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SERVICES FOR SCIENCE AND EDUCATION

Mycoplasmas and Mycoplasmosis

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ABSTRACT

The paper underlines the importance of Mycoplasmas on the course of pneumonia mostly in children. Mycoplasmas constitute a distinct class from bacteria since they lack a cell wall. There is a list of the main mycoplasmas pathogenic to humans with a special attention to Mycoplasma pneumoniae. The use of Polymerase Chain Reaction (PCR) is fundamental for serological diagnosis. The clinical history is mostly favorable to prompt recovery. Then are problems concerning long-term antibiotic treatments. Very important studies are reported on the hypothesis that the mycoplasmas could at as co-factors for the progression of HIV infection and represent one of the main weapons of potential bacteriological wars. Transferred genome can create life in a new microbe and opens broader horizons for scientific research.

Keywords: mycoplasmas, pneumonia, arthritis, PCR, AIDS

INTRODUCTION

With the wave of pneumonia among children, the presumed medical scholars return. Here's what Mycoplasma Pneumoniae really is, studied since the 1960s, and everything you need to know beyond harmful generalizations. Be careful with prolonged antibiotic treatments: they can be more harmful than useful.

In our beautiful country, Italy, there are many earworms, especially at the level of our institutions, who proclaim themselves from one day to the next as expert connoisseurs of some cultural topic that they do not know, except by hearsay, and express themselves as experts.

Unfortunately, this situation happens from one day to the next and the new "speakers" speak as experts to refer to, without taking into account those who actually experienced the problem, also providing a scientific contribution that was part of the information and/or recognized publications.

The last topic of epidemiological knowledge refers to Mycoplasmas. Prof. Paolo Altucci (Emeritus of Internal Medicine 2nd University of Naples), and the undersigned Giulio Tarro (Head Doctor Emeritus of the D. Cotugno Hospital), already in 1964 had published some of our observations on pneumopathies caused by Mycoplasma pneumoniae (Mp, all called PPLO or Pleuro-Pneumonia Like Organism). With those studies we had, on the one hand, set up a nosological, clinical and pathogenetic framework of the disease and on the other we provided the validation of the main diagnostic techniques (among which, importantly, that for the cultivation of the responsible agents on acellular media) (1).

METHODS

Mycoplasmas constitute a sui generis class, being distinct from bacteria also because (unique among prokaryotes) they lack a cell wall, but are equipped with a trilaminar lipoprotein membrane, rich in sterols.

The main mycoplasmas pathogenic to humans are listed (2).

Mycoplasma pneumoniae: Certain cause of pneumonia, asthma, respiratory tract diseases (upper and lower) (3-6).

Mycoplasma hominis, Ureaplasma urealyticum: these mycoplasmas are present in the urogenital system even of healthy people. However, they are also: a certain cause of diseases of the urogenital tract in adults, of neonatal respiratory infections and of opportunistic infections in the compromised host. Mycoplasma fermentans: a role has been hypothesized in some arthritis, in Gulf War Syndrome (a fibromyalgia syndrome with pain and stiffness). Mycoplasma genitalium: hypothesized role in some arthritis, in chronic non-gonococcal urethritis and in urogenital infections causing sterility. Mycoplasma salivarium: certain cause of gingivitis, periodontal diseases and tooth decay, temporomandibular joint syndrome, eye infections and ear infections.

Mycoplasma pneumoniae infections. The vast spectrum of clinical manifestations related to MP infection is generally limited to the respiratory system, with pictures clinically indistinguishable from those sustained by many respiratory viruses. Pneumonia is observed only in a minority of MP infections (5-30%). It is partly linked to the age of the patients, as it occurs mainly between 5 and 14 years of age although, in a large North American series (Seattle), subjects up to 30 -40 years of age are also predominantly affected. The frequency of infections it is, however, completely independent of age. It documents the possibility that M. pneumoniae and viruses give rise to exudative bronchopnemonic foci with segmental, plurisegmental and even lobar extension.

Clinically indistinguishable interstitial pneumonias can be caused (in addition to Coxiellae viruses) by:

- Chlamydia trachomatis (in newborns and infants)
- Chlamydia pneumoniae (TWAR-agent) (epidemiology and clinic completely similar to those of M. pneumoniae). But also from bacteria:
- Legionella pneumophila (and other Legionellae) especially in advanced age and in subjects with underlying pathology (but sporadic and/oligosymptomatic forms?)
- Branhmelle catarrhalis: 20% of infections such as pneumonia; rarely with signs of consolidation
- Klebsiella and other “traditional” bacteria (forms “decapitated” by antibiotic therapy).

