



## Seize the opportunity to shrink the malaria map

Every 30 seconds a child dies of malaria. Between 300 and 500 million people are affected every year in 100 countries around the globe, mostly in sub-Saharan Africa. Malaria not only impacts the health of people in developing countries, it also hinders economic development.

Despite these dismal prospects, we can today express cautious optimism. In 2009, more international funding is available in the fight against malaria than ever before. New efficacious drugs and preventive tools have been developed and the recently published proposal of the Malaria Elimination Group envisages the potential elimination of malaria in 39 countries.

We must seize this opportunity and work together to effectively and sustainably roll back malaria. A complex problem calls for a complex solution involving all stakeholders: governments, international organizations, pharmaceutical companies, NGOs, and private donors must all contribute.

In the following pages, we inform you about the current approaches used to manage and reduce malaria prevalence and how Novartis and the Novartis Foundation for Sustainable Development are contributing to the fight against the disease.

I hope you will enjoy reading this newsletter and thank you for your continued support.

Klaus M. Leisinger

## The malaria challenge

Malaria is as old as mankind and has been a leading cause of illness and death for centuries. In 1945, malaria occurred on every continent and in almost every country, even as far north as Canada and Finland. Today, 108 countries have eliminated malaria, pushing the border of malaria southwards.

Yet, in 100 countries, the deadly disease is still active, claiming 1 million lives per year. Particularly vulnerable are children under the age of five and pregnant women. The most-affected region is sub-Saharan Africa, which accounts for 90% of malaria-related deaths.

Malaria is an infectious disease that is transmitted to the human being through bites of the female anopheles mosquito. The mosquito is only the vector, i.e. it carries the parasite that causes malaria when biting an infected person. The majority of human malaria is caused by two different parasites: *Plasmodium falciparum*, which is especially predominant in sub-Saharan Africa and *Plasmodium vivax*, a form frequently found in Asia. In the human body, the parasites multiply in the liver and then infect red blood cells, which results in the outbreak of malaria. Though a dangerous disease, death is preventable if appropriate treatment is taken in time and correctly.

Malaria not only affects the health of millions of people every year, it also represents

an enormous social and economic burden for households and governments in developing countries. People cannot work or go to school when they fall ill with malaria; and the disease consumes substantial resources of a country's health system. Africa alone – so it is estimated – suffers at least USD 12 billion per year in direct losses due to malaria (e.g. illness, treatment, premature deaths), and much more in terms of hindered economic growth. Controlling and eventually eliminating malaria is therefore key to health and economic development.

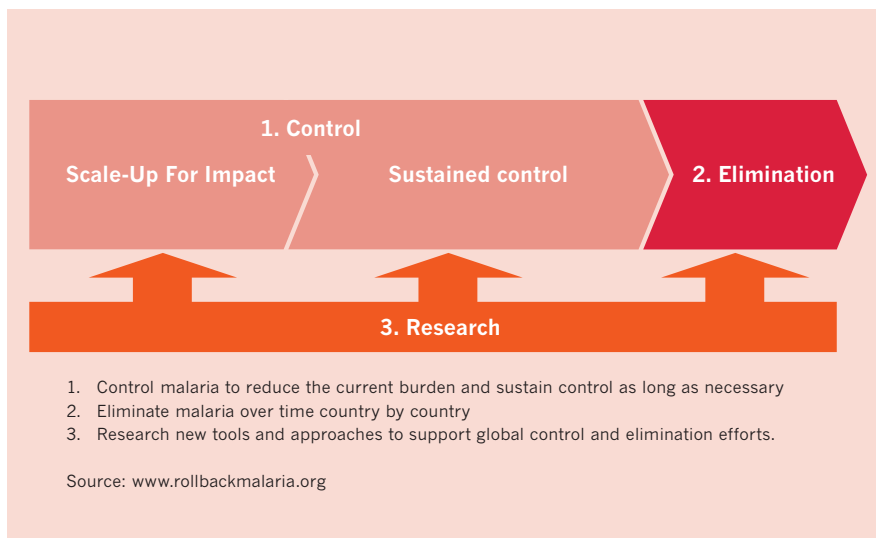
## Paving the way to malaria elimination

Over the last decade, several countries have demonstrated that it is possible to substantially reduce the malaria burden (i.e. Rwanda and Eritrea). New, more efficacious drugs are available, and awareness of the disease, as well as funding has been raised. Today, unprecedented amounts of money go into malaria control: in 2008, international funding alone reached USD 1.1 billion (compared to USD 51 million in 2003).

