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Chlamydial infection

Results of micro-immunofluorescence tests for the detection of type-specific antibody in certain chlamydial infections

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The development of the micro-immunofluorescence (micro-IF) typing test by Wang and Grayston (1970) has led to the demonstration of thirteen separate serotypes within the subgroup A *Chlamydia* (Table I).

TABLE I *Micro-IF serotypes of subgroup A* Chlamydia

TRIC *AGENT*[a]	
Hyperendemic trachoma	TRIC types A, B, Ba, C
Paratrachoma	TRIC types D, E, F, G
LGV AGENT[b]	
Lymphogranuloma venereum	LGV types I, II, III,

[a]Possible further types UW4 and UW12
[b]Subgroup B chlamydial agents have also been isolated from a small number of cases of LGV

To date six TRIC serotypes have been described (Serotypes A to F) (Wang and Grayston, 1970) and we are about to report a further type—G. In addition, two further isolates (UW4) and (UW12) are under consideration as additional serotypes (Wang, personal communication). Three clearly-defined LGV serotypes have also been demonstrated (Wang and Grayston, 1971).

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This serotyping test is based on an indirect immunofluorescence technique using relatively monospecific anti-chlamydial sera obtained after inoculation of the tail vein of mice with suspensions of chlamydial antigens; the immune sera are collected 11 days after the primary inoculation. When an untyped chlamydial agent is tested against such antisera to known chlamydial serotypes, and when an antiserum raised to the unknown agent is titrated against known chlamydial serotypes as antigens, it is then possible to find a pattern of reactivity in this two-way cross-titration which serves to type the unknown agent.

Work in our laboratory has revealed an interesting geographical distribution of serotypes which is in agreement with the patterns seen in the work of Wang and Grayston (1971). The main types we have found in isolates from Africa or Asia are A, B, or C (Table II). In these areas trachoma is a hyperendemic disease and transmission of infection is

TABLE II *Geographical and clinical distribution of Micro-IF serotypes of subgroup A* Chlamydia

	Serotype											
Area	A	B	C	D	E	F	G	UW4	UW12	L I	L II	L III	*No. tested*
Africa	23	7	1	1									32
Asia	2	4	10	1	1								18
Europe				4	9	3	6					1	23
N. America				2	10	3	1	1	1	2	11	1	32
Total													105
Clinical syndrome													
Trachoma	25	11	11	5	1								53
IC and TPK					6	2	2						10
Genital TRIC				3	13	4	5	1	1				27
Classical LGV										2	11	2	15
Total													105

IC = Inclusion conjunctivitis
TPK = TRIC punctate keratoconjunctivitis

probably from eye to eye. So far we have found none of these serotypes amongst the isolates available to us originating in Europe or North America. In the latter areas there is a considerable incidence of genital infection due to chlamydial agents (Jones, 1972a, Dunlop, Vaughan-Jackson, Darougar, and Jones, 1972). Although chlamydial eye infections are not uncommon in London and although a proportion of these cases present the characteristic clinical picture of trachoma, with typical tarsal conjunctival follicles, papillae, scarring, and corneal pannus, it is thought likely that in the United Kingdom these agents spread mainly by genital transmission (Jones, 1964a, b, 1972a, b; Jones, Al-Hussaini, and 8 others, 1966).

We have therefore proposed (Jones, 1972b) that TRIC agents be divided into two classes:

(*a*) *Hyperendemic trachoma agents*
With few exceptions these have proved to be TRIC serotypes A, B, Ba, or C, and infections have been of probable eye-to-eye transmission.

(*b*) *Paratrachoma agents*

With few exceptions these have been TRIC serotypes D. E, F, or G.

Paratrachoma (Lindner, 1910) is thus a convenient term for the genital, rectal, or other extraocular disease arising from infection by these TRIC serotypes. For some time it has been apparent that paratrachoma, which is also a convenient term for the eye disease arising from sexually transmitted TRIC agent infection, as seen in Great Britain, includes TRIC agent ophthalmia neonatorum (ON) in babies (Jones, Collier, and Smith, 1959; Freedman, Al-Hussaini, and 9 others, 1966) and ranges in severity in adults from inclusion conjunctivitis (IC), through the intermediate syndrome of TRIC agent punctate keratoconjunctivitis (TPK) to the more severe condition of trachoma (Jones and others, 1966; Jones, 1972a, b).

