Two family outbreaks of *Chlamydia pneumoniae* infection

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ABSTRACT: During autumn 1992, we observed two unrelated family outbreaks of *Chlamydia pneumoniae* infection.

Family A consisted of grandmother (aged 77 yrs), father (aged 41 yrs), mother (aged 38 yrs), daughter (aged 10 yrs), and two sons (aged 6 yrs and 3 months, respectively). The grandmother and daughter suffered from pneumonia, father from pharyngitis and bronchitis and the older son from mild bronchitis. No symptoms were recorded in the mother and younger son. Symptomatic subjects showed a fourfold increase in immunoglobulin G (IgG) titre for *Chlamydia pneumoniae*, determined by a microimmunofluorescence test with specific antigen (TW-183). Other serological studies against *Mycoplasma pneumoniae*, *Legionella pneumophila*, influenza virus type A and B, adenovirus and respiratory syncytial virus (RSV) were negative. Sputum culture gave a positive result for *Haemophilus influenzae*, colony forming units (cfu)= 10^4 ·ml⁻¹ in the grandmother. No serum positivity was recorded in the mother and younger son, who remained asymptomatic. All symptomatic patients were successfully treated with macrolides.

Family B consisted of mother (aged 63 yrs) and daughter (aged 36 yrs). Both suffered from *Chlamydia pneumoniae* pneumonia. Diagnosis was made by means of serological microimmunofluorescence test, and direct identification using an indirect immunofluorescence test on pharyngeal swab. Sputum culture and other serological tests remained negative. Both patients were successfully treated with macrolides.

These observations emphasize the relevance of *Chlamydia pneumoniae* in family cluster respiratory infections.

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Chlamydia pneumoniae is a recently described species of *Chlamydia* genus, originally isolated from the conjunctiva of a Taiwanese child, and classified on the basis of ultrastructure and deoxyribonucleic acid (DNA) studies [1, 2]. Retrospective and prospective studies have shown that *Chlamydia pneumoniae* is involved in a wide spectrum of respiratory tract infections [3, 4].

Family transmission, child-to-child, was described in Japan in 1990 [5]. MORDHORST *et al.* [6] described an outbreak of *Chlamydia pneumoniae* infection in four farming families living close together in Denmark, with an unusually high incidence of symptomatic infections, particularly lower respiratory tract infections, among the family members. These data support the human-to-human contact spread of *Chlamydia pneumoniae* infection, and emphasize the role of this agent in family cluster respiratory infections, even though ALDOUS *et al.* [7], in a serological study of family serum samples conducted between 1966–1979, reported that acute infections more often affected a single family member than multiple members.

To date, no data on family transmission of *Chlamydia pneumoniae* infection have been reported in Italy. During a prospective study on community-acquired pneumonia,

we observed outbreaks of *Chlamydia pneumoniae* infections occurring in two unrelated families, in autumn 1992.

Methods

We studied the members of two unrelated families suffering from acute respiratory tract infections. Family A consisted of grandmother (aged 77 yrs), father (aged 41 yrs), mother (aged 38 yrs), daughter (aged 10 yrs), and two sons (aged 6 yrs and 3 months, respectively). Family B consisted of mother (aged 63 yrs) and daughter (aged 36 yrs). Family A members were studied retrospectively, whilst family B members came to our observation with acute symptoms.

All members of family A, except the three month old son, underwent acute and convalescent serological tests for *Mycoplasma pneumoniae*, *Legionella pneumophila*, influenza virus type A and B, adenovirus, respiratory syncytial virus (RSV) and *Chlamydia pneumoniae*. Members of family B underwent acute and convalescent serological tests for *Mycoplasma pneumoniae*, *Legionella pneumophila* and *Chlamydia pneumoniae* and were also submitted to pharyngeal swabs for direct identification

Table 1. - Demographic and clinical data, and results of serological and direct identification of *Chlamydia pneumoniae* in the two families studied

