

Brief Reports

Vox Sang. 18: 366-369 (1970)

A Case of Haemolytic Disease of the Newborn Due to a New Red Cell Antigen, Zd

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A young mother gave birth to her second child, and he was found to be suffering from haemolytic disease of the newborn. A detailed study has failed to identify the antigen-antibody concerned and it is considered that a new blood group has thus been revealed. The mother has become immunized by pregnancy to a low frequency antigen present on her husband's cells. The family study has shown the antigen to be present in three generations. The antibody will be called anti-Zd and the corresponding antigen, Zd.

Case History

Mrs. Z. D., aged 26, who is of group A Rh-positive, had received transfusions of blood after delivery of her first child. Two years later she gave birth to a child, of group A Rh-positive, which was icteric and had an enlarged liver and spleen. The direct anti-globulin reaction of the baby's cells was weakly positive.

The child was exchange-transfused with 750 ml of group O cells suspended in group AB plasma. The serum-bilirubin level fell. After 10 days the baby was given 120 ml of group O cells in AB plasma. The child continued to improve and made normal progress.

Serological Findings

The antibody, anti-Zd, in the serum of Mrs. Z. D. was found to react only with cells of her husband, her two children and some other members of her husband's family (fig. 1). The anti-Zd gave optimum reactions at 37°C by albumin, enzyme (papain and ficin) and anti-globulin techniques.

The anti-Zd failed to react by the above techniques with 270 Czech red cell samples, some of which were from unselected donors and others were from donors of fully-grouped cells. These tests excluded the presence of more common antibodies to the established blood group systems in the serum of Mrs. Z. D. Cells possessing the following low frequency antigens also failed to react: C^w, C^x, V, VS, \overline{R}^N , D^w, c^t, E^u, Mi^a, V^w, Mur, Hil, M^g, St^a, Cl^a, Vr, M^v, Lu^a, K, Kp^a, Js^a, Kw, Di^a, Yt^b, Bu^a, Co^b, Wr^a, Sw^a, By, Bp^a, Wb, Ls, Good, Raddon, Rd, Bg^a and Bg^b. One rather old stored sample of Tr(a+) cells reacted weakly in saline, albumin and after ficin treatment suggesting that anti-Tr^a may be present. Anti-Sk^a (Skjelbred) was detected in saline and albumin at room temperature and at 37°C with ficinised cells. In addition the anti-Zd failed to react with cells known to lack high frequency antigens: O_h, U(-), pp, Luke(-), Lu(a+b-), Lu(a-b-), Kp(a+b-), Yt(a-b+), Cs(a-), Chido(-), Sd(a-), Au(a-), Co(a-), Ve(-), Lan(-), Ge(-).

The cells of Mrs. Z. D.'s husband, which reacted strongly with her antibody, were fully grouped and tested for the presence of known low frequency antigens. Negative reactions were obtained with sera containing antibodies to the following antigens: C^w, C^x, E^w, V(ce^s), VS(e^s), D^w, Go^a, \overline{R}^N , Mi^a, V^w, Mur, Hil, M^v, M^g, Ny^a, St^a, Mt^a, Vr, Ri^a, Cl^a, Kp^a, Js^a, Di^a, Yt^b, Bu^a, Co^b, Bi^a, Be^a, Rd, Wb, By, Bp^a, Wr^a, Sw^a, Tr^a, Kamhuber, Jn^a, Sk^a, Good, Heibel, Evans, Ul^a. In addition, sera containing antibodies to unsolved or unpublished low frequency antigens gave negative results with the cells of Mrs. Z. D.'s husband.

In an attempt to find further examples of anti-Zd, the cells of Mrs. Z. D.'s husband were screened, after ficin-treatment, at 37°C against sera from 447 donors of high titre ABO antisera. No reactions due to the presence of anti-Zd were found.

Inheritance of the Zd Antigen

The presence of the Zd antigen in Mrs. Z. D.'s two children, her husband and his relatives is demonstrated in the figure 1. The inheritance appears to be of a Mendelian dominant type. The red cell grouping results have not demonstrated the independence of Zd from any other blood group systems, except possibly Lewis. The red cells of I-1 are Le(a-b+) and both his sons, II-5 and II-6, are Le(a-b-), suggesting that his *le* gene is independent of *Zd*. These results were

not checked with saliva samples. The *Zd* gene of I-1 has travelled with his Y gene to II-5 but not in II-6, demonstrating independence from sex. There is some suggestion that *Zd* may be associated with the Rh system, since it can be followed in the family study that where an individual is *Zd*(+) they all possess a *cde* gene. Members who are heterozygous *CDe/cde* *Zd*(+), show that the *Zd* antigen has always travelled with the *cde* gene complex. Although none of the individual families are large and the results could be due to chance, it can be seen that there are no recombinants and one *cde* gene could be traced through the family members studied.

Conclusions

With the enormous increase in reports of 'new' blood groups, it is difficult to avoid some duplication. A report is given of the tests performed so far in this study and they seem to be informative enough, according to certain criteria suggested by RACE and SANGER [1], to propose that another new low frequency antigen has been detected. The antigen *Zd* may be part of the Rhesus system. The antibody caused haemolytic disease of the newborn and reacts in the manner of an immune antibody. Strong clear cut reactions are obtained when tested at 37°C by albumin, anti-human globulin and enzyme techniques. No other random samples have been shown to possess the *Zd* antigen but only a small series have been tested.

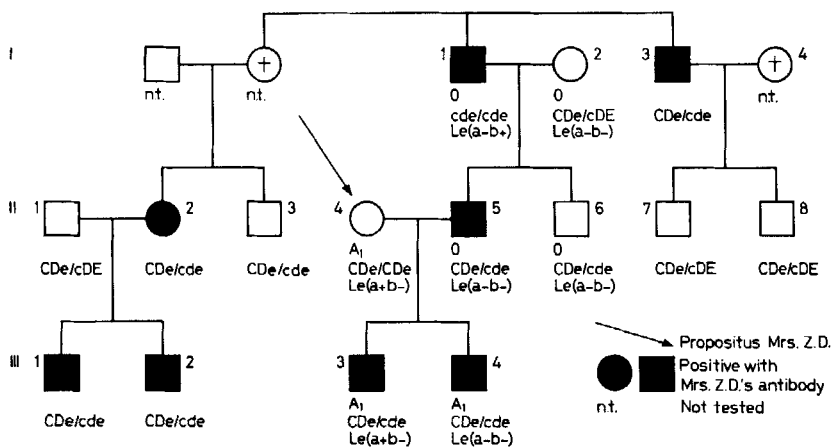


Fig. 1. Family of Mrs. Z. D.

Acknowledgements

The authors are grateful to Miss JUNE GAVIN, MRC Blood Group Unit, Lister Institute, London and Dr. T. E. CLEGHORN, North London Regional Transfusion Centre, Edgware for testing the serum of Mrs. Z. D. and the cells of her husband and excluding several antibody specificities.

Reference

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