

Letter to the Editor

Neurocysticercosis in Europe: Need for a One Health Approach

Brecht Devleeschauwer^{1,2} G. Suzanne A. Smit^{1,2} Pierre Dorny^{1,3} Joke W. van der Giessen⁴
Sarah Gabriël³

¹Department of Virology, Parasitology and Immunology, Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

²Institute of Health and Society (IRSS), Université catholique de Louvain, Brussels, Belgium

³Department of Biomedical Sciences, Institute of Tropical Medicine, Antwerp, Belgium

⁴National Reference Laboratory for foodborne Parasites, Center for Zoonoses and Environmental Microbiology, National Institute of Public Health and the Environment, Bilthoven, The Netherlands

Address for correspondence Brecht Devleeschauwer, PhD, DVM, MSc, Department of Virology, Parasitology and Immunology, Faculty of Veterinary Medicine, Ghent University, Salisburylaan 133, 9820 Merelbeke, Belgium (e-mail: brechtdev@gmail.com).

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We read with great interest the recently published case series by van de Pol et al.¹ The authors described three cases of *Taenia solium* neurocysticercosis diagnosed in children living in the Netherlands. *T. solium*, the pork tapeworm, is a neglected zoonotic parasite, endemic in areas where pigs are reared under nonindustrialized conditions, pork is consumed undercooked, and sanitation is low. Because of the industrialization of pig production, the parasite is no longer endemic in Western Europe, and cases of neurocysticercosis, as the ones described, are the result of infection incurred in the endemic countries.

We complement the case series by discussing the epidemiology and diagnosis of *T. solium*, and by highlighting the policy implications of (imported) neurocysticercosis cases in Europe, calling for a One Health approach.

In the discussion by van de Pol et al,¹ the authors state that “By eating undercooked pork meat, *Taenia solium* cysts can develop into adult parasites in the human digestive tract, which is called cysticercosis. Neurocysticercosis can develop when a person is infected with eggs from the *Taenia solium* by fecal-oral transmission from a person with cysticercosis, that become encysted in the central nervous system.” This description of the *T. solium* lifecycle is not entirely correct. When humans ingest *T. solium* cysticerci through consumption of undercooked pork, these cysticerci may indeed develop into an adult tapeworm in the host’s intestines. This condition in humans, however, is called taeniosis, and not cysticercosis. Persons with taeniosis excrete tapeworm segments with thousands of infective eggs in their stool. When sanitation and hygiene are low, these eggs may be

ingested by the same or another individual because of the fecal-oral transmission. Once ingested, the larvae released from these eggs will further develop into cysticerci, giving rise to a condition called cysticercosis or neurocysticercosis, when the cysticerci are lodged in the central nervous system. Cysticercosis in humans is therefore a dead end disease, unlike cysticercosis in pigs. Furthermore, human cysticercosis is in essence a fecal-oral disease, transmitted from human to human. Pork consumption is thus not a necessity, and cysticercosis in vegetarians, such as patient three, is not at all a surprise.

The authors based their diagnosis of neurocysticercosis on the so-called Del Brutto criteria.² In practice, the main diagnostic criteria are neuroimaging findings, detection of specific antibodies, and travel/migration history. Recently, antigen detection has been promoted as an additional diagnostic criterion.³ Unlike antibodies, which can be present after mere exposure to *T. solium*, antigens are only present in serum when actual infection with *T. solium* cysticerci has occurred.⁴ Furthermore, as antigen levels decrease rapidly after degeneration of cysticerci, antigen detection may also assist in the follow-up of patients with noncalcified cysts, such as patient three.

The true extent of neurocysticercosis in Europe is currently unknown.⁵ We are therefore grateful that the authors took the effort to report these three cases in international literature. However, it is likely that there are many more cases diagnosed in the Netherlands and other European countries. Recently, several European groups joined forces in a European network on taeniosis/cysticercosis, CYSTINET (COST Action TD1302), aiming to advance knowledge and understanding of *T. solium*

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and *Taenia saginata* (the beef tapeworm, which does not cause cysticercosis in humans). CYSTINET, together with other authorities, is urging to make neurocysticercosis a notifiable disease, and to develop a register of neurocysticercosis cases. Such an information system would also act as an early warning system for possible reemergence of *T. solium* in Western Europe. Indeed, with the increasing popularity of organic pig farming and the increasing human migration from endemic countries, there is a chance that autochthonous *T. solium* transmission may one day become possible again.⁶ To contain this potential threat, collaboration between clinicians and veterinarians in a “One Health” approach is crucial. The case series by van de Pol et al¹ offers opportunities to establish cross-disciplinary collaboration in a One Health approach because both disciplines are needed to combat *T. solium*.

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