The establishment of the Roll Back Malaria Partnership (RBM) in 1998 – aimed at coordinating the various international efforts in the fight against malaria – has also paved the way to malaria elimination. RBM aims to halve malaria cases and deaths by 2010 compared to 2000 and, in the long term, to eliminate malaria worldwide. Last year, the group outlined a Global Malaria Action Plan (GMAP), a strategy combining three parts to be unfolded simultaneously (see figure 1).

First (1), it aims at strengthening and expanding malaria control in malaria-endemic countries, especially in sub-Saharan Africa. Controlling malaria entails universal availability of prevention and treatment to all people at risk, and that at least 80% of people who need these services actually use them. In order to achieve long-term results, control must also include the sustainable strengthening of healthcare systems. Second (2), the GMAP aims at shrinking the malaria map by eliminating malaria in low-transmission countries over time. Finally (3), each stage of malaria control and elimination must be reinforced through research into new prevention and treatment forms such as new drugs in case of resistance.

Figure 1: The three-part strategy of the Global Malaria Action Plan



The newly established Malaria Elimination Group (MEG), a group of 45 international experts including Klaus M. Leisinger, President and CEO of the Novartis Foundation for Sustainable Development, focuses on the second part of the GMAP: the elimination of malaria.

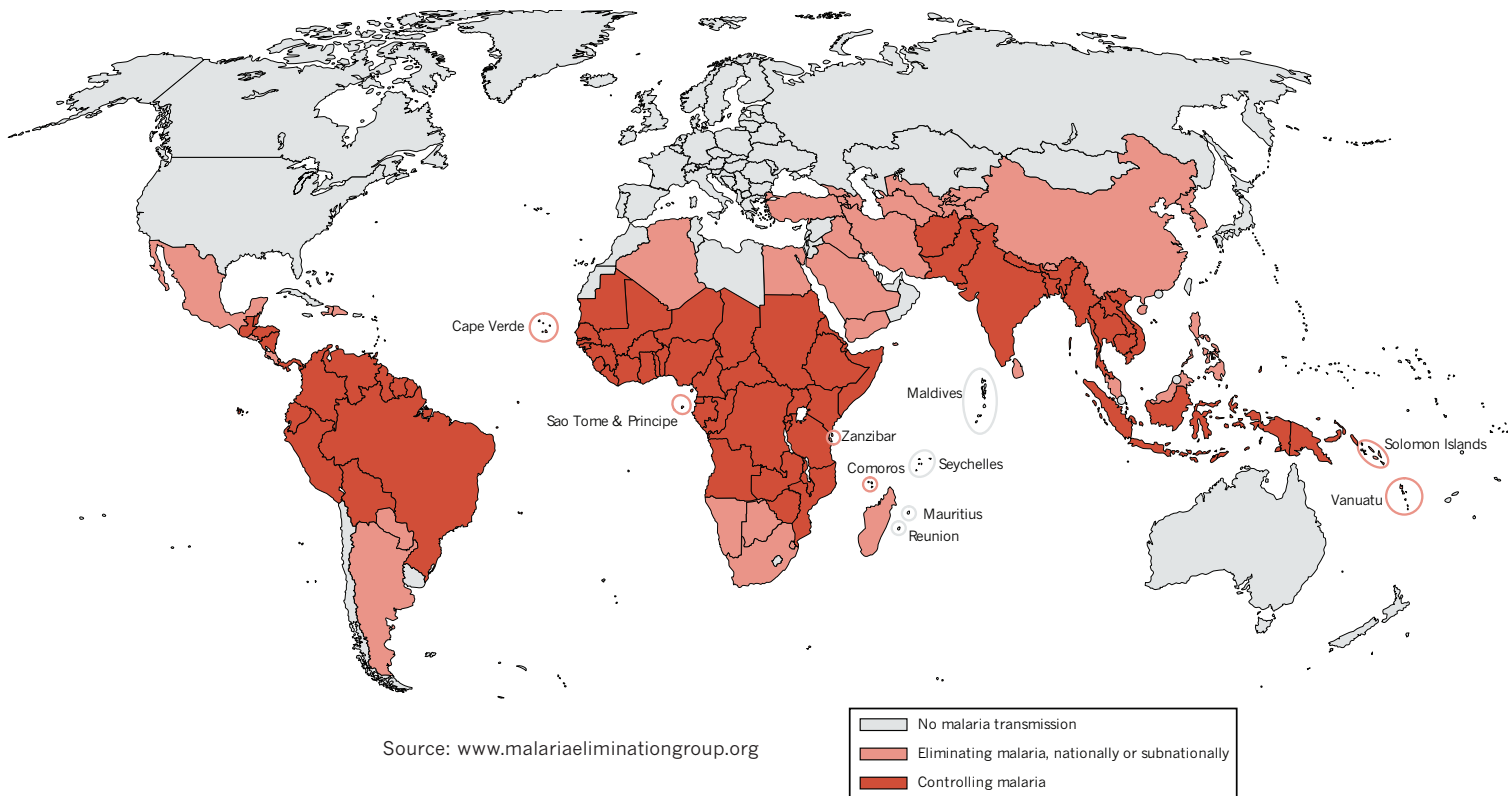
Elimination means reducing malaria transmission to zero in a defined geographical area. The MEG has identified 39 countries, in which elimination is feasible (see figure 2). All 39 countries lie at the margins of a malaria-endemic zone, already have significant malaria-free areas within their borders and transmission has already been reduced. Each of these countries must make a rational decision to move from control to elimination based on various political,

