

SWITZERLAND
AGAINST
MALARIA:
SUCCESSFUL
TOGETHER!

**BACKGROUND AND INFORMATION
ON A DEADLY DISEASE**
A BROCHURE OF THE SWISS MALARIA GROUP

EDITORIAL

Dear reader,

Much progress has already been made in the fight against malaria, thanks to substantial international investment. Life-saving products such as bed nets, insecticides, medicines and diagnostic products have reached hundreds of thousands of people and saved lives. And yet every year more than 600,000 people still die of malaria, mainly in the world's poorest countries. Malaria prevents countless individuals and families from realising their dreams. Malaria is a contributing factor in trapping whole societies – even entire countries – in poverty. Nine out of ten victims claimed by the disease are in Africa. This is perhaps one of the reasons why malaria has fallen off our radar.

We have forgotten that malaria was also part of Switzerland's past. At the end of the 19th century it still represented a major threat to public health among the Swiss population. The fact that we managed to put the disease behind us shows us one thing: malaria is not simply a force of nature determined by fate, but a disease that can be overcome with the right measures. That is why today over 90 countries are malaria-free. Through coordinated measures and strategies our generation has a historic opportunity to eliminate this insidious disease.

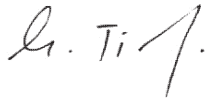
As a leading international research centre, with its cutting-edge industry and its many state-run and non-governmental organisations active in international health, Switzerland is well placed to make a meaningful contribution to the fight. It was for that reason that the Swiss Malaria Group (SMG) was set up a few years ago based on an initiative of the Swiss Agency for Development and Cooperation. It brings together research institutes, public institutions, private industry and civil society with one common goal: to wage an effective war against malaria through promoting and strengthening knowledge and through the sharing of experience. It has been successful in doing so.

Publicly and privately funded partnerships have enabled Switzerland to assume a pioneering and internationally recognised leading role in researching and developing new medicines and diagnostic products. It can now take pride of place among the principal actors in the global fight against malaria.

Switzerland assumes its social responsibility through the organisations that make up the SMG. Global health is a matter of concern to us all, as we are so clearly interdependent at so many levels. Malaria is one of the global challenges we must never lose sight of. The international community is currently in the process of formulating new

THE STORY OF MALARIA

sustainable development goals, and in doing so it must not omit to factor malaria into the equation, as hundreds of thousands of lives are still at stake. To beat malaria we must commit ourselves to keep up the fight. The SMG is fighting the fight today and will never give in!



Swiss Agency for Development
and Cooperation SDC
Maya Tissafi
Ambassador, Deputy Director General
Head of Regional Cooperation

Mosquitoes were plaguing the Egyptians, Indians and Chinese even in ancient times. Hippocrates realised that malaria occurred in swamps. But what was responsible for the transmission of «swamp fever»? Was it swamp gases, evil spirits, or «bad air», which gave «mal-aria» its name? In Switzerland, too, the *Anopheles* mosquito made large rivers and lakes insecure. In the 18th century, malaria was still widespread on all continents. The only cure was quinine, yet still no one knew the cause. In 1880, Charles L.A. Laveran discovered the malaria parasite, *Plasmodium falciparum*, in the blood of malaria patients. Soon after, Sir Ronald Ross linked the parasite to the *Anopheles* mosquito. The culprit had been discovered! Humanity finally knew what it was up against.

Swamps, which were now known to be breeding sites for mosquito larvae, were drained, and drugs to fight the pathogenic malaria parasite were developed by the chemical industry. In 1939, the insecticidal properties of the neurotoxin DDT were discovered in Basel. Armed with DDT and the medicine chloroquine, the World Health Organization (WHO) rolled out a global eradication campaign to drive back the *Anopheles* mosquito and its parasites. All went well until the clever parasite began to develop resistance to both the insecticide and the medicine resulting in a rise in malaria epidemics. Today, artemisinin combination therapies and other drugs, as well as modern insecticides and insecticide-treated bed nets, are used to keep malaria in check.

TRANSMISSION

The deadly duo is inseparable: the malaria pathogen and its carrier, the *Anopheles* mosquito. The pathogen is an insidious parasite invisible to the naked eye, that kills people in large numbers, aggressively and with terrifying efficiency. The parasite flies through the dark in the body of a blood-thirsty female mosquito. The landing target is exposed human skin. As the mosquito feeds, the malaria parasite in the saliva of the insect worms its way through the proboscis into the human victim's bloodstream. There it immediately begins its ingenious work of destruction. It infiltrates the liver, multiplies without restraint, transforms itself continuously and destroys the red blood cells.

