

***Mycoplasma* spp.**

Ureaplasma urealyticum

Mycoplasma spp.
Ureaplasma urealyticum

:

論文 理學碩士 學位論文 提出

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**Studies on vertical transmission of *Mycoplasma*
spp. and *Ureaplasma urealyticum* from pregnant
women to neonate**

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Abstract

In order to evaluate the effect of *Mycoplasma* spp., *U. urealyticum* and vertical transmission to neonate infection on the outcome of pregnancy, term pregnant women and of their vaginally delivered newborns were investigated. The urine culture of the pregnant women and throat swab culture of the neonates were performed, and the results were obtained as follows:

1. Out of one hundred pregnant women, the infection rate of *Mycoplasma* spp. and *U. urealyticum* was 81%, 58%, respectively, and the duplicate infection of both was 43%. Also, in the case of one hundred neonate, the infection rate of 72%, 25%

and 17% as the same order.

2. We have the followings as the result of examining pregnant women of age: The infection rate of *Mycoplasma* spp. to pregnant women and neonate and vertical infection to neonate increase the accordance with pregnant women of age, however, the infection rate of *U. urealyticum* to pregnant women and neonate didn't have any relation with pregnant women of age.
3. We have the followings as the result of examining pregnant women of gestational age: The infection rate of *Mycoplasma* spp. and *U. urealyticum* to pregnant women and neonate and vertical infection to neonate show the high infection rate in case the pregnant women is preterm delivery.
4. We have the followings as the result of examining pregnant women of abortion frequency: The infection rate of *U. urealyticum* to pregnant women and neonate and vertical infection to neonate increase the accordance with abortion frequency, however, abortion frequency didn't have any relation with the infection rate of *U.urealyticum*.
5. We have the followings as the result of examining pregnant women of delivery frequency: it showed that it dosen't have any relation.

6. We have the followings as the result of examining of neonate sex: The infection rate of *Mycoplasma* spp. and *U. urealyticum* to pregnant women delivered girl is little higher than the case of boy. The vertical infection rate of *Mycoplasma* spp. to girl neonate is higher than boy neonate but vertical infection of *U. urealyticum* is higher than girl neonate.
7. We have the followings as the result of examining of neonate weight: pregnant women, neonate and vertical infection rate of *Mycoplasma* spp., in case the neonate is low weight, show high tendency, however, there is no constant tendency in *U. urealyticum* infection.

I.

Mycoplasma spp. 1898

(pleuropneumonia-like organism: PPLO)

, *Mycoplasma*

(Myco=Myke & plasma) . 1937

Bartholin's gland abscess()

1953 *Mycoplasma hominis* .

1954

Tiny-form *mycoplasma* *Mycoplasma*

, *Mycoplasma* spp.

1974 *Ureaplasma* spp. (1).

Mycoplasma spp. 가

가 가 , 3

, peptidoglycan polymer

lysozyme, penicillin,

가 .

, , , , 가

,

Dienes

(2). ,

1962 Chanock

가 PPLO 가

Mycoplasma spp.

.
가 , galactans,
polysaccharides, P1

(3, 4), ,
(5).

Mycoplasma spp.

, (6, 7)

(8).

Mycoplasma 가

, , (9) 2

가 ,

.
Mycoplasma spp. , *M. genitalium*, *M. pneumoniae*
glucose arginine
M. hominis, *M. fermentans*, *M. arthritidis*, *M.*
primatum, *M. pirum*

가 . *M.*
genitalium *M. hominis*가 . *M. hominis*

, , , , , ,
, , , , , ,

(1, 3, 4, 10-14).

Ureaplasma spp. *Mycoplasma* spp. ,
urea

. *Ureaplasma urealyticum* *Ureaplasma*
diversum , *U. urealyticum* 가

(15). *U. urealyticum* , , ,

, , , , ,

, , , , ,

, ,

(16- 21).

Mycoplasma spp. *U. urealyticum*

,

(12).

Mycoplasma spp.

,

U. urealyticum

Mycoplasma spp.가

.

가 ,

,

가 (13),

가 (14, 19, 20). ,

,

,

.

가 .

Mycoplasma

spp. *U. urealyticum*

,

,

,

,

,

.

•

1.

2000 11 2001 5 I
100
100 .

2.

