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Eliminating onchocerciasis as a public health problem

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Onchocerciasis as a disease of public health significance, which affects people of 35 countries in Africa, America and the Arabian Peninsula (Figures 1 and 2) did not receive much attention until after World War II. By then the blindness produced by onchocerciasis had been fairly well described in studies from west and central Africa, and the transmission of *Onchocerca volvulus* by *Simulium* flies was well known (Figure 3). In 1949, the successful interruption of transmission through vector control by means of DDT applications was demonstrated in Kenya. This created interest in the prospect of controlling onchocerciasis through vector control schemes, particularly as the medical profession by then had realized that there was no easily applicable or safe treatment for the disease. Suramin, the only drug proven to kill the adult worm, turned out to be very toxic and had to be given in repeated injections over several weeks, which limited its use to hospitalized cases. Di-ethylcarbamazine-citrate (DEC) was known to be a very effective microfilaricide against *O. volvulus*, but with intense, and often dangerous, adverse effects in form of the Mazzotti reaction. This treatment, which had to be given over several weeks, and repeated regularly, was so unpleasant that most patients tried it only once, if at all. Efforts to develop low-dose schemes for suramin and DEC, including addition of anti-histamines and steroids, did not bring about much improved tolerance. In the 1970s it became clear that both drugs could lead to an aggravation of onchocercal eye lesions, and chemotherapy against onchocerciasis was virtually abandoned.

In 1953 and again in 1966 the WHO convened Expert Committees on onchocerciasis, which led to increased interest and significant progress in the field of vector control. Several such schemes against onchocerciasis were established in the 1960s, including a major project in Burkina Faso, Cote d'Ivoire and Mali. It was known that the initial success achieved in Kenya was not easily replicated, as the different vector species in west Africa were more difficult to control. It soon became apparent that despite some success, an ever-present problem was the invasion of *Simulium* flies from outside the vector control area. This led to a radical concept formulated in a meeting in 1968 in Tunis, to apply vector control in such a vast area so that no flies could come in from nearby breeding sites. This idea came to reality a few years later, when the Onchocerciasis Control Programme (OCP) in the Volta River Basin Area was initiated. The OCP covered an area of more than 1.2 million km^2 with surface and air-delivered larvicide treatment (Figure 4) – initially this was 7, and later on 11, countries in west Africa. The OCP was unique in that it clearly identified disease and disability as a major obstacle to economic growth and development; it was also unique in its partnership formula involving the World Bank and UN, with the WHO acting as the executive agency. That partnership was later expanded to include the Mectizan Donation Programme and several nongovernmental organizations (NGOs).

Unfortunately, OCP soon ran into difficulties. Migrating flies over long distances turned out to be a problem, and in 1980 resistance to the chosen insecticide, temephos, was discovered in some *Simulium* flies. The Programme skillfully overcame these difficulties through research and alternative insecticide applications with careful environmental monitoring.

The decision of Merck and Co. in 1987 to make ivermectin (Mectizan®) available free of charge through the Mectizan Donation Programme (MDP) was an important addition to the OCP vector control strategy. WHO had already collaborated with Merck in clinical trials of Mectizan. Its potential for mass treatment was clearly realized, as it showed an excellent microfilaricidal effect without many adverse reactions. Further, the long-lasting effect of a single dose of Mectizan made annual treatment possible, while maintaining an effective suppression of the microfilarial load. MDP therefore had a ready partner from its outset in the OCP, and that partnership soon included a group of NGOs dedicated to the prevention of blindness. After a few years of groundbreaking efforts to find suitable and cost-effective distribution schemes for Mectizan, based heavily on the field experience of collaborating NGOs, the OCP with its partners was able to gradually achieve the needed population coverage with Mectizan.

As the successful implementation of large-scale Mectizan distribution became evident, there was a move to control onchocerciasis also in the six endemic Latin American countries. Local vector control schemes, and in

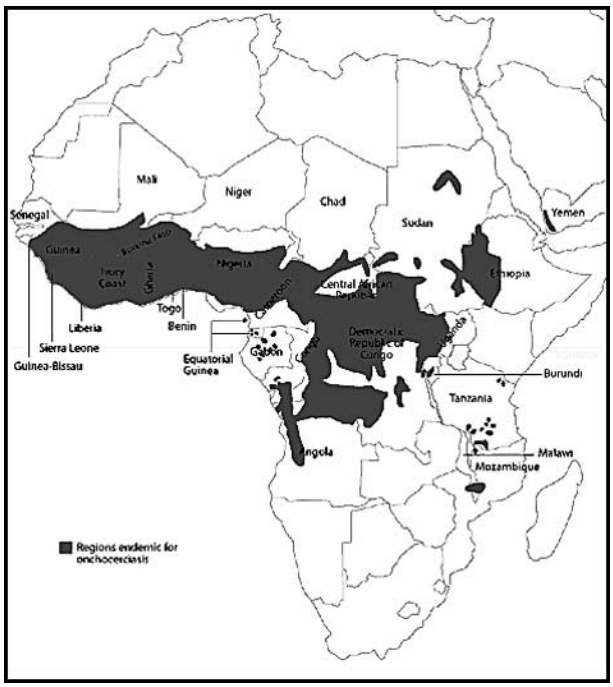

Figure 1 Regions endemic for onchocerciasis in Africa

Figure 2 Regions endemic for onchocerciasis in Latin America

Figure 3 Onchocerciasis-associated blindness

Figure 4 Aerial larvicide treatment

some instances nodulectomy campaigns, had given mixed results. In Latin America it was realized that effective Mectizan distribution might even eliminate the disease forever, as there are less-efficient vector flies in the western hemisphere. The Onchocerciasis Elimination Program in the Americas (OEPA) was therefore established in 1990 by the Ministries of Health concerned. Based in Guatemala, OEPA has since achieved successful Mectizan distribution in all six countries, and onchocerciasis is targeted to be virtually eliminated from the western hemisphere by 2007.

Given the success of OCP, the remaining 19 onchocerciasis-endemic countries in Africa should clearly benefit from similar achievements. The co-sponsoring agencies for OCP along with the collaborating NGO group planned an additional programme, launched in 1995 as the African Programme for Onchocerciasis Control (APOC). The new programme was modelled

after OCP, but its strategy was based on building sustainable Mectizan distribution programmes in all the 19 countries, with only a minor component for vector control. APOC has managed over only a few years to develop effective community-directed treatment with Mectizan, which has been of great significance in allowing for a rapid expansion of coverage of populations in need of treatment.

The OCP closed at the end of 2002, having largely achieved its mission. It leaves behind ongoing surveillance, continuing treatment in many areas, including some special intervention zones. The national capacity-building undertaken by OCP now allows the participating countries to do most of the follow-up required. Meanwhile OEPA is on the verge of successful elimination of onchocerciasis from Latin America, and APOC is rapidly progressing in terms of coverage of all African countries in need of mass treatment with Mectizan. There are therefore good reasons to be optimistic that by 2010 onchocerciasis as a public health problem will finally be eliminated. This does not mean that Mectizan treatment can be stopped everywhere, as continuing efforts will be needed to rid Africa of the disease.

The progress in controlling onchocerciasis as a severely disabling disease is truly impressive; it is a result of an evolution of not only technical and programmatic strategies, but also partnership building over the years. The establishment of the MDP, and its work through a broad partnership, from UN-agencies and Ministries of Health to affected communities, has allowed for the present success. This will also go a long way to achieve global control of onchocerciasis, which is now within reach.

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