Family member	Sex	Age yrs	Diagnosis	Onset date	Serum follow-up samples days after onset	IgM titre	IgG titre	Pharyngeal swab	Treatment
Family A									
Grandmother (index case)	F	77	Pleuro-pneumonitis	15.09.92	17	-ve	128	ND	A/C 2 g-day ⁻¹ (5 days) >
					46	-ve	1024		
Father	M	41	Pharyngitis and bronchitis	24.09.92	73	-ve	1024	ND	E 3 g-day ⁻¹ (14 days)
					66	-ve	512		C 500 mg-day ⁻¹ (11 days)
					93	-ve	1024		
Mother	F	38	No disease	-	01.12.92	-ve	64	ND	-
					27.12.92	-ve	64		
Daughter	F	10	Pneumonia	30.09.92	6	-ve	-ve	ND	E 50 mg·kg ⁻¹ (16 days)
					31	-ve	256		
First son	M	6	Bronchitis	10.10.92	58	-ve	512	ND	-
					50	-ve	256		-
					77	-ve	1024		-
Second son	M	0.25	No disease	-	ND	-	-	ND	-
Family B									
Mother	F	63	Pneumonia	24.12.92	6	-ve	256	+ve	E 2 g-day ⁻¹ (1 day) **>
					14	-ve	512		C 500 mg-day ⁻¹ (16 days)
Daughter (index case)	F	36	Pneumonia	06.12.92	17	-ve	128	+ve	Ce 3 g-day ⁻¹ (6 days) >
					24	-ve	512		E 3 g-day ⁻¹ (24 days)

IgM: immunoglobulin M; IgG: immunoglobulin G; ND: not done; -ve: negative; +ve: positive; A/C: amoxycillin/clavulanate; E: erythromycin; C: clarithromycin; Ce: ceftazidime; **: withdrawn due to gastric intolerance.

of *Chlamydia pneumoniae* by means of an indirect immunofluorescence test (Cellabs PTY Ltd, Brookvale, Australia).

The test for *Chlamydia pneumoniae* antibody fractions (immunoglobulins G and M (IgG and IgM)) was performed by microimmunofluorescence [8], using a specific antigen (TW-183) purchased from the Washington Research Foundation, Seattle, USA, and results were classified, as reported previously [9]. All subjects with fever and abnormal chest findings underwent chest radiography, sputum and blood culture. Table 1 shows the demographic and clinical data, and the serological results for identification of *Chlamydia pneumoniae*.

Case reports

Family A

The grandmother, aged 77 yrs, was affected by chronic obstructive pulmonary disease (COPD). She was admitted to another hospital on September 22, 1992, with diagnosis of pneumonia with pleural effusion. Chest X-ray showed right basal infiltration with ipsilateral pleural effusion. Since September 15, she had suffered from headache, sore throat, cough, fever and chest pain, resistant to antibiotic treatment with amoxycillin-clavulanate (2 g-day⁻¹). Blood cultures were negative and sputum culture yielded *Haemophilus influenzae* 10⁴ colony forming units (CFU·ml⁻¹). Serological tests other than for *Chlamydia pneumoniae* were negative.

The father, aged 41 yrs, complained of cough and sore throat on September 24, 1992. The daughter, aged 10 yrs, who shared a room with her grandmother, suffered from high fever (39°C) and cough, on September 30, and was admitted to another hospital, where a chest X-ray showed bilateral interstitial pneumonia. Blood cultures and serological tests other than for *Chlamydia pneumoniae* were negative.

The older son, aged 6 yrs, complained of dry cough lasting for a few days during the first days of October, with spontaneous recovery.

The mother, aged 38 yrs, and younger son, aged 3 months, living in the same room and apart from the other members, had no symptoms.

Family B

The daughter, aged 36 yrs, was admitted to our hospital with a diagnosis of pneumonia on December 22, 1992. Chest X-ray showed subsegmental right infiltration. On December 6, she had complained of fever and fatigue, with remission following acetylsalicylic acid (ASA). After three days, fever recurred, associated with dry cough, bilateral hypoacusia and left ear pain.

The mother, aged 63 yrs, was admitted to our hospital with the diagnosis of pneumonia on December 30. She had suffered from fever, cough, chest pain, sore throat, and right hypoacusia since December 24. On admission, chest X-ray showed right upper lobe interstitial pneumonia.

In both patients *Chlamydia pneumoniae* was identified in pharyngeal swab specimens. Sputum and blood cultures, and serological tests other than for *Chlamydia pneumoniae* were negative.