1)

10cc
가 (Deep freezer, -70 ,
REVCO) .
swab
-70

•

2)

Mycoplasma hominis PG21 U.
urealyticum T960
•

Mycoplasma spp. *U. urealyticum* ,

Table 1 . base medium

(121 , 15) complete medium 가

, agar powder

가 , .

3.

vortexing ,

1,000rpm 10 . 24 well

plate broth 2ml 200 μ l 가

10⁻¹ 10⁻⁶ 37 1

(Fig. 1).

.

(CCU : Color

Changing Unit) .

well 0.01ml(10 μ l)

Gas pak jar(5-10% CO₂) 1 .

Colony가 40-100

.

Table 1. The components of the media for the cultivation and isolation of

Mycoplasma spp. and *Ureaplasma urealyticum*

Enrichment medium	<i>Mycoplasma</i> spp.	Base broth medium	
		PPLO broth powder	1.5 gm
		Arginine	0.4 gm
		3rd Distilled water	70 ml
		Complete broth medium	
		Autoclaved base medium	70 ml
		1% Phenol red	0.1 ml
		Horse serum	20 ml
		Yeast extract	10 ml
		2.5% Thallium acetate	1 ml
		Penicillin G(<100,000unit)	1 ml
Isolate medium	<i>U. urealyticum</i> (A ₇ medium)	Base broth medium	
		PPLO broth powder	1.17 gm
		3rd Distilled water	70 ml
		Complete broth medium	
		Autoclaved base medium	70 ml
		10% Urea	0.8 ml
		2% L-Lysteine HCl	0.5 ml
		1% Phenol red	0.1 ml
		Horse serum	20 ml
		Yeast extract	10 ml
		Penicillin G(<100,000unit)	1 ml
Isolate medium	<i>Mycoplasma</i> spp. (PPLO medium)	Base agar medium	
		PPLO agar powder	3.5 gm
		Arginine	0.4 gm
		3rd Distilled water	70 ml
		Complete agar medium	
		Autoclaved base medium	70 ml
		1% Phenol red	0.1 ml
		Horse serum	20 ml
		Yeast extract	10 ml
		2.5% Thallium acetate	1 ml
		Penicillin G(<100,000unit)	1 ml
Isolate medium	<i>U. urealyticum</i> (A ₇ medium)	Base agar medium	
		PPLO agar powder	3.3 gm
		3rd Distilled water	70 ml
		Complete agar medium	
		Autoclaved base medium	70 ml
		10% Urea	0.8 ml
		2% L-Lysteine HCl	0.5 ml
		1% Phenol red	0.1 ml
		Horse serum	20 ml
		Yeast extract	10 ml
		Penicillin G(<100,000unit)	1 ml