In individual cases the differentiation between hyperendemic trachoma (of eye-to-eye transmission) and ocular paratrachoma (of genital transmission) may thus rest on epidemiological considerations, and appears to correlate well with the serotype of TRIC agent (Jones, 1972b). It would therefore seem probable that determination of the serotype of TRIC agent isolated from any individual case of trachoma (or other syndrome of chlamydial infection) could give an indication of the probable epidemiological background to its transmission.

As the serotyping of these agents involves considerable effort and expense, it is of interest to know whether the measurement of the micro-IF levels of antibody to each of the chlamydial serotypes can furnish a guide to the serotype involved and thereby afford an indication of the probable mode of transmission.

Equally, it is of interest to compare the chlamydial type-specific antibody levels, as measured by the micro-IF test with the chlamydial group-specific antibody levels, as measured by the complement-fixation (CF) test and the radio-isotope precipitation (RIP) test, because it would seem likely that for routine clinical use the micro-IF test could provide a more sensitive and a more specific test for chlamydial infection than the CF test. This paper reports and discusses the results of micro-IF testing of sera from patients known to have, or suspected of having, chlamydial infection (either ocular, or genital, or both ocular and genital) in order to assess the value of such testing for diagnostic and for epidemiological purposes.

Material and methods

SPECIMENS

Sera to be tested were selected from

(*i*) Patients in London or the USA having or suspected of having ocular or genital or both ocular and genital chlamydial infections, and some of their contacts

(*ii*) Patients with hyperendemic trachoma in Iran or Tunisia

(*iii*) Patients diagnosed clinically as having LGV and from whom LGV type II isolates were obtained

(*iv*) Patients with active acute or progressive Reiter's disease.

All sera were absorbed before testing with an equal volume of 4 per cent. normal yolk sac and were tested at an initial dilution of 1/8.

CHLAMYDIAL ANTIGENS

Subgroup A chlamydial antigens used were TRIC serotypes A to F, a new serotype G, and further possible serotypes represented by UW4 and UW12, as well as LGV serotypes I, II, and III. Also included were 'J.H.', a subgroup B chlamydial antigen, and 'IOL-207', an organism isolated from the eye of a child with trachoma in Iran which has certain properties of subgroup B *Chlamydia*. We have shown that both 'J.H.' and 'IOL-207' are distinct one from the other and from the established subgroup A antigens in the micro-IF test. Futhermore, 'IOL-207' is antigenically similar in the micro-IF test to an isolate, 'TW 183', kindly supplied to us by Dr. San-Pin Wang of Washington University. Work on the characterization of 'IOL-207' is to be published shortly (Treharne, in preparation). Antigens were prepared and the test performed as previously described by Treharne, Davey, Gray, and Jones (1972).

FLUORESCENT CONJUGATES

Fluorescein-isothiocyanate-conjugated anti-human-globulin of swine origin (Sw AHu-'Nordic') was used, after titration to determine the optimal dilution, in the presence of 1/40 rhodamine bovine albumin (Baltimore Biological Laboratories) as counterstain.

Results

Table III shows the results of testing a few sera from patients with active ocular or genital infections, from whom subgroup A chlamydial isolates were obtained. The highest tires in each case are directed against TRIC types D or E or LGV type II. These are the serotypes commonly found in association with ocular, genital, or oculo-genital infections in urban communities such as London or parts of the USA. From Patient 3054 a chlamydial isolate was obtained which was serotyped as TRIC type D. Also, there was only weak cross-reactivity with these sera between the subgroup A serotypes and the subgroup B agent 'J.H.' or 'IOL-207'.

TABLE III *Patterns of Micro-IF type-specific antibody titres in isolation-positive chlamydial infections in London*

	Serum No.			
Antigen type	2604	1891	3054	54108
A	4	64	32	8
B	8	32	64	4
C	8	64	32	32
D	**128**	**512**	**512**	**128**
E	64	**512**	256	32
F	4	32	64	4
LGV II	**128**	**512**	**512**	8
LGV III	64	—	64	—
'J.H.' (subgp. B)	16	32	—	8
'IOL-207'	16	64	32	32

Tests were performed on a few sera from patients in areas of hyperendemic trachoma in Iran or Tunis. The results (Table IV) show that the highest titres are against TRIC types B or C; A, B, or C are the chlamydial serotypes most commonly isolated in these areas (Treharne and others, 1973).