economic, social and epidemiological factors such as financial feasibility and the capacity of the healthcare sector.

In order to put these plans into action, more funding for control, elimination and research will be needed. RBM estimates average funding needs amount to USD 5 billion per year until 2020. In total, from 2008 to 2010, 730 insecticide-treated million bed-nets will be needed. Further, every year, we will need 1.5 billion diagnostic tests, 228 million artemisinin-based combination therapies (ACT), and spraying of insecticides in 172 million households.

Benefits, however, outweigh costs: up to 4.2 million lives may be saved by 2015 in the 20 highest-burden countries alone.

Figure 2: The 39 elimination countries



### Key tools for malaria prevention and treatment:

- Sleep under **long-lasting insecticide-treated nets**
- **Indoor residual spraying** to kill mosquitoes
- **Intermittent preventive treatment during pregnancy**
- **Other vector control measures** including larviciding and environmental management
- Prompt parasitological **diagnosis** (through rapid diagnostic tests)
- **Treatment** by providing antimalarial drugs (ACTs such as Coartem for *P. falciparum* and chloroquine and primaquine for *P. vivax*)

## A comprehensive contribution in the fight against malaria

Novartis and the Novartis Foundation for Sustainable Development have a long-standing commitment in the fight against malaria. The most important contribution of Novartis is the development of Coartem, an artemisinin-based combination therapy (ACT) highly effective against *P. falciparum*, the most common malaria type in sub-Saharan Africa.

But the commitment does not stop there. In fact, Novartis's activities range from R&D of new anti-malarials and the provision of Coartem without profit, to initiatives in developing countries aimed at improving access to medicines and healthcare (see figure 3).

### 1. R&D on malaria

Through the Novartis Institute for Tropical Diseases (NITD), Novartis conducts research for into novel treatments and prevention methods for TB, dengue and malaria. In developing countries where these diseases are endemic, Novartis intends to make treatments readily available without profit to poor patients. Today, ACTs are the most effective treatment against malaria. Recent reports suggest that decades of continuous use of monotherapies may have fostered artemisinin resistance in Plasmodium.

