The first example of anti-Gy\textsuperscript{a} detected in Hong Kong

K.H. Mak, C.K. Lin, D.S. Ford, G. Cheng, and C. Yuen

The incidence of anti-Gy\textsuperscript{a} is known to be extremely rare, and only a few examples have been reported in Japanese persons and in Caucasians. This case history reports the first example of anti-Gy\textsuperscript{a} detected in a Chinese person. The patient is a 83-year-old male whose anti-Gy\textsuperscript{a} was revealed because of incompatibility of all units of blood tested by a saline indirect antiglobulin test (SIAT). Although the antibody had a titer of 512 by SIAT, 10 units of Gy(a+) red cells were transfused without any adverse effect. *Immunohematology* 1995,11:20-21.

The high-incidence blood group antigen Gy\textsuperscript{a} was first reported by Swanson et al.,\textsuperscript{1} and phenotypic linkage of the antigen with H\textsuperscript{y} was described by Moulds et al.\textsuperscript{2,3} Another high-incidence antigen, Jo\textsuperscript{a}, was found by Spring et al. to reside on the Gy\textsuperscript{a}/Hy-active glycoprotein.\textsuperscript{4} Evidence that Gy\textsuperscript{a}, H\textsuperscript{y}, and Jo\textsuperscript{a} antigens are part of the Dombrock blood group system has been reported by Banks et al.\textsuperscript{5,6} The three high-frequency antigens Gy\textsuperscript{a}, H\textsuperscript{y}, and Jo\textsuperscript{a}, now allocated as part of the Dombrock system, are numbered as follows: Gy\textsuperscript{a} = Do\textsuperscript{3}, H\textsuperscript{y} = Do\textsuperscript{4}, and Jo\textsuperscript{a} = Do\textsuperscript{5}. Red cells lacking Gy\textsuperscript{a} represent the null phenotype of the Dombrock system and are designated as Do\textsuperscript{-}1,-2,-3,-4,-5.\textsuperscript{7} The incidence of anti-Gy\textsuperscript{a} is known to be extremely rare, and only a few examples have been reported in Japanese persons and in Caucasians.\textsuperscript{8} We describe the first example of anti-Gy\textsuperscript{a} detected in a Chinese person.

**Case Report**

The patient, an 83-year-old male patient of Chinese descent, was admitted to a hospital in Hong Kong with a fractured femur. The patient stated that he had had an operation on his right leg 40 years ago, at which time he was probably transfused. The patient's red cells were found to be group A\textsubscript{1}, D+, Gy(a−), and an antibody in his serum was identified as anti-Gy\textsuperscript{a}. Despite the fact that Gy(a+) cells had a titer of 512 (score 98)\textsuperscript{8} when tested with the patient's serum, he was transfused with a total of 10 units of Gy(a+) blood, and no untoward reactions were reported.

**Materials and Methods**

Blood grouping, antibody investigation, and titration procedures were performed according to standard techniques,\textsuperscript{10,11} using both commercial panel cells (CSL Limited, Australia; Ortho Diagnostic Systems, Inc., Raritan, NJ, and Organon-Teknika, Inc., Durham, NC) and panel cells from the Red Cross Blood Bank, Victoria, Australia. Rare red cells and sera originated from local donors, other reference centers, and the SCARF (Serum, Cells, and Rare Fluids) international exchange group. These were stored in a frozen state in liquid nitrogen or glycerol and reconstituted and resuspended in saline before use. Some rare antisera were obtained commercially: anti-Kp\textsuperscript{a}, -Kp\textsuperscript{b}, and -Co\textsuperscript{b} (Gamma Biologicals, Inc., Houston, TX), anti-Lu\textsuperscript{a}, -Lu\textsuperscript{b} (Dominion Biologicals, Canada), anti-Js\textsuperscript{b} (Biotest, Germany), and anti-TJ\textsuperscript{a} (Ortho). These were used in accordance with the suppliers' directions. The DAT was performed using polyspecific, anti-C\textsubscript{3d}, and anti-IgG anti-human globulin reagents (CSL Limited and Ortho).