TABLE IV *Patterns of Micro-IF type-specific antibody titres in sera from patients with trachoma in hyperendemic areas*

	Serum No.			
Antigen type	0006	3905	3393	3335
A	16	16	4	16
B	**16**	**64**	0	0
C	**64**	**64**	**16**	**64**
D	16	0	0	4
E	0	0	0	8
F	Undiluted	0	0	0
LGV II	0	0	0	16
LGV III	0	0	0	16

Such encouraging results led to the testing of 94 sera from 9-year-old school-children at Douz in Southern Tunisia, an area of hyperendemic trachoma. Clinical and laboratory studies on these children will be published elsewhere. In all, 48 out of the 94 sera had antichlamydial antibody. Table V, giving the geometric mean titres of antibody to eight chlamydial serotypes, shows that the highest geometric titres are those against serotypes A and C. Work to be published will show that, of 21 chlamydial isolates obtained from these 94 children, sixteen were serotyped as type A, four as type B, and one as type C (Treharne and others, 1973).

TABLE V *Geometric mean titres of Micro-IF type-specific antibody in 48 antibody-positive sera from children in Douz, Southern Tunisia, with hyperendemic trachoma*

Antigen type	*Geometric mean titre*
A	**32**
B	16
C	23
D	7
E	12
F	2
LGV II	16
LGV III	15

The titres in the RIP test were identical to or within one dilution of the micro-IF titres in seven of the eleven sera tested by both methods; the CF titres were three to five dilutions lower. This obtained for all sera from the cases of LGV for which we have typed the isolates (LGV type II) and three cases of NSU or their contacts from which isolates were made but which we have not typed (Philip, Hill, and 5 others, 1971). In four cases the micro-IF titres were two or more dilutions lower than the RIP titres. These sera were from cases of NSU or their contacts, or from cases of gonorrhoea or possible LGV; only one of these cases furnished an isolate which we have not yet typed. In no instance was the RIP group antibody titre more than one dilution lower than the highest micro-IF type-specific titre.

Table VI shows the results of testing selected sera from widely different geographical areas obtained from patients with trachoma or with ocular or genital or oculo-genital paratrachoma infections (or suspected of having such infections). It can be seen that these sera have given clear-cut reactions with isolate 'IOL-207' but have shown little reactivity with established TRIC or LGV antigens.

Table VII shows the results of testing fourteen sera kindly supplied by Dr. R. Philip of the Rocky Mountain Laboratory, Montana, USA, together with his results of testing these sera in the CF test and Dr. R. K. Gerloff's results in the RIP test (Gerloff

TABLE VI *Micro-IF titres of type-specific antibody in selected sera from widely distributed geographical areas showing antibody to 'IOL-207'*

	Tunisia		*London*		*New Zealand*	*Denmark*
Antigen type	3358	3370	1882	3787	3652	3264
A	8	16	0	8	4	<4
B	2	2	0	8	<4	<4
C	8	64	0	8	<4	<4
D	2	8	4	<8	<4	<4
E	2	8	0	<8	<4	<4
F	0	0	0	—	<4	<4
LGV II	0	16	—	8	<4	<4
LGV III	2	16	0	8	<4	<4
'IOL-207'	**64**	**256**	**64**	**64**	**64**	**32**

TABLE VII *Highest type-specific Micro-IF antibody titres and group-specific antibody titres by CF* and by RIP† tests in sera from patients with LGV or other genital infections*

Case No.	*Clinical diagnosis*	*Serum*	*Isolate[a] type*	*Micro-IF type-specific highest titre*	*RIP group-specific titre*	*CF group-specific titre*
DC. 001	LGV	3638	LGV II	1024	1024	16
DC. 009	LGV	3639	LGV II	256	256	32
DC. 036	LGV	3641	LGV II	256	512	32
69–17	LGV	3561	LGV II	1024	n.t.	16
69–11	LGV	3650	LGV II	256	n.t.	16
69–8	LGV	3649	LGV II	1024	n.t.	16
DC. 098	possible LGV	3648	—	<8	256	8
DC. 049	NSU	3644	—	<8	<32	<8
DC. 040	NSU	3642	—	<8	128	<8
DC. 020	NSU	3640	—	128	128	8
DC. 044	NSU contact	3643	—	128	1024	8
DC. 055	NSU contact	3645	—	1024	512	64
DC. 063	Gonorrhoea	3646	—	64	64	8
DC. 073	Gonorrhoea	3647	—	32	256	8

