Short Report

Circulating cathodic antigen levels in serum and urine of schistosomiasis patients before and after chemotherapy with praziquantel

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Detection of circulating anodic antigen (CAA) and circulating cathodic antigen (CCA) in serum and urine has been shown to be a valuable alternative to egg counts for the diagnosis of schistosome infections. The levels of CAA and CCA were found to be highly specific and sensitive markers for the intensity of infection (DEELDER *et al.*, 1989; DE JONGE *et al.*, 1990). Circulating antigen assay is also useful in monitoring therapeutic intervention. Following successful chemotherapy with praziquantel, CAA disappeared from serum within about 10 d (DE JONGE *et al.*, 1989), and from urine within several weeks (VAN LIESHOUT *et al.*, 1991). No post-treatment study of CCA has been performed.

The present study was designed to evaluate the kinetics of CCA after chemotherapy. All individuals included in this study gave informed consent. Serum and urine samples were collected from 17 Egyptian patients with *Schistosoma mansoni* infection, before, and 1, 3, and 6 weeks after, treatment with 60 mg/kg praziquantel (Biltricide®), administered in 3 doses of 20 mg/kg orally at 4–6 h intervals. No urine sample was collected from one individual. All patients were males in the age range 11–49 years (median 17 years) and remained in hospital until 3–6 weeks after chemotherapy. Before treatment the faecal *S. mansoni* egg output ranged from 50 to 976 eggs/g of faeces (median 260 eggs/g). The CCA level was measured in serum and urine by a monoclonal antibody-based enzyme-linked immunosorbent assay (ELISA) (DE JONGE *et al.*, 1990). Serum and urine samples were titrated (dilutions ranging from 1:4 to 1:4096) and considered to be positive for CCA if the reciprocal titres were ≥ 8 and ≥ 16, respectively, based on previous results with control sera from uninfected individuals in an endemic area (VAN LIESHOUT *et al.*, 1992). The lower detection limit of this ELISA was 3·9–7·8 ng/mL of the trichloroacetic acid-soluble fraction of adult worm antigen (AWA-TCA), which contains approximately 3% CCA (G. J. Van Dam, personal communication).

Serum and urine CCA levels before and after treatment are shown in the Figure. Before chemotherapy, all serum samples and 81% of the urine samples were positive. After one week, CCA titres in serum and urine decreased significantly (Wilcoxon's test, $P<0{\cdot}001$, $n=17$ and 16). All serum and most (92%) urine titres became negative 3–6 weeks after treatment. Overall, the decline of CCA levels in serum and urine showed a profile similar to serum CAA in this group (VAN LIESHOUT *et al.*, 1991). In 14 patients no viable eggs were found at repeated parasitological examination 3–6 weeks after treatment; data could not be obtained from 3 patients.

A significant correlation was found between the number of parasite eggs in faeces and the CCA level in serum before treatment (Spearman's $\rho=0{\cdot}71$, $P=0{\cdot}001$, $n=17$), and between serum and urine CCA level before and after treatment (Spearman's $\rho=0{\cdot}50$, $P<0{\cdot}001$, $n=61$). No other significant correlation was found.

