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Letter to the Editor

Onchocerciasis, Cysticercosis, and Epilepsy

Dear Sir:

Katabarwa and others[1] reported on detection of nodules of *Taenia solium* cysticerci mistakenly identified as *Onchocerca volvulus* nodules in a post-treatment survey after 12 years of ivermectin mass treatment in Uganda. On the basis of this observation, they suggest that neurocysticercosis may be the cause of frequent occurrence of epileptic seizures, which has been reported from several onchocerciasis-endemic areas.

Over the past 15 years, a positive correlation between the prevalence of epilepsy and that of onchocerciasis has been reported from various African areas.[2–5] All of these studies used microscopy for the detection of microfilariae in dermal biopsy specimens as an unequivocal diagnostic means of infection with *O. volvulus*. Contrary to what is suggested by Katabarwa and others,[1] these studies did not rely on nodule counts, which could be biased by the presence of subcutaneous cysticercosis. Kaiser and others[2] in western Uganda found a close relationship between the prevalence of epilepsy and the prevalence of skin microfilariae. Newell and others[3] in the province of Bururi in southwestern Burundi performed a case-control study in two areas with different endemicity levels for onchocerciasis. They confirmed a significant association between epilepsy and *O. volvulus* infection in hyperendemic villages and a less pronounced effect in mesoendemic villages. Boussinesq and others[4] in Cameroon and Dozie and others[5] in Nigeria demonstrated a positive relationship between the prevalence of epilepsy and mean community microfilarial densities. In their analysis of patients without previous ivermectin treatment, Boussinesq and others[4] also demonstrated that intensity of infection was significantly higher in epilepsy patients than in pair-matched controls.

Information on the possible influence of cysticercosis on epilepsy is available for the study areas of three of the above mentioned studies: First, in western Uganda, serologic test results for *T. solium* were positive in one and borderline in three of 53 epilepsy patients, and the significant correlation between onchocerciasis and epilepsy was not affected when these patients were excluded.[2] During four years of repeated visits to the study villages and patient homes, pig-breeding was not observed to be a common practice in the area (Kaiser C, unpublished data).[6] Thus, neurocysticercosis cannot be considered a relevant cause for the elevated epilepsy prevalence found by Kaiser and others.[2]

Second, in southwestern Burundi, a serologic study on cysticercosis was performed in the two villages included in the above-mentioned investigation on onchocerciasis.[3,7] This study found a higher seroprevalence for cysticercal antibodies in 103 patients with epilepsy than in controls, but this difference was not significant (11.7% versus 2.8%; $P = 0.06$).[7] In contrast, a case-control study from an area in northern Burundi, which was not endemic for *O. volvulus* but was infested with *T. solium*, showed a highly significant association between cysticercosis and epilepsy.[8]

Third, in one village in the area (Mbam Valley, Cameroon) examined by Boussinesq and others,[4] a case-control study detected cysticercal antibodies in 17 (18.3%) of 93 patients with epilepsy compared with 12 (14.8%) of 81 controls (a non-significant difference; odds ratio = 1.3, 95% confidence interval = 0.6–3.0).[9] This finding suggests that in the areas of the studies conducted in Burundi[3] and Cameroon,[4] where *O. volvulus* and *T. solium* are co-endemic, the expected influence of cysticercosis on epilepsy may be masked by the effect of onchocerciasis as a competing etiologic factor.

As demonstrated by Katabarwa and others[1] and in other studies, *T. solium* infection is widespread in Africa and can be co-endemic with onchocerciasis in many areas. We agree with Katabarwa and others[1] that subcutaneous cysticercal cysts may be confounded with onchocercal nodules in co-endemic areas, and that this is of relevance because it could produce a bias in evaluation of onchocerciasis control measures with rapid epidemiologic assessment methods. This distortion may be small at the outset of a control campaign because even in disease-endemic areas the prevalence of subcutaneous cysticerci in the general population is usually low, especially in Africa.[8,10] However, the distortion will increase over time when the relative fraction of nodules caused by adult filaria of *O. volvulus* decreases either because of a direct effect of repeated drug administration on the preexisting adult worms or indirectly by reducing transmission of onchocerciasis and incidence of new nodules. The accuracy of assessing onchocerciasis endemicity by nodule palpation could be improved by taking into account that subcutaneous cysticerci are predominantly found on the upper limbs and on the head, whereas onchocercal nodules are usually localized (at least in Africa) on the lower part of the body. In this respect, it would be of interest to know from what anatomic sites the nodules reported by Katabarwa and others[1] were excised.

In conclusion, a positive correlation between onchocerciasis and epilepsy has been demonstrated in areas that are endemic for *O. volvulus* throughout West, Central, and East Africa. Whether this correlation constitutes a causal relationship is not known.[11] In contrast to the suggestion of Katabarwa and others,[1] epidemiologic data on cysticercosis from the respective areas do not support the hypothesis that neurocysticercosis could be the cause of onchocerciasis-associated epileptic seizures. Studies combining appropriate neuroepidemiologic, clinical, and parasitologic methods are needed to clarify 1) the etiology of excess incidence of epilepsy in areas endemic for *O. volvulus*, 2) the effect of *T. solium* on epilepsy at the community level in Africa, and 3) the possible interaction of both diseases in co-endemic areas.

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