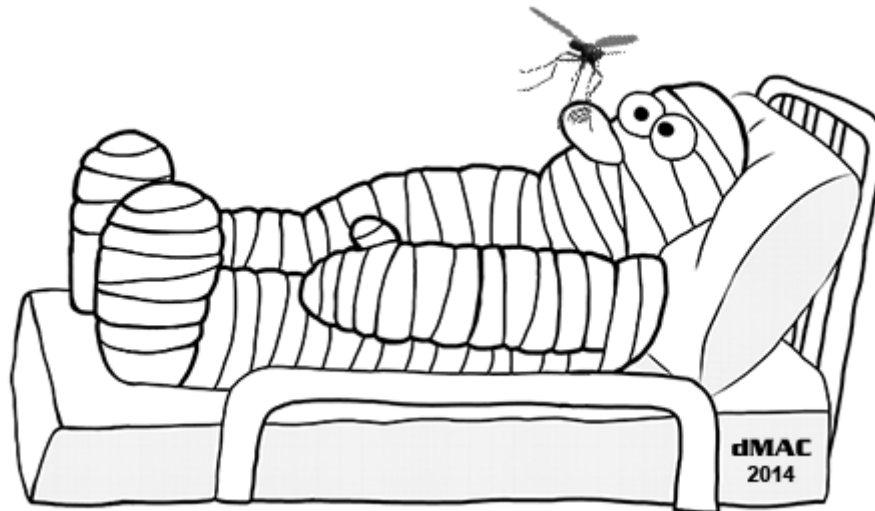


CONCLUSION

The reduction of *dengue* fever will depend greatly on increased public education regarding mosquito breeding - the elimination of all standing water in containers. If *dengue* fever is to be totally eliminated much will depend on scientific discoveries now and in the future.

The release of *Wolbachia* bacteria into mosquitos shows promise by inhibiting replication of many viruses including *dengue*, *West Nile* and *malaria parasites*. But until now nobody has understood the molecular mechanism underlying *Wolbachia's* ability to inhibit virus replication. [8]

Life's Like That



Reference:

1. Queensland Government, Health Information, dengue fever
2. Centers for Disease Control and Prevention, www.cdc.gov/dengue
3. What you can do about Dengue Fever, J. Kevin Baird PhD, Venture Hygenica Asia Pte Ltd (Singapore)
4. wikipedia.org/wiki/dengue_fever
5. University of Sydney & Westmead Hospital, Australia, <http://medent.usyd.edu.au/fact/dengue.htm>
6. Adult Survivorship of the Dengue Mosquito *Aedes, aegypti* Varies Seasonally in Central Vietnam, Leon E Hugo, PLOS Neglected Tropical Diseases, Vol 8 Issue 2, 1-Feb-2014
7. www.eliminatedengue.com - 12-Feb-2014
8. Wolbachia hijacks mosquito gene, Anna Salleh, ABC, 4-June-2013

[Back to top](#)



This Digest can be downloaded as a *FREE* e-book on Smashwords. Available on iPad / iBooks, Kindle, Nook, Sony, & most e-reading apps including Stanza & Aldiko.

Just click the link below

<http://www.smashwords.com/books/search?query=Duncan+MacDonald>