Are Alternative Sources of Parasitic (Cysticercal) Antigens Necessary for Diagnosis of Neurocysticercosis?

In their recent article, Bueno et al. (1) evaluated antigenic extracts from Taenia crassiceps (Tcra) and Taenia solium (Tso) metacestodes in cerebrospinal fluid (CSF) and serum samples of neurocysticercosis (NC) patients for diagnosis of NC and attempted to investigate whether serum alone could be used for seroepidemiological purposes in the diagnosis of NC. The authors observed a high specificity of the immunoassays when either Tcra or Tso in CSF was used but a significant difference when serum samples were used. The study concluded that Tcra could be used in immunoblotting for confirmation of enzyme-linked immunosorbent assay (ELISA) results.

Do we need alternative sources of parasites for preparing cysticercal antigens for the immunodiagnostics of NC? It is believed that obtaining Cysticercus cellulosae from naturally infected swine would be a simpler and more economical way to prepare antigens than obtaining cysterci from T. crassiceps. In underdeveloped and developing countries, pig rearing is a common activity. Pigs become infected naturally by grazing in open areas where humans defecate. Cost-wise, a kilogram of (infested) pork would cost approximately Rs.25/- (US $1 = INR 45). Therefore, one could easily obtain infested pork and prepare cysticercal antigens. Earlier, several researchers evaluated various antigenic preparations (either purified, partially purified, or crude) of C. cellulosae only and obtained a high specificity (4, 6, 8). Qualitative differences between C. cellulosae from porcine and human sources and antigenic variation in C. cellulosae obtained from infested pigs from different regions of India have been observed (5). Moreover, both definitive and intermediate hosts are different in both Taenia species. Therefore, it would be appropriate and reasonable to employ antigens of C. cellulosae in the diagnosis of NC.

For immunodiagnosis of NC, detection of both antigen and antibody in CSF or in CSF and serum, and not in serum alone, has been suggested since de novo synthesis of anticysticercal antibodies in the central nervous system (CNS) compartment has been demonstrated in cases of NC (7). Therefore, the objective of Bueno et al. (1) to evaluate serum alone for seroepidemiological purposes may result in the detection of cases of systemic cysticercosis and the underdiagnosis of cases of NC in areas of endemicity in Brazil.

The differential diagnosis of chronic meningitis to determine whether the infection is NC or tuberculous, cryptococcal, or carcinomatous meningitis has always been problematic because these infections are highly endemic in many underdeveloped and developing nations and various clinical manifestations of NC overlap those of other diseases of the CNS (2). Therefore, it would have been ideal if the authors had assessed the specificity of Tso or Tcra antigens in CSF samples from patients with proven cases of tuberculosis, cryptococcal, or carcinomatous meningitis.

Antigenic identity between peptides of ≥23, 39, 85 to 77, and 97 kDa of Tso and peptides of ≤62, 74, 109, 121, and 131 kDa of Tcra has not been elucidated. Therefore, studying the antigenic relationship between specific antigenic components of Tso and Tcra (see Table 2 in reference 1) would enhance the specificity of immunoassays in the immunodiagnosis of NC by purifying them.

It is essential that future studies offer appropriate measures of control and prevention of NC (3). For control of NC, it is necessary to diagnose the disease accurately by using purified parasitic antigens prepared from pools of cysts derived from different regions of endemicity of the world, since parasites are known to exhibit antigenic variation (5, 9). NC could be prevented by simply breaching the life cycle of the parasite, and that is achieved by the education of the population, the adoption of strict hygienic practices in their lifestyle, the elimination of pig grazing in open areas where defecation has occurred and, finally, the cessation of pork consumption.

REFERENCES


Author’s Reply

We thank Dr. Katti for the critical view of our work and for such appropriate suggestions. The objective of our work was to study serum samples, which can be obtained in a less invasive manner than CSF, for the diagnosis of NC as well as for serum-epidemiological studies for the mapping of areas of endemicity in our country. We then used as reference the results obtained with paired CSF samples in the NC group for validation of the serologic tests.

We have had difficulties in obtaining swine naturally infected with T. solium larvae to prepare antigen extracts for NC diagnosis in Brazil, mainly in big cities. In our country, there is legislation that does not allow the purchase of contaminated pork meat; thus, commercial availability of pork is only in clandestine form and it is difficult for researchers to obtain it. In addition to this difficulty, procedures for specific antigen purification are necessary to continue the work. In fact, Tsang

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et al. (4) developed a test with purified antigen that showed elevated sensitivity for serum samples.

The possibility of choosing an animal model that is easily maintained in the laboratory as an alternative to obtaining parasites arises from the observation that the *Taenia* species have antigens in common. We have been working with the ORF strain of *T. crassiceps*, which reproduces in an asexual manner by intraperitoneal passage through female BALB/c mice. It represents an important experimental model, which, according to comparative studies conducted by us and other authors on homologous antigens in CSF samples, can be used for the immunodiagnosis of NC (1, 2, 3, 5, 6). The major advantages of the use of the heterologous antigen Tcra are the unlimited sources of cysticerci, the minimal cost due to its production in the laboratory, and the ease of extraction of the parasite from mice. The tests using the Tcra antigen have shown good reproducibility in different lots as evaluated by the peptide pattern on a sodium dodecyl sulfate-polyacrylamide gel electrophoresis gel and by the results with the positive and negative controls used in each assay.

In our work, sera reacting in an enzyme-linked immunosorbent assay needed confirmation with a Tcra blot. The purification of immunodominant peptides in *T. crassiceps* vesicular fluid antigen and its use in adequate concentrations in an enzyme-linked immunosorbent assay may elevate the specificity. It may also facilitate serum-epidemiological studies in humans and swine at a reduced cost for the evaluation of the real situation of the taeniasis-cysticercosis situation in Brazil. Presently, we are using Tcra antigen in CFS samples more frequently. Other analysis that is ongoing is the utilization of our tests with serum samples in different areas of Brazil.

In fact, NC, more than a medical problem, is a public and social problem, since sanitary controls would solve the problem with the additional advantage of eliminating the effect of other parasitic diseases.

REFERENCES


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