It causes fever spikes, joint pain, diarrhoea and vomiting. And it craftily tricks the immune system of its victim until she or he falls into a coma and dies of *malaria tropica*, the most dangerous of the four types of malaria. The crafty *Plasmodium* protozoon has made malaria, along with HIV/AIDS and tuberculosis, the most deadly infectious disease afflicting humanity. It claims more than 600,000 lives each year, especially in developing countries.



- 1 Poverty pushes people to live in places full of risks and life hazards, like diseases. Numerous studies have shown the relationship between poor housing and rises in malaria transmission.
- 2 A child fetches water in the state of Bentiu, South Sudan. Living and working near infested water sites increases exposure to malaria. Marshes are a fertile breeding ground for malaria-infected mosquitoes.

MALARIA AT A GLANCE

Malaria is an infectious disease. It is caused by a unicellular parasite of the genus *Plasmodium*. There are four types of *Plasmodium* capable of infecting human beings. *Plasmodium falciparum*, the most menacing, causes *malaria tropica*.

The parasites, which are visible under a microscope, are transmitted to humans by the bite of a female *Anopheles* mosquito, which is its main host. Humans are intermediate hosts. To infect a person the mosquito, which is mainly active in the evening and night, must previously have bitten a person who was carrying the parasite and have been infected by that person. It is an endless cycle: the disease spreads automatically as long as nothing is done to fight the mosquitoes, prevent bites or treat the disease.

The life cycle of the pathogenic parasite is complex. *Plasmodia* multiply in the human body, specifically in the liver, and destroy red blood cells. A week or as long as a year may elapse before symptoms are noticeable. The symptoms are similar to those of the flu, so accurate diagnosis is important: fever, headache, aching limbs, fatigue, chills, nausea, vomiting and diarrhoea. If left undetected or untreated, malaria can quickly become fatal. Children die more often than adults from this disease.

Malaria is still prevalent in tropical and subtropical countries, particularly Sub-Saharan Africa, Asia, the Pacific, Central America and South America. Travellers from industrialised countries in particular should protect themselves because their organisms have not developed the appropriate immune defences. One of the most important measures to be taken to protect oneself against mosquitoes is by using bed nets, wearing long clothing and using repellents. Depending on the destination and time of year, prophylactic medication prescribed by a doctor may be recommended.

PREVENTION

No one is safe from its thirst for blood. The female *Anopheles* mosquito carrying malaria parasites kills people everywhere. But with the right knowledge, we can defend and protect ourselves, for example, by sleeping under a mosquito net. This method has already significantly reduced infant mortality in Africa. It is also possible to kill the *Anopheles* mosquito by spraying rooms, windows and doors with a contact insecticide harmless to humans.

Modern insecticides play a key role in prophylaxis and defense against the *Anopheles* mosquito. But equally important, alongside efforts to combat outdoor breeding sites, are new drugs made from a combination of effective, active antimalarials, including artemisinin. These combinations are necessary because treatment with only one active ingredient, once effective, is now failing miserably: the malaria parasite is surviving because it has built up resistance to these monotherapies. For the moment, it is not yet resistant to artemisinin-based combination therapies (ACT). This is fortunate because, at present, few other alternative drugs are available to us.

DIAGNOSIS AND TREATMENT

Every year, *Plasmodium falciparum*, the dangerous malaria parasite, causes more than 200 million people around the world to become newly infected with malaria. Children under five and pregnant women are particularly affected. What can be done? The experienced members of the Swiss Malaria Group (SMG) are in no doubt: the earlier malaria is detected, the faster it can be treated, the more lives can be saved. The most successful way to help patients is to combine continuously improving diagnostic techniques with the right medical treatment. Artemisinin-based combination therapies (ACTs) are effective where traditional remedies and conventional medicines can no longer help.

The SMG occupies a leading position in the research, production and distribution of such new drug combinations, and it is doing this with resounding success, helping to save the lives of millions of people from this often fatal disease. In addition, some members are researching new alternatives to ACTs, to ensure that the medicine chest is not empty when artemisinin resistance emerges.

