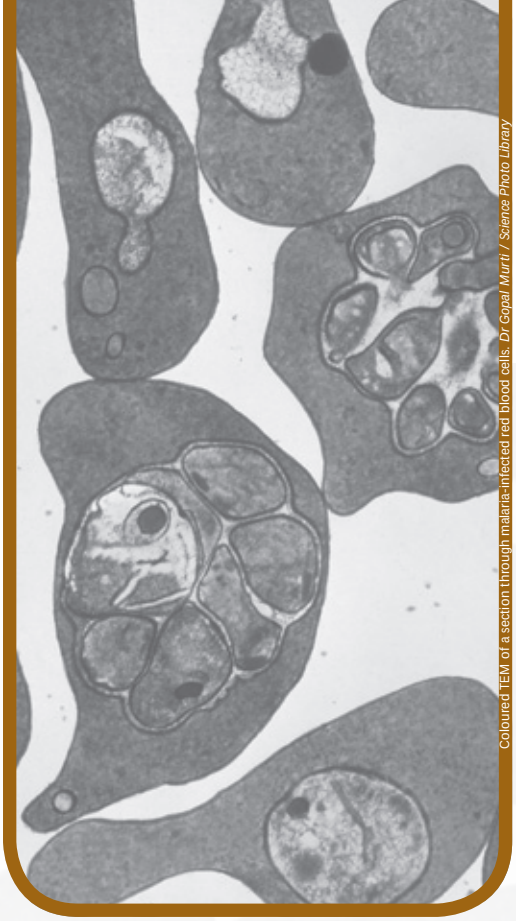
MALARIA

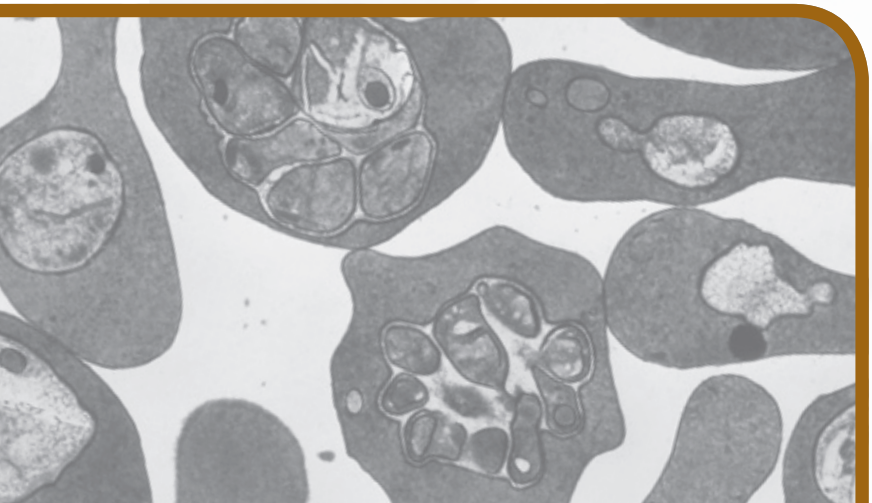
- Malaria is an infectious disease transmitted by biting mosquitoes.
- In 2010 there were an estimated 216 million episodes of malaria and 655,000 malaria deaths, primarily in sub-Saharan Africa.
- Drug and insecticide resistance, the lack of a vaccine, and inadequate healthcare infrastructures remain a barrier to disease eradication.



Coloured TEM of a section through malaria-infected red blood cells. *Dr Gopal Murti / Science Photo Library*

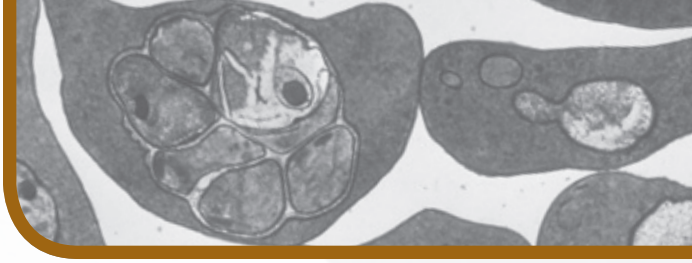
OVERVIEW

Malaria is an infectious disease caused by a single-celled parasitic organism, *Plasmodium*, which infects the blood and liver. If left untreated, severe disease leads to coma and death; more frequent but less serious 'flu-like' cases also occur. Biting mosquitoes transmit malaria and make the disease a particular problem in tropical and sub-tropical regions of Africa, Asia and South America, with Africa being the most affected. Where malaria is prevalent, there may be associated macroeconomic costs to foreign investment, tourism, labour productivity and trade. Prevention of mosquito bites by sleeping under nets and spraying housing with insecticides cuts the incidence of disease. There are highly effective drug treatments, notably the artemisinins extracted from a Chinese herbal medicine, but no commercialized vaccine. Drug and insecticide resistance, the lack of a vaccine, and inadequate healthcare infrastructures remain a barrier to disease eradication.