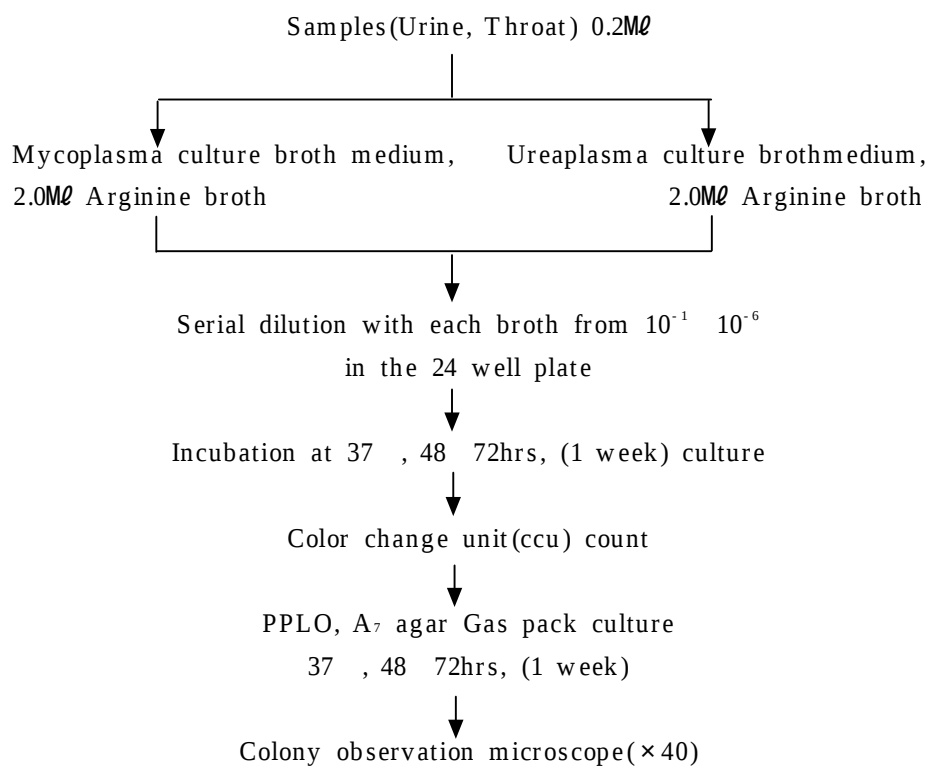


Fig. 1. Procedure of isolation of *Mycoplasma* spp. and *Ureaplasma urealyticum*.

•

1. *Mycoplasma* spp. *Ureaplasma urealyticum*

1) *Mycoplasma* spp.

Broth medium	가	10^{-1}	10^{-6}
37	1		

(Fig. 2), PPLO

(Fig. 3). PPLO

Dienes stain *Mycoplasma* spp.

(Fig. 4).

2) *Ureaplasma urealyticum*

U. urealyticum *Mycoplasma* spp.

, broth

(Fig. 5).

A₇

U. urealyticum

Mycoplasma spp.

(Fig. 6).

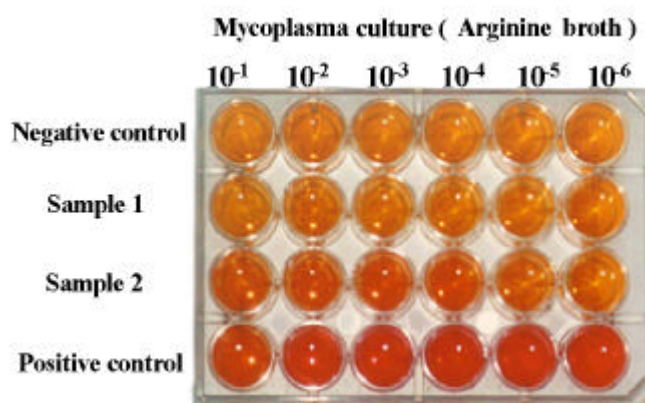


Fig. 2. *Mycoplasma* spp. cultured in Arginine broth of serial dilution with each broth from 10^{-1} 10^{-6} in the 24 well plate.

Negative control : Distilled water

Sample 1 : Throat

Sample 2 : Urine

Positive control : *Mycoplasma hominis* PG21



Fig. 3. *Mycoplasma* spp. cultured in PPLO agar medium
: fried egg appearance colony observation microscope
($\times 40$).

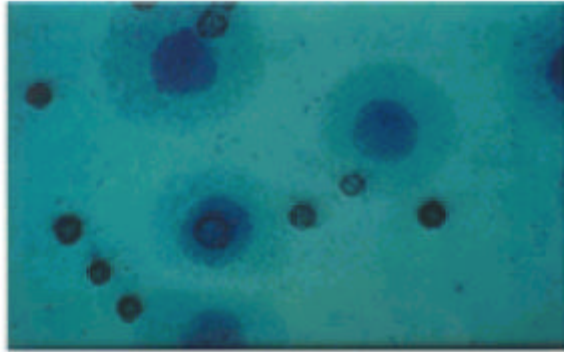


Fig. 4. *Mycoplasma* spp. cultured in PPLO agar medium
: Dienes stain colony observation microscope($\times 40$).

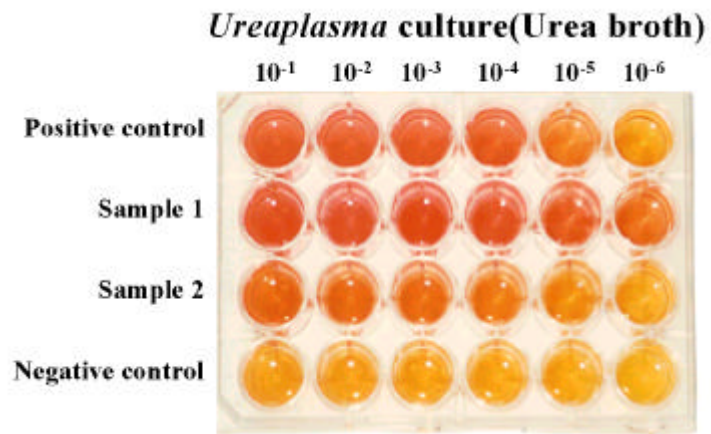


Fig. 5. *Ureaplasma urealyticum* cultured in urea broth of serial dilution with each broth from 10^{-1} 10^{-6} in the 24 well plate.