RESEARCH AND DEVELOPMENT

Global malaria research remained a neglected stepchild until the year 2000. The consequences of this neglect were fatal. Malaria experts and the World Health Organization (WHO) watched with concern as previously effective drugs, such as chloroquine, increasing began to fail. The cause was soon discovered: all the drugs used until then were monotherapies, having but one active ingredient. But the adaptable malaria parasite had found ways to survive this monotherapy.

Resourceful researchers from the Swiss Malaria Group (SMG) soon realised that it was necessary to develop drugs with at least two active ingredients: if the parasite was resistant to one, the other would be sure to kill it. One key ingredient, artemisinin, comes from the Sweet Wormwood shrub, and was in use 2000 years ago in ancient China to treat malaria fever. Artemisinin-based combination therapy (ACT) is the current gold standard treatment against malaria. But there is a risk that it too will become less effective one day. Therefore, SMG researchers are resolutely working on alternative therapies. Their big goal: a new class of drugs as well as an effective malaria vaccine. Initial results are promising! But official Swiss institutions ought to increase their financial commitment, as this kind of research is extremely expensive.



- 1 The world needs 150 million insecticide-treated bed-nets (ITN) each year to protect the vulnerable from malaria. The number of households in Sub-Saharan Africa owning at least one ITN has risen from 3% in 2000 to 54% in 2013.
- 2 A young girl gets her finger prepped for a rapid diagnostic test (RDT) for malaria during a household research campaign in Sinazongwe District, Southern Province Zambia.

- 1 Severe malaria is less common among well-nourished children, possibly because a well-nourished child is better able to mount an immune response and more capable of withstanding and clearing infection.
- 2 Understanding the parasite's life-cycle and how it develops in the mosquito is essential for research into new antimalarial medicines, diagnostics and insecticides.

ACCESS, EDUCATION, AWARENESS-RAISING

Exactly how many children, women and men fall victim to malaria can only be estimated, as it is still not possible to conduct accurate surveys in medically underserved areas. But it is an undisputed fact that in many countries malaria is one of the main causes of poverty. People suffering from malaria lack energy and initiative, become dependent on care and financial support, and impose a burden on society and the economy.

The Swiss Malaria Group (SMG) is combating this disease in a targeted way in close cooperation with local health services – through broad-based information, education and awareness-raising activities directed at the general public, as well as through aid strategies that improve access to medical facilities and treatments for malaria patients. This also enables people in rural areas, in particular, to seek and use good-quality malaria services early on. Thus, patients can benefit from a rapid and correct diagnosis, the right medication and the exact dosage. Consequently, an informed population learns to better protect itself, for example with mosquito nets. In Tanzania, for example, these measures reduced malaria cases by 60% and deaths from the disease by approximately 48%.

FUNDRAISING

A vicious circle: poverty spawns malaria, malaria spawns poverty. The fight against malaria costs a lot of money. In order to pool forces in Switzerland, the Swiss Malaria Group (SMG) was founded in 2007, bringing together a wide range of companies and public health specialists.

But there was also movement on the malaria front worldwide, not least thanks to large donations of money. New partnerships were established between NGOs, government and private institutions and new initiatives were launched to achieve more reliable prevention, diagnoses and faster distribution in the affected areas. In addition, the World Bank, various governments, the Bill & Melinda Gates Foundation and others initiated research programmes and provided new funding for the most severely malaria-stricken regions of Africa. With its considerable financial leverage, the Global Fund to Fight AIDS, Tuberculosis and Malaria enables malaria-endemic countries to obtain the most effective medicines, nets and diagnoses, and to finance anti-malaria campaigns.

THE FUTURE

It is a devastating tragedy: each year, more than 600,000 children die of malaria. The numbers are falling thanks to the global efforts of a dedicated community of institutions, governments and donors. It has ensured that this disease has been rolled back considerably since 2005. Nonetheless, neither the *Anopheles* mosquito nor the malaria-causing parasite *Plasmodium falciparum* have been defeated. The tremendous adaptability of the malaria parasite continues to threaten the anti-malaria front: what will happen if combination therapies no longer kill it? ACTs are currently the only effective antimalarial available to people and researchers are working diligently to develop new drugs and a malaria vaccine, as well as to bring the *Anopheles* mosquito forever under control in the tropics.

