

CASE REPORT

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A Review of Violence Prediction: Guidelines for the Forensic Practitioner

REFERENCE: Tumosa, C. S. and Dowd, R., "An Unusual Variant of Blood Group A," *Journal of Forensic Sciences*, JFSCA, Vol. 33, No. 6, Nov. 1988, pp. 1503-1505.

ABSTRACT: A blood specimen from a forensic science case appeared to violate Landsteiner's Rule. The red cells failed to react with anti-A, anti-B, or O serum while reacting strongly with *Ulex europaeus* lectin but not other anti-A lectins. The saliva from the person involved was found to contain both A and H blood group substances in a ratio of 4:1. The blood group was determined to be type A_m.

KEYWORDS: forensic science, blood, antigen systems, ABO system, blood group A_m

Landsteiner's Rule has been the benchmark of blood grouping in the ABO system for many decades. This law states that the antibodies found in serum are those for which the corresponding antigens are missing from the red cell. Exceptions to this law are rare and have been the subject of several papers [1-9].

Gammelgaard [1] first described a blood that behaved like a type O but lacked the A antigen. Weiner and Gordon [2] later found and named A_m, a blood that appeared to be type O, lacked anti-A in its serum, but the cells of which would elute anti-A after absorption. The saliva of the person with this blood type contained both A and H substances.

Several more examples of this phenomenon have been reported [4-8], and the characteristics of this weak blood type A variant emerged. The A_m variant does not react with group B serum (anti-B) and rarely reacts with group O serum (anti-A,B). The red cells will, however, absorb anti-A and it can be eluted from their surface. Reactions with anti-H (*Ulex europaeus* lectin) are also very strong. If the person is a secretor, the A and H substances are present in the saliva and there is an A/H antigen ratio of about 3.2.

The description of this variant is further compounded by the postulation by Weiner et al. [10] of genes Y and y to explain the inheritance of the A_m blood group in families where the A₁O genotype seems to be inherited. The genes Y and y are present at a locus independent of the genes for the ABO system but are necessary for the normal expression of the A antigen on red cells. Darnborough et al. [7] have described this situation and found a homozygous y individual. Variation of the A antigen in these families has led to the new classification of A_y for those A individuals who are apparently A₁ but who do not manifest that antigen on their

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red cells by direct agglutination tests. In describing the secretor behavior of these individuals, it was found that the soluble A/H ratio in saliva was about 0.5 [8], much less than this ratio in A_m individuals. This observation provided a means of distinguishing the various A subtypes. Family studies are, of course, virtually the only way of sorting out the true genotype of an individual.

Case History

During a routine casework examination, a blood specimen was found which on direct typing first appeared as a blood group O. On further testing, this specimen lacked the expected presence of an anti-A in the serum. This person was also a secretor and secreted both A and H blood group substances into her saliva. The blood and saliva samples were studied further.

The red blood cells reacted with typing sera in the following manner: negative reactions with anti-B as expected but also no reaction with 5 anti-A sera and 19 group O (anti-A,B) sera. The red cells also failed to react with three anti-A lectins from *Dolichos biflorus*, *Helix pomatia* and *Bandeiraea simplicifolia I*. The *Ulex europaeus* lectin gave a strong reaction. The serum of the blood sample contained anti-B to a titer of $1/32$ but no anti-A.

Examination of the red cells showed that anti-A could be absorbed onto and eluted from the cells by the method of Landsteiner [11] and from a dried stain by a similar technique applicable to bloodstains [12].

The saliva of the individual showed the presence of both A and H blood group substances with an A/H ratio of 4 as determined by a standard titrating method [13].

The person was also Le(a-b-). Family studies were not possible.

Discussion

The existence of rare variants in the ABO blood group system is rather well known. Since they are, by definition, rare, they usually do not present any routine problems for the practicing forensic serologist. This does not, however, rule out the possibility of their occurrence in casework specimens such as the one described in this report, nor does it rule out the possibility of confusion arising from their unusual characteristics.

The blood specimen found met the criteria for an A_m variant. The person lacked an anti-A in serum, possessed A antigen in saliva at a higher A/H ratio than an A_y would, and could absorb onto and elute from their red cells anti-A, although the red cells would not react with any anti-A reagents in direct agglutination tests.

The blood group A_m described above is rather rare, but when both liquid blood and saliva are available, this A variant should not be difficult to identify. If, however, only washed cells were tested and serum testing ignored, comparison of the direct typing with the absorption-elution results could lead to a problem in interpretation. One specimen would appear to be type "O" while the second would appear to be type "A."

Acknowledgment

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Errata

In the letter to the editor "Anaphylactic deaths" in the Sept. 1988 issue of the *Journal* (Vol. 33, No. 5, pp. 1108-1110), there was an omission. Dr. Emilio B. Gonzalez, Division of Rheumatology/Immunology at the University of Texas Medical Branch at Galveston, was inadvertently omitted as a coauthor with Dr. Victor W. Weedn.

The case report "An Unusual Variant of Blood Group A" in the Nov. 1988 issue of the *Journal* (Vol. 33, No. 6, pp. 1503-1505) by Charles S. Tumosa and Ruby Dowd had the wrong heading on p. 1503. Review of *Violence Prediction: Guidelines for the Forensic Practitioner* is incorrect. We are sorry for this inadvertent error.