Negative control : Distilled water

Sample 1 : Throat

Sample 2 : Urine

Positive control : *U. urealyticum* T960

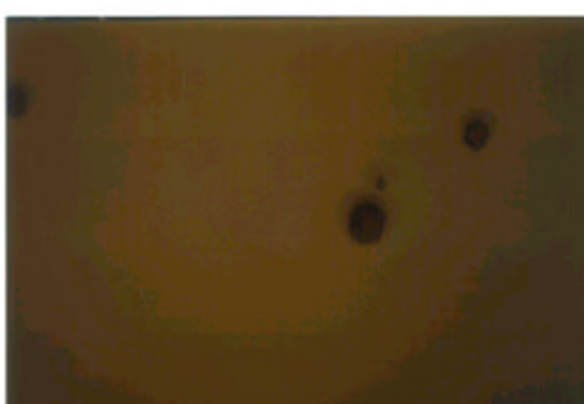


Fig. 6. *U. urealyticum* cultured in A₇ agar : dark brown pigmentation around the small colony observation microscope($\times 40$).

2. *Mycoplasma* spp. *U. urealyticum*

1)

21 47 100
Mycoplasma spp. *U. urealyticum*
 Table 2 . 26 30
 가 100 72 가
 가 .
Mycoplasma spp. 30
 77% 30 100%
 . *U. urealyticum*
 50 54%
 . *Mycoplasma* spp. *U. urealyticum*
 44 54% 가
 , *U. urealyticum* *Mycoplasma* spp.
 .
Mycoplasma spp. 30
 가 62 71%, 31 가
 85%
 , *U. urealyticum*
 26 39 가 29 31% , 26 35
 18 31%
 .
Mycoplasma spp. 21 25

Table 2. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women differentiated by age and their neonate

Age of pregnant women	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>		
		Pregnant women No.(%)	Neonate No.(%)	V.T.* (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	
21 25	13	10(76)	8(62)	80	7(54)	0(0)	0	7(54)	0(0)	
26 30	72	56(78)	51(71)	91	38(53)	21(29)	55	32(44)	13(18)	
31 39	13	13(100)	11(85)	85	7(54)	4(31)	57	6(46)	4(31)	
40 47	2	2(100)	2(100)	100	1(50)	0(0)	0	1(50)	0(0)	
Total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)	

* V.T. : Vertical Transmission

80%, 26 30
 91%, 31 39 85%, 40 47 100%
 가 .

2)

Mycoplasma spp. *U. urealyticum*
 35 42 (Table
 3). 35 36 1 *Mycoplasma*
spp. *U. urealyticum* , 37 38 33
Mycoplasma spp. 98%, *U. urealyticum* 57%,
Mycoplasma spp. *U. urealyticum* 55%
 , 39 40 63 *Mycoplasma* spp. 76%, *U.*
urealyticum 51%, 43% , 41 3
U. urealyticum 33% .

가 35 36

1 *Mycoplasma* spp. *U. urealyticum*
 , 37 38 *Mycoplasma*
spp. 88%, *U. urealyticum* 30%,
 21% , 39 40
Mycoplasma spp. 67%, *U. urealyticum* 21%, 14%
 . 41 *U.*
urealyticum 33% .

Mycoplasma spp. *U. urealyticum*

.

35 36 *Mycoplasma* spp. *U. urealyticum*,

Table 3. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women differentiated by gestational age and their neonate

Gestationl age (weeks)	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>		
		Pregnant women No.(%)	Neonate No.(%)	V.T.* (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)
35 36	1	1(100)	1(100)	100	1(100)	1(100)	100	1(100)	1(100)	100
37 38	33	32(98)	29(88)	90	19(57)	10(30)	53	18(55)	7(21)	33
39 40	63	48(76)	42(67)	88	32(51)	13(21)	41	27(43)	9(14)	33
41 42	3	0(0)	0(0)	0	1(33)	1(33)	100	0(0)	0(0)	0
T total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)	37

* V.T. : Vertical Transmission

100% *U. urealyticum*
 41 40 1 1
Mycoplasma spp.

