

Research Note

Quantitative Comparison of Natural Immunoglobulin M Antibodies Reactive with *Toxoplasma gondii* between Pregnant and General Woman Populations

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Immunoglobulin (Ig) M antibodies have been an important diagnostic marker for recent acquisition of infection with *Toxoplasma gondii* in humans (Remington and McLeod, 1992). However, nonspecific reactions derived from natural IgM antibodies have been occasionally observed in several serologic tests (Konishi, 1993). The antibody levels were usually low enough to classify serum samples as negative, but very rarely were as high as comparable to specific IgM antibody levels obtained during acute infections (Konishi, 1991). Since these sera seem to bring about positive results in routine laboratory tests, certain healthy people may be erroneously diagnosed, as in cases where pregnant women had high levels of IgM antibodies without a rise in IgG antibody levels until delivery (Konishi, 1987; Gussetti *et al.*, 1990). Although both of these cases were reported with pregnant women, it is unclear if high natural IgM antibody levels were detected due to their immune status specific for pregnancy. In this report, distribution of IgM antibody levels were compared between pregnant and general woman populations negative for *Toxoplasma* infection to know the effect of pregnancy on natural IgM antibodies reactive with *Toxoplasma* antigens.

A total of 500 sera negative for IgG antibodies to *Toxoplasma* in enzyme-linked immunosorbent as-

say (ELISA; Konishi and Takahashi, 1983) were obtained from pregnant women during the first trimester at a hospital in Kobe, Japan. No *Toxoplasma* infection in these women was confirmed by checking umbilical cord sera collected from the same individual at delivery, which were also negative for IgG antibodies. Ages of this population ranged from 21 to 41 years with a mean of 28.3. Another serum samples were collected from general women with a comparable age composition ranging from 21 to 41 years with a mean of 28.5. This population was also negative for IgG antibodies to *Toxoplasma*, and no infection was confirmed by checking paired area collected from the same individual 1 year later. These sera were examined for IgM antibodies to *Toxoplasma* soluble antigen preparation by ELISA as previously described (Konishi, 1991). All samples were negative for rheumatoid factor and antinuclear antibodies as determined by the method previously described (Konishi, 1991).

Pregnant women showed ELISA values for IgM antibodies ranging from 0.000 to 1.184 (Fig. 1). Since the positive control serum used in this ELISA was obtained from an acute patient of toxoplasmosis and since all absorbances obtained with test samples were adjusted with the absorbance for this positive control as 1.00, this antibody distribution indicates that a small population negative for *Toxoplasma* infection did have natural IgM antibodies at comparable levels to those detected in acute patients. The

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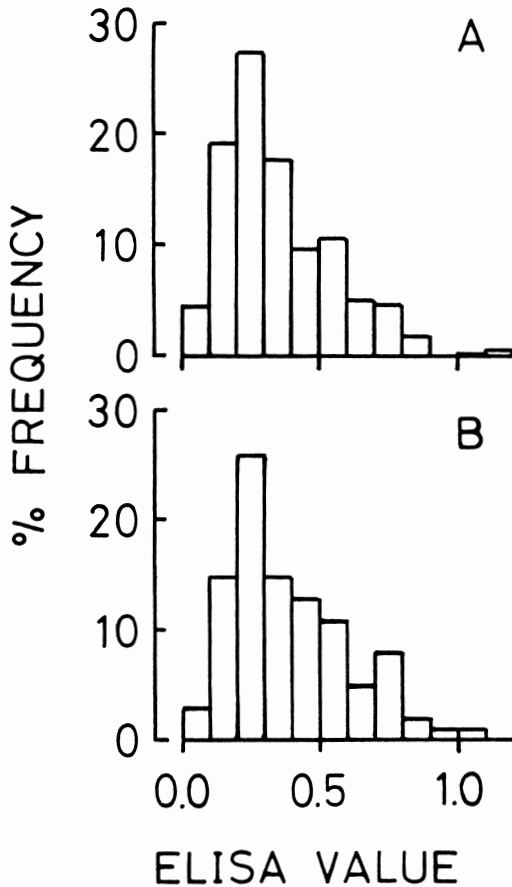


Fig. 1 Percent frequency distribution of ELISA-IgM antibody levels to *Toxoplasma* for (A) 500 pregnant and (B) 100 general women with a similar age composition. Both populations were negative for *Toxoplasma* infection.

pattern of frequency distribution was binomial with a peak at ELISA values of 0.2 to 0.3. Similarly, the natural IgM antibody levels in general women distributed in binomial pattern in the range of 0.095 to 1.077 with a peak of 0.2 to 0.3. Geometric means of antibody levels in pregnant women (0.292) and general women (0.330) were not significantly different ($P > 0.05$ by the Student's *t*-test).