To address this potential resistance, the NITD has led the formation of a research consortium that brings together cutting-edge drug discovery at Novartis with world-class malaria biology expertise. Armed with a grant from the Wellcome Trust, the Medicines for Malaria Venture, and the Singapore Economic Development Board, the consortium has the ambitious goal of identifying new drugs with a potential for a single-dose cure for *P. falciparum* malaria, but also a curative modality for *P. vivax* malaria, which is able to rapidly and safely eradicate the parasite liver stages.

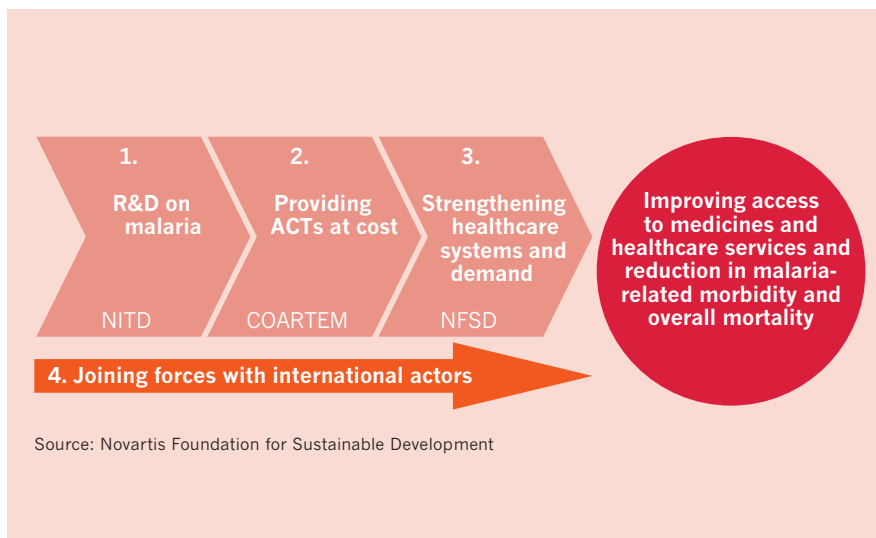
### 2. Providing ACTs at cost

Under the leadership of Silvio Gabriel, the Novartis Malaria Initiative achieved outstanding results. Since 2001, Novartis has provided nearly 250 million Coartem treatments without profit for public sector use, which have helped save an estimated 600,000 lives. In some areas, malaria-related deaths have decreased by as much as 97% since Coartem was introduced accompanied by a bold program of insecticidal spraying. Coartem is prequalified by the WHO and on the WHO's Essential Medicines List.

The recent launch of the new pediatric formulation – Coartem Dispersible – will contribute to improve the effectiveness of malaria treatment in children, the most vulnerable patient group. Crushing bitter-tasting tablets is no longer necessary, as the new sweet-tasting tablets dissolve quickly in liquid and ensure effective dosing for children. Coartem Dispersible has been developed together with Medicines for Malaria Venture (MMV).

Like Coartem, Coartem Dispersible will be provided to the public sector without profit, at USD 0.37 per treatment. As a pilot project, Coartem is now also provided at cost directly to the non-premium private sector drug stores in rural areas of Tanzania. In addition, the Novartis Foundation for Sustainable Development donates Coartem to all Millennium Villages.

Figure 3: Novartis and Novartis Foundation activities in the fight against malaria



### 3. Strengthening healthcare systems and demand

Worldwide availability of efficacious medicines is good news, but not enough to actually reach patients. Long distances to healthcare facilities, financing problems, wrong diagnosis and dosages still pose obstacles in the fight against malaria.

Through its ACCESS Project, the Novartis Foundation for Sustainable Development aims at overcoming these barriers and improving access to malaria treatment in a comprehensive way, looking both at the supply and demand side of access. Measures on the supply side include, for example, strengthening quality of care through training and supportive supervision of health personnel and the establishment of new drug stores. On the demand side, social marketing campaigns inform people about the disease and encourage patients to request appropriate and timely treatment. In addition, income-generating measures and health insurance schemes facilitate financing of healthcare services in case of illness.