*CF = Complement-fixation titres supplied by Dr. Leo Thomas, Rocky Mountain Laboratory, Montana, USA.
†RIP = Radio-isotope precipitation titres supplied by Dr. R. K. Gerloff, Rocky Mountain Laboratory, Montana, USA.
[a] = Sera and isolates supplied by Dr. R. N. Philip and Dr. F. B. Gordon.
n.t. = not tested

and Watson, 1967; Philip and others, 1971). All six isolates from the six patients diagnosed clinically as definite cases of LGV were serotyped as LGV type II (Treharne and others, 1972). The highest titres to subgroup A agents are shown, and these are seen to be much greater than those given in the CF test using chlamydial group antigen. Of the fourteen sera, eleven had titres of 1/32 or greater to more than one of the TRIC or LGV serotypes and ten had titres of 1/64 or greater. The titres in the micro-IF test range as high as 1/1,024 in several instances, whereas the CF titres are much lower, the highest being 1/64 in only one instance.

The sera from the patients with LGV in this group had strikingly broad reactivity with all the subgroup A antigens, but only weak reactivity with the subgroup B antigens or 'IOL-207'. This is shown by a few examples in Table VIII.

Next a group of sera from 36 patients in London with ocular and associated genital infection were

TABLE VIII *Micro-IF type-specific titres in sera from selected cases of isolation-positive LGV and in 'NSU contacts' from the USA**

Antigen type	*LGV* 3638	*LGV* 3649	*NSU contact* 3645
A	1024	256	128
B	1024	256	256
C	1024	256	256
D	1024	**1024**	512
E	1024	**1024**	512
F	1024	64	64
G	1024	128	64
UW4	1024	**1024**	256
UW12	1024	512	256
LGV I	1024	256	256
LGV II	1024	512	**1024**
LGV III	1024	**1024**	**1024**
'J.H.' (subgp.B)	32	32	32
'IOL-207'	128	64	256

*Sera supplied by Dr. R. N. Philip, Rocky Mountain Laboratory, Montana, USA.

tested. From all of these patients chlamydial agents were isolated. The results (Table IX) show that 34 of the 36 patients had highest serum titres of 1/8 or greater.

Two clinics for venereal diseases in London supplied sera from similar groups of patients. Table X shows the results of testing these sera. It is seen that titres of 1/16 or greater correlate well with positive isolation of chlamydial agent in fourteen out of seventeen in which isolates were obtained, as compared with only two out of twelve in which a chlamydial isolate was not obtained. The sera from the second clinic came from patients from whom isolates were not obtained, and the results are seen to be similar to those of the twelve patients with negative cultures from the first clinic.

Each of eighteen sera from eleven patients with Reiter's disease, either acute or progressive, was also tested for antichlamydial antibody. Except for one patient who yielded a chlamydial isolate from the urethra all had negative chlamydial cultures. Table XI shows that fourteen out of eighteen sera reacted to 1/16 or higher, the highest titres being to 'IOL-207' (Table XII).

Table XII shows a comparison of geometric mean titres of various groups of sera to indicate the relative frequencies of individual antibody types. The highest geometric mean titres in the groups with ocular and genital infection and positive isolations and the patients with NSU who had positive isolations were to TRIC types D and E, which correlates well with the results of micro-IF serotyping of isolates. So far serotypes D and E have been most commonly isolated from infections of this kind in London.