According to World Health Organization (WHO) figures, reductions in malaria cases of more than 50% have been recorded between 2000 and 2010 in 43 of the 99 countries with on-going transmission, while downward trends of 25–50% have been seen in 8 other countries.[1] Reductions have coincided with donor funds – US$2 billion globally in 2011 – that paid for the distribution of insecticide-treated bed-nets, indoor residual spraying, rapid and reliable diagnosis, and effective treatment.[2]

In large areas of the world, however, a different and less-promising picture emerges. In Burkina Faso, Democratic Republic of Congo (DRC), Nigeria, Somalia and Sudan (North and South) disease rates appear to be rising (although, in the case of Burkina Faso, DRC and Nigeria, the WHO attributes rises to better diagnostic methods picking up more cases).[3] Médecins Sans Frontières indicate that malaria surges in the DRC have overwhelmed an already failing or non-existent healthcare system.[4] Outside Africa, WHO estimates that malaria rates remain static – or are at best falling slowly – in Columbia, Brazil, Yemen, Pakistan, India, Bangladesh, Burma, Cambodia, Indonesia and Papua New Guinea.[5]



PROBLEMS

Plasmodium parasites that cause malaria can become drug-resistant, which means that the standard treatments stop working reliably. South-east Asia harbours the bulk of drug-resistant malaria, but there are also cases in Africa. Insecticide resistance can develop among mosquitoes, meaning that sprays work less effectively. Even a damaged (and holed) mosquito net can thwart attempts to stop disease transmission.

Counterfeit or substandard drugs – containing inert 'fillers', toxic additives or diluted doses – are another major concern. A recent review by Nayyar and colleagues estimated that about a third of antimalarial drugs sold in the developing countries of Africa and Asia were falsified or failed chemical analysis.[6]

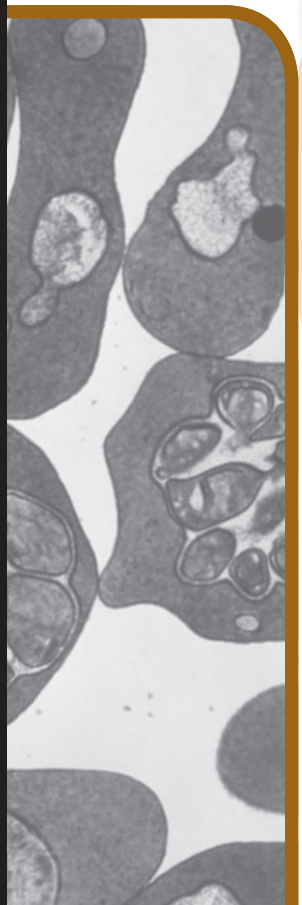
NEW TECHNOLOGIES

'Neglected' diseases such as malaria by definition occur in 'neglected' places – low-income economies thought not to represent a lucrative market for drugs and other interventions. Accordingly, scientific research in the malaria field relies for its impetus on government-backed alliances with the private and not-for-profit sectors. Recent figures, from 2010, show that governments provided more than half, or US$295.7 million, of global R&D funding for malaria, with industry contributing 25% and philanthropists 23%.[7]

The Medicines for Malaria Venture (MMV), founded in 1999 and based in Geneva, coordinates work on new antimalarial drugs. The WHO's 'Initiative for Vaccine Research', the GAVI Alliance and PATH fulfil related roles for vaccines.

There are currently 38 different antimalarial drug projects recorded in MMV's global survey, with about 16 either very recently approved or in the final stages of development and product registration.[8] WHO estimates that there are about 30 vaccines undergoing clinical trial.[9] An experimental vaccine developed by GSK, 'RTS,S/AS01', has been interpreted as giving promising results, based on a phase 3 clinical trial in about 15,000 African children.[10] A leading malaria researcher, Nicholas J. White, predicted in November 2011 that the GSK vaccine should be available in '*just over 3 years*'.[11]

Genetically modified (GM) mosquitoes are another technology under active trial. These GM mosquitoes are genetically engineered to produce offspring that die as larvae or pupae, thereby cutting the mosquito population able to transmit disease. A UK-based biotech company, Oxitec Ltd, are trialing the release of such mosquitoes in Malaysia, Brazil and the Cayman Islands, the latter a British overseas territory.[12] The mosquito species in question spreads dengue fever rather than malaria, and therefore Oxitec's work is not intended to disrupt malaria transmission. However, some scientists believe that similar techniques might be applied to malaria.



MALARIA, MINES & MINERALS

Key industrial minerals come from the malarial regions of Africa. Worker sickness and lost productivity have led mining firms such as UK-listed AngloGold Ashanti, BHP Billiton and Rio Tinto to run large-scale malaria control programmes.[13] AngloGold used indoor insecticide spraying to cut malaria cases around its mine at Abuasi in Ghana – some 35,000 dwellings – by 73% between 2005 and 2007. Average work days lost due to malaria fell from 6,983 per month in 2005 to 282 in 2009. The project cost US$1.7 million for the first year, with an annual budget of US$1.3 million thereafter.[14]

Details of references cited in this briefing can be found at ***www.sgm.ac.uk/news/hot_topics/Malaria-references.pdf****. The text is based on* Malaria – A Global Challenge *(2012), available on request from SGM.*

SGM BRIEFINGS

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