



TRANSFUSION DIAGNOSTICS Characteristics of Blood Grouping Antibodies

| BLOOD GROUPING SYSTEM | ANTIBODY | ISBT NOMENCLATURE | IgG | IgM | Optimal Technique | 20°C SALINE TECHNIQUE | 37°C SALINE TECHNIQUE | LISS-IAT | ENZYME | COMPLEMENT BINDING | IMMUNE | NATURAL | HEMOLYTIC TRANSFUSION REACTION | HDN | CAUCASIAN | BLACK | REMARKS |
|----------------------------|------------------------|-------------------|------|------|-------------------|-----------------------|-----------------------|----------|-----------|--------------------|--------|---------|--------------------------------|------|------------------|-------|---|
| ABO SYSTEM | Anti-A | ABO1 | + | + | RT | + | Some | + | Enhanced | + | 0 | + | + | Some | 43 | 27 | Frequencies do not include type AB. A antigen is absent in South American Indians. |
| | Anti-B | ABO2 | + | + | RT | + | Some | + | Enhanced | + | 0 | + | + | Some | 9 | 20 | Frequencies do not include type AB. B antigen is absent in South American Indians. |
| | Anti-A1 | ABO4 | Some | + | RT | + | Some | Some | Enhanced | Some | Some | + | Some | 0 | 37 | 19 | Frequency: 2% in blood group A ₂ , 25% in blood group A ₂ B, 99% in blood group A ₁ . |
| rh system | Anti-D | RH1 | + | Some | IAT | Some | + | + | Enhanced | Some | + | 0 | + | + | 85 | 92 | Occurs frequently with anti-C. |
| | Anti-C | RH2 | + | + | IAT | Some | + | + | Enhanced | 0 | + | 0 | + | + | 70 | 33 | Occurs frequently with anti-D, -C ^o or -e. |
| | Anti-E | RH3 | + | + | RT or IAT | Some | + | + | Enhanced | 0 | + | + | + | + | 30 | 21 | Occurs frequently with anti-c, may show dosage. |
| | Anti-c | RH4 | + | Some | IAT | Some | + | + | Enhanced | 0 | + | 0 | + | + | 80 | 97 | Occurs frequently with anti-E, may show dosage. |
| | Anti-e | RH5 | + | Some | IAT | Some | + | + | Enhanced | 0 | + | 0 | + | + | 98 | 99 | Occurs frequently with anti-C, may show dosage. |
| | Anti-C ^w | RH8 | + | + | RT or IAT | Some | + | + | Enhanced | 0 | + | + | + | + | 1 | <1 | |
| Hh system | Anti-H | H1 | Some | + | RT or Lower | + | 0 | 0 | Enhanced | Some | 0 | + | + | + | 99.9 | 99.9 | Oh is Bombay type (null). Most RBC's carry some H antigen. O>A2>B>A1>A1B |
| KELL SYSTEM | Anti-K | KEL1 | + | Some | IAT | Some | Some | + | No Effect | Some | + | Some | + | + | 9 | 2 | Kell, k (cellano), and Js ^a antigens may be depressed by the presence of Kp ^a . |
| | Anti-k | KEL2 | + | Some | IAT | Some | Some | + | No Effect | 0 | + | 0 | + | + | 99.9 | >99.9 | |
| | Anti-Kp ^a | KEL3 | + | 0 | IAT | Some | Some | + | No Effect | 0 | + | 0 | + | + | 2 | <0.1 | |
| | Anti-Kp ^b | KEL4 | + | Some | IAT | Some | Some | + | No Effect | 0 | + | Some | + | + | >99.9 | >99.9 | |
| | Anti-Js ^a | KEL6 | + | Some | IAT | Some | Some | + | No Effect | 0 | + | + | + | + | <0.1 | 20 | |
| | Anti-Js ^b | KEL7 | + | 0 | IAT | 0 | 0 | + | Variable | 0 | + | 0 | + | + | >99.9 | 99 | |
| DUFFY SYSTEM | Anti-Fy ^a | FY1 | + | Some | IAT | Some | Some | + | Depressed | Some | + | 0 | + | + | 65 | 10 | Some antibodies exhibit dosage. |
| | Anti-Fy ^b | FY2 | + | Some | IAT | Some | Some | + | Depressed | Some | + | 0 | + | + | 80 | 23 | |
| LEWIS SYSTEM | Anti-Le ^a | LE1 | Some | + | RT or IAT | + | Some | + | Enhanced | + | Some | + | Some | 0 | 22 | 23 | Frequently seen in pregnancy. Often found together and mostly in people with Le(a-b-) red cells. |
| | Anti-Le ^b | LE2 | Some | + | RT or IAT | + | Some | + | Enhanced | + | Some | + | 0 | 0 | 72 | 55 | |
| KIDD SYSTEM | Anti-Jk ^a | JK1 | + | + | IAT | Some | Some | + | Enhanced | + | + | 0 | + | + | 77 | 91 | Some antibodies exhibit dosage, some require anti-complement for detection. |
| | Anti-Jk ^b | JK2 | + | + | IAT | Some | Some | + | Enhanced | + | + | 0 | + | + | 73 | 43 | |
| MNS SYSTEM | Anti-M | MNS1 | + | + | RT or IAT | + | Some | Some | Depressed | 0 | + | + | Some | Some | 78 | 70 | May exhibit dosage or be pH dependant. |
| | Anti-N | MNS2 | + | + | RT or IAT | + | Some | Some | Depressed | 0 | Some | + | 0 | Some | 72 | 75 | Rare antibody. Formaldehyde induced anti-N can be formed in dialysis patients. |