In the previous antibody survey using ELISA (Konishi, 1991), varying levels of natural IgM antibodies reactive with *Toxoplasma* were observed in almost all of adult Japanese populations negative for

IgG antibodies to *Toxoplasma*. Consistent with this result, almost all of the pregnant women negative for IgG antibodies had natural IgM antibodies at varying levels. Since natural IgM antibodies are a factor involved in natural cytotoxicity of normal sera as was reported with trypanosomes (Ferrante, 1985; Yoshida and Araguth, 1987; Verducci *et al.*, 1989), a general concept that natural cytotoxicity increases during pregnancy (Glumac *et al.*, 1976) is possibly explained by high natural antibody levels during pregnancy like those reactive with tumor cells (Bolande *et al.*, 1989). As for natural IgM antibodies reactive with *Toxoplasma* antigens, however, a comparison in this study showed similar distribution patterns and mean antibody levels between pregnant and general woman populations, indicating no significant effect of pregnancy on natural IgM antibody levels detectable under the present assay conditions.

References

- 1) Bolande, R. P., Arnold, J. L., II and Mayer, D. C. (1989): Natural cytotoxicity of human serum: a natural IgM 'antibody' sensitizes transformed murine cells to the lytic action of complement. *Pathol. Immunopathol. Res.*, 8, 46-60.
- 2) Ferrante, A. (1985): Trypanolytic activity, agglutinins, and opsonins in sera from animals refractory to *Trypanosoma lewisi*. *Infect. Immun.*, 49, 378-382.
- 3) Glumac, G., Mates, A. and Eidinger, D. (1976): The heterocytotoxicity of human serum. III. Studies of the serum levels and distribution of activity in human populations. *Clin. Exp. Immunol.*, 26, 601-608.
- 4) Gussetti, N., D'Elia, R., Mottola, A. and Rigoli, E. (1990): Natural immunoglobulin M antibodies against *Toxoplasma gondii* during pregnancy. *Am. J. Obstet. Gynecol.*, 162, 1359-1360.
- 5) Konishi, E. (1987): A pregnant woman with a high level of naturally occurring immunoglobulin M antibodies to *Toxoplasma gondii*. *Am. J. Obstet. Gynecol.*, 157, 832-833.
- 6) Konishi, E. (1991): Naturally occurring immunoglobulin M antibodies to *Toxoplasma gondii* in Japanese populations. *Parasitology*, 102, 157-162.
- 7) Konishi, E. (1993): Naturally occurring antibodies that react with protozoan parasites. *Parasitol. Today*, 9, 361-364.
- 8) Konishi, E. and Takahashi, J. (1983): Reproducible enzyme-linked immunosorbent assay with a magnetic processing system for diagnosis of toxoplasmosis. *J. Clin. Microbiol.*, 17, 225-231.
- 9) Remington, J. S. and McLeod, R. (1992): Toxoplasmosis. In *Infectious Diseases*. Gorbach, S. L., Bartlett, J. G.

- and Blacklow, N. R., ed., W. B. Saunders, Philadelphia, 1328–1343.
- 10) Verducci, G., Perito, S., Rossi, R., Mannarino, E., Bistoni, F. and Marconi, P. (1989): Identification of a trypanocidal factor against *Trypanosoma equiperdum* in normal human serum. *Parasitology*, 98, 401–407.
- 11) Yoshida, N. and Araguth, M. F. (1987): Trypanolytic activity and antibodies to metacyclic trypomastigotes of *Trypanosoma cruzi* in non-Chagasic human sera. *Parasite Immunol.*, 9, 389–393.