3)

Mycoplasma spp. *U. urealyticum*
 , 1 2 , 3
 (Table 4).
Mycoplasma spp 80%,
 1 80 82%
 . *U. urealyticum*
 43%, 1 2 70%, 3
 60%
U. urealyticum ,
 . *Mycoplasma* spp. *U.*
urealyticum 39%
 , 1 2 56%,
 3 60%

.

Mycoplasma spp.
 가 61 79%, 1 2
 가 59%, 3
 가 80%

Table 4. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women differentiated by number of abortion and their neonate

No. of abortion	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>		
		Pregnant women No.(%)	Neonate No.(%)	V.T.* (%)	Pregnant women No.(%)	Neonate No.(%)	V.T.* (%)	Pregnant women No.(%)	Neonate No.(%)	
0	61	49(80)	48(79)	98	26(43)	13(21)	50	24(39)	11(18)	
1 2	34	28(82)	20(59)	71	24(70)	11(32)	46	19(56)	5(15)	
3	5	4(80)	4(80)	100	3(60)	1(20)	33	3(60)	1(20)	
Total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)	

* V.T. : Vertical Transmission

. *U. urealyticum*
, 1 2 , 3
가 21%, 32%,
20% ,

. 가
18%, 1 2 가
15%, 3 가
20% 가 3
가

.
Mycoplasma spp. 3
100% , *U. urealyticum*

4)

Mycoplasma spp. *U. urealyticum*
Table 5 .
Mycoplasma spp. 79%,
83% , *U. urealyticum*
53%, 52%
, 45 48% .
Mycoplasma spp.
69 74%, *U. urealyticum* 24 26% ,

Table 5. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women differentiated by number of parity and their neonate

No. of parity	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>	
		Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)
Primi	58	46(79)	43(74)	94	31(53)	15(26)	48	26(45)	10(17)
Multi	42	35(83)	29(69)	83	22(52)	10(24)	46	20(48)	7(17)
Total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)

* V.T. : Vertical Transmission

Mycoplasma spp. *U. urealyticum* 17%

Mycoplasma spp.

U. urealyticum

Mycoplasma

spp. *U. urealyticum* 94%, 48%, 39%

83%, 46%, 35%

5)

Mycoplasma spp. *U. urealyticum*

Mycoplasma spp.

55 76%, 45 87%가

(Table 6). *U. urealyticum*

49%, 58%가

, 40%,

53% ,

가

Mycoplasma spp.

55 64%,

45 82%

U. urealyticum

27%

22%

16%,

18%

Mycoplasma spp.

Table 6. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women and neonate differentiated by sex of neonate

Sex of neonate	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>		
		Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	
Male	55	42(76)	35(64)	83	27(49)	15(27)	56	22(40)	9(16)	
Female	45	39(87)	37(82)	95	26(58)	10(22)	39	24(53)	8(18)	
Total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)	

* V.T. : Vertical Transmission

83%, 95% 가 , *U. urealyticum*
 56% , 39%
 , 41%, 33%

6)

2200-2700g
Mycoplasma spp. 100%, 2700-3700g
 83%, 3700g
 44%
 (Table 7), *U. urealyticum*
 2200-2700g 56%,
 2700g 38%-51%

2200-2700g *Mycoplasma* spp.
 100%, *U. urealyticum* 33%, 33%
 , 2700-3700g *Mycoplasma* spp.
 74%, *U. urealyticum* 19-33%, 11-20%
 , 3700g 가 *Mycoplasma* spp.
 22% . *Mycoplasma* spp.

, *U. urealyticum*

Table 7. Infection and vertical transmission ratio(%) of *Mycoplasma* spp. and/or *U. urealyticum* in pregnant women and neonate differentiated by body weight of neonate

Body weight of neonate (g)	No. of pregnant women	<i>Mycoplasma</i> spp.			<i>U. urealyticum</i>			<i>Mycoplasma</i> spp. and <i>U. urealyticum</i>	
		Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)	V.T. (%)	Pregnant women No.(%)	Neonate No.(%)
2200 2700	9	9(100)	9(100)	100	5(56)	3(33)	60	5(56)	3(33)
2700 3200	37	31(84)	27(73)	87	16(43)	7(19)	44	14(38)	4(11)
3200 3700	45	37(82)	34(76)	92	26(58)	12(27)	62	23(51)	9(20)
3700	9	4(44)	2(22)	50	6(67)	3(33)	50	4(44)	1(11)
Total	100	81(81)	72(72)	89	53(53)	25(25)	47	46(46)	17(17)

* V.T. : Vertical Transmission

Mycoplasma spp.