Malaria researchers also warn that mosquitoes are showing increasing resistance to insecticides. This poses a huge threat to the entire world. Moreover, any slackening in the fight against malaria – due to, for example, a false sense of security based on the decline in the number of malaria cases achieved by all efforts undertaken until now – would have terrible consequences. The Swiss Malaria Group is determined to defeat malaria. The odds are on our side, but only if official Switzerland steps up its commitment! Together we will succeed in ensuring that one day no child need fear the *Anopheles* mosquito.

TOWARDS MALARIA ELIMINATION: AN INTEGRATED APPROACH



ACTIVITIES OF THE SWISS MALARIA GROUP MEMBERS IN THE FIGHT AGAINST MALARIA

Acino Pharma AG

Acino Pharma is represented in than 80 countries all over the world. Besides a large number of generic products, Acino also manufactures antimalarial drugs for prophylaxis as well as for treatment and offers these products in Africa, in Asia and in Latin America. Acino continues to invest in research and development for new antimalarial drugs to be offered in Swiss quality and at affordable prices to those in need for prophylaxis as well as for treatment.

www.acino-pharma.com



Biovision

Biovision is a Swiss organization founded with the aim of sustainably improving life for people in Africa while conserving the environment as the basis for all life. Biovision is engaged in the field of information and supports projects in Switzerland which show how each individual can contribute to an environmentally and socially responsible development in the world. In its Stop malaria initiative, Biovision has pilot projects in Kenya and Ethiopia that are using environmentally friendly methods – so-called «Integrated Vector Management» (IVM) – in order to tackle malaria. These pilot projects run by Biovision are demonstrating that environmentally-friendly and cost-effective methods supported by the local community can effectively control malaria.

www.biovision.ch



Centre Hospitalier Universitaire Vaudois (CHUV)

Research at the CHUV is geared towards public health in developing countries. The CHUV is also part of the Swiss Institute for Vaccine Research which was launched on December 5, 2007. This Institute encompasses the principal aspects of vaccine research to fight the three main infectious diseases: HIV/AIDS, tuberculosis and malaria. It encourages cooperation between scientists working in the field of HIV, malaria, tuberculosis, influenza and cancer vaccine development in Switzerland. The CHUV has a substantial clinical trial infrastructure that is available for vaccine research.

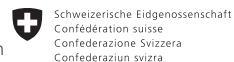
www.chuv.ch



Swiss Agency for Development and Cooperation (SDC)

SDC contributes to the fight against malaria through bilateral as well as multilateral cooperation. In partner countries that are highly malaria endemic, SDC backs specific projects that tackle malaria by increasing mosquito-net coverage, strengthening health systems and supporting community-based initiatives. At international level, SDC contributes to the fight against malaria with financial contributions to global initiatives such as the Global Fund to Fight AIDS, Tuberculosis and Malaria and to internationally recognised academic institutions as well as public private partnerships that are driving innovative research and the development of new prevention means, drugs and diagnostic tools.

www.sdc.admin.ch



Federal Department of Foreign Affairs FDFA
Swiss Agency for Development and Cooperation SDC

Drugs for Neglected Diseases Initiative (DNDi)

DNDi is a not-for-profit research and development organization working to deliver new treatments for neglected diseases. Since its inception in 2003, DNDi has delivered six new treatments to patients in need, notably for malaria, sleeping sickness, leishmaniasis, and Chagas disease, and is working on other new treatments for these diseases as well as specific helminth infections and paediatric HIV. The two treatments developed for malaria are the fixed-dose combinations ASA Q and ASM Q. ASA Q, launched in 2007, was developed in partnership with the French pharmaceutical company Sanofi; ASM Q was launched in 2008 thanks to a partnership with the Brazilian public pharmaceutical company Farmanguinhos.

www.dndi.org



Foundation for Innovative New Diagnostics (FIND)

FIND is dedicated to developing affordable, easy-to use and cutting edge diagnostic tests that save lives in the poorest areas of the world. In addition to malaria, the not-for-profit organization works on tuberculosis, sleeping sickness, leishmaniasis and Chagas disease. Beyond developing new tests, FIND also works with partners to ensure that diagnostics can be used effectively in the field. Since inception in 2003, FIND has already brought six new technologies into widespread use, using its public-private model.

www.finddiagnostics.org



Medicines for Malaria Venture (MMV)

MMV, a not-for-profit public-private partnership, was established as a foundation in Switzerland in 1999. Our mission is to reduce the burden of malaria in disease-endemic countries by discovering, developing and facilitating delivery of new, effective and affordable antimalarial drugs. Our vision is a world in which these innovative medicines will cure and protect the vulnerable and under-served populations at risk of malaria, and help to ultimately eradicate this terrible disease.