Discussion

Family outbreaks of *Chlamydia pneumoniae* respiratory tract infection have been reported in Japan, USA and Denmark [5–7]. This is the first report of family outbreaks in Italy. We recorded a high rate of infection (75%).

These data are in contrast with the low incidence of infection recorded during epidemics in military trainees in Finland [10], and in the serological study of ALDOUS *et al.* [7]. They are in agreement with the report by MORDHORST *et al.* [6], who observed a family cluster with relatively high rate of infection.

Most of our symptomatic patients (4 out of 6) suffered from mild to moderate pneumonia, with one case showing pleural effusion and one bilateral interstitial involvement. Only one patient showed biphasic illness, and another recovered spontaneously. Erythromycin at 3 g·day⁻¹ and clarythromycin at 500 mg·day⁻¹ for at least 14 days, were both effective in the treatment of *Chlamydia pneumoniae* infection.

The time span of infection spread was unusually short in both families, ranging from 5–18 days. This may be explained by their living habits. In fact, both families lived in small flats, with high person-to-person contact. Interestingly, the index case in family A was affected by COPD, whereas the index case in family B was a young, otherwise healthy woman, suggesting that *Chlamydia pneumoniae* may play a role as an agent of respiratory tract infection in subjects with different risk factors.

As reported previously [11], COPD patients have a very high antibody prevalence to *Chlamydia pneumoniae*, with a significant risk of acute exacerbations due to this agent. The case reported in our study suggests that *Chlamydia pneumoniae* may also play a role as an agent of pneumonia in COPD patients.

Our data confirm the relevance of *Chlamydia pneumoniae* in family outbreaks of respiratory tract infection,

and emphasize the role of this agent in family cluster lower respiratory tract infections in our area.

References

1. Grayston JT, Kuo CC, Wang SP, Altman J. – A new *Chlamydia psittaci* strain, TWAR, isolated in acute respiratory tract infections. *N Engl J Med* 1986; 315: (3): 161–168.
2. Grayston JT, Kuo CC, Campbell LA, Wang SP. – *Chlamydia pneumoniae* sp. nov. for *Chlamydia* sp. strain TWAR. *Int J Sys Bacteriol* 1989; 39: 88–90.
3. Grayston JT, Campbell LA, Kuo CC, *et al.* – A new respiratory tract pathogen: *Chlamydia pneumoniae* strain TWAR. *J Infect Dis* 1990; 161: 618–625.
4. Bates JH, Campbell GD, Barron AL, *et al.* – Microbial etiology of acute pneumonia in hospitalized patients. *Chest* 1992; 101: 1005–1012.
5. Yamazaki T, Nakada H, Sakurai N, *et al.* – Transmission of *Chlamydia pneumoniae* in young children in a Japanese family. *J Infect Dis* 1990; 162: 1390–1392.
6. Mordhorst CH, Wang SP, Grayston JT. – Outbreak of *Chlamydia pneumoniae* infection in four farm families. *Eur J Clin Microbiol Infect Dis* 1992; 11: 617–620.
7. Aldous MB, Grayston JT, Wang SP, *et al.* – Seroepidemiology of *Chlamydia pneumoniae* TWAR infection in Seattle families, 1966–1979. *J Infect Dis* 1992; 166: 646–649.
8. Wang SP, Grayston JT, Kuo CC, Alexander ER, Holmes KK. – Serodiagnosis of *Chlamydia trachomatis* infection with the microimmunofluorescence test. In: Hobson D, Holmes KK, eds. *Nongonococcal Urethritis and Related Infections*. Washington, D.C., American Society for Microbiology, 1977; pp. 237–248.
9. Thom H, Grayston JT, Wang SP, Kuo CC, Altmann J. – *Chlamydia pneumoniae* strain TWAR, *Mycoplasma pneumoniae* and viral infections in acute respiratory disease in a University Student Health Clinic population. *Am J Epidemiol* 1990; 132: 228–256.
10. Kleemola M, Saikku P, Visakorpi R, *et al.* – Epidemics of pneumonia caused by TWAR, a new *Chlamydia* organism, in military trainees in Finland. *J Infect Dis* 1988; 157: 230–236.
11. Blasi F, Legnani D, Lombardo VM, *et al.* – *Chlamydia pneumoniae* infection in acute exacerbations of COPD. *Eur Respir J* 1993; 6: 19–22.