Suitability of commercial human rheumatoid factor rapid tests for detection of rheumatoid factors in dog serum

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Introduction

The diagnosis of rheumatoid arthritis may be supported by detection of serum rheumatoid factors (RF), autoantibodies directed against the Fc region of IgG immunoglobulins (1).

Agglutination tests are used widespread for RF detection, amongst them haemagglutination tests based on the Waaler Rose principle which measures the capability of serum RF to agglutinate sheep erythrocytes sensitized with rabbit IgG (2,3, Fig. 1a). Additionally, serum RF cause agglutination of latex particles coated with species-specific IgG in latex agglutination tests (Fig. 1b).

Rapid agglutination tests are commercially available, time-saving, and would be useful in veterinary practice. However, it is unclear if such rapid RF tests developed for human RF detection are suitable to detect canine RF. Therefore, we examined if commercially available rapid tests for RF detection in humans are also suitable to detect RF in dog serum.

Material and Methods

Sample material:

- 12 dog sera, positive (n=6) or negative (n=6) in the reference test
- One human serum, positive in reference test
- Sera were used at day of arrival in the lab or after storage at -20°C

Reference test:

validated test routinely used at Laboklin GmbH & Co. KG (haemagglutination test based on Waaler Rose principle; sensitivity 86%, specificity 97,91%)

Examined tests:

10 commercially available rapid tests for human RF detection (Table 1)

Procedure: qualitative method according to the manufacturer's guide

- 2-3 min incubation with pure sera, visual examination of agglutination (Fig. 2)
- In case of agglutination in pure sera: dilution of sera to allow differentiation of presence of RF from that of heterophilic antibodies

Table 1. Examined commercial rapid tests 1-10

Kit	Principle	Name	Supplier	Ref. number	Analytical Sens., IU/ml	Sens., %	Spec., %
T1	WR	Rose Waaler	Lorne Laboratories Ltd.	156050A	8	100	93,6
T2	WR	Waalser Rose Kit	bestbion dx GmbH	96111	8	100	93,6
T3	WR	NADAL® Waaler Rose Test	nal von minden GmbH	795017	8	100	93,6
T4	WR	Waalser Rose	Dialab GmbH	495055	8	100	93,6
T5	WR	Waalser Rose	Cypress Diagnostics	22162	8	100	93,6
T6	WR	Waalser Rose Test	Mascia Brunelli S.p.a.	UA80255	8	N.S.	N.S.
T7	WR	celarkit AR	Werfen GmbH	3000-1020	7	N.S.	N.S.
T8	LA	rheumajet RF	Werfen GmbH	3800-0145	10	N.S.	N.S.
T9	LA	RF-Latex	Cypress Diagnostics	22112	8	100	100
T10	LA	RF-Latex	Mascia Brunelli S.p.a.	UA80210	8	98	97

T1-10, Rapid tests 1-10; WR, Waaler Rose principle, LA, latex agglutination principle. Sens./Spec., diagnostic sensitivity/specificity for human according to the manufacturer; N.S., not specified.

Discussion and Conclusions

None of the examined rapid latex agglutination tests was suitable for the detection of RF in dog sera. Because canine RF has low affinity for human IgG, this result was foreseeable: the examined rapid latex agglutination tests use human IgG coated latex particles. Therefore, canine IgG coated latex particles should be used in latex agglutination tests for dogs (5).

Likewise, none of the examined rapid haemagglutination tests detected RF in dog sera, although these tests use the non species-specific Waaler Rose principle which generally works in many animal species. Time needed for antibody binding may be prolonged though; thus, the use rapid tests with haemagglutination principle for RF detection may be limited in various animal species.

In summary, none of the examined rapid agglutination tests was suitable to detect canine RF. Therefore, specialized laboratory testing for canine RF is recommended.

Fig. 1. Principles of haemagglutination and latex agglutination

Fig. 2. Visual examination of agglutination by comparison with positive and negative control in rapid tests based on haemagglutination (left, test T1) or latex agglutination (right, test T9). +/-, positive/negative control. 1-10, sample number (see Table 2)

Results

The human serum was positive in all rapid tests (Tab. 2). However, the incubation time was prolonged to 5-8 min in tests based on the Waaler Rose haemagglutination to achieve clear agglutination.

The negative and positive tested dog sera were all negative in the rapid tests even after prolonged incubation times. Serum 8, which caused agglutination when used pure was negative as well when diluted 1:10.

Table 2. Detection of RF in sera of dogs (D) and one human (H) with rapid tests 1-10 in comparison to the reference test (R)

No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Sp.	D	D	D	D	D	D	D	D	D	H	D	D	D
R	+	+	-	+	-	+	-	-	+	+	+	-	-
Titer	1:128	1:64	<1:16	1:128	1:32	1:64	<1:16	<1:16	1:64	1:128	<1:16	<1:16	<1:16
T1	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T2	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T3	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T4	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T5	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T6	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T7	-	-	-	-	-	-	-	-	-	(+)	-	-	-
T8	-	-	-	-	-	-	-	-	-	+	-	-	-
T9	-	-	-	-	-	-	-	-	-	+	-	-	-
T10	-	-	-	-	-	-	-	-	-	+	-	-	-

No., Sample number; Sp., animal species (D = dog, H = Human); R, Reference test; Titer: Titer in reference test (positive when $\geq 1:64$); T1-10, rapid test 1-10; -, negative result; +, positive result; (+), positive result after prolonged incubation time of 5-8 min.

Literature

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