TABLE XII *Distribution of geometric mean titres of Micro-IF type specific antibody in sera from patients with Reiter's disease, isolation-positive ocular or genital paratrachoma, and NSU (isolation-positive or negative)*

Antigen type	*Reiter's diseasse*	*O/G isolation positive*	*NSU isolation*	
			positive	*negative*
	18 sera	36 sera	17 sera	12 sera
A	**26**	24	16	<8
B	16	23	18	**16**
C	**26**	18	14	<8
D	23	**43**	22	<8
E	21	**51**	**27**	<8
F	18	18	16	<8
G	20	23	14	<8
UW4	20	21	16	<8
UW12	17	22	17	<8
LGV I	16	28	19	<8
LGV II	**27**	**42**	20	<8
LGV III	22	36	21	<8
'J.H.' (subgp.B.)	14	13	13	8
'IOL-207'	**32**	24	17	**12**

TABLE IX *Distribution of highest Micro-IF type-specific antibody titres in isolation-positive oculogenital chlamydial infections in London*

Total no. of patients	*Highest titres*						
	<8	8	16	32	64	128	256
36	2	0	3	8	10	8	5

TABLE X *Distribution of highest Micro-IF type-specific antibody titres in sera from patients with NSU and 'NSU contacts' in relation to isolation of* Chlamydia *from the genital tract*

Clinic	*No. of patients*	*Isolation*	*Highest titres*						
			<8	8	16	32	64	128	256
First	17 NSU	Positive	2	1	7	5	2	0	0
	12 NSU	Negative	9	1	2	0	0	0	0
Second	12 NSU	Negative	8	2	0	1	1	0	0
	25 "NSU contacts"	Negative	13	1	6	1	1	1	2
	7 vaginal discharge, gonorrhoea, etc.	Negative	5	0	0	1	1	0	0

TABLE XI *Distribution of highest Micro-IF type-specific antibody titres in sera from patients with Reiter's disease*

Total no. of sera	*Highest titres*						
	<8	8	16	32	64	128	256
18	4	0	5	1	3	5	0

Discussion

The sera tested from children in areas of hyperendemic trachoma (Tables IV and V) have given a good indication of the individual serotypes of TRIC agent responsible (TRIC types A, B, or C) in that the highest geometric mean micro-IF titres to individual serotype antigens reflect the serotypes that we have most commonly isolated in the area.

Many individual sera show antibody levels at least two dilutions higher to the serotype that we have isolated from the patient and typed; furthermore, it has been rare for a serum to have a higher titre to any serotype other than that isolated from the patient. This established the possibility of using micro-IF measurement of type-specific antibody as an epidemiological tool for investigating the incidence of infection by various chlamydial serotypes in a community.

However, the fact that only 48 out of 96 children, all of whom had clinical signs of trachoma, had measurable serum antibody to the battery of antigens used, is in accord with findings that we have published elsewhere (Darougar, Dwyer, and 4 others, 1971) and indicates that negative micro-IF tests do not exclude the possibility of chlamydial infection.

Of the sera from London or the USA which were obtained from patients with genital, or ocular, or both genital and ocular chlamydial infection, only a few have shown two-fold higher titres to a single serotype (paratrachoma TRIC types D, E, F or G); the majority have shared reactivity with a few types, especially D and E, or have reacted with those and the LGV serotype antigens (Tables III, VII, VIII, and XII). Others have reacted broadly with all antigens, and a proportion have given negative or only weak reactions.

Although the sera from London have given fewer monospecific reactions than the hyperendemic trachoma sera from Tunisia, the degree of specificity has generally been sufficient to indicate that infection has been with one or other of the paratrachoma serotypes (TRIC D, E, F, or G) rather than with one of the hyperendemic trachoma serotypes (TRIC A, B, Ba, or C). So this test could be used to give an indication of which of these two main classes of TRIC agent is responsible for an individual case of trachoma.

The sera from cases of LGV are in general the strongest reactors in the micro-IF test but show the least specificity. They react more or less equally either right across the board with subgroup A *Chlamydia* or react especially with the LGV serotypes and with the TRIC types D and E (Table VIII).

The antigenic similarities between TRIC types D and E and the similarities between these and related paratrachoma serotypes and the LGV serotypes are sufficient to explain the cross-reactivity seen in clinical sera. However, the pattern of cross-reactivities is not constant and suggests that previous exposure to other antigens may be an important factor. When considering the higher degree of type-specificity of sera from hyperendemic trachoma as compared with the lower degree of specificity in sera from ocular, genital, or ocular and genital infection in London, the following points may be relevant:

(*a*) The sera from hyperendemic trachoma came from children, whereas most of the London sera came from adults.