| | Anti-S | MNS3 | + | + | RT or IAT | + | Some | + | Variable | Some | + | Some | Some | Some | 55 | 31 | |
| | Anti-s | MNS4 | + | + | RT or IAT | Some | Some | + | Variable | Some | + | Some | + | + | 89 | 92.5 | |
| | Anti-U | MNS5 | + | 0 | IAT | Some | Some | + | No Effect | 0 | + | 0 | + | + | 99.9 | 99 | Autoantibody has been identified to cause WAIHA in rare cases. |
| LUTHERAN SYSTEM | Anti-Lu ^a | LU1 | + | + | RT or IAT | + | Some | + | Variable | Some | + | + | 0 | Some | 8 | 5 | |
| | Anti-Lu ^b | LU2 | + | + | RT or IAT | + | Some | + | Variable | Some | + | + | + | + | 99.9 | 99.9 | Some antibodies have HTLA characteristics. |
| PIPK SYSTEM | Anti-P1 | P1 | Some | + | RT or Lower | + | Some | Some | Enhanced | Some | Some | + | Some | 0 | 79 | 94 | Antigen strength is variable. |
| | Anti-PP1P ^a | P1Pk | + | + | RT or IAT | + | + | + | No Effect | + | 0 | + | + | + | 100 | 100 | Produced by p individuals early in life without sensitization. |
| I SYSTEM | Anti-I | I1 | Some | + | RT or Lower | + | Some | Some | Enhanced | + | 0 | + | 0 | 0 | 100 | 100 | Most common cold autoantibody. Rare alloantibody in i-adults. High titer at 0-4°C. Wide thermal range. Associated with CAS and Mycoplasma pneumoniae infection. |
| | Anti-i | I2 | Some | + | RT or Lower | + | Some | Some | Enhanced | + | 0 | + | 0 | Some | 100 | 100 | Found in serum of people with infectious mononucleosis. |
| XG SYSTEM | Anti-Xg ^a | XG1 | + | Some | RT or IAT | + | Some | + | Depressed | Some | + | Some | 0 | 0 | 88.7 F 65.6 M | * | Inheritance by an X-linked gene. |
| COLTON SYSTEM | Anti-Co ^a | CO1 | + | Some | IAT | 0 | 0 | + | No Effect | Some | + | 0 | + | + | 99.9 | 99.9 | |
| | Anti-Co ^b | CO2 | + | 0 | IAT | 0 | 0 | + | Enhanced | Some | + | 0 | + | + | 10 | 10 | |
| DIEGO SYSTEM | Anti-Di ^a | DI1 | + | 0 | IAT | 0 | 0 | + | No Effect | Some | + | Some | + | + | <0.1 | <0.1 | Di ^a antigen frequency highest in southeast Asians and Native Americans. |
| | Anti-Di ^b | DI2 | + | 0 | IAT | 0 | 0 | + | No Effect | 0 | + | 0 | + | + | >99.9 | >99.9 | |
| | Anti-Wr ^a | DI3 | + | + | RT or IAT | + | Some | + | No Effect | 0 | + | + | + | + | <0.01 | <0.01 | Relatively common antibody that is seldom detected due to lack of Wr(+ ^a) red cells. |
| DOMBROCK SYSTEM | Anti-Do ^a | DO1 | + | 0 | IAT | 0 | 0 | + | No Effect | 0 | + | 0 | + | 0 | 67 | 55 | Some antibodies may exhibit dosage. |
| | Anti-Do ^b | DO2 | + | 0 | IAT | 0 | 0 | + | No Effect | 0 | + | 0 | + | 0 | 82 | 89 | |
| | Anti-Gy ^a | DO3 | + | 0 | IAT | 0 | 0 | + | Enhanced | 0 | + | 0 | + | 0 | 99 | >99.9 | Some antibodies have HTLA characteristics. |
| | Anti-Hy | DO4 | + | 0 | IAT | 0 | 0 | + | Enhanced | 0 | + | 0 | + | 0 | 99 | >99.9 | |
| CARTWRIGHT SYSTEM | Anti-Yt ^a | YT1 | + | 0 | IAT | 0 | 0 | + | Variable | Some | + | 0 | Some | 0 | >99.9 | >99.9 | Some antibodies have HTLA characteristics. |
| | Anti-Yt ^b | YT2 | + | 0 | IAT | 0 | 0 | + | Variable | 0 | + | 0 | 0 | 0 | 8 | 8 | Rare, usually seen with other antibodies. |
| Chidos/Rogers/Anops System | Anti-Ch ¹ | Ch ¹ | + | 0 | IAT | 0 | 0 | + | Depressed | 0 | + | 0 | 0 | 0 | 96 | 96 | Antigens are variable in strength. The antibodies are difficult to detect due to characteristically weak reactions in the antiglobulin test. The antibody can be neutralized by antigen positive serum or plasma. |
| | Anti-Rg ¹ | Rg ¹ | + | 0 | IAT | 0 | 0 | + | Depressed | 0 | + | 0 | 0 | 0 | >98 | >98 | |
| | Anti-Kn ^a | KN1 | + | 0 | IAT | 0 | 0 | + | Depressed | 0 | + | 0 | 0 | 0 | 98 | 99 | |
| | Anti-McC ^a | KN3 | + | 0 | IAT | 0 | 0 | + | Depressed | 0 | + | 0 | 0 | 0 | 98 | 94 | |
| | Anti-Yk ^a | KN5 | + | 0 | IAT | 0 | 0 | + | Depressed | 0 | + | 0 | 0 | 0 | 92 | 98 | |
| ISBT Collection 212 | Anti-Vel | VEL | + | + | IAT | Some | Some | + | Enhanced | + | + | 0 | + | + | >99 | >99 | Antigens are variable in strength. The antibodies are difficult to detect due to characteristically weak reactions in the antiglobulin test. Auto anti vel exists. |

*: insufficient data to calculate antigen frequency