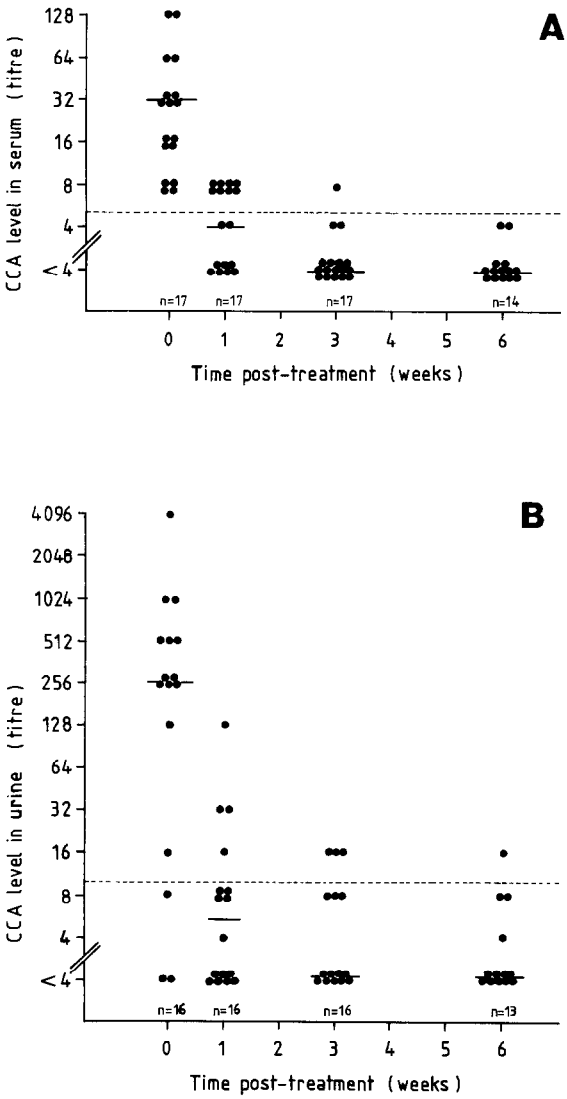

Figure. Reciprocal CCA titres in serum (A) and urine (B) samples of patients with schistosomiasis mansoni before treatment and at one, three and six weeks after treatment with praziquantel (60 mg/kg, orally). Horizontal lines indicate median values; broken line shows negative/positive cut-off value; n=number of patients.

In conclusion, this study demonstrated that the CCA assay can be used with both serum and urine as a sensitive method to monitor the efficacy of chemotherapy. The use of urine samples only would be highly desirable for mass population-screening programmes because it is non-invasive. The level of CCA in urine does not show any circadian variability (unpublished data), which is consistent with previous results obtained for CAA (VAN LIESHOUT *et al.*, 1991). In addition, the CCA urine assay has the advantage, compared to the CAA urine assay, that it does not require a time consuming concentration procedure.

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References

Deelder, A. M., De Jonge, N., Boerman, O. C., Fillié, Y. E., Hilberath, G. W., Rotmans, J. P., Gerritse, M. J. & Schut, D. W. O. A. (1989). Sensitive determination of circulating anodic antigen in *Schistosoma mansoni* infected individuals by an enzyme-linked immunosorbent assay using monoclonal antibodies. *American Journal of Tropical Medicine and Hygiene*, **40**, 268–272.

De Jonge, N., De Caluwé, P., Hilberath, G. W., Krijger, F. W., Polderman, A. M. & Deelder, A. M. (1989). Circulating anodic antigen levels in serum before and after chemotherapy with praziquantel in schistosomiasis mansoni. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **83**, 368–372.

De Jonge, N., Kremsner, P. G., Krijger, F. W., Schommer, G., Fillié, Y. E., Kornelis, D., Van Zeyl, R. J. M., Van Dam, G. J., Feldmeier, H. & Deelder, A. M. (1990). Detection of the schistosome circulating cathodic antigen by enzyme immunoassay using biotinylated monoclonal antibodies. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **84**, 815–818.

Van Lieshout, L., De Jonge, N., Bassily, S., Mansour, M. M. & Deelder, A. M. (1991). Assessment of cure in schistosomiasis patients after chemotherapy with praziquantel by quantitation of circulating anodic antigen (CAA) in urine. *American Journal of Tropical Medicine and Hygiene*, **44**, 323–328.

Van Lieshout, L., De Jonge, N., El Masry, N. A., Mansour, M. M., Krijger, F. W. & Deelder, A. M. (1992). Improved diagnostic performance of the circulating antigen assay in human schistosomiasis by parallel testing for circulating anodic and cathodic antigens in serum and urine. *American Journal of Tropical Medicine and Hygiene*, **47**, 463–469.

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Health and population data for developing countries available through USAID project

The Demographical and Health Survey (DHS) Program, funded by the U.S. Agency for International Development (USAID), is contributing unique data to the global database on population and health. To date, over thirty-five surveys have been conducted in developing countries including Botswana, Kenya, Nigeria, Senegal, Zimbabwe, Indonesia, Sri Lanka, Peru, Bolivia, Ecuador, Egypt and Morocco.

The surveys address topics such as infant and child mortality, prenatal and delivery care, fertility and family planning, breastfeeding, immunization, diarrhea, acute respiratory infection, fever, child nutritional status, and women's and husband's background and employment. Some surveys also gather information on causes of child death, maternal mortality, knowledge of AIDS, social marketing and availability of services.

In general, DHS datasets are available to researchers after the publication of the country survey report. For a few surveys, written permission is necessary from the in-country survey organization. The data files are accompanied by questionnaires, machine-readable descriptions and associated documentation. Currently, the cost of a DHS dataset is $200 ($50 for researchers in developing countries).

To order a DHS dataset, send a completed request form and description of your analysis project to the DHS Data Archive. Request forms are available from the archive. The address is:

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