www.mmv.org



Medicus Mundi Switzerland (MMS)

Medicus Mundi Switzerland, the network health for all, is a network of 45 Swiss organisations working in the field of international health. Medicus Mundi Switzerland promotes the sharing of knowledge and know-how among its members and advocates for universal access to health and health care as a fundamental human right. Some of the members provide advice and support to partner organisations in their fight against malaria.

www.medicusmundi.ch



Novartis Switzerland

Focused on access, treatment, R&D and capacity-building, the Novartis Malaria Initiative is one of the healthcare industry's largest access-to-medicine programs measured by the number of patients reached annually. Since 2001, the initiative has delivered 500 million malaria treatments without profit to the public sector in more than 60 countries, contributing to saving an estimated 1 million lives. Over the last years, Novartis and partners have discovered two new classes of compounds with great antimalarial potential. Together with our partners, we are committed to the common goal of malaria elimination.

www.novartis.ch



Roll Back Malaria (RBM)

The Roll Back Malaria Partnership (RBM) is the global framework for coordinated action against malaria. Founded in 1998 by UNICEF, WHO, UNDP and the World Bank and strengthened by the expertise, resources and commitment of more than 500 partner organizations, RBM is a public-private partnership that facilitates the incubation of new ideas, lends support to innovative approaches, promotes high-level political commitment and keeps malaria high on the global agenda by enabling, harmonizing and amplifying partner-driven advocacy initiatives. RBM secures policy guidance and financial and technical support for control efforts in countries and monitors progress towards universal goals. The RBM Secretariat is hosted at World Health Organization in Geneva, Switzerland.

www.rollbackmalaria.org



Swiss Tropical and Public Health Institute

The Swiss Tropical and Public Health Institute (Swiss TPH) is active in various fields related to research and malaria control, in particular in the innovation of new concepts and products (vaccines and medicines), the validation of new interventions and the implementation of health system strengthening strategies. A number of large scale programs aim to improve the quality of health care for children. In Tanzania two vaccine candidates show promising results and the Swiss TPH supports the distribution of insecticide treated bed nets for over 15 years.

www.swisstph.ch



Swiss Malaria Foundation (SMF)

The Swiss Malaria Foundation is currently supporting three projects whose main objectives are to improve the diagnosis, treatment and prevention of malaria and to facilitate access of the population to treatment against the most common infectious diseases in selected places on the African continent. These three projects involve building a medical center in a deprived region of Burkina Faso; the exchange of students between Switzerland and Africa in malaria vaccine development and Improvement of diagnostic procedures and treatment of malaria.

www.swissmalaria.ch



Novartis Foundation for Sustainable Development

Since over 30 years, the Novartis Foundation for Sustainable Development (NFSD) supports projects in developing countries to improve access to healthcare. In the frame of the ACCESS project in Tanzania, the foundation worked with partners to facilitate access to effective malaria treatment. Through different interventions, ACCESS enhances the quality of care, strengthens human resources and improves access to healthcare for patients through health insurance schemes and income-generating activities.

www.novartisfoundation.org



Swiss Red Cross (SRC)

The Swiss Red Cross (SRC) helps to improve the provision of health care for particularly vulnerable sectors of the populations in around 30 countries. The fight against malaria is of major importance in this, especially in Africa. Our priority is to distribute mosquito nets that are treated with insecticide. The Red Cross also trains volunteers to teach villagers how to correctly use the nets and where they can find help if they fall ill.

www.redcross.ch



SolidarMed

SolidarMed ist the Swiss organisation for health in Africa. The specific focus on a region of Africa increases our competence and hence the quality of our work. SolidarMed fights malaria holistically: 2012, we distributed mosquito nets in Mozambique and Tanzania to 11,200 families. In 18 partner hospitals, over 35,000 malaria patients get treated. The commitment of around 380 local health workers results in a sustainable sensitization of the population about health and malaria.

www.solidarmed.ch



Syngenta

Syngenta is one of the world's leading companies with more than 26,000 employees in over 90 countries dedicated to our purpose: Bringing plant potential to life. Through world-class science, global reach and commitment to our customers we help to increase crop productivity, protect the environment and improve health and quality of life.

www.syngenta.com



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