100% , 3700g

50%

, *U. urealyticum*

.

2200- 2700g

60%, 2700g

25%- 39%

.

.

Mycoplasma spp.

.

Mycoplasma spp. 가

(22-24). *Mycoplasma*
hominis, *M. genitalium*, *M. pneumoniae*, *M. fermentans*, *M.*
arthritidis, *M. primatum*, *M. pirum*

M.

genitalium *M. hominis*, urea
Ureaplasma urealyticum .

70%

Mycoplasma spp. , 40%

70% 가 (12)

Mycoplasma spp. , Barile(25)

Mycoplasma spp.

57% .

56%(26),

57%가 *U. urealyticum* , 29%가 *Mycoplasma*
spp. , *U. urealyticum*가

91%, *Mycoplasma* spp.가 89% (27, 28),

63%가 *Mycoplasma* spp. (29)

. , *Mycoplasma* spp. *U. urealyticum*

가 ,

(30), , , , ,
mycoplasma spp. 가
 가

.
Mycoplasma spp. *U. urealyticum* .

,
 가
Mycoplasma
 가

.
Mycoplasma spp.
U. urealyticum

, , ,
 , 가

.
 100 ,

Mycoplasma spp. 81%, *U. urealyticum*

53%, 43% , 100

Mycoplasma spp. 72%, *U. urealyticum* 25%,

17% . Embree and

Krause(31) Gibbs(32) *U. urealyticum* 34%,

U. urealyticum 49% *M. hominis*

32% 가 ,

Mycoplasma spp. ,

(33) *M. hominis*

Mycoplasma spp.

Mycoplasma spp.

26-30 가 *Mycoplasma* spp. 71%

. *U. urealyticum*

가 53%

가 *U. urealyticum*

57%(34) 40-80%(35, 36) , *M. hominis*

5-80%(25)

Mycoplasma spp. *U. urealyticum*

(35-36) 가 (38)

. Embree et al.(31) *U.*

urealyticum 67%

, (37) 38 32%

Kundsin and Driscoll(34) Sanchez(38)

Mycoplasma spp.가

87.5%

Mycoplasma spp.

80 82%가

. *U. urealyticum*

(43%)

1

(60-70%)

.

U. urealyticum *Mycoplasma* spp. *U. urealyticum*

.

Mycoplasma spp. *U. urealyticum*

.

Mycoplasma spp. *U.*

urealyticum

.

82%, 64%

. Sanchez(38) *U. urealyticum*

57%, 43%

.

Mycoplasma spp.

, *U. urealyticum*

. 1000g

89%

(38), 2500g

34%

(9).

Mycoplasma spp. *U. urealyticum*

가

.

Mycoplasma spp. *U. urealyticum*

. 가
M. hominis 30%, *U. urealyticum* 50%
가

(17, 20, 31, 39).

, 가
,

, *Mycoplasma* spp. *U. urealyticum* ,
가 .

6 , 1
가 ,

, 가 .
PCR (40, 41, 42)

.

.

Mycoplasma spp. *U. urealyticum*

100

100

.

1. 100 *Mycoplasma* spp. 81%, *U.*
urealyticum 53%, 43% ,
100 *Mycoplasma* spp. 72%, *U.*
urealyticum 25%, 17% .

2. *Mycoplasma* spp.

, *U. urealyticum*

.

3. *Mycoplasma* spp. *U. urealyticum*

,

.

4. *U. urealyticum*

, *Mycoplasma* spp.

5. *Mycoplasma* spp. *U. urealyticum*

6. *Mycoplasma* spp. *U. urealyticum*
가

. *Mycoplasma* spp. 가
, *U. urealyticum*

7. *Mycoplasma* spp.
, , *U.*
urealyticum

1. , . 1991. . 621-630.
2. **Robertson, J., M. Gomersall**, 1975. Effect of preparatory techniques on the gross morphology of *Mycoplasma hominis*. *Journal of Bacteriology* **24**, 1019-22.
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