(*b*) In hyperendemic trachoma, re-infection probably derives mainly from within the family unit, so that re-infection is likely to be with the same serotype, whereas in London re-infection with the genital serotypes would frequently appear to include sexual exposures beyond the family unit. Hence there may be a greater tendency for repeated sexually-acquired infections to introduce different serotypes, thereby broadening the antibody response.

The sera that have been tested by all three methods (Table VII) have given much higher titres in the micro-IF test than in the CF test, whereas most sera gave closely similar titres in the micro-IF test and the RIP test.

We have not typed the chlamydial isolates in the three cases with positive isolation in which the micro-IF titres were much lower than the RIP titres, but this discrepancy may suggest that the patient had been infected with a serotype that was not included in the range of subgroup A chlamydial antigens in the micro-IF test, or even with a subgroup B chlamydial agent such as psittacosis.

It should be emphasized that the CF test (including the LGVCFT) uses chlamydial group antigens, as does the RIP test performed by Gerloff and Watson (1967).

The RIP test would therefore appear to offer the most sensitive screening test for chlamydial infection by any serotype, including as yet undefined serotypes, whereas only the micro-IF test, which has a similar order of sensitivity, can give any indication of the serotype involved, or even differentiate between infection by subgroup A *Chlamydia* (such as TRIC and LGV agents) and subgroup B *Chlamydia* (such as psittacosis and most animal *Chlamydia*). That the micro-IF test does this is indicated by the poor reactions shown by many sera with the subgroup B 'J.H.' antigen, although they react strongly with one or other subgroup A *Chlamydia* (Tables III, VIII, XII). Furthermore, we have observed different patterns of reactivity with different subgroup B *Chlamydia* in certain sera.

It is probable that early convalescent sera would be most likely to show monospecific reactions, and our animal work (Treharne, Katzenelson, Davey, and Gray, 1971) suggests that this specificity would be greatest in the IgM response which can be read separately in the micro-IF test. However, as pointed out by Juchau, Linscott, Schachter, and Jawetz, (1972), it might be desirable to fractionate the serum before testing because the presence of antichlamydial IgG can mask the presence of IgM antibody in this test.

Because of the chronicity and recurrent nature of chlamydial infections, it is often difficult to obtain sera in the early stage of disease so that these can be matched with sera obtained later to study rises in titres. However, by testing sera from selected groups of patients, we have shown some degree of correlation between antibody titres of 1/16 or greater and the isolation of *Chlamydia*.

The level of micro-IF antibody in sera from patients with Reiter's disease suggests that there is a high prevalence of chlamydial infection in these patients (Table XII). Interpretation of the relatively high levels of antibody reacting with 'IOL-207' requires further elucidation (Table XII).

Summary and conclusions

Although the number of sera tested is not very large, the following conclusions may be drawn concerning the clinical and epidemiological applications of micro-IF measurement of antibody to each chlamydial serotype:

(1) The micro-IF test is much more sensitive than the CF test and is of similar sensitivity to the RIP test, although it must be borne in mind that the two latter tests measure antibody to chlamydial group antigen.

(2) Unlike the CF and the RIP tests, the micro-IF test would appear to be able to differentiate between infections by subgroup A *Chlamydia* and by subgroup B *Chlamydia*.

(3) Markedly lower titres in the micro-IF test for type-specific antibody than in the RIP test for antibody to chlamydial group antigen may suggest that a patient has been infected by a serotype not included in the micro-IF test.

(4) Micro-IF testing of sera has indicated in certain geographical areas and, in a variety of clinical conditions, patterns of serological response in agreement with the micro-IF serotyping of *Chlamydia* isolated from the patients concerned.

(5) Clear-cut responses to single chlamydial serotypes have been easier to demonstrate with the micro-IF test in sera from cases of hyperendemic trachoma (TRIC types A, B, or C) than in sera from cases of paratrachoma including those with NSU (TRIC types D, E, F, or G). Such responses seldom occur in sera from cases of LGV, although these have been the strongest reactors.

(6) The typical clinical picture of trachoma can result from infection with any of the hyperendemic trachoma serotypes (TRIC A, B, Ba, or C, generally acquired by eye-to-eye transmission) or by one or other of the paratrachoma serotypes (TRIC D, E, F, or G, generally acquired by sexual transmission). Apart from epidemiological considerations or the results of investigations for associated chlamydial infection of the genital tract, it may be impossible to distinguish between these two. Micro-IF serology can, however, differentiate infections with one or other of these two main classes of TRIC agents, even though it will not always indicate the individual serotype responsible.

