Z Rechtsmed (1982) 89:101–104

Zeitschrift für
Rechtsmedizin

The Reaction of Human Anti-A and Anti-B Sera with Animal Bloodstains

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Summary. The reaction of animal bloodstains with human anti-A and anti-B typing sera was examined by absorption-elution. The majority of samples studied reacted with either one or both sera. The results demonstrate the need for precise species determination in forensic work.

Key words: Animal bloodstains – Absorption-elution

Zusammenfassung. Es wird über die Reaktion von Tierblutflecken auf A- oder B-Antikörper mittels Absorption-Elution berichtet. Die Mehrzahl der Fälle manifestierte sich wie menschliche A-, B- und AB-Gruppen.

Schlüsselwörter: Spurenkunde, Tierblutflecken – Absorption-Elution

Introduction

The examination of bloodstains using a technique as sensitive as absorption-elution has many attendant problems. Springer (1971) and Joysey (1959) have shown that blood group substances similar to human A, B and H antigens are present in many non-human sources and Weiner et al. (1966) found the same antigens in primates. Bowdler et al. (1971, 1973) have shown a cross-reacting A-like antigen in the dog and Krötlinger et al. (1977) described a similar antigen in cattle. To investigate further these cross-reacting animal antigens in bloodstains and their possible forensic implications, a series of non-human bloodstains were examined by an absorption-elution technique to determine whether they would react with anti-sera against the human A and B antigens and hence mimic the behavior of human bloodstains.

Materials and Methods

Anti-A and anti-B sera were obtained from Ortho Diagnostics, Raritan, NJ, USA. The titer of the anti-sera was 1/256. Human A_1 and B cells were obtained from the same source and were diluted

0044-3433/82/0089/0101/$ 0.80

Table 1. Reaction pattern of non-human blood samples with anti-A and anti-B sera

	Animal	No. tested
Anti-A reacting only	Chicken	3
	Chimpanzee	1
	Gibbon	2
	Gnu	2
	Goat	2
	Orangutan	1
	Patas monkey	1
Anti-B reacting only	Barasingna	1
	Chinchilla	1
	Civet	1
	Groundhog	10
	Guanaco	1
	Giraffe	1
	Llama	2
	Lynx	1
	Mouse	3
	Rabbit	3
	Rhinoceros	1
	Slow Loris	1
	Springbuck	1
	Zebra	3
Anti-A and anti-B reacting	Aardvark	1
	Addax	1
	Aoudad	1
	Blesbak	4
	Camel	2
	Cat	28
	Cow	18
	Dog	109
	European bison	1
	Fox	1
	Giant Anteater	1
	Himalayan tahr	1
	Impala	2
	Kangaroo	2
	Lion	1
	Opossum	1
	Polar bear	1
	Rat	1
	Tiger	3
	Wallaby	1
	Wallaroo	2

Table 1 (continued)

	Animal	No. tested
Non-reacting	Duck	2
	Goose	1
	Horse	1
	Ostrich	1
	Snake	4

Table 2

Animal	No. tested	Apparent blood group		
		A	AB	B
Cat	28	3	23	2
Cow	19	0	8	11
Dog	109	0	68	41

to 2% for use. Animal blood samples were taken during the routine examinations at the Philadelphia Zoological Garden and were placed on cotton cloth as soon as possible. The unfixed bloodstains were examined using the absorption-elution technique described by Fiori et al. (1963), and the resulting eluate was tested with a drop of the appropriate human red cells.

Results

The various species examined and the number of animals tested are given in Table 1. The presence of a B-like antigen in a wide range of animals was again demonstrated by absorption-elution of their dried bloodstains. The majority of species reacted with either the anti-A or anti-B sera, usually both. No reactions were detected with samples from ducks, geese, ostrich, various snakes, and one patas monkey.

The reaction pattern of three species is summarized in Table 2. Enough individuals of these species were tested to indicate the possibility of a polymorphism within that species detected by the use of human anti-A and anti-B sera. The samples from cats, cattle, and dogs showed a reproducible behavior indicating a polymorphism cross-reacting with anti-A and anti-B sera of human origin. The absorption-elution process also precludes the chance that reactions of species antibodies from the anti-sera used were observed.

Discussion

The observation that dried bloodstains from a number of animal species react with either human anti-A or anti-B sera by an absorption-elution technique to imply the presence of a human blood type may be explained in several ways.

First, the possibility exists that antigens related to human type A and B in chemical structure may be present. This was previously reported in other studies (Joysey 1959; Bowdler et al. 1973; Krötlinger et al. 1977).

Second, the "Matuhosi-Ogatu phenomenon" may occur; i.e., the reaction of an antibody, the corresponding antigen of which is absent, with another antigen-antibody complex (Allen et al. 1969).

Third, more simply, a non-specific absorption of antibodies alone.

The results indicate that extreme care in the preliminary species identification of a bloodstain is necessary, for failure to identify properly the species origin of that bloodstain can lead to an erroneous human blood type.

Acknowledgements. The kind help of the staffs of the Philadelphia Zoological Garden and the Philadelphia Police Laboratory is gratefully acknowledged.

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Received June 4, 1982