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Editorial

Defeating Schistosomiasis

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Schistosomiasis is an ancient, neglected parasitic disease caused by blood flukes (trematode worms) of the genus schistosoma. Affecting an estimated 200 million persons in 78 countries, the disease is intimately associated with poverty and is grossly debilitating, leading to chronic ill health.[1] The African species *Schistosoma haematobium* (urogenital) and *S. mansoni* (intestinal) have the highest prevalence and cause by far the greatest burden of disease (approximately 90% of which occurs in sub-Saharan Africa).[1] Only one drug, praziquantel, is available to treat all forms of schistosomiasis, and it is widely used.

The World Health Organization (WHO) sets ambitious targets for global schistosomiasis control and elimination to reduce prevalence and infection intensity, and hence morbidity, mainly by means of large-scale mass drug administration (MDA) of praziquantel to school-age children and to persons in other high-risk groups.[2] Despite important health benefits in achieving decreased morbidity in several geographic areas, the MDA approach has not been a total success, owing to a number of logistic challenges: for example, a shortfall in the delivery of praziquantel, poor drug coverage, and poor rates of drug adherence.[3] In this issue of the *Journal*, Deol et al.[4] report a systematic review of data from the Schistosomiasis Control Initiative–supported multiyear, cross-sectional treatment programs in eight countries in sub-Saharan Africa and in Yemen. Data on *S. mansoni* and *S. haematobium* infections in school-age children (5 to 15 years of age) were analyzed from the commencement of the MDA program. The study aimed to assess whether the countries that were implementing preventive chemotherapy had already reached the ambitious WHO goals — disease control by 2020 and elimination of schistosomiasis as a public health problem by 2025 — and if so, how many treatment rounds were required.

The results show that treatment reduced the prevalence of heavy-intensity infection for both species to below 5% in all the countries except Niger, which only marginally missed the disease-control target for *S. haematobium* in the first treatment round. The more ambitious target of eliminating schistosomiasis as a public health problem was reached for *S. mansoni* infection only, and only in half the country programs. The inference is that if countries follow the current WHO guidelines, many programs would need to continue beyond 2020 to achieve the projected disease-control and elimination targets. Deol et al. conclude that, on the basis of the local epidemiologic picture, more frequent reevaluation of schistosomiasis control progress is needed to inform future programmatic decision making.

Whereas the mass praziquantel drug distribution and treatment approach that

is advocated by the WHO seems to be quite effective in the short term, it is likely to be unsustainable in the long term. Praziquantel is highly efficient in killing adult schistosomes, and it controls morbidity well among infected persons who receive treatment; however, because praziquantel does not kill developing schistosomes and does not prevent reinfection, the drug has only a transient effect on transmission.[1] Reinfection can occur rapidly, returning prevalence to baseline levels within a relatively short time after treatment.[5,6] Less appreciated, but an important consideration for any control program, is the occurrence of severe rebound disease, particularly in high-transmission areas when MDA is interrupted.[5,6] It is evident that the mass praziquantel–based approach needs to be scrutinized carefully in terms of efficacy and long-term sustainability. Other key issues concerning effective schistosomiasis control include the following: potential issues of hybridization (interspecies schistosome hybrids affecting phenotypic characteristics) and animal reservoirs in sub-Saharan Africa, which would probably affect disease dynamics and responses to treatment; the potential reduction in the efficacy of praziquantel as a result of multiple rounds of MDA; and the requirement for more accurate, but cost-effective, diagnostic methods for large-scale use — particularly as diagnostic sensitivity decreases with reduced infection intensity.[1,7,8]

Transmission reduction is critical for the elimination of schistosomiasis; so, rather than relying solely on praziquantel treatment, it is sensible to include a multifaceted, integrated intervention approach to reduce parasite transmission and morbidity. This tactic has been used effectively in China, where elimination is now on the immediate horizon.[9] Such an integrated program would be tailored to specific social-ecologic settings and would require strong local and international governmental involvement and support. The program would combine chemotherapy with other interventions, such as snail control by means of molluscicides or environmental modification, as well as involve health education and promotion in addition to improvements in water, sanitation, and hygiene. Health services would need to be developed at the same time in order to support the efficacy of program delivery to reduce transmission, making it more cost-effective, more cost-beneficial, and more sustainable in the long term than treatment alone.

The ambitious WHO milestones for disease control and, especially, for the elimination of schistosomiasis as a public health problem, with the use of the stand-alone drug treatment approach, are unlikely to be met. Nevertheless, increasing the profile of addressing the global schistosomiasis challenge and, especially, the ongoing discussion about more effective intervention options to deliver long-term sustainable control is important and relevant. As with other neglected tropical diseases, research and development on approaches to managing schistosomiasis are not a priority. New antischistosomal drugs and diagnostic tools are needed, and although vaccination may represent our best hope for achieving elimination and would be a welcome addition to the armory of treatments for schistosomiasis, it is a stark reality that, despite recent

progress,[10] no such vaccine has yet been developed to an acceptable level for public use. Defeating schistosomiasis is within our grasp, but we are not there yet.

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Disclosure forms provided by the author are available with the full text of this editorial at NEJM.org.

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