Investigations for warm antibodies were performed by a saline indirect antiglobulin test (IAT), a low-ionic additive IAT (RAM, CSL Limited, Melbourne), a polyethylene glycol IAT,\textsuperscript{12} and a 2-stage enzyme (Activated Papain Solution, CSL Limited) IAT. Cold antibodies were tested for at 16°C, using precipitation tubes (50mm x 6mm). The urine neutralization test was performed according to "Reference Point" ODS 1984, DZ-53 (Ortho).

Do\textsuperscript{b} typing was performed following removal of anti-c from an in-house serum containing anti-Do\textsuperscript{b} and anti-c.

**Results**

The patient's red cells were found to be group A\textsubscript{1}, D+, and direct antiglobulin test negative. The red cells were further typed as CcDe. Ns, k, Fy(a+b−), Jk(a+b+), Le(a−b+), P\textsubscript{1}, and Lu(b+). His red cells were also typed with antisera to high-frequency antigens and found to be positive for Co\textsuperscript{a}, Di\textsuperscript{b}, Er\textsuperscript{a}, Ge, In\textsuperscript{b}, Lan, Lu8, P, Sc\textsubscript{1}, Vel, Yt\textsuperscript{a}, Ch, JMH, McC\textsuperscript{a}, and Rg\textsuperscript{a}, and negative for Gy\textsuperscript{a}, Gs\textsuperscript{a}, Kn\textsuperscript{a}, and Yk\textsuperscript{a}.

The patient's serum strongly agglutinated all red cells of a commercial panel, as well as the following
red cells, which lack high-incidence antigens, by all IAT techniques: Vel-, Rhnull, Co(a-b+), Kn(a-b+), JMh-, Kp(a+b-), Ch:-1, Cs(a-), Yt(a-b+), Jr(a-), Tj(a-), Di(a+b+), U-, Js(b-), and para-Bombay O. The patient's own cells (autocontrol) and one Gy(a-) cell were negative. Three additional examples of Gy(a-) cells were recovered from liquid nitrogen storage, and negative reactions were also obtained with these. Three examples of Hy- red cells reacted weakly. No decrease in reactivity was noticeable with group O cord cells or after neutralization by human urine. The antibody in the patient's serum did not fix complement, nor was there any noticeable change in reactivity when antigen-positive red cells were treated with enzyme. The antibody was nonreactive at 4°C.

Titration of the patient's serum with Gy(a+) cells gave a titer of 512 and a score of 98.9

The patient's red cells were found to be Do(a-). The only anti-Do available contained anti-c, but following adsorption with rr Do(b-) red cells, this anti-Do failed to react with the patient's red cells, indicating that the patient was also Do(b-). It was not possible to perform immunoblotting tests, since no further samples of blood were available, nor could the cells be typed for Hy or Jo because no antisera were available for group A cells. However, since the patient's cells typed as Do(a--b--), they are probably negative for both Hy and Jo.

Discussion
The Gy antigen was previously classified as being among the "high-titer, low-avidity" group. One of the characteristics of that group is the paucity of antigen sites. Our patient was transfused with a total of 10 units of Gy(a+) blood, and no untoward reactions were reported. This result complements a report by Ellisor et al., who described a transient anti-Gy in an untransfused male in whom Cr-labeled Gy(a+) red cells survived normally. The scarcity of antigens on the red cells could provide the explanation for the lack of transfusion reaction or any clinical evidence of shortened red cell survival. Unlike the Japanese cases reported, who were all female and had produced anti-Gy probably as a result of pregnancy, this first reported anti-Gy is in a Chinese male who presumably developed the anti-Gy as a result of a transfusion 40 years ago. Although the anti-Gy was an IgG antibody with a titer of 512 by SIAT, antigen-positive red cells were transfused without any adverse effect.

References