To ensure that Coartem and Coartem Dispersible are properly used, and to improve patient adherence, Novartis and MMV provide malaria case management educational programs, which include hands-on training for local healthcare workers, customized training manuals, and user-friendly packaging.

In order to study the effectiveness of Coartem, Novartis and the Novartis Foundation for Sustainable Development, together with the Swiss Tropical Institute, are conducting a research initiative in Tanzania. The ALIVE Initiative measures the reduction of malaria-related illnesses and the overall mortality rate compared to previous therapies, as well as patient compliance and transmission rates under programmatic conditions.



### 4. Joining forces with international actors

Nobody can fight malaria alone. A complex problem requires a complex solution involving numerous stakeholders with different skill sets. This is why Novartis and the Novartis Foundation are collaborating with national governments, research institutes, international organizations, and local NGOs on all three levels described earlier, from R&D to access to treatments (see figure 3 on page 4).

In addition to participating in the Malaria Elimination Group (MEG), which provides policy advice for the 39 countries embarking on malaria elimination, the Novartis Foundation for Sustainable Development is also a member of the Swiss Malaria Group (SMG), consisting of Swiss-based players from the public and private sectors (including Novartis), as well as from civil society.

Through these various initiatives, we are contributing to the strategy outlined by the Global Malaria Action Plan. We are confident, that with a multi-stakeholder effort, malaria can be better controlled, eliminated and ultimately eradicated.



## Malaria glossary

**Anopheles:** Malaria is transmitted by bites of an infected female anopheles mosquito. Anopheles mosquitoes exist throughout the world, but only a few species are responsible for transmitting human malaria. The anopheles mosquito is active at night.

**Elimination of malaria:** The interruption of local mosquito-borne malaria transmission in a defined geographical area, creating a zero incidence of locally contracted cases. Imported cases will continue to occur and continued intervention measures are required.

**Eradication of malaria:** The permanent reduction to zero of the worldwide incidence of malaria infection.

**Plasmodium falciparum:** The most deadly form of malaria, especially in children. It occurs mostly in sub-Saharan Africa.

**Plasmodium vivax:** A severe form of malaria which is mostly found outside of sub-Saharan Africa, due to a resistance developed by most Africans. It causes relapsing malaria, due to its ability to stay dormant in the liver for months to years.

**Prevention:** To reduce transmission, long-lasting insecticide-treated nets, as well as indoor residual spraying with insecticides is recommended. Other vector control methods are larviciding and reducing standing water habitats where insects breed, among other approaches.

**Symptoms:** The common first symptoms – fever, headache, chills and vomiting – usually appear 10 to 15 days after a person is infected.

**Transmission:** Anopheles mosquitoes pick up the parasite from infected people when they bite to obtain blood needed to nurture their eggs. Inside the mosquito, the parasites begin to reproduce. When the mosquito bites again, the parasites mix with its saliva and pass into the blood of the person being bitten.

**Treatment:** Early treatment of malaria will shorten its duration, prevent complications and avoid a majority of deaths. The best available treatment for *P. falciparum* malaria is a combination of drugs known as artemisinin-based combination therapies (ACTs), among others produced by Novartis.

## Selected links for further information

### Traveling to malaria-endemic countries

Swiss Tropical Institute: [www.sti.ch](http://www.sti.ch)

### International malaria control and elimination strategy

Roll Back Malaria Partnership:  
[www.rollbackmalaria.org](http://www.rollbackmalaria.org)

Malaria Elimination Group:  
[www.malariaeliminationgroup.org](http://www.malariaeliminationgroup.org)

Medicines for Malaria Venture:  
[www.mmv.org](http://www.mmv.org)

World Health Organization:  
[www.who.int](http://www.who.int)

### Novartis contribution

Novartis Foundation for Sustainable Development:  
[www.novartisfoundation.org](http://www.novartisfoundation.org)

Novartis Institute for Tropical Diseases:  
[www.novartis.com/research/nitd/index.shtml](http://www.novartis.com/research/nitd/index.shtml)

Coartem: [www.coartem.com](http://www.coartem.com)

Tanzanian Training Center for International Health:  
[www.healthtrainingifakara.org](http://www.healthtrainingifakara.org)