(7) The test is thus a useful adjunct to the isolation and typing of chlamydial agents for the study of the distribution of these organisms and for the elucidation of the role that various serotypes may play in the pathogenesis of chlamydial disease.

(8) Micro-IF tests can provide a serological diagnosis of disease, or stage of disease, when no other microbiological evidence of chlamydial infection can be found.

(9) For these reasons the clinical value of micro-IF serological testing should be systematically explored by testing larger numbers of sera from carefully defined groups of patients and from persons from whom it is possible to collect sera at the acute and convalescent phases.

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Infection chlamydiale
Résultats des tests de micro-immunofluorescence pour la détection de l'anticorps spécifique du type dans certaines infections chlamydiales

SOMMAIRE

Quoique le nombre des sérums éprouvés ne soit pas très grand, les conclusions suivantes peuvent être dégagées quant aux applications cliniques et épidémiologiques de la mesure en micro-IF du taux d'anticorps trouvé pour chaque sérotype:

(1) Le test de micro-IF est bien plus sensible que l'épreuve de fixation du complément (FC) et a une sensibilité voisine de celle du test 'RIP' (radio-isotope* précipitation) en gardant à l'esprit que ces deux derniers tests détectent l'anticorps correspondant à l'antigène du groupe *Chlamydia*.

(2) Au contraire des tests FC et RIP, le test de micro-IF se montrerait capable de différencier les infections dues aux *Chlamydia* sous-groupe A de celles dues aux *Chlamydia* sous-groupe B.

(3) Des titres nettement plus faibles pour le test de micro-IF (qui détecte l'anticorps spécifique du type) que pour le test RIP (qui détecte l'anticorps correspondant aux antigènes de tout le groupe *Chlamydia*) peut suggérer qu'un malade a été infecté par un sérotype non concerné dans le test de micro-IF.

(4) L'examen de sérums en micro-IF a indiqué, dans certaines régions géographique et dans des conditions cliniques variées, des profils de réponses sérologiques en accord avec le sérotype tel qu'il avait été établi par micro-IF sur les *Chlamydia* isolés chez les malades considérés.

(5) Des réponses nettement définies pour un seul des sérotypes de *Chlamydia* ont été plus faciles à obtenir avec le test de micro-IF sur des sérums provenant de cas de trachomes hyperendémiques (TRIC types A, B, ou C.) que sur des sérums de cas de paratrachome, dont ceux d'urétrites non spécifiques (TRIC types D, E, F ou G). De telles réponses s'obtiennent rarement pour des sérums provenant de cas de lymphogranulomatose vénérienne, bien que ces sérums réagissent fortement.

(6) On peut observer une image clinique typique de trachome avec les sérotypes du trachome hyperendémique (TRIC A, B, Ba ou C, dépendant généralement d'une transmission d'oeil à oeil); on peut l'observer également avec l'un ou l'autre des sérotypes du paratrachome (TRIC D, E, F ou G, généralement transmis par contact sexuel). Sauf du fait de considérations épidémiologiques ou des résultats de la recherche d'une infection chlamydiale associée des voies génitales, il peut être impossible de faire la distinction entre les deux. La sérologie micro-IF peut, pourtant, différencier les infections dues à l'une ou à l'autre des deux grandes classes d'agents TRIC, même si elle ne permet pas toujours d'indiquer le sérotype individuel responsable.

(7) Ainsi, le test est un complément utile pour isoler et typer les agents chlamydiaux pour l'étude du domaine de ces organismes et pour élucider le rôle que les différents sérotypes peuvent jouer dans la pathogénie des maladies chlamydiales.

(8) Les tests de micro-IF peuvent permettre un diagnostic sérologique de la maladie ou du stage de la maladie alors que l'on ne peut trouver aucune autre preuve microbiologique de l'infection chlamydiale.

(9) Pour ces raisons, la valeur clinique de l'examen sérologique en micro-IF doit être systématiquement explorée en testant de plus grands nombres de sérums provenant de groupes de malades soigneusement définis et de personnes chez lesquelles il est possible d'obtenir des sérums pendant la phase aigüe et pendant la convalescence.

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