Ultimately, the clinical-diagnostic approach is rather complex and still requires prevalence studies that can better define, in individual epidemiological situations, the frequency of the various candidates as agents of pneumonia. Serology becomes fundamental in this case, in particular with the use of PCR. (Polymerase Chain Reaction).

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RESULTS

During the Mycoplasma attack, we first observe the loss of mobility of the epithelial cells, followed by the aggregation and detachment of the cilia.

In this way, the mycoplasmas do not invade the lung parenchyma, but attack it with a very particular system: the peculiar relationship that is established between mycoplasmas and epitheliocytes allows, in fact, on the one hand the protection of the microorganism against the host's defenses and on the other hand, it also exposes the infected cells to immune-mediated damage, with the possible triggering of other pathologies.

In fact, the hypothesis is well known that, in the pathogenesis of interstitial pneumonia, an important role is played by the immune response which, in an attempt to eliminate the pathogen, can damage the host with inflammation and tissue lesions.

Once they have invaded the host cell, mycoplasmas survive above all in the leukocytes, within which they are transported, with the bloodstream, throughout the organism, spreading everywhere (even in the CNS, through the blood-brain barrier).

Examining our case history of Pneumopathies again, we see that their course was mostly favorable and with recovery in a relatively short time.

Autoantibodies directed against host tissues are often found in M. p. infection. It could be of antigenic modifications of the infected cells or, more likely, of cross-reactivity of antigens mycoplasma with host tissues. The manifestations of greatest interest are those affecting the CNS.

We have already mentioned the close relationships that M. p. establishes with the host's immune system, although many other mycoplasmas have been implicated for their ability to activate autoimmune diseases.

No less interesting information comes from the results of research on experimental arthritis in some animal species (7). We report on the current state of knowledge on the possible pathogenic role of these microorganisms.

DISCUSSION

In the field of male genitourinary pathology (8), the only proven etiological responsibility is that of Ureaplasmas in 10-30% of non-gonococcal urethritis and in some post-gonococcal forms, while there would be evidence of the causal role of M. hominis in some cases of acute pyelonephritis.

On a therapeutic level, at the moment the only indication for chemoantibiotic treatment is chlamydia-negative forms of non-gonococcal urethritis. As regards the choice of antibiotic, however, we recall the numerous reports of resistance to tetracyclines among microbes and to erythromycin by Ureaplasmi and M. hominis.

Then there is the problem of long-term antibiotic treatments (for months and years), which are prescribed by some doctors to patients with arthritis, chronic fatigue syndrome, fibromyalgia, etc., in the hypothesis of a mycoplasmal etiology.

The harm of these treatments is certainly greater than the hypothetical benefits (9).

We have recommended that these patients stop taking antidepressants and immunosuppressants. Some of these drugs are used to relieve conditions and symptoms, but in our opinion, they can interfere with therapies and should therefore be gradually reduced or eliminated.

It was Montagnier himself who advanced the hypothesis that mycoplasmas could act as co-factors, catalyzing the progression of HIV infection towards full-blown AIDS (10, 11). Furthermore, he hypothesized that AIDS could even have arisen from a co-evolution of HIV Mycoplasma, whose genomes would have mutually modified each other, enhancing their virulence (12).

But since the pygmies of Central Africa have been hunting monkeys and chimpanzees since the dawn of time, another unknown biological factor must necessarily have intervened to unleash the impressive virulence of HIV. It is even hypothesized that it is a mycoplasma genetically modified in biological warfare laboratories (13).

Due to their peculiar characteristics, mycoplasmas are easily susceptible to genetic manipulation, so they have represented one of the main weapons of potential bacteriological wars (14).

In the laboratories of Fort Detrick to the creation of variants of the *Mycoplasma fermentas strain* of particular virulence through a genetic mutation induced on Brucella abortus through the use of a Visna virus. The propagation of the infection would have been guaranteed by the creation of microcrystals then disseminated in the atmosphere.

Analysis of tetracycline-resistant colonies resulting from the genome transfer process revealed that the genome transfer process was a success. The introduced genome of M. mycoides was sufficient to support life and replication. This experiment demonstrates that an artificially synthesized and chemically transferred genome can create life in a new microbe and therefore opens new, broader horizons for scientific research.

CONLUSION

We wanted to report an update of the topic "Mycoplasmas and Mycoplasmosis" already treated in the recent past (15). The most frequent mycoplasmas in human pathology are recalled and the importance of the polymerase chain reaction (PCR) test for their identification is reiterated. Much space is given to M. pneumoniae and the various pathological forms it causes in respiratory pathologies, with the variants compared to what was called "primary atypical pneumonia". The possibility of chronic evolution, sometimes into fibrosis, of this disease is also suggested.

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The other sites (especially the CNS) where M. pneumoniae can be localized are mentioned and the genitourinary system is mentioned. for M. hominis and Ureaplasmi.

Finally, the relationship - at least adjuvant (see M. fermentans) - of these agents with HIV infection is discussed.

Finally, knowledge of the genetic and molecular biology aspects of these singular microorganisms is deepened (16).

The current knowledge of the molecular biology and genetic aspects of mycoplasmas is explored and how, in some aspects, they were also taken into consideration for the purposes of use for bacteriological warfare.

Few changes in human life have been as profound as those affecting health care and the virtual elimination of a range of infectious diseases. Early diagnosis and the application of advanced technologies have contributed to the lengthening of existence. It's about using medicine not only to deal with biological pathologies, but also to improve human capabilities, essentially to normalize and optimize. Obviously, medicine is influenced by the economy and politics of the society of which it is part and follows its directions (17, 18).

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References

1. Altucci P, Jori GP, Tarro G: Mycoplasma pneumoniae pneumopathy: nosological and clinical framework and first personal observations. Journal of Infectious and Parasitic Diseases 1964; 1:1-41.

2. Altucci P, Jori GP, LORENZUTTI G, ET AL: Definition of methods for the cultivation of PPLOs in acellular media. Bulletin of the Italian Society of Experimental Biology 1964; 50: 1311-1314.

3. Clyde WA Jr.: Immunopathology of experimental Mycoplasma pneumoniae disease. Infect Immun 1971; 4:757-763.

4. Fernald GW: Immunological mechanisms suggested in the association of M. pneumoniae infection and extrapulmonary disease: A review. Yale J Biol Med 1983;56: 481-186.

5. Catena E, Micillo E, Marzo C, ET AL: Respiratory virosis: etiology and particular clinical manifestations. Proceedings Congr Naz Soc It of Pneumology Nov 1983; 271-275.

6. Bruzzese L, Boudillon G, Catalano G, ET AL: Pleuropneumopathies with atypical cytology. Relationships with Myc pneumoniae infection. Med Clin Experiment, 1968; 18:485.

7. Taylor-Robinson D, Thomas BJ, Furr PM, ET AL: The association of Mycoplasma hominis with arthritis. Sex Transm Dis 1983; 10:341-344.

8. Altucci P, Varone GL, Catalano G, ET AL: Mycoplasmas in human genito-urinary pathology. Path Microbiol, 1971; 37:89.

9. Nicholson G, ET AL: Diagnosis and integrative treatment of intracellular bacterial infections in chronic fatigue and fibromyalgia syndromes Gulf War Illness, rheumathoid arthritis and other chronic illnesses. Clin Pract alternate Med 2000; 1-2, 42-102.

10. Mycoplasma and AIDS - what connection? Editorial Lancet, 1991; 337:20-22.

11. Montagnier L, Berneman D, Guetard D, ET AL: Inhibition of the infectiosité of souches prototypes du VIH by antibodies directed against a peptide sequence of mycoplasma. CR Acad Sci Paris. 1990; 311:425-30.

12. Montagnier L, Vialard D: Science will heal us. Winning life's battles with prevention. Milan: Sperling & Kupfer Editore, 2009.

13. Horowitz S, Horowitz J, Hou L, ET AL: Antibodies to mycoplasma fermentans in HIV-positive heterosexual patients: Seroprevalence and association with AIDS. Journal of Infection 1998; 36:79-84.

14. Martinelli F, Garrafa E, Turano A, ET AL: Increased frequency of detection of ureaplasma urealyticum and mycoplasma genitalium in AIDS patients without urethral symptoms. Journal Clinic Microbiology 1999; 37: 2042-2044.

15. Tarro G. and Altucci P. Mycoplasmas and mycoplasmosis: 20 years later. The practical section of the Polyclinic. Luigi Pozzi Editions. Vol. 121, number 9 September 2014.

16. Altucci P. and Tarro G. Role of Etio-pathogenesis in Internal Medicine. Luigi Pozzi Editions – Rome. Extract from Il Policlinico – Section. Medica, Vol. 121 – Numbers 2-3 May-August 2014.

17. Tarro G. Medicine and life perspectives in Proceedings of the Conference “The future is in our hands”, City of Trani, 15 May 2016.

18. Tarro G. and Altucci P. Medicine and life perspectives. MEDIC Vol. 24, 51-57, -----ISSN